

Table Of Contents

Introduction	1
Chapter I: Organisms and Teleology in <i>The Only Possible Argument</i>.....	23
1.1: Potentially Natural Responses to the Central Question	30
1.2: A General Answer to the Central Question	40
1.3: <i>Epigenesis vs. Preformation</i> as Accounts of Natural Generation	78
1.4: Natural Teleology and the Perfection of the World	110
Chapter II: Organisms and Teleology in the 1770s	124
2.1: Generation and Classification	124
2.2: Natural History and Natural Teleology	125
2.3: Generation and the <i>Generative Force (Zeugungskraft)</i>.....	130
2.4: Conclusions Concerning the Pre-Critical View	153
Chapter III: Organisms and Teleology in the 1780's.....	156
3.1: Reason and Nature in the <i>Critique of Pure Reason</i>	178
3.2: Kant, Leibniz, and the <i>Order of Nature</i>	194
3.3: Ideas of Reason as Rules for Systematic Empirical Cognition.....	231
3.4: Systematic Unity and the Idea of a Fundamental Power	264
3.5: The Two-Fold Justification of the Principle of Continuity	277
3.6: Kant and Herder in the 1780s.....	299
Chapter IV: Organisms and Teleology in the <i>Critique of the Power of Judgment</i>.....	325
4.1: Natural History and the <i>Critique of the Power of Judgment</i>.....	339
4.2: Mechanical Inexplicability and the Causal Unity of Nature	350
4.3: The <i>Formative Power</i> of Nature and Natural Organization	374
4.4: The Dialectic of Teleological Judgment and the <i>Order of Nature</i>	419
4.5: The Methodology of Natural Teleology (Conclusion).....	469
Bibliography.....	488

Organisms and Teleology in Kant's Natural Philosophy

Introduction

There is a trend in recent scholarship away from interpreting Kant as a philosopher interested exclusively in what can be known *a priori* and towards understanding him as a thinker concerned to reflect on, understand, and contribute to the development of the natural and the human sciences. A good deal of work has been done, for instance, on Kant's understanding of Newtonian physics, the generally Leibnizean context into which Newton's views are introduced in Germany, and the significance of the reception of these views for the development of Kant's mature philosophy.¹ Work has also been done on Kant's understanding of anthropology, his role in the development of that discipline, and the differences between the model of cognition provided in the *Critique of Pure Reason* and the model Kant develops and applies to the task of understanding and interpreting human culture and life.² Thus far, however, comparatively little attention has been paid to the details of Kant's long time engagement with two disciplines that are central to the eighteenth-century context in which he is working, namely, *natural history* and *physiology*.

This is somewhat surprising given several relevant facts, some of which are already generally recognized by Kant scholars and historians of the philosophy of science. It is fairly well known, for instance, that one of Kant's first publications is an original work on the natural history of the cosmos. Kant also lectures on physical geography nearly every year during his

¹ Notable work in this area has been done by Watkins [1995, 1998a, 1998b, 2001a, 2001b, 2005] Friedman [1992] Polonoff [1971], Schönfeld [2000]

² Makkreel [1990] provides a discussion of Kant's general framework for interpretation in the human sciences. Düsing [1968] provides a discussion of the central role of teleology in Kant's conception of the human world. Zammito [2002] discusses Kant's role in the development of anthropology in eighteenth-century Germany.

time as an active lecturer. In his other lecture courses (e.g., metaphysics, logic, ethics) Kant lectures from introductory textbooks that are already readily available, but his physical geography lectures are delivered from a compendium he puts together himself through consulting the latest work of practicing physiologists and natural historians.³ Although the focus on Kant's relation to the cosmology and general physics of modern science is clearly justifiable, it can also tend to obscure the fact that many of the important metaphysical and methodological controversies that concern Kant and his eighteenth-century contemporaries are more directly related to the scientific investigation of aspects of nature that do not lend themselves straightforwardly to the mathematically precise models of mechanistic physics. This fact, I believe, becomes even more obscured by the tendency to conflate Kant's claims about *mechanistic physics* with his claims about the *mechanism of nature*, and to assume that his various appeals to a *supersensible* substrate for the former are largely motivated by his practical interest in *supernatural* entities and powers that are free from the constraints of the latter.

In the following, I aim to make a contribution to the growing body of historically informed and philosophically rigorous work on Kant's engagement with the sciences of his time. My work provides a closer look at Kant's theoretical views concerning the status and nature of the various substances and powers appealed to in plant and animal physiology, and the status of the methodological principles that guide classificatory and explanatory hypotheses in natural history than is currently available in the secondary literature on Kant and on the history of the philosophy of biology. It will, I hope, provide a more contextually accurate and a more philosophically interesting picture of central aspects of the development and expression of Kant's Critical philosophy than one finds in largely ahistorical reconstructions of the arguments in Kant's major works in theoretical and practical philosophy. By paying detailed attention to how one of the greatest philosophical minds of the modern period approaches a constellation of issues

³ Werner Stark and Reinhardt Brandt are editing a new *Akademie* edition of Kant's physical geography lectures. For a discussion of the way in which Kant came to put together this compendium, see Stark [2001]

confronted by natural philosophers who are striving to equal the achievements of Leibniz and Newton, within the constraints provided both by the nature of the particular objects of their inquiry and the nature of the human understanding, I believe we can also gain a fuller appreciation of the obstacles that present themselves to the eventual establishment of biology as a unified and autonomous natural science in the nineteenth century. I hope to show that the view Kant carefully constructs and defends concerning organisms and teleology in natural philosophy is far more original and far more coherent, *both* with the accepted methods and practices of natural philosophers at the time *and* with his own mature project in metaphysics and transcendental philosophy, than is generally recognized to be the case. In the remainder of this introduction, I will provide an overview of some of the recent work that has been done on Kant's views on organisms and their role in justifying a teleological approach to the natural world, before providing an overview of my own position and of the chapters that will follow.

The common point of focus in the literature is on Kant's *Critique of the Teleological Power of Judgment* (1790, hereafter *CTJ*). This work has remained relatively obscure in comparison to the first two installments in Kant's three-part critique of reason, namely, the *Critique of Pure Reason* (A edition 1781, revised B edition 1787, hereafter *CPR*) and the *Critique of Practical Reason* (1788), and even in comparison to the first half of the third *Critique*, the *Critique of the Aesthetic Power of Judgment* (hereafter *CAJ*). If one accepts the judgment of contemporary scholars such as Paul Guyer, there is good reason for this.⁴ According to Guyer, the several arguments that Kant provides to establish that organisms defy all mechanical explanation and, thus, require the adoption of causal principles that are located outside of the *mechanism of nature* are bad arguments that rest on confusions that Kant himself diagnoses in the *CPR*. What is worse, in Guyer's view, is that the position Kant argues for there, in an effort to provide empirical justification for the basic two-worlds presupposition of his practical philosophy, is both unstable in itself and unnecessary to its intended end. The view that there is

⁴ Guyer [2001]

an ontological distinction *within nature* between beings that are possible in accordance with the principles of mechanism and beings whose possibility depends on free causality in accordance with ideas of ends is held by Guyer as a threat to Kant's most promising insights in other places. Kant should have realized that it is our consciousness of ourselves as free that leads us to treat organisms as systems of means and ends. He should not have tried to look to exceptions to the causal unity of nature for a justification of the practice of viewing ourselves as free.

Other recent commentators, such as Hannah Ginsborg, have not taken such a negative view of the project of the *CTJ*.⁵ Ginsborg addresses what might appear to be a *non sequitur* in the argument of the work, namely, the inference from the conclusion that organisms are not subject to *mechanical* laws to the claim that they are subject to *teleological* laws, and focuses on the issue of normativity as providing the relevant transition for Kant. Because there is something that the organism *ought to be*, but that it can also fail to be, its functioning is not something we can account for by reference to the mere *mechanism of nature*. This brings its functioning into connection with our practical ideas and requires us to think about organisms in terms of teleological laws. Ginsborg does more than do other commentators to distinguish between various senses in which one could maintain that organisms are mechanically inexplicable, and draws our attention to some potentially revealing symmetries between Aristotle's approach to teleology and Kant's own. One of the most relevant differences between their views, from her perspective, can be traced to the fact that, as a Newtonian, Kant does not accept the Aristotelian view of organisms as having specific natures. This leads Kant to place constraints on the status of teleological judgments that Aristotle does not recognize, or to treat teleological principles for judgment as merely regulative principles.

Although the judgments of these authors concerning the philosophical merits of Kant's *CTJ* differ in important respects, there are some basic features of their discussions that are common. Both take the argument of the *CTJ* to be largely concerned with providing an argument

⁵ Ginsborg [2001]

for the mechanical inexplicability of organisms, which then opens the way for a justification of the use of teleological principles in natural philosophy.⁶ Guyer locates the discussion in the context of the systematic aims of Kant's Critical philosophy, which are primarily practical from his perspective. Ginsborg locates it in the context of historical and contemporary issues in the philosophy of biology, which are largely concerned with the issue of whether biological phenomena can be explained by appeal to the tools of general physics. While both of these contexts are clearly important from the perspective of contemporary moral philosophy and the philosophy of science, neither of these authors pays any real attention to the immediate context in which Kant himself perceives the need to publish a work that deals with our use of seemingly practical principles for making theoretical judgments concerning nature. Guyer confesses that the details of Kant's example concerning the unique features of plants that lead us to the apparently paradoxical claim that they are *cause and effect of themselves* are obscure to him. Ginsborg brackets the issue of plant and animal generation by appealing to Kant's claim that it is the functioning of these beings that leads us to think of them in terms of systems of means and ends.

Accordingly, although Guyer's discussion is both interesting and informative, it is hard to take his claims concerning what Kant should have recognized concerning organisms and teleology to be authoritative. It appears, provisionally at least, that it could be a simple misunderstanding of Kant's real aims and methods that leads to the view that the former are misguided and the latter are unnecessary and insufficient. Similarly, although Ginsborg's comparisons to ancient and contemporary ways of thinking about the central issues involved in biological explanation are instructive for her audience, it is difficult to get a sense from her work of how these issues would have been approached by Kant's own audience. It may be plausible to suggest that generally Newtonian leanings in the eighteenth-century would be relevant to the

⁶ In this, they are not alone. Much of the literature on the *CTJ* is focused narrowly on the claim of mechanical inexplicability. See also Marc-Wogau [1938], Zumbach [1984], Allison [1991], Kreines [2005]. Notable exceptions are Düsing [1938], Löw [1980], and Makkreel [1992], who focus on Kant's teleological orientation to the world more generally and on the role of life in Kant's reflections on organisms.

differences between Kant and Aristotle. However, if Kant's general theory of cosmology and rational physics, and his particular approach to issues of empirical science have other sources as well, these are potentially just as relevant to his particular position. If, moreover, the *CTJ* is addressed to practitioners that are involved in disputes between generally Newtonian approaches to the phenomena of plant and animal generation that attempt to get by without appeal to things like specific natures, and generally Leibnizean approaches to these same phenomena that make substantive appeal to these natures, then we might want to look a bit more carefully at this context before claiming that Kant is a Newtonian, in a sense relevant to this particular issue, and that, as such, he is not committed to Aristotelian natures.

The work of Peter McLaughlin appears to me to take us in the right direction for clarifying some important issues that arise in relation to the claims made by Guyer and Ginsborg. It also provides a compelling case for rejecting once popular views concerning both the relation between the *CTJ* and Kant's general view of causality in the *CPR*, and concerning the argument of the 'Dialectic of the Teleological Power of Judgment'. In *Kant's Critique of Teleological Judgment in Biological Explanation*⁷, McLaughlin argues convincingly that the once common view that Kant modifies his position on causality in significant ways in the *CTJ* involves a confusion between Kant's understanding of causality in general and his understanding of mechanism. In denying that the thesis "All generation of material things and their forms must be judged possible according to merely mechanical laws"⁸ is a constitutive principle, Kant is not actually denying that the principle of causality presented in the *CPR* is constitutive for natural

⁷ This is the title of the English translation of McLaughlin [1989].

⁸ 5: 387 As is customary, all citations of Kant's published works other than the *Critique of Pure Reason* are located by the volume and page number of *Kants Gesammelte Schriften, herausgegeben von der Deutschen Akademie der Wissenschaften*, 29 vols. (Berlin: de Gruyter, 1902-). The passage cited here is found on page 387 of volume 5 of *Kants Gesammelte Schriften*. Citations from the *Critique of Pure Reason* are located by the pagination of the first edition of 1781 (A) and/or the second edition of 1787 (B). Citations of unpublished student notes from Kant's lectures on physical geography are located by the name and page of the manuscript from which they are taken. I have typically used the English translations of Kant's writings, insofar as they are currently available in the Cambridge Edition of the Works of Immanuel Kant, as a guideline for the translation of passages that I supply here. I have not generally indicated the places where my own translation diverges in minor ways from the one found there. All translations of Kant's texts that are not yet translated there are my own.

phenomena. If McLaughlin is right here, we can avoid a common interpretation of the *CTJ* that has rendered the coherence of Kant's project there somewhat suspect.

McLaughlin also argues, again convincingly, against the plausibility of seeing the 'Antinomy of the Power of Judgment' itself to consist in the objective conflict between supposedly constitutive principles, which Kant presents after introducing the mechanical and teleological maxims that he believes serve to regulate the power of judgment in its reflection on nature. On this once standard interpretation, it is little more than architectonic considerations that lead Kant to add a section on Dialectic to the *CTJ* that involves a discussion of an antinomial conflict within our *power of judgment*. As Kant himself notes, the objective conflict between principles that would result from converting these maxims into rules that constitute the possibility of objects would be an antinomy of *reason*. Accordingly, taking this conflict to be the one central to the 'Dialectic of the Teleological Power of Judgment' means that there really is no antinomy that has to do specifically with the rules provided by the power of judgment. McLaughlin is less willing than are others to attribute such confusion or disingenuousness to Kant, so he attempts to understand the conflict that Kant sees arising between the maxims that regulate the power of judgment in its reflection.

McLaughlin provides a view of the *CTJ* as an historically situated and philosophically important reflection on central issues within the philosophy of biology that are just as relevant today as they are in the eighteenth century. By looking at Kant's early involvement in the central debate between supporters of preformationist theories of organic generation and supporters of epigenetic theories, and by interpreting the discussion of the *CTJ* in light of the general structure of an antinomy that Kant addresses in the 'Transcendental Dialectic' of the *CPR*, McLaughlin sheds much needed light on several aspects of Kant's mature view concerning organisms and the need to appeal to teleological principles in natural philosophy. He locates Kant's work within the context of the more general dispute in the philosophy of science between mechanism and vitalism in biological explanation, and also within the framework of the particular way in which moderns

perceive the need, and the warrant, to supplement mechanistic science with teleological considerations. The *CTJ*, from McLaughlin's perspective, provides a basically non-partisan reflection on these issues and a decision in favor of maintaining that, despite the limitations that give rise to vitalist alternatives, mechanical reductionism is the only genuinely scientific mode of explanation for natural phenomena.

Despite the significant merits of this work, there are several questions that one might still have concerning the view of the *CTJ*, if one looks more closely at the particular historical and contextual issues that McLaughlin is clearly right to suggest are relevant to Kant's position there. One of these questions concerns whether it is right to think, as McLaughlin does, that the *divine clockwork* model of mechanistic means to the ends that we refer to in our teleological judgments is really the most relevant model for understanding the particular way in which Kant approaches the issues of mechanism and teleology in biological explanation. Another concerns whether Kant is primarily concerned to provide a non-partisan reflection on an issue of general theoretical interest, rather than, say, to defend his Critical philosophy in general, or his own Critical position on specific issues concerning organisms and the use of teleological principles in natural philosophy. Kant's first publication in natural history, the *Universal Natural History* (1755, hereafter *UNH*), rejects the *divine clockwork* view of the universe in favor of a view of nature as forming itself into a complex cosmological system that harmonizes naturally with the ends that we attribute to plants and animals, through processes that accord with mechanical laws. His first extended discussion of the peculiarity of organisms, in the *Only Possible Argument* (1763, hereafter *OPA*), involves the view that even though we cannot understand the *original* formation of organisms according to the principles of mechanical explanation, we ought to avoid the *divine clockwork* model of *individual preformationism* or pre-existence theories of generation, allow that individual organisms are genuinely produced and maintained naturally, and investigate the processes through which this occurs as far as is possible in conformity with the basic principles of mechanistic explanation. In neither of these texts does Kant support the view that the systematic

and purposive unity of arrangements of beings within nature rule out explanations of natural events in terms of mechanical laws, and in neither of these texts does Kant appeal to the mechanical inexplicability of particular bodies or particular events in arguing for the necessity of taking certain connections within and between bodies to be grounded in a system whose possibility cannot itself be explained mechanically. Given these facts, we might wonder whether there is not another way of conceiving of teleology that is more relevant to Kant's thinking concerning biological explanation than is the *divine clockwork* model.

In addition, between 1763 and the 1790 *CTJ* Kant develops in a fairly continuous way his own largely original position concerning the natural principles involved in the generation of plant and animal bodies and the natural development of various predispositions within the *species* that allow its members to thrive in a variety of different geographical locations. This view forms part of a more comprehensive idea of natural history that aims to complement the largely descriptive methods and logical systems of classification that have characterized it thus far with a more genuinely historical and causal approach to the particular physical systems (within more general physical systems) that characterize the natural world. During the 1780s, Kant is involved in several public disputes concerning his view, in which central aspects of his Critical philosophy are implicated, and in which the particular use of the intellect in natural historical investigations that he develops in the 1770s and expresses in the *CPR* come under attack. Two of the key issues Kant addresses in defense of his own views during the 1780s are the empirical warrant for positing fundamental natural powers or forces and the proper standard for making judgments concerning the perfection of the *order of nature*. These facts all seem to be relevant to Kant's motivation for discussing organisms and teleology in the *CTJ*, and they also appear to be quite relevant to the argument of this work itself.

Because Guyer and Ginsborg abstract almost entirely from the specific context in which Kant addresses the unique status of organisms, they are unable to shed much light on the ways in which it would be natural for Kant to be addressing the central questions that his own audience

would agree need to be answered. McLaughlin looks at this context in a somewhat general way and attributes to Kant a somewhat narrow view of explanation and a largely deflationary view of teleology; i.e., explanation is the reduction of the properties of complex wholes to the properties of their previously existing parts, and teleology fills in gaps until we can discover mechanical explanations. He does this without noting Kant's distinctions between issues of the ultimate origins and principles of order in nature and questions concerning the natural generation and maintenance of order, and without distinguishing between the physical capacities of bodies, to which the natural philosopher refers as grounds in providing mechanistic explanations of the phenomena of bodies, and the fundamental powers of natural substances, which the natural philosopher reflectively considers as the unobservable ontological grounds that explain the possession of these capacities and the possibility of their being determined to act in accordance with natural laws.

Although McLaughlin does so in a different way, he shares with Guyer and Ginsborg the presupposition that the argument of the *CTJ* is largely concerned with the problems or opportunities presented for Newtonians by the mechanical inexplicability of organisms. McLaughlin even claims that the problem presented by organisms, from Kant's perspective, does not actually lie in a teleological relation, but in the conflict between organic phenomena and the reductive approach to part-whole causal relations that is essential to mechanistic science. Because mechanical explanations are essentially reductive, the characteristics of complex wholes have to be causally dependent on the characteristics of their parts, if we are to explain some complex whole mechanically. This means that the characteristics of the parts *cannot* be causally dependent on those of the whole, or on those of the other parts in the whole. Since it appears to be the case that the parts of organized bodies violate these standards for explanation, and the parts of machines do not, McLaughlin thinks it is *this* feature that provides the relevant difference between organized bodies and machines to which Kant refers in the 'Analytic of the Teleological Power of Judgment'. It is, thus, the appearance of an efficient-causal relation between parts of

bodies that cannot be grasped by the understanding, and not any teleological relation, that McLaughlin locates as providing the crucial distinction between understanding machines and understanding organisms for Kant.

The part-whole relation as represented by the understanding is clearly important to Kant's resolution of the apparent 'Antinomy of Judgment' in the Dialectic, so it is natural for McLaughlin to think that it also plays an important role in the identification of the peculiar features of organized beings in the Analytic. Guyer, Ginsborg, and others are also clearly right to see the *CTJ* as raising issues concerning mechanical explanation. There is something that strikes me as somewhat odd about these views, however. The Analytic portion of the *CTJ* is nearly exclusively concerned with a variety of teleological relations and hardly makes any mention at all of mechanical explanations. In the crucial § 65, 'Things as Natural Ends are Organized Beings', Kant discusses the efficient causal nexus that we think according to the understanding, and the final causes that we think through reason, without mentioning specifically mechanical causality.⁹ Further on, when he compares organized beings to machines, the fundamental issue he points to is that machines have only *moving power*, while organized beings have an intrinsic *formative power* that cannot be explained through mechanism alone. This difference means that machines *cannot*, while organized and self-organizing beings *can*, do such things as replace lost parts, repair damaged parts, return themselves to a state of order, adapt themselves to different environments, generate new bodies that are members of the same species, etc. This power is something that Kant discusses in terms of species of nature's products and the natural requirements for the "self-preservation according to circumstances" of these species.¹⁰

This seems to be a clear indication that the relation between the parts that distinguishes organisms from machines for Kant is *both* the kind of efficient-causal relation to which McLaughlin points *and* the teleological relation that he denies is relevant to this distinction. It

⁹5: 373

¹⁰ 5: 374

also suggests that Kant does not believe that it is because the generation and functioning of plant and animal bodies cannot be explained mechanically that we are forced to treat them as subject to standards that appeal to ideas. As we will see, there are other features of plants and animals that Kant believes lead us to make judgments concerning their *possibility*, and that of the relations to others of the same kind that are partially constitutive of what they are as individual members of species, in terms of our intellectual representation of systems of mutually supporting means and ends. These other features may or may not have any direct bearing on difficulties we encounter in trying to explain the *actual* generation and functioning of a particular plant or animal body by appeal to empirically discovered natural causes, which we do not take to be *determined to* those effects that we deem to be purposive *through* the same intellectual representation of an end that we, for the most part unproblematically, make use of in our judgments concerning these effects. There is clearly an important relation between mechanical inexplicability and teleological judgments for Kant, but it appears to me not to be the case that the failed attempt to *explain* organic functioning according to the standards of mechanistic science is the starting point of Kant's reflection on organisms in the *CTJ*, or that this failure is something that he perceives as what first leads to a need to supplement mechanistic explanations with other principles. If I am right, commentators have had difficulty finding good arguments in the *CTJ* for the claim that organisms are mechanically inexplicable, because it is not a claim about which there is any serious doubt at the time Kant is writing and because Kant has other intentions in addressing the peculiar status of organized beings. Of course, that does not mean that there is no work to be done to figure out what Kant and others in the eighteenth century have in mind in claiming that some natural body or some change within a natural body cannot be explained mechanically. It does mean, however, that there are other fundamental issues that have to be taken into account before we can hope to make sense of the particular way in which Kant understands these claims, and of the specific role they play in the arguments he provides for other claims.

When Kant does turn to focus specifically on the issue of mechanistic science, in the ‘Dialectic of the Teleological Power of Judgment’, his concern is not directly with bodies and the part-whole relations between their physical parts. The discussion there is focused, rather, on the particular empirical laws to which natural bodies are subject and the relations between these laws within a hierarchically ordered system of empirical laws. He does claim that, due to the nature of our sensibly conditioned understanding, we will never have insight into the ground of explanation for the generation of organized beings by appeal to the mere *mechanism of nature*. This cannot be assumed, however, to mean either that plant and animal bodies are not generated in accordance with the mechanical laws of material nature or that we cannot provide a generally mechanistic explanation of the functioning of plant and animal bodies. That is, in this context, Kant is discussing our ability to unify the particular empirical laws we discover, through our experience of the various capacities and determinations of existing kinds of bodies, by appeal to a single principle that is *both* empirically discovered *and* general enough to subsume all other empirically discovered laws under it. It seems to be possible, even on the presupposition that each particular law we *could ever* discover through our experience of nature *actually is* a mechanical law, that we would be unable to conceive of the unity of the particular laws involved, say, in the generation of a blade of grass, without thinking of the ground of this unity a priori through an idea.¹¹

When we are thinking about the ground of the unity of the particular laws to which a species of organism is subject, if I am right about Kant’s view, we are thinking about a natural substance that provides the supersensible ground for the entire cosmological series of its causally related members. It is clear that Kant does not believe we can explain the possibility of this supersensible ground by appeal to mechanical laws, or in any other way for that matter.¹² It is

¹¹ In fact, one of the central figures of the tradition, and one of the figures most responsible for setting the terms of the debate into which Kant is entering in the *CTJ*, namely, Leibniz, held just such a view.

¹² This ground is thought as a thing-in-itself, which is not subject to the conditions under which alone we can ascribe categorical determinations to objects of the outer sense, or bodies, according to Kant’s transcendental idealism. The general laws of mechanics are derived from our a priori construction of the empirical concept of matter, so neither they nor any particular empirical laws that are subsumed under them

just as clear, however, that he does not believe that doing this is the task of the natural philosopher. What Kant appears to believe is that it is wholly legitimate for us to presuppose the unity of these laws, which we cannot explain, as the basis for seeking and providing *efficient-causal* explanations of how members of the species function in preserving themselves, adapting to their environments, and generating other members of the species. From the fact that the formative power required for nature to have the capacity to organize “itself and every species of its organized products”¹³ cannot be explained by appeal to the capacity for motion common to all bodies, however, it cannot be assumed to follow that this power cannot provide a principle to be made use of in generally mechanistic explanations. If we conceive of mechanistic explanation of phenomena narrowly, in terms of mechanical laws that govern the transfer of motion between bodies, and we conceive of mechanistic generation narrowly, in terms of the blind aggregation of pre-existing parts, we will never have the least understanding of how bodies that are assumed to be generated and to function in *this* way could possibly have any connection to the ends that we believe natural bodies do, in fact, serve.

From Kant’s perspective, however, we also have no real reason to believe that material natural systems are actually generated and maintained in *this* way, aside from our a priori representation of the conditions that would render the natural world most suited to our mathematical methods of explanation. The modern presupposition that *nature* exhibits this kind of order is, in Kant’s view, already the presupposition of an *order of nature* that is conducive to our own subjective needs as cognizing beings. The view that nature exhibits this kind of order *naturally*, rather than through the immediate external agency of a being that has our cognitive

can be referred to in an explanation of the possibility of the substances themselves that are thought as ultimate grounds of matter. If these grounds are thought as ultimate only in relation to the appearances of bodies, and not absolutely, we might think *there is some explanation* of their possibility, existence, and connection with other substances, without thinking that it is an explanation that *we can provide*. The idea of an absolutely necessary first ground of the possibility and existence of all other things serves the interest of our theoretical reason in this respect, as Kant will argue throughout his works pre-Critical and Critical, but it does not provide us an explanation from first principles for the things-in-themselves that we think as grounds for the possibility of the various cosmological series in which natural bodies of observably different kinds are generated.

¹³ 5: 374

ends in mind in creating the world, requires the idea that this order arises from the exercise of powers that are natural to finite substances. The organized bodies that we take to result from the formative power of nature are *de facto* capable of producing states, such as nutrition and growth, that we take to be proximate ends to the end of the preservation of individual plant or animal bodies and, through this, of the natural species of which these bodies are members. We are able to conceive of these states as natural states, and of their production as the effects of natural causes, only if we conceive of the natural species as a *natural end* that determines the efficient causal powers responsible for the production of these bodies to their regularly observable effects.

From Kant's perspective, whatever involves systematic connections between its parts, whether it is the solar system or a blade of grass, leads us to think of its possibility in terms of ideas of reason. We cannot conceive of the possibility of harmonious connections between distinct elements, and of the unity of laws of different kinds, except through the idea that a plan lies not only at the ground of the act of fashioning the parts into a particular system, but at the ground of the *possibility* of the parts themselves that have *the potential to become fashioned* into such a system. If we have already conceived of the latter possibility in terms of an idea, then we can conceive of the actual production of particular states within the system according to empirically discoverable laws that arise from the activity of the natural powers of genuinely efficient causes, or natural substances. The issue of mechanical explicability arises, for Kant, within the context of an approach to material systems that we *already* judge in terms of ideas, and that we *already* understand to be operating according to a variety of particular natural laws, some of which we *already* think as unified by reference to the *natural end* furthered through the functioning of organized bodies. There are cases in which the purposiveness of the system is not its *formal* accordance with the a priori laws of geometry and mechanics, which we make use of in furthering our knowledge of the systematic order of particular things in nature by subsuming these particulars under a single set of mathematically expressible laws of motion. In some cases the purposiveness of the system is its role in the production of states that are necessary for the

preservation of natural beings, which are not exhausted by their phenomenal characteristics in general, let alone by the specific phenomenal characteristics that lend themselves so nicely to precise determination by way of mathematical equations. Accordingly, there is a significant difference between those natural systems that we judge in terms of a merely formal representation of an end and those that we judge in terms of a representation of a *material end* that is also an *end of nature*.

For Kant, it is not because we cannot explain the generation and functioning of these systems mechanically that we view them *as if* they were products of final causality. Rather, it is because we already view them as products of efficient causes whose activity is directed at the achievement of determinate states (rather than as products of efficient causes that are indifferent towards the many possible determinate states of motion or rest a body can be in) that we sometimes go so far as to exempt their generation and/or their functioning from the *mechanism of nature* entirely, or so far as to make additions to the *matter* involved in this mechanism that actually undermine, rather than save, our commitment to the causal unity of material nature. As we might expect, the Dialectic of the *CTJ* addresses a perceived threat to our ability to provide generally mechanistic explanations of vital phenomena in a consistent fashion and, by extension, a perceived threat to the unity and coherence of the empirical sciences. Kant does not believe that this threat comes from organized and self-organizing natural beings, however. It comes, rather, from transcendental realist presuppositions concerning our cognitive faculties and concerning the individual bodies that we represent through these faculties as being members of natural systems of various kinds.

If we take the particular plant and animal bodies that we come across in experience and classify as individuals of general kinds to be individually existing entities (things-in-themselves) then we are faced with a number of difficulties concerning the part-whole relations that characterize them, both internally and externally (i.e., the relations in which they, as spatio-temporally intuited *wholes*, stand to their spatio-temporally intuitable material parts, and the

relations in which they, as spatio-temporally intuited *parts*, stand to the natural species of which they are co-existing and successive *members*, and to the more general system of material nature of which they are also co-existing *parts*). If we take the extension and impenetrability essential to matter to be absolute characteristics of some independently existing entity (thing-in-itself) then we are faced with difficulties concerning a *natural* power to form the matter of bodies *from within* in such a way as to render these bodies suitable to the ends of organized beings. These are the particular difficulties faced by practicing physiologists and natural historians during Kant's time who are concerned to provide efficient-causal explanations, rather than merely descriptive accounts, of the series of stages that natural bodies go through in coming to exhibit organic forms.

Kant believes that a general solution to the most vexing aspects of this problem can be offered by appeal to the *transcendental* ideality of the *empirically* real matter of bodies. Kant's transcendental idealism allows us to treat the part-whole relations dealt with in natural philosophy according to standards provided by our sensible mode of intuiting and our discursive mode of unifying the various phenomena of bodies in nature, without claiming that these standards are authoritative for the substances themselves that reason enables us to think as fundamentally active natural grounds for these phenomena. As empirical criteria for identifying bodies, rather than absolute criteria for their existence, extension and impenetrability can be conceived as depending on the more fundamental natural powers of corporeal substances. The formative power of nature, or the generative powers of particular species of plant and animal can, accordingly, be conceived as vital natural powers that act together with these fundamental powers in producing and maintaining the specific observable forms we appeal to in identifying particular bodies as plants or animals, trees or birds, oaks or eagles.

This *would* contradict the nature of body *if* we had some previous assurance that the features we think as essential to all bodies are the only natural grounds of explanation for the capacities and states of bodies of specifically different kinds, or if we had some guarantee that the powers concluded to be universally active throughout material nature on the basis of the laws of

motion were the only *natural* powers capable of explaining corporeal phenomena. If our a priori knowledge of nature extends only as far as the formal conditions for the possibility of our empirical cognition, however, then we cannot make any determinate claims concerning how many, or how many specifically different kinds, of natural substance and natural power will be required to explain the phenomena we cognize empirically according to particular natural laws. The tension introduced by our commitment to a fundamental *formative power* of nature is, thus, a tension with our a priori commitment to the parsimony of principles in natural philosophical explanation. It is not, as it appears to Kant to be in the work of some physiologists and at least one theologically and aesthetically motivated ‘natural historian’, an objective conflict between the mechanical workings of nature and a vital principle that conflicts with the laws of these workings. This kind of conflict would result, however, if the bodies of our experience were *things-in-themselves* and if the a priori knowledge we have concerning the laws of material nature were knowledge of the laws that govern the interaction of these *things-in-themselves*.

A specific solution to the problems of organic generation, and a coherent plan for a natural history of plant and animal species, can, in Kant’s view, be provided only if we accept transcendental idealism and the distinction between the matter of bodies, as *substantiated phenomenon* or the real in the appearance, and the substantial grounds of the empirically discovered capacities and determinations of bodies of different kinds. This provides the basis not only for adjudicating the dispute between mechanistically minded (reductive) approaches and vitalistically minded (holistic) approaches to biological phenomena, but also for defending Kant’s own original project of grounding a specific, and potentially fruitful, program for natural history. This program makes appeal to the idea of a natural species as the enduring ground of a unified line of descent, in which limited modification due to both hereditary and environmental factors provides the natural mechanism through which populations of plants and animals achieve the ‘fit’ with particular geographic regions that is required for the self-preservation of the natural species.

The idea that this preservation is the *natural end* of the functioning of the various individuals that comprise the system is what provides the basis for a natural teleology that is genuinely distinct from the kind of cognition that we have of other complex material systems that we deem to be purposive in relation to *these* systems. We accept the possibility that other systems could be governed purely by a multiplicity of mechanical laws that are unified reductively, through appeal to the fundamental laws of material nature, because we represent the ends served by these arrangements as *external to* the substances that are the efficient causes responsible for their production. We also represent these ends and as playing no determining role in the production of these systems (i.e., these systems happen to lend themselves naturally to being judged in accordance with standards provided by our own feelings, our grasp of our own cognitive ends, our grasp of our own practical ends, or our ideas of the ends of other natural beings). We cannot do the same in the case of organized plant and animal bodies as natural products, however, because these are the objects within our experience that we are constrained to think whenever we are considering *other* natural arrangements from the perspective of whether or not they happen to be conducive to some end or other. The ends served by the arrangement of plant and animal bodies cannot be considered in abstraction from, and as merely contingently connected to, the active powers responsible for the production of these bodies. Thus, even if we could, somehow, have a complete understanding of the mechanical layout of the body, and of each of the particular laws that govern the motion of its parts in procuring food, in processing it, etc., we would still be required to think of the possibility of the unification of these particular laws in a system by reference to the idea of the preservation of this system as the end that guides the activity of the efficient-cause responsible for its functioning to the production of its regular observable effects.

The mechanical inexplicability of the possibility of a blade of grass follows, for Kant, from the *intrinsic* connection in which this body stands to the ends that we represent its existence and functioning as furthering. If I am right, then natural teleology for Kant is not, as McLaughlin

and others portray it, a supplement to our knowledge of natural systems that merely fills in the gaps that are left by our insufficient acquaintance with the mechanical laws of nature. It is, rather, the basic presupposition in virtue of which some suggested, generally mechanistic, explanation of plant and animal functioning can be thought to provide us with a genuinely natural explanation of phenomena that are specific to plant and animal bodies. Even if there were no gaps in our acquaintance with the mechanical laws of nature, we would still have to include among the dynamical grounds of the *mechanism of nature* fundamental formative powers that have no essential connection to the fundamental attractive and repulsive powers that are posited as grounds for all physical mechanical explanations. Without these formative powers, *nature* is lacking any ground for the empirically real differences between the ways in which the elements of natural bodies are aggregated in naturally occurring compounds, on the one hand, and the ways in which organized parts are unified in plant and animal bodies, on the other. Failing any *natural* ground for the empirically real distinction between these mutually co-coordinated and interacting realms of bodies within our experience, we would be required to posit some *supernatural* ground that works in ways that are entirely inscrutable to the natural philosopher and that undermine our a priori commitment to the causal unity of nature. I believe that seeing Kant as providing an argument against views of this kind leaves us better able than are the other major voices in the contemporary literature to make sense of the contextually and historically situated development of the views concerning organisms that Kant will express in the *CTJ*. This will allow us to provide a more historically plausible and philosophically robust interpretation of the text of this work itself, and will help to explain the emergence of Kant's perception that *he needs* to publish a *Critique* dealing specifically with the use of teleological principles in natural philosophy. Ultimately, this work should put others as well as myself in a better position to continue developing an adequate understanding of the implications of Kant's view for historical and contemporary issues that are of enduring theoretical and practical concern.

The body of the work that follows aims to do a good deal of the work that appears to me still needs to be done in sorting through the complex network of issues involved in Kant's views concerning organisms and teleology in natural philosophy. Each of the chapters will have a detailed introduction, so in the remainder of this introduction, I will provide a brief overview of the trajectory of the work. Chapter I provides an interpretation of the position for which Kant argues in the *OPA*, Chapter II discusses the period between the *OPA* and the *CPR*, Chapter III discusses the significant changes in Kant's view in the *CPR* and also considers the dispute in the 1780s that stems from Kant's review of Herder's *Ideas*, and Chapter IV provides an interpretation of the *CTJ*. I believe that Kant develops a largely original and fairly coherent position concerning organisms and natural teleology in the 1760s, which he presents in slightly more detailed form and argues for, on the basis of its utility for addressing disputes concerning the origins of differences within the human species, in the essay *On the Various Races of Humans* (1775). The view of a natural species he presents there and the project for a natural history of plant and animal species based on it, however, requires a different conception of the cognitive faculties, their relation to one another, and their relation to objects that have importantly different ontological status than Kant provides in his *Inaugural Dissertation* (1770, hereafter *ID*) 'Concerning the Form and Principles of the Sensible and Intelligible Worlds'.

The distinction Kant develops in the 'silent decade' of the 1770s, within the intellectual faculty of cognition, between the understanding (*Verstand*) and reason (*Vernunft*) allows him to provide a cognitive foundation in the *CPR* for the distinction between a logical species, which is a class concept that is found in a rationally ordered systematic description of natural variety (*Naturbeschreibung*) and a natural species, which is a system of interbreeding plants or animals that is found in the natural world (*Naturgeschichte*). Kant's own approach to the use of ideas as the basis for systematic empirical cognition of the *order of nature*, for which he argues in the 'Transcendental Dialectic' of the *CPR*, is challenged in the popular work on natural history published by his former student, J. G. Herder. Kant is asked to review this work, which provides

him with an occasion to reiterate and defend several of the central points of his own approach to natural species and to the proper methodology for the kind of natural history that requires this view of species. The public dispute between Kant and Herder also leads Kant to reiterate and defend his own views on anthropology in the essays *Determination of the Concept of a Race of Humans* (1785) and *On the Use of Teleological Principles in Philosophy* (1788). The latter of these is composed after Kant has already decided to compose a third *Critique*, which he publishes in 1790. Although there are several notable changes in emphasis and detail between 1763 and 1790, the position Kant presents in the *CTJ* concerning the proper relation between teleological and mechanical principles in the natural scientific study of organisms is largely continuous with that of the *OPA*.

Chapter I: Organisms and Teleology in *The Only Possible Argument*

Introduction to the Central Question

Kant is clearly not the only philosopher in the middle of the eighteenth century interested in the connection between organisms and teleology. Trends away from both traditional religious orthodoxy and the systems of seventeenth-century rationalists like Descartes, Spinoza, and Leibniz lead to an increasing emphasis during Kant's time on the natural world as a source both for knowledge in the natural sciences and for religious beliefs. Natural theology, or as it is often called at the time physico-theology, is a common activity that looks to particular aspects of the natural world for evidence concerning the existence and characteristics of God.¹ Although there

¹ The term Kant uses most often for natural theology is *Physikotheologie*. He contrasts the kind of cognition referred to by this term at different times and in various contexts with those referred to by the terms *Transcendentaltheologie*, *Ontotheologie*, *Kosmotheologie*, and *Moraltheologie*. Despite the first *Critique*'s well known criticism of the attempt to provide theology with a scientific status, either a priori through pure reason or a posteriori through reasoning based on experience, all three of Kant's *Critiques* culminate in discussions of philosophical theology that focus on a legitimate kind of natural theology. In the first *Critique*, Kant introduces a distinction within natural theology between physico-theology and moral theology, each of which are grounded in observation of the "order and unity that is met with in this world, in which two causalities and their rules must be accepted, namely, nature and freedom." (A 632/B 660) The causality of freedom and the fundamental rules of this causality become central issues for the second *Critique*'s attempt to establish that pure reason can be practical. The consistency of positing the causality of nature and the causality of freedom as both having a legislative domain within a single efficient-causal nexus of objects of possible experience is one of the central issues addressed by the third *Critique* as well. Before moral teleology can be adjoined to natural teleology in a coherent theology, the apparent obstacles to a synthetic, non-reductive, *unification* of organic laws of *natural* causality with laws of mechanistic *natural* causality must be overcome. The Dialectic of the *CTJ* aims to accomplish just that, and then to vindicate the vital role of natural teleology as a *propaedeutic* to a theology that can be *grounded* only in our practical reason. As will become clear in what follows, one of Kant's most interesting and important contributions to the eighteenth-century study of organisms is his continual insistence that the purposive order and unity in this world have to be results of *natural* causality, if one is to appeal to this order and unity as something that leads our reason to a supreme being beyond nature. The supposed insufficiency of natural agents to cause particular events and arrangements in nature is a short-cut to a God of the gaps who recedes ever further as the sciences discover more and more of the mechanisms involved in bringing these natural events and arrangements about. Only the sufficiency of nature as a whole with respect to all particulars in nature, combined with the insufficiency of nature as a whole to explain its own possibility and existence, could provide the basis for a natural theology that leads us to consider God as *supremely* powerful and perfect. Accordingly the proximate ends of the natural philosopher and of the natural theologian *ought to* coincide, even if particular individuals with differing commitments concerning

is almost no aspect of nature that is not used as a basis for natural theology in the eighteenth century, particularly common are arguments, which we would now call *arguments from design* or *teleological arguments*, that focus on the purposive relations between the parts of complex natural bodies as evidence for the existence of a supernatural and intelligent being capable of designing and creating them.² Accordingly, it is not at all surprising to find a link between organisms and teleology in Kant's own thinking in both his pre-Critical and Critical periods. Nor is it surprising to find the pre-Critical Kant supporting the predominating view that organisms cannot be understood as necessary results of the mechanical workings of matter alone. What is somewhat more surprising, however, is that Kant subscribes to this view in the context of his own fairly progressive work in natural history.

Early in his academic career, Kant develops an interest in the attempt to understand and explain various orderly and harmonious aspects of the present state of the natural world as results of natural-causal processes whose beginnings we project backwards into the distant past. In the first two decades of his publishing career, Kant produces two works that provide just such an explanation of the most general features of order in the solar system. The *Universal Natural*

the further ends served by natural philosophy fail to recognize this and turn the natural sciences into a battleground over the rationality of theistic and atheistic beliefs.

² Schönfeld [2000] provides an informative discussion of the religious and intellectual climate into which Kant introduces his own views on teleology and the order of nature. He refers to works of physico-theology published between 1714 and 1772 that argue for the existence of God on the basis of features of nature such as: fire, rocks, water, snow, thunder, earthquakes, grass, birds, silkworms, insects, bees, locusts, grasshoppers, mussels and snails, fish, and tadpoles. (pp. 102-103) Although Schönfeld's work is an admirable and thorough attempt to identify a unified project in Kant's pre-Critical works, a task with which I am sympathetic, I have trouble accepting many of his conclusions. I will draw attention to my disagreement on particular claims as issues arise in the text. My disagreement with his main thesis, however, should be made clear at the outset. He identifies the OPA as both "misguided" (p. 244) and "The Culmination of the Precritical Project" (p. 183), which leads to crisis, collapse, and the rejection of the possibility of a unified world in which souls and bodies, freedom and nature, and teleology and mechanism are combined. I am more prone to see the OPA as representative of a new stage within Kant's attempt to provide an ontological model according to which this very combination is possible. Kant never gives up on this project, which receives its fullest expression in the Critical period through the recognition that the conditions for the possibility of common experience, scientific knowledge, artistic and cultural production, and moral action, all involve the development and harmonious activity of the contingently related and synthetically unified capacities natural to our souls within a unified natural world.

History (1755, hereafter *UNH*)³ provides a nebular hypothesis of the origins of order in the universe, or an explanation of the shapes and masses of the planets, the trajectories they trace around the sun, etc., as arising solely through the continuous exercise of natural forces from an initial state in which the elements of matter are dispersed throughout space. The outlines of this hypothesis are repeated in the *Only Possible Argument* (1763, hereafter *OPA*)⁴ as an example of the proper method for seeking and discovering natural explanations for various arrangements in nature that have frequently been thought of as artificial and attributable directly to God. Kant proceeds in these works according to the idea that, if the forces and laws generally accepted to explain the motion of material bodies can account for the *maintenance* of a system as apparently complex as that of the planets and fixed stars, these same forces and laws may well be able to account for the *generation* of this system as well.⁵

³ The full title of this work is *Allgemeine Naturgeschichte und Theorie des Himmels oder Versuch von der Verfassung und dem mechanischen Ursprunge des ganzen Weltgebäudes, nach Newtonischen Grundsätzen abgehandelt*. The title is translated by the editors of the Cambridge edition as ‘Universal Natural History and Theory of the Heavens, or Essay on the Constitution and Mechanical Origin of the Entire Universe, treated in accordance with Newtonian Principles’. It is worth mentioning that the German ‘allgemein’ and its variants are often used to convey the sense of ‘general’, i.e., ‘in abstraction from certain particularities’, rather than the sense of ‘universal’, i.e., ‘for all x’. It is certainly not Kant’s intent to explain historically each and every feature of the cosmic system, whether in accordance with Newtonian principles or not. Rather, his intent is to explain the most general features of this system historically according to these principles. Kant’s title is obviously modeled on that of the seminal work in natural history of Georges-Louis Leclerc, Comte de Buffon (1707-88). The first parts of Buffon’s *Histoire naturelle, générale et particulière* (36 vols. Paris: 1740-88) were translated into German with a foreword by the equally eminent eighteenth-century naturalist, and opponent of Buffon, Albrecht von Haller. The *Allgemeine Historie der Natur nach allen ihren besonderen Theilen abgehandelt; mit einer Vorrede Herrn Doctor Albrecht von Haller, zweyter Theil* (Hamburg und Leipzig, 1752) is the source of Kant’s familiarity with Buffon. Kant refers to and/or makes use of Buffon’s work, though as we will see below not uncritically, in his own published work on cosmogony and on the generation and classification of organic bodies, as well as in comprising the source book from which he lectures on physical geography. Haller’s criticisms of Buffon’s theory of generation are, I believe, accepted by Kant as good reasons for rejecting both radical transformism and Buffon’s particular mechanical account of generation. I return to these issues below (1.4).

⁴ The full title of this work is *Der einzig mögliche Beweisgrund zu einer Demonstration des Daseins Gottes* (1763).

⁵ Here Kant is consciously taking exception with Newton’s view of the universe as a clockwork constructed, and occasionally repaired, by God, siding instead with the Leibnizean view that the perfection, or relative self-sufficiency, of the world renders such hypotheses unnecessary. Interestingly enough, we will see in the final section of this chapter that Kant uses the idea of perfection developed in the *OPA* to argue against Leibniz’s account of the order of nature as well.

Kant's approach is aimed at reducing *our* reliance on supernatural design in accounting for complex phenomena in nature, while, at the same time, stressing the ultimate reliance of all things whatsoever on a being that possesses perfect wisdom.⁶ This frees us to proceed in natural philosophical investigations *as if* nature alone were sufficient to bring about and maintain the immense, and often awe-inspiring, order and harmony observed in the natural world. From a standpoint other than that of natural philosophy, however, we recognize that the blind mechanism through which matter orders itself into harmonious, beautiful, and purposive arrangements points us to an ultimate, intelligent ground of the entirety of material nature.⁷ To put Kant's point somewhat paradoxically, the less frequently we are required to call on special provisions in explaining the phenomena of nature, the more convinced we will be that the whole of nature constitutes a single system brought about according to a wise plan. Moreover, investigating nature according to the idea that it is a unified and harmoniously functioning system governed by natural laws that does not require frequent supernatural influences introduces a systematic order into our knowledge of nature that would otherwise be lacking.⁸

Given this general commitment to avoiding any appeal to particular provisions in explaining complex and harmonious arrangements in nature, it may be somewhat surprising to find that Kant does not think we can provide an explanation of how organisms are generated that is analogous to the explanation of the generation of the cosmos. In the *UNH*, he claims that "the

⁶ That this is Kant's intent is most obvious in the *OPA*. There, Kant provides a recap of the argument of the *UNH*, as an application of his revised method of physico-theology. This method, which is clearly a precursor to Kant's claims about the use of reason's ideas of unity in regulating our systematic inquiry into natural order, has as much to do with suggestions for causal and natural historical accounts of orderly and harmonious arrangements in nature as it does with inferring the existence of a being capable of providing the ground for the possibility of these arrangements.

⁷ 1:225

⁸ This is the main point of the revised method of physico-theology outlined in the *OPA*, as well as the preemptive response there, and in the *UNH*, to certain unnamed theologians who Kant assumes will see the most convincing argument for God's existence undermined if matter is capable of ordering itself into such harmonious relationships. According to Kant, the more we are able to explain as necessary consequences following from the essence of matter (i.e., the movable in space), the more amazed we will be that such self-ordering matter is even possible. This will have the two-fold effect of, on the one hand, strengthening our commitment to the existence of a wise creator, and, on the other, freeing the natural sciences from any a priori strictures concerning what can be explained naturally without appeal to specific provisions:

origin of the present state of the entire universe will be understood before the generation of a single weed or grub is clearly and completely illuminated on mechanical grounds”.⁹ In the *OPA*, he claims, “it would be absurd to regard the initial generation of a plant or animal as a mechanical effect incidentally arising from the universal laws of nature”.¹⁰ In the latter work, Kant develops the view that the possibility of organisms results from divine artifice and that organisms require us to conceive of them, and the laws governing their generation and functioning, as part of a *contingent order of nature* that exists alongside the mechanically explicable *necessary order of nature*. The question that guides this chapter, and the answer to which provides the basis for appreciating Kant’s developing views concerning organisms and teleology, is the following:

What leads Kant to the view of the *OPA* that there is an important distinction between *necessary* and *contingent* order within nature, and that organisms are part of the *contingent order of nature*?

Despite the growing interest, among Kant scholars and historians and philosophers of science, in issues central to the investigation of organisms in the eighteenth century, little work has been done on Kant’s pre-Critical views in this area.¹¹ This is especially unfortunate given the tendency of some to assess the view of the *CJ* without acknowledging, or paying any serious attention to, the fact that by 1790 Kant has been lecturing on physical geography for nearly thirty-five years and has even published several works dealing with the range of issues addressed in the *CJ*.¹² Providing an answer to the question I pose above seems to be a natural place to start in the

⁹ 2: 230

¹⁰ 2: 114

¹¹ Some notable exceptions are Sloan [1979, 2001], McLaughlin [1989], Ferrini [2000], Bernasconi [2001], Reill [2001].

¹² Kant lectured on physical geography regularly from the time he began teaching, in 1757, until the time he stopped, in 1796. Between his appointment as professor in 1770 and his retirement in 1796, he delivered lectures on physical geography twenty-seven times, and on anthropology twenty-four times. As Stark [2001] makes clear, the fact that there was no ready-made work from which he could lecture provided Kant with the opportunity and the incentive to keep himself abreast of the growing body of travel literature and of developments in areas that we know refer to as geology, chemistry, medicine, mineralogy, and biology. It seems to me that it is primarily from this engagement, with its focus on a pragmatic orientation towards

attempt to understand and assess the development of Kant's views on organisms and teleology in the Critical period and his general contribution to the complex and lively eighteenth-century discussion of these issues.

In what follows, I will begin by considering what I take to be fairly natural responses to the question I pose above, or responses that might occur to anyone familiar with Kant's philosophy and with the general state of metaphysics and natural philosophy in the middle of the eighteenth century.¹³ As I will show, none of these potentially promising considerations can

the natural world, that the impetus for the *CJ* stems. That is, here the world is considered neither metaphysically (as a system of connections between intelligible substances) nor merely physically (as an object to be explained by mathematical natural science) but as the place in which beings organized in a variety of particular ways must develop their various capacities, orient themselves towards their needs, and learn to make use of the 'materials' they inherit (biologically, socially and/or culturally) so as to not merely survive as individuals and preserve the species, but so as to adapt to changing circumstances and flourish.

¹³ Given the relative lack of attention to this question, even among those authors who do address aspects of Kant's early view, the responses I consider are not actual responses that have been offered in the secondary literature on the pre-Critical view. Rather, they are modeled on general considerations that one might think shed light on Kant's view, and on considerations that are actually discussed in the literature on Kant's later views. Ferrini [2000] does address Kant's reasons for denying the intelligibility for us of the mechanical generation of organic bodies in the *UNH*, the *OPA*, and *Dreams*. Though this article contains some valuable suggestions about changes of emphasis in Kant's claims during the pre-Critical period, it seems to attribute to Kant the kind of mechanism versus finalism view that I think Kant is trying to overcome in his work from the very beginning. As I will argue, Kant wants to establish that there is a universal and genuinely efficient-causal nexus in nature that can, in principle, include both blind and directed efficient causes. Within the class of blind efficient causes, moreover, there are 1) those whose action results in geometrically describable motions and transfers of motion between pre-existing material parts, 2) those whose action results in motions that require us to posit attractive and repulsive forces in addition to the size and shape of material parts, and 3) those whose action results in determinations and changes that we can explain neither purely mechanically, according to 1), nor physico-mechanically, according to the combination of 1) and 2). This last category is not exhausted by the natural causes responsible for the generation and maintenance of organic bodies, since crystals and snowflakes are also products of this kind of causality. Organic bodies are, however, the only natural bodies, the possibility of which seems to require that natural efficient-causal forces be combined according to an idea of the ends that these bodies actually are involved in making possible, such as growth, reproduction, and the directed efficient-causality of human and non-human animals. Developments in the natural sciences and in Kant's own thinking about the metaphysical and epistemological grounding of this ontological model do bring about important changes in Kant's strategy for justifying his commitment to it, but this commitment is evident at least from the time of the *OPA*, and is precisely that for which the *CTJ* is intended to provide a transcendental justification. That there are efficient-causes of natural objects corresponding to 3) is suggested as possible by beautiful forms (e.g., crystals and snowflakes), is posited as actual organized beings whether living or not (e.g., plants, which require a seed even if not a soul), and as necessary by considerations of the conditions for the possibility that souls be in nature. That these causes be natural causes operating according to natural laws that can be combined with the forces and laws involved in 1) and 2) within a single system of nature is both a presupposition of the reflective use of our judgment (*CJ*) and an idea represented as the natural end of the use of our theoretical reason (*CPR*). Furthermore, this model allows for the sensibly determined wills of animals to be directed natural efficient-causes that operate according to natural psychological laws of desire, pleasure and displeasure. Finally, the free wills of rational beings can

alone provide an adequate response to this central question (1.1). Accordingly, I will proceed to provide my own answer to this question in the following sections. My general aim is to show that by 1763,¹⁴ Kant has already developed a view of natural teleology and contingent natural order that involves a complex and original position on the central metaphysical and methodological issues involved in investigating the organic realm. Kant's claim that the *mechanical* generation of organisms is unintelligible *to us* is part of a systematic view that he believes is the only one that will allow us to conceive of the generation of organic bodies as a truly *natural* process that *is*, nonetheless, intelligible *per se*. The first section of my answer involves showing that by denying that all natural determinations and changes in bodies can be explained as the result of a single kind of force operating according to a single kind of causal-law, Kant believes he is better able to preserve the unity of nature than are the proponents of any of the competing views of the generation of organic bodies available during his time (1.2).

I will then turn to discuss the origins of these competing views, and Kant's discussion of them in the *OPA*, for confirmation of my answer to the central question of this chapter, and evidence for my assertion that we find already in the *OPA* an expression of the view concerning the generation of organisms that Kant will continue to support in the *CJ*. The basic claim

be determined by the moral law and be the directed supernatural causes stimulating directed psychological natural efficient-causes to actions in nature that can be subsumed under the universal efficient-causal nexus of nature.

¹⁴ There are several related reasons for picking this date as the starting point for my discussion. First, it is during this time that Kant begins to develop in a systematic way his characteristic distinctions between real and logical grounds of possibility and real and logical agreement and opposition. This leads, initially, to a distinction between the constructive methods of mathematics and the analytic methods of philosophy, and eventually, to the claim that the fundamental concepts we are concerned to uncover, analyze, and justify in philosophy involve synthetic judgments. This is also when the importance of the distinction in Kant's thinking between necessary (essential or analytic) unity and contingent (natural or synthetic) unity emerges with respect to considerations of the relations between powers of the mind, and the relations between the powers grounding the determinations and changes of bodies. Related to this, in my view, is the fact that Kant also transforms the structure of his physical geography lectures in the early 1760s, jettisoning the ancient and medieval tri-partite distinction of nature into the animal, plant, and mineral kingdoms, and treating natural bodies as either organic or inorganic. This is coupled, further, with a move away from the Leibnizean conception of continuity expressed by the idea of the *great chain of beings*, which Kant had endorsed in the *UNH*, and towards the idea that the perfection of the world is constituted by its being a unity involving both real agreement and real conflict between the genuinely diverse powers of genuinely diverse kinds of substance. I do not mean to downplay the importance of Kant's work in the decades prior to the 1760s, but I cannot go into any detail here concerning the developments leading to the view of the *OPA*.

involved in this view is that ascribing to nature a genuine capacity to form matter into organic structures requires that we conceive of this capacity as one that is given originally through the existence of organisms and is limited to the formation of other organic bodies of the same natural kind. In the terms Kant will use to characterize it in the *CJ*, his view is that any defensible theory of *epigenesis* will have to be a view of *generic preformation* (1.3). Through these sections, it should become clear how Kant conceives of the distinguishing features of organisms, the natural generation of organic bodies, natural teleology, and the *contingent order of nature* in the *OPA*. Natural philosophical considerations and an ontological model that allows him to preserve prior commitment to the intelligibility *per se* of the natural generation of organic bodies, however, are not alone sufficient to justify Kant's insistence that generation really is the natural production of a genuinely new organic body. Accordingly, the final section of this chapter will argue that Kant's ultimate justification for his view on organisms and natural teleology in the *OPA* is the claim that this view is more consistent with the perfection of the world and, thus, with God's perfection than is the view that natural forces operating according to natural laws unguided by a specific intention could never produce the purposive unity characteristic of an organic body (1.4).

1.1: Potentially Natural Responses to the Central Question

If Kant were claiming a peculiar status within the natural world for organisms on the basis of a prior commitment to the insufficiency of matter and natural forces to form complex, beautiful, or purposive arrangements in general, it would be easy to see why he would hold the view that we cannot explain the generation of organisms mechanically. Such a commitment might plausibly be based on the worry, not uncommon in this context, that mechanistic explanations of the *order of nature* would render any appeal to a Divine Author of nature

unnecessary.¹⁵ If this worry were behind Kant's claims, we might find it lamentable that prior metaphysical or religious convictions play such a role in his natural philosophical views, but it would at least be clear why Kant holds the view he does. Given the broader contexts in which these claims occur, however, such considerations obviously cannot provide the answer to our question. That is, if, as Kant argues, matter and natural forces *are* capable of explaining the origins of order in the cosmos, and a great deal of the complexity, beauty, and purposiveness found in nature is the necessary result of these forces, then it cannot be the case that organisms require appeal to supernatural causes *because* matter and natural forces are insufficient for forming complex, beautiful, and purposive arrangements.¹⁶

Perhaps looking to the state of natural philosophy in Kant's time could be of help here. If no serious natural philosophers are advancing mechanical theories of the generation of organisms, or if Kant is not aware of any such theories, we might be better able to understand why he does not think such explanations are possible. Upon closer inspection, however, this turns out not to be the case.¹⁷ In fact, the *OPA* contains explicit criticisms of attempts to explain the mechanical

¹⁵ Koyré [1957] provides a nice summary of how the followers of Newton, 'infected' by Leibniz's principles of plenitude and sufficient reason, render Newton's clock-maker less and less relevant until, finally, Laplace can claim no need for such a hypothesis. Kant himself, who receives no mention from Koyré in this particular context, maintains a view of intelligibility and explanation apparently far more substantive than other Newtonians 'infected' by Leibniz. Physical science can rest content with discovering the conditions that render what we observe to be actual necessary, whereas genuine metaphysics is concerned with gaining insight into how the principles that are necessary from the standpoint of natural science are really (and not merely logically) possible. For Kant, God is appealed to legitimately only in the latter enterprise, which no extension of the former can render superfluous.

¹⁶ According to the view of the *OPA*, the possibility and existence of matter (which includes the natural forces and laws that explain its characteristic features and changes) is grounded in a single all-sufficient first principle. Thus, even if all order in nature, including that exhibited in the organic realm, were generated and maintained through the motion of material elements, the very possibility of this order would still depend on God.

¹⁷ Although by Kant's time, the Cartesian attempt to explain the generation of organic bodies through the externally impressed motion of previously existing material parts has been abandoned, theories of the mechanical generation of organic bodies dominate the early to mid-Eighteenth Century. As we will see below, there are two groups representing the sides of a dispute that ultimately concerns both the fruitfulness of nature in producing purposive order and the ontological requirements for mechanistic explanations of events and processes in nature; namely, those who support preformation and those who support epigenesis. The former group sees previously existing, artificially designed and created, organic machines as the means through which the ends of living beings are realized in nature. The latter group attempts to explain the purposive organization of these machines themselves by appeal to previously existing organic molecules and the natural forces and laws explaining their behavior. This debate, between groups that are equally

generation of organisms offered by two prominent Newtonians, whose work in other areas of natural philosophy Kant clearly admires.¹⁸ These thinkers do not attempt what Kant claims is absurd; namely, they do not attempt to explain the *initial* generation of plants or animals through mechanical causes. Rather, they provide theories of the mechanical generation of genuinely new individual organic bodies from other organisms of the same kind. Although Kant does not deem such explanations impossible in principle, he does refer to them as either ‘incomprehensible’ or ‘entirely arbitrary’, adding that the natural production of an organic body is ‘unintelligible to us’.¹⁹

From the passage in which he makes this claim, however, it is not clear why Kant moves from asserting that none of the current attempts at a *mechanical* explanation of the generation of organisms is intelligible²⁰ to us to the claim that the *natural* generation of organisms is unintelligible to us (which I will call the *Thesis of Unintelligibility*, or *TU*). The legitimacy of this stronger claim would appear to require further argument, even if Kant has good grounds for asserting that no current *mechanical* explanations are viable. First, even if the particular theories

committed both to mechanistic explanation in natural philosophy and to a distinction between organic and inorganic natural bodies, leads Kant to identify and address the apparent antinomy of judgment in the *CJ* (see Chapter 4). For general discussions of these positions and the figures supporting them in the Eighteenth-Century, see Gasking [1967], Hall [1969], Jacob [1970], Roe [1981], Mayr [1982], Larson [1994]. For discussions of the significance of these debates for Kant’s views, see Zumbach [1984], McLaughlin [1989], Zammito [1992, 2003], Reill [2001], Sloan [2001]. I will call attention to points of disagreement with these authors on particular points as they arise in the subsequent text.

¹⁸ One of these is Buffon, and the other is Pierre Louis Moreau de Maupertuis (1698-1759), who was made head of the Prussian Royal Academy in 1745, and to whom Kant refers as having discovered the principle of least action, which Maupertuis was also accused of having plagiarized from Leibniz. For an account of the events surrounding this accusation, and of the more general animosity between Wolffians and Newtonians in the middle of the Eighteenth Century, see Calinger [1969].

¹⁹ 2: 115

²⁰ The term Kant uses in this context is *begreiflich*, which is not a technical term in the sense that intelligible and sensible become after 1770. I stick with Walford and Meerbote’s choice of ‘intelligible’ for this term, which could also be rendered with ‘comprehensible’, ‘conceivable’, or ‘understandable’, because it seems to me that Kant is pointing to a common attempt on the part of Wolffian preformationists and Newtonian supporters of *epigenesis* to provide an account of the unobservable mechanisms through which the phenomena associated with the generation of an organic body are grounded (ontologically) and through cognition of which we gain a kind of a priori insight into the possibility and existence of these phenomena (epistemically). The point at issue is not whether we can discover the rules according to which these phenomena follow upon each other in a regular order, which all parties agree can be done, but of whether we can explain how this happens by reference to the ontologically prior things-in-themselves (i.e., pre-formed organic machines or spontaneous organic molecules) that render these phenomena possible, considered abstractly, and necessary, considered concretely.

Kant has in mind really are incomprehensible or arbitrary, this does not automatically entail the claim that no theory of that general type could overcome whatever difficulties are involved in these two attempts (which is the view expressed by what I will call the *Thesis of Mechanical Unintelligibility*, or *TMU*). Second, the truth of *TMU* would not itself legitimate *TU* without further argument. Despite the centrality of mechanistic explanation to seventeenth- and eighteenth-century natural science, it is not obvious that one can simply assume that Kant subscribes to the identification of the terms *natural* and *mechanical* in considering particular issues in natural philosophy. In fact, as we will see, doing so undermines rather than furthers our attempts to grasp the significance of Kant's thinking about organisms and teleology.²¹

Our situation becomes even more complicated if we consider that *TU* is not sufficient to justify the claim that organisms actually require causes that lie outside the merely mechanical workings of nature. That is, the fact that the natural generation of organisms is unintelligible *to us* is not enough to warrant the claim that it is impossible (which I will refer to as the *Thesis of Impossibility*, or *TI*). Presumably, *TI* is what would be required for a legitimate appeal to any supernatural grounds, beyond those required for the *necessary order of nature*, in accounting for the possibility of organisms. Given these complications, it might be that I am considering the relation between *TMU*, *TU* and *TI* in the wrong light, perhaps owing to my initial focus on natural history and on Kant's mechanical account of the generation of order in the cosmos. Given that *TMU* does not entail *TI*, but *TI* does entail *TMU*, Kant may be taking the failure of mechanical theories of generation to be a necessary consequence of *TI*, rather than as evidence for it.²² If this is right, what might otherwise appear to be a *non sequitur* would actually be a legitimate inference. The task would then be to locate Kant's independent reasons for asserting *TI*.

²¹ see I.4 below, and Chapter 4

²² That is, instead of providing an argument that has the claim 'The mechanical generation of organisms is unintelligible to us' as a premise, and the claim 'organisms cannot be generated naturally' as a conclusion, it could be that Kant treats the latter as an independently justified claim that should lead us to give up hope that we will ever be able to explain the generation of organisms mechanically.

We might suggest that the issue of the origin of life is central here. Maybe Kant denies that we can explain the mechanical generation of organisms because he thinks it is impossible for life to arise out of or be attributed directly to matter, which is essentially lifeless or inert. It is clearly true to say that Kant denies life to matter,²³ so this may seem like an initially promising direction. It is not clear, however, that this fact has any direct bearing on Kant's position concerning the natural generation of organic bodies in the *OPA*. Throughout his published writings and lectures in both the pre-Critical and Critical periods, Kant generally treats natural philosophical issues about organic bodies in relative independence of what he considers to be metaphysical and psychological considerations about life.²⁴ Although he thinks there is partial overlap between the class of living beings and the class of organisms, he does not seem to be committed to the claim that all living beings are organisms, or to the claim that all organisms are living beings.²⁵ Kant never attributes anything more than an *analogon* of life to plants, although his most famous claims about our inability to explain the generation of organic bodies, from both the pre-Critical and Critical works, make explicit reference to them.²⁶ This is not to deny the significance of questions concerning the nature and origin of life in this context, but only to draw attention to the fact that life cannot be the feature of organic bodies that leads Kant to include them in a *contingent order of nature*.

²³ Throughout his published writings, Kant maintains that inertia is an essential characteristic of matter as such. He does attribute active powers to the simple substances grounding bodies in his pre-Critical period, but these substances do not change their own states of motion or rest through the exercise of these powers. They are explanatory grounds, rather, of the determinations of the substance (in isolation) and of the changes in other substances (in community). Although his particular conception of what explains the essential inertia of matter as such does undergo changes between the *True Estimation* (1747) and the *MFNS* (1786), his commitment to the lifelessness of matter remains. I will address the famous passage concerning hylozoism from the *MFNS* (4: 544) in my discussion of the *CJ* (Chapter 4).

²⁴ See, e.g., *Dreams* (2:329-31) where Kant admits that we may never be able to tell precisely what things in nature are living and what things are not, but seems to think that growth and reproduction are sufficient characteristics for grouping plants and animals together and distinguishing them from other kinds of material object.

²⁵ See the *Lectures on Metaphysics*, where Kant discusses animal life, human life, and spritual life in the section on psychology (e.g., 28:248). Kant does not rule out the possibility that there are spirits, which are alive without being principles of life for organic bodies, nor does he include plants, which he clearly thinks are organic bodies, among the living.

²⁶ The most famous of these is the passage concerning the 'Newton of the blade of grass' from the *CJ* (V: 400), but there are similar passages in the *UNH* (I: 230) and the *OPA* (2: 114).

Perhaps general leanings in the direction of the metaphysics of Leibniz or Wolff prevents Kant from accepting that organic bodies can be generated naturally, and this leads him to deny that mechanical explanations can render their generation intelligible to us. Both Leibniz²⁷ and Wolff²⁸ claim that each individual organism is the direct result of God's creative act, and that natural causes can be invoked only for explaining the subsequent growth and functioning of the artificial organic machine. Given that Kant thinks that organisms are part of an artificial order, it might be that he is expressing his agreement with these central figures in the German metaphysical tradition. If we consider further that, like Leibniz and Wolff, Kant thinks that matter and the order of mechanical efficient causes in nature is grounded in the activity of created substances, it may begin to seem likely that roughly Leibnizean or Wolffian metaphysical commitments lead Kant in this direction. Maybe we should see Kant's pre-Critical views on organisms and teleology as reflecting the same kind of view that we find in Leibniz. The mechanically explicable order of efficient causes (the realm of nature) is merely an appearance grounded in the natural striving towards perfection of simple substances, the harmony between the effects of which natural activity (the realm of grace) is guaranteed by the divine plan for this, the best of all possible, worlds.²⁹

If this is the case, it would help explain why Kant, like Leibniz, thinks it is consistent with a general commitment to mechanical explanations of natural phenomena to claim both that the bodies and changes explained in this way require a grounding in substance, and that the production of an organic body is something we cannot explain naturally or mechanically. If Kant agrees with Leibniz that organisms are paradigm cases of corporeal substances, i.e., they are unities *per se* constituted by multiplicities of simple substances related to each other through their relation to a substantial form or soul, then he might think it is an obvious mistake to claim that

²⁷ *Theodicy* § 90, *Fifth Paper to Clarke* § 115, *Monadology* § 74

²⁸ *German Physics* § 444 - § 454

²⁹ *Theodicy* § 62

they can be generated naturally.³⁰ According to Leibniz, simple substances come about only through creation, and the souls that provide the substantial forms for bodies are never without some organic body, or multiplicity of simple substances, that they inform.³¹ Mechanical ‘causes’ can be referred to only in relating the members of the series of appearances of an already existing corporeal substance to each other and to other bodies in space and in time. These ‘causes’ cannot be responsible for the actual production of a substantial composite. If it is impossible for organisms to be generated through natural causes, then *TI* is true, and *TMU* follows unproblematically.

As promising as this direction of interpretation might seem, it ultimately fails as an answer to our question for two reasons. First, in the very same passage where he criticizes the mechanical theories of generation offered by the Newtonians, Kant refers to the view that each individual organic body is of supernatural origin as an equally arbitrary view that we need not accept, even if *TU* is true. Second, it would be a mistake to assume that the issue of *origin* or *formation* and the issue of *generation* are the same issue. Natural philosophers in Kant’s time who adopt the kind of creationist view of the *origin* of natural substances that Leibniz, Wolff and others espouse, see this as not merely consistent with, but as a necessary presupposition of, *mechanical* theories of the generation of organisms.³² The primary difference between their views and those of the Newtonians concerns precisely what it is that actually occurs in the process of generation, which they all agree is a mechanically explicable natural process. Is generation the natural production or formation of a genuinely new organic body from previously existing parts, as the *theory of epigenesis* holds, or is it simply the natural unfolding of an already existing organic structure, as the *theory of preformation* holds? Kant clearly thinks that the *preformationist* view of generation as the unfolding of a previously existing organic structure

³⁰ *Primary Truths* (AG 34)

³¹ *Monadology* § 72 - § 77

³² See the Introduction to Roe [1981] and the section on ‘Animism and Mechanism (1700-1750)’ in Hall [1969]

(*Generation as unfolding*, or *Gu*) denies any real fruitfulness to nature.³³ The proper way of conceiving of what is going on in generation, according to Kant, is that it is genuinely the formation of a new organic body (*Generation as formation*, or *Gf*).

Accordingly, when Kant rejects the view that we can understand and explain the natural generation of organisms in the *OPA*, he is parting company with Leibniz and the Wolffians just as much as he is with the Newtonians. Despite shared general commitments to providing mechanical explanations of natural phenomena and to the reconciliation of efficient causality and final causality through an ultimate appeal to God's creative activity, Kant clearly rejects the particular attempt to characterize this reconciliation in the case of organisms that is favored by Leibniz and the Wolffians.³⁴ Thus, whatever considerations are involved in Kant's assertion of *TU*, they cannot be considerations simply taken over directly from Leibniz or Wolff.

The natural responses considered so far turn out to be insufficient for providing us with an answer to our central question. That is not to say that none of these points us to issues that our answer will have to take into consideration, but only that we do not yet have a clear sense of the precise commitments that lead Kant to develop his pre-Critical view on organisms and the *contingent order of nature*. These responses to our initial question have, however, led us to a potentially puzzling complication in Kant's view. That is, Kant denies the attempt of the Newtonians at a mechanical explanation of generation, but he refuses to concede to Leibniz and the Wolffians that we have grounds for maintaining that each individual organic body is a product of supernatural causality. Despite his commitment to *TU*, Kant thinks we ought to deny *TI* and treat individual organic bodies as genuinely produced or formed by natural forces operating according to natural laws. Our central question, then, is not about Kant's motivation for introducing a division within nature between *artificially produced* organic bodies that develop and function according to natural laws and, other bodies that are in addition *produced* according

³³ 2: 115

³⁴ *ibid.*

to natural laws. The question concerns Kant's motivation for claiming that there is a division within the unified system of natural forces and laws between those that are responsible for generating *genuinely new* organic bodies and those that are responsible for generating other kinds of natural bodies.

Before offering an answer to this question, it will be helpful to review the central points discussed so far. The central question of this chapter is:

What leads Kant to the view of the *OPA* that there is an important distinction between *necessary* and *contingent* order within nature, and that organisms are part of the *contingent order of nature*?

In the *OPA* Kant is committed to:

Thesis of Unintelligibility (TU) = The natural generation of organisms is unintelligible *to us*

Generation as formation (Gf) = Generation is the formation of a genuinely new organic body

Kant denies:

Thesis of Impossibility (TI) = The natural generation of organic bodies is impossible

Generation as unfolding (Gu) = Generation is the unfolding of a previously formed organic body

Kant's view in the *OPA* is that we *ought* to consider individual organic bodies as the natural products of other organisms, even though the manner in which their generation occurs is unintelligible *to us*. It is not because he thinks that nature is incapable of generating individual organic bodies that Kant claims the possibility of organisms requires a supernatural ground. The

possibility of the mechanical generation of order in the cosmos requires a supernatural ground as well, so it also cannot be on this basis alone that Kant thinks the natural generation of individual organic bodies is unintelligible *to us*. The distinction between necessary and contingent order is made within a natural world that Kant believes is characterized by a natural tendency towards the generation and maintenance of systematic order.³⁵ Systematic unity and harmony between diverse phenomena *in nature* is guaranteed by, and would be unintelligible without, a single common source of the *natures* of the individual substances that give rise to these phenomena.³⁶ His view of the metaphysical grounding of the real possibility of the natural world allows Kant to conceive of the generation of the order of the cosmos as subsumed under the *necessary order of nature*. Kant's subsumption of organic phenomena under a *contingent order of nature*, then, must be made on the basis of a belief that the particular kind of order exhibited by organisms

³⁵ According to Kant's view in the OPA, both of these orders are grounded in real causal connections between substances, so all events subsumed under these orders and, thus, all events within nature as a whole, follow other events with necessity according to natural laws. (2: 108) The distinction between necessary and contingent orders of nature that Kant develops in the OPA is not a distinction within this order of events. It is one made according to differences in the real dynamical grounds of these series of observable events and the particular kinds of real relations that must obtain between these grounds within and between substances with different natures. These are orders between the forces or powers of natural substances of different kinds, and between these fundamental powers and the derivative capacities of these same substances. According to the view of the OPA, if the real grounds of an event and its position within a series of events in the world are the same forces that ground the extension and impenetrability characteristic of all bodies, the event is subsumed under the necessary order of nature. If, however, the real grounds of an event include the activity of fundamentally different forces that explain capacities that are not shared by all bodies (e.g., the capacity of sensibility that characterizes animal bodies), the event is subsumed under the contingent order of nature. These latter events follow upon prior states of the body and prior states of other bodies according to empirically discoverable rules, but these rules themselves must be understood to result from a unity of real grounds (e.g., fundamental attractive forces and fundamental formative forces) that themselves have no necessary connection to one another independent of their unification in the causal nature of the body. Given such a unification of grounds in the causal nature of the body, and the unification of the causal natures of all bodies in a single system of nature, all events in nature would follow with natural necessity (even those that are subsumed under contingent orders of nature). Accordingly, the presupposition of such a unity provides the fundamental basis for the methodology of natural sciences like anatomy, physiology, and particular natural history, which do not investigate the most general and mathematically determinable natural phenomena (i.e., the local motion of geometrically conceived bodies), but are also concerned to make their practices consistent with what mathematical natural philosophers have determined to be universal laws of corporeal nature. The same methodology is also required for any potential use of the findings of the natural sciences in support of theological claims to be consistent with the scientific practices themselves that generate these findings.

³⁶ 2: 95-96, 2: 99

requires some ground in addition to those that give rise to more general kinds of order among natural phenomena.

Kant also consciously rejects the particular ways of conceiving of this additional ground of order in organisms prevalent among both the Wolffians and the Newtonians of his time. That is, Kant thinks then-current mechanistic versions of the *theory of epigenesis*, which take the organic matter of parent organisms as their starting points, fail to make the natural formation of organic bodies intelligible *to us*. This does not mean, however, that we should subscribe to the *theory of preformation*, attribute the formation of each organism to God's creative act, and treat natural philosophical questions concerning generation according to *Gu*. Kant's support of *TU* and *Gf* and his denial of *TI* is clearly also a rejection of the *theory of preformation* as a way of making the natural generation of organisms intelligible *to us*. An adequate answer to our question will have to illuminate Kant's reasons for rejecting both of these rival programs and for proposing his own particular approach to dealing with organisms in terms of a *contingent order of nature* that involves causal processes that are both natural and unintelligible *to us*.

1.2: A General Answer to the Central Question

The primary consideration Kant offers in the *OPA* for claiming that organisms are part of a *contingent order of nature* that ultimately requires an *artificial* supernatural ground is the claim that their parts and their capacities exhibit a *contingent unity* that is *aimed at perfection*.³⁷ In and of itself, this is not an original claim; *i.e.*, contingency and perfection are features of organisms, and of nature more generally, that are traditionally used to argue for the dependence of the natural world on an intelligent first cause.³⁸ Considered in independence of the systematic concerns Kant is developing, we might be tempted to see his claims as little more than expressions of a fairly

³⁷ 2: 106

³⁸ In the Christian tradition, of course, such arguments can be traced back at least as far as Aquinas' 'Five Ways' (Cf., *Summa theologiae*, Part I, Q.2)

common view. If we consider these claims in the context of the particular views concerning possibility and perfection that he develops in the 1760s, however, we will see that Kant's views on organisms are fairly uncommon for his time.

Despite supporting *TU*, Kant develops a conception of natural teleology in the pre-Critical period that diverges in important ways from the kind of teleology prevalent among his contemporaries in the Eighteenth-Century. The most salient features of Kant's view are his refusal to admit the *ontological necessity* of all apparently contingent and purposive connections in nature, the *artificiality* of all purposive activity in nature, or the *immanence* of the ultimate grounds of this purposive activity. That is, Kant's view in the *OPA* can be characterized as a non-reductive approach to contingency and purposiveness in nature. It makes use of a kind of *natural teleology*, supposedly rendered superfluous by the moderns through *mechanical reductionism* and/or *supernatural teleology*, without accepting the *naturalism* that one might associate with such a view. To this extent, Kant is far closer to Leibniz than he is to the views of seventeenth-century thinkers such as Descartes, Malebranche, and Spinoza, or to eighteenth-century thinkers such as Wolff and Newton. Kant's view that the *order of nature* is a self-sustaining order grounded in the genuine efficient-causal connections between created substances, however, is a rejection of a central aspect of Leibniz's ontology that has important implications for his own views in natural philosophy.³⁹

The Thesis of Unintelligibility: Ontology and Natural Teleology

Newton's method maintains that one ought, on the basis of certain experience and, if need be, with the help of geometry, to seek out the rules in accordance with which certain phenomena of nature occur. Even if one does not discover the fundamental principles of these occurrences in the bodies themselves, it is nonetheless certain that they operate in accordance with this law. Complex natural events are explained once it has been clearly shown how they are governed by these well-established rules. (2: 286)⁴⁰

³⁹ On the importance of the theory of physical influx in Kant's pre-Critical metaphysics and natural philosophy, see Watkins [1995a, 1995b, 2003, 2005] and the Introduction to Friedman [1992].

⁴⁰ For discussions of Kant's relation to Newtonian ideas in his pre-Critical period, see the Introduction to Friedman [1992] and Chapter II of Schönfeld [2000]

I take Kant's admission of *TU* to involve an acceptance, not of occult *qualities* that are unobservable and unintelligible *per se*, but of causally efficacious *natures* that are both unobservable and unintelligible relative *to us*. These natures are conceived of as unified ontological or metaphysical grounds, the existence of which we are justified in positing through observation of the regular and lawful harmony amongst various manifold phenomena that we come to treat as their effects. One central difference between the generation and maintenance of organic natural bodies and other *complex natural events*, from the standpoint of our ability to explain these events in terms of rules, concerns the complexity of the phenomena with which we start and the resulting multiplicity of distinct kinds of forces and laws seemingly required to account for these. The *OPA* contains Kant's first usage of the term *fundamental force* (*Grundkraft*), which becomes a central term in the subsequent decades for his views concerning legitimate grounds of explanation in natural philosophy, including physics, psychology, and the study of organisms.⁴¹ In explaining why he thinks a mechanical explanation of the origins of order in the cosmos is not something entirely exceeding our powers, Kant claims that the "heavenly bodies are spherical masses, without organization and hidden artificial preparation. The force through which they are moved is, to all appearances, a *fundamental force* belonging to matter, which, thus, simply cannot be explained."⁴²

This means that the intelligibility *for us* of a complex arrangement of material parts, in Kant's view, does not require that we be able to deduce or explain the real possibility of each of the principles involved in its generation from some, more fundamental, principle. In the case under discussion, the regular motions of the heavenly bodies are mathematically describable and relatively simple, yet they are not rectilinear, which is what we would expect of the externally

⁴¹ This is one of the central points I will stress in each of the following chapters.

⁴² 2: 137-38, emphasis mine

communicated motions of bodies through empty space.⁴³ We do not observe any influence from external bodies that would explain this deviation, and insisting despite this that they must be there in order to explain what we do observe leads to several problems. Not the least of these, it seems from Kant's perspective, is that *insisting* that the causes we do not observe operate in precisely the same ways as those that we do observe is based on the assumption that things in general must be intelligible, not merely *per se*, but also *to us*.

If we insist that Cartesian vortices as the only possible mechanical explanation for what are, to all appearances, motions through *empty* space, we have not really done anything to explain these motions. We have merely insisted that *either* there really are vortices *or* Cartesian mechanics cannot explain the motions of the heavenly bodies. Whatever the basis for or the degree of conviction Descartes and others have concerning the explanatory power of mechanics, we should remain free to judge aspects of the observed *order of nature* to be counter-examples to the universality and necessity of this view, even if we agree that it is clearly a useful tool for investigating nature. This is especially so in cases where siding with Descartes means resting content that we have explained something we do not understand in terms of something else we have invented specifically for this case and that we cannot even be sure is possible.

Recognizing that we might need to appeal to something other than the communication of motion through contact, however, does not grant us license to overturn completely everything that is useful about mechanics in explaining these motions. Similar concerns to those above tell just as much against appealing to particular spontaneous causes that allow the heavenly bodies to deviate from the courses that mechanics would lead us to expect they would follow. If these spontaneous causes are internal to matter, then we have invented a fundamental force that characterizes only those kinds of matter that are giving us trouble and that contradicts the explanatory principles we started with rather than complementing them. If we appeal instead to

⁴³ On the importance of questions concerning the inertia of bodies and the consistency with the law of inertia of various attempts to provide metaphysical foundations for physics in Kant's context and in his pre-Critical works, see the Introduction to Friedman [1992].

spontaneous causes external to matter to render these motions intelligible *to us*, then we are claiming that the regular and relatively simple motions of these nearly perfectly spherical bodies, which occur in accordance with already discovered mathematical laws, are not grounded in the natures of these bodies.

Either of these two approaches would obviously undermine the possibility of any genuinely explanatory natural philosophy. That is, if particular kinds of matter are free to deviate from the well-established laws that follow *a priori* from the essence of matter *as such*, then these laws are not genuinely *laws* of nature. If, alternatively, the causal powers that give rise to the observed motions of the heavenly bodies are not grounded in the natures of these bodies, then the *empirically* discovered and *mathematically* formulable laws according to which they move are not genuinely laws of *nature*. It is not clear how we could maintain the hope of explaining *any* aspects of the world according to natural laws, if the most regular and harmonious motions of which we are aware do not admit of such an explanation.⁴⁴

Kant thinks the best way to explain the *maintenance* of the regular curvilinear motions of the heavenly bodies, the observation of which has already led to the formulation of the laws of universal gravitation, is to offer a mechanical account of the processes by which these bodies themselves are *generated* out of material particles through motions resulting from the exercise of fundamental and inexplicable forces that are natural to matter *as such*.⁴⁵ In this way, we can reject Cartesian vortices as necessary for explaining the trajectories of the heavenly bodies, and

⁴⁴ I take it that this is why Kant uses the rhetorical device of responding to the worry that his nebular hypothesis surpasses the powers of human comprehension by claiming that it is far easier to comprehend than the generation of natural beings in which there is ‘organization and hidden artificial preparation’, like a caterpillar which will somehow metamorphose into a butterfly, or even a blade of grass.

⁴⁵ Kant refers to this kind of explanation as mechanical or through mechanism (*per mechanismum*) in the 1760s, both in his published works and in the lecture notes on metaphysics that were taken by Herder between 1762 and 1764. (28: 49-50) In the notes we have from the 1770s, he begins to refer to it as physical or dynamical (28: 210). There he contrasts this kind of explanation both with mechanical explanation, which makes use only of the size, shape, and communicated motion of bodies, and pneumatic explanation, which makes use of psychological laws and “which one must not use in the corporeal world without need.” (28: 211) The best method, which Kant claims Newton was the first to use, is physico-mechanical. This method starts by trying to explain mechanically, and then posits a fundamental force only when “it is not possible otherwise.” (28: 210) I will return to this point below in treating Kant’s discussion of the generation of organic bodies (I.4), and in Chapters III and IV.

we can reject the Epicurean swerve as necessary for the initial generation of complex bodies, without having to accept Newton's claims about God's action in creating (and occasionally repairing) the mechanically functioning clock-work of nature. This is not a case of merely inventing a force for a specific case that we cannot be sure is possible or that contradicts what follows from the essence of matter.

Rather, the fundamental force of attraction is, according to Kant, one of the real or ontological grounds of those characteristics of matter that are generally accepted to be essential and that are used in mechanical explanations, *i.e.*, extension and motion. The determinate size and shape of any given particle of matter, as well as its determinate quantity of motion, has grounds in the exercise of the attractive and repulsive forces constituting its nature, according to Kant. The determinate size, shape, and quantity of motion of compound bodies are, in turn, grounded in the system of connections between the forces constituting the natures of its simple parts. The law of inertia remains intact, on this model, since it is only through the interaction of its natural forces with those grounding those of other bodies that a body undergoes any change in its determinations; *i.e.*, the state of motion or rest grounded *sufficiently* in the nature of a particular body *in isolation* would remain the same indefinitely. The actual states of motion and rest of the bodies in the world, however, have merely *necessary* grounds in their own natures and further necessary grounds in the natures of the other bodies constituting the world.

Accordingly, both the rectilinear motions of mechanics and the actual curvilinear motions of the heavenly bodies result from the exercise of forces natural to matter *as such*. The reason this model can solve our problem concerning the curvilinear motions of the heavenly bodies is that the interaction of the forces that gives rise to the actual motions in the world, and the laws governing these motions, does not take place through contact between bodies. It is genuine action-at-a-distance, the result of which is universal gravitation.⁴⁶ Although we have no *a priori*

⁴⁶ Kant argues that metaphysicians who reject the possibility of such action have no sound reasons for doing so in the *Inquiry* (2:288). Friedman [1992, p.1, n2] suggests that Kant's was a somewhat extreme

insight into how such a force is possible, and this model does not provide the same kind of *intuitive clarity* that the model of billiard balls or gears in a machine does, it has the advantage, for Kant, of being able to account for the phenomena we actually observe in nature in terms of natural forces common to all bodies, which are exercised in accordance with natural laws that we can express mathematically. What is more, as the problematic, dogmatic, and skeptical versions of ‘material idealism’ provided by Descartes, Malebranche, Spinoza, Berkeley, Leibniz, and Hume more than adequately establish, the *intuitive clarity* provided by seeing one body go from motion to rest as another body goes from rest to motion is quite a different thing from an *intellectual comprehension* of why it is that, if one thing is posited, something else is necessarily posited or cancelled as a result.⁴⁷

We have no direct insight into how these forces are possible, how they are combined together in the natures of the particles that serve as the building blocks of complex bodies, or precisely how they act in producing their effects, so from our standpoint the natures of bodies are

commitment to this principle in his context, stronger even than staunch supporters of Newton such as Voltaire and Maupertuis. Thinkers such as Leibniz and Wolff, who deny any intersubstantial causation whatsoever, obviously cannot accept the reality of action at a distance, the appearance of which they explain in terms of the harmony between the monadic properties of individual substances. Kant’s early support for this view within his own monadological approach to metaphysical foundations for physics, accordingly, is a significant divergence from their views.

⁴⁷ In the essay on *Negative Magnitudes*, also published in 1763, Kant discusses at length the same distinction between real and logical grounds that motivates his ontological argument in the *OPA*. He asks rhetorically, though it certainly seems to be genuine question, “How am I to understand the fact that, because something is, something else is?” (2:202, emphasis in text) and then later he writes, “Let us see whether we can offer a distinct explanation of how it is that, because something is something else is cancelled...” (2:204, alternate emphasis also in text) His conclusion is that terms like ‘force’, ‘activity’, ‘cause’ and ‘effect’ are themselves, or can be analyzed into, “simple, unanalyzable concepts of real grounds, the relation of which to their consequences cannot be rendered distinct at all.” (2:204) This comes, incidentally, four pages after the claim that “[e]xternal things may well contain the condition under which concepts present themselves in one way or another; but external things do not have the power actually to produce those concepts.” (2:199) It is clear that the metaphysical and natural philosophical investigations concerning Kant in the early 1760s are important stimuli for his formulation of the problems that the theory of experience he works out in the 1770s and 1780s are intended to solve. One of these problems seems to present itself for the view, which Kant has maintained since the 1750s, that any change in the representative state of the soul requires that the soul be connected with an organic body. Some interpreters (e.g., Laywine [1993], Friedman [1992], Schönfeld [2000]) see the discussion in the *Dreams* essay as indicative of a crisis in which Kant realizes that his position makes the soul subject to the laws of bodies, and which forces Kant to distinguish more radically than he had before between the worlds of phenomena and noumena. I agree with Ferrini [2000] that the position of *Dreams* is far more complicated and interesting than that, though not for precisely the same reasons. I do not have the space here to go into these reasons.

inscrutable principles. Given this understanding of natures, it would be presumptuous of us to insist on supposedly *a priori* grounds that whenever we observe apparently contingent unity and purposiveness in nature we can be certain that it is *merely* apparent. In Kant's view, no amount of *a priori* reasoning about the essence of matter, and no systematic observations of natural phenomena, can guarantee that all determinations and changes in bodies actually arise with necessity from the motions of other bodies or from the same blindly determined forces that ground the essential characteristics common to all bodies. Mechanical reductionism is a valuable methodological principle, in Kant's view, but we cannot justify it through *a priori* insight into the ontological grounds of matter, and observation of particular complex bodies in nature is precisely what it is that presents the challenges such an *a priori* commitment is supposed to overcome if we are to take it seriously.⁴⁸

Accordingly, we have no ontological assurance that all *natural* determinations of bodies are necessary results of the same forces that ground the essential features of matter. We also have no guarantee that all real contingency or purposiveness in nature must be the *artificial* result of causes external to matter that work according to ideas.⁴⁹ For the sake of unifying our knowledge

⁴⁸This is one of the key points of Kant's revised method of physico-theology, which remains quite important in the Critical period as well. If the value of a methodological principle is its use in providing our cognitive capacities with their greatest possible extension, and this involves representing nature as a unified system under empirically discoverable natural laws, artificially one-sided *a priori* approaches to conceiving of the unity of nature are destructive of the very ends for which they are adopted. See Chapter III below.

⁴⁹One of the advantages of the view I see Kant developing is that it does not presuppose an identity of reference for the phrases contingent features of a thing and purposive features of a thing, and then set out to find (or invent) explanations for all contingencies by reference to the purpose, end, or good that they serve. This approach to teleology, which appears to have been somewhat common among natural theologians of the day (Cf. Schönfeld, 2000), is famously ridiculed in Voltaire's *Candide*. Contingency as such is not the mark of purposiveness for Kant, but real contingency is required if there is to be any unity between seemingly diverse things beyond necessary (analytic) unity. The orientation of really distinct elements of a thing to one another through their mutual orientation towards a common end is contingent, not because it is purposive, but because it is a unity of really distinct elements, or elements that have no intrinsically necessary connection to one another. The fact that these elements are aimed at an end in plant and animal bodies (i.e., they exhibit contingent unity aimed at perfection) is what constitutes them as purposive and as real unities (instead of aggregates of contingently connected parts with no principle of unity). Accordingly, without real connections that are contingent insofar as they occur between fundamentally distinct or really diverse things, there is no purposiveness. It does not follow, however, that there cannot be contingency without purposiveness. If there are spontaneous agents that are neither determined by nor active in conformity with any law, or if there really is chance, radical contingency, or an Epicurean swerve,

of nature by reducing the number of different kinds of causes we make use of in our explanations, we should, according to Kant, try to understand the determinations and changes of compound bodies and arrangements in nature in terms of the fundamental forces that give rise to the essential characteristics of matter and to the laws of motion; *i.e.*, we should try to subsume them under the *necessary order of nature*.⁵⁰ The failure of this attempt in particular cases of unity and purposiveness, however, does not require immediate appeal to causes intentionally directed at the production of these particular cases of purposive unity as ends.⁵¹

We can preserve a greater unity in our knowledge of nature in cases of unity and purposiveness that are contingent from the standpoint of the most general principles of mechanical explanations, if we admit the possibility that the purposive unity of a particular arrangement of material parts in nature is grounded in the particular combination of natural forces that constitute the nature of the being in question.⁵² Even though we have no insight into *how* these various forces are combined, this view of nature is lent plausibility by some well-known facts about organisms. For instance, the purposive unity exhibited by an individual organic body is very *similar* to that exhibited by others, but it also *diverges* in some ways as well. Individual organic bodies also appear to be *generated* by others that exhibit the same general purposive unity that they do. The *functioning* of organic bodies can be partially explained according to the same mathematically expressible laws governing the functioning of machines, and the maintenance of this functioning requires interaction with other organic and inorganic bodies. The kind of regularity that we actually observe to characterize the connections among phenomena in organisms, and those between organisms and the rest of nature, counts *against* the view that

whatever is contingent on these would not be purposive simply in virtue of its ontological contingency. Furthermore, neither the parts of a contingently connected multiplicity of material things, nor the totality of these parts considered as a whole, would require any reference at all to any purpose for judging the possibility, existence, and characteristics of the parts and the whole. In the third Critique, Kant discusses purposiveness as the lawfulness of the contingent, but it is clear that this does not mean that all contingency is purposive.

⁵⁰This is a paraphrase of the first rule of Kant's revised method of physico-theology. (2:126)

⁵¹ See rule three of the revised method of physico-theology. (2:126)

⁵² *ibid.*

individual organic bodies are direct products of artificial causes just as much as their purposive unity counts *for* it. Kant's discussion of a *contingent order of nature* is an attempt to account for this kind of, genuinely purposive, order in terms of natural causes operating according to natural laws.⁵³

The observed facts of *similarity* and *divergence* among the forms and activities of natural bodies could be rendered intelligible, *per se* even if not *to us*, in terms of natural principles, if all bodies of a particular kind are related to each other, and to bodies of other kinds, in specific ways. Most generally, organisms are bodies, and must be subject to whatever laws govern the activities of the forces that ground the extension and impenetrability common to all bodies *as such*. The logical class formed by considering *extension* as a characteristic mark includes all bodies, regardless of whether these bodies are real or imaginary, simple or complex, organic or inorganic, animated or inert, natural or artificial. In virtue of this fact, all existing bodies are related to each other through their membership in the class of *extended things*, and they all occupy some space through the exercise of the forces constituting their natures.

On this basis, it can seem that the factually given distinctions between the kinds of bodies we observe in nature are distinctions among members of a single physical class, and that these distinctions can be explained sufficiently by differences in the exercise of the same capacities or the same forces shared by all of its members. That is, if all natural determinations and changes of a substance must have grounds in the nature of the substance, and if all bodies have a material nature, it would seem that all natural determinations and changes of bodies would have to be grounded in their material nature. If the forces common to all substances that are of a material nature are mechanical forces, this way of conceiving of the class of bodies will lead to the disjunctive statement that Kant is concerned to deny throughout his work on organisms; namely, *either* complex organic bodies are generated by mechanical forces *or* organization is not a

⁵³ See the 'Fourth Reflection: Employment of our Argument in Judging the Perfection of a World According to the Course of Nature' (2:108-15). I focus on a significant part of this text below (I.4).

naturally produced determination of bodies.⁵⁴ Admitting that the real possibility, or nature, of bodies *involves* the mechanical forces and laws that ground the extension characteristic of *all* bodies, however, is not the same thing as claiming that the *only* forces required to ground the natural determinations of bodies are mechanical forces. Kant is right to see that the above disjunction follows only if we take a generally accepted *necessary* condition for a thing to qualify as a body to be also a condition *sufficient* in itself for accounting for all of the natural determinations of bodies.⁵⁵

It is perfectly consistent to maintain, as Kant does, *both* that all bodies are of a material nature *and* that the distinction between organisms and other natural bodies is a real distinction grounded in the combination of natural forces that is required for the generation and functioning of organic bodies but not for the generation of inorganic bodies.⁵⁶ The same can be said for the distinctions at various levels within the organic realm. For instance, plants and animals require

⁵⁴ This seems to be the common assumption shared by supporters of epigenesis and preformation in the middle of the eighteenth century. Although the former are often thought of as vitalists, and not without good reason, their views are best understood as attempts to provide what Kant refers to as a physico-mechanical account of natural phenomena that cannot be accounted for purely mechanically, i.e., through the sizes and shapes of material parts and externally impressed motions (see note 41 above). Just as Newtonians find that attractive and repulsive forces are required to explain the most general phenomena studied in physics, Buffon relies on organic molecules that have been molded from within and Maupertuis posits forces that resemble memory, desire, and aversion in order to explain how material parts produced by parents gradually assume the form characteristic of the species. The structure of these explanations is a mechanical one, even if the forces postulated are not identical to those made use of in physico-mechanical explanations of other kinds of compound bodies and their motions. What is more, these explanations are intended to recapture the naturalness of the generation of organic bodies from the dominance of preformationist views. I will show below (1.3 and Chapter IV) that this dispute is central to Kant's thinking about organisms and teleology in the *OPA* and that it also gives rise to the apparently dialectic conflict between maxims for reflective judgment in the *CTJ*.

⁵⁵ This is much the same error committed by those who start by taking activity to be a necessary condition of substance, and then conclude that a substance must be the sufficient ground of all of its own determinations and changes, i.e., that it must be spontaneous. This leads to one or another form of non-interactive theory of harmony and, when coupled with the view that matter is inert, 'material idealism'. I think Kant takes Malebranche, Leibniz, and Wolff to have all made this mistake, which undermines any chance of distinguishing between an ideally instituted agreement between distinct substances and a genuinely causal *order of nature*.

⁵⁶ That this is Kant's view becomes even clearer in the 1770s, when he begins to talk about the unity of a species in terms of the particular generative force (*zeugende Kraft*, *Zeugungskraft*) shared by its members. He reformulates this conception in the *CJ*, due I think both to his desire to stress an analogy with our own natural faculty of forming representations (*Bildungsvermögen*) and to the growing recognition of the importance of Blumenbach's work on the formative drive (*Bildungstrieb*) as a non-mechanical drive active in the generation and maintenance of the form characteristic of a particular species of organized being. These views will be discussed at length in subsequent chapters.

that the forces characteristic of matter *as such* be combined with natural forces that together explain the capacities for the formation, growth, and reproduction of material structures. Animals, but not plants, require that all of these be combined with forces that together give rise to the capacity for voluntary motion.⁵⁷ Different species of animal also require different forces, acting in combination with the mechanical forces grounding matter *as such*, that together explain the characteristic differences in organic structures and the corresponding differences in types of voluntary motion. Kant's view involves treating the generation and functioning of individual organic bodies as the result of individually necessary, contingently related, natural causal powers that are jointly sufficient to explain the various capacities that lead us to posit real distinctions within the general class of naturally produced bodies.

Since all of these distinctions are made within the physical class of existing bodies observed in the natural world, rather than within the logical class of Being *as such*, there is no worry that positing real distinctions between the various kinds of force and law required to account for natural phenomena will undermine the ontological unity of nature.⁵⁸ Their common material nature⁵⁹ will guarantee that bodies that are subject to distinct laws arising from the

⁵⁷ 2: 125 Kant begins to treat the most basic distinction between natural bodies as the organic/inorganic distinction, rather than dividing nature into the kingdoms of animal, plant, and mineral, around the time of the *OPA*, but there are still important differences in the capacities of plants and animals that this distinction must be able to accommodate.

⁵⁸ According to Kant, as will become even clearer below, the kind of systematic conceptual unity that is made possible by treating each individual in nature as the physical correlate of a concept arrived at by successively determining the most general concept of being is an artifact of our discursive way of representing the similarities and differences between objects. The unity of nature does not have to consist in the analytic or logical relation between all forces, laws, or forms that would result if all of the apparently different kinds were simply various manifestations of a single kind. The claim that it is not intelligible to us how genuinely distinct kinds of thing in nature can be related to each other in orderly and lawful ways is certainly true, but it is not clear that this claim has any straightforward implications for how the ontological grounds of the natural world have to be related to each other.

⁵⁹ This is slightly different point from the one about general natures that Watkins [2005] makes: "...God has endowed each substance with a general nature, that is, one with causal powers that always act on other substances in certain ways under certain conditions. The link between general grounding and intersubstantial causation is established through the nature God provides each substance. This nature is general, since the nature consists in the substance's essential, that is, non-contingent and immutable, properties. Further, this nature implies intersubstantial causation, since such a nature would be superfluous unless it acted or were capable of acting (directly) on other substances." (p. 176) I think Watkins is right to see the connection between general and singular grounding, on the one hand, and physical influx, on the other, as merely hinted at in the ND and developed fully only in the ID. The point I want to make concerns

contingent connections between their grounds will, nonetheless, be capable of interacting with each other in a single world.⁶⁰ As I understand Kant's usage, the term *material* or *bodily nature* refers to a set of ontological grounds that are common to the manifold natures of a variety of distinct kinds of natural substance. We *posit* all of these manifold natures as *existing* on the basis of commonalities in observable effects between spatially and temporally distinct bodies, and we *conceive of their possibility* and that of the interaction between substances (whether of the same or of different, specific or general, natures) through thinking about each as the effect of a common cause, namely, God.

In cases of bodies with homogenous parts, and some cases of bodies with heterogeneous parts, we are capable of explaining the determinations and changes of the resulting bodies in terms of the compound effects of the determinations and changes of their parts. Each fundamental part of matter, or each material element, continuously exercises the force or forces

an idea which is explicitly used in the ND against the universality of the Leibnizean principle of the identity of indiscernibles. Here the point is that there can be several things that have the same nature and that, thus, will necessarily be subject to the same sets of laws. Kant mentions specifically 'bodies which are said to be similar' that 'agree completely in their primitive parts', such as 'water, mercury, gold, the simplest salts, and so forth'. The point I want to make here is that there is an important sense in which two bodies that are of different natures and act according to different laws, e.g., water and gold, are also, as bodies, of the same nature and act according to the same laws, e.g., the laws of gravitation. That is, we cannot proceed from the laws that follow from identity of general type to the claim that all more specific types subject to these laws will have to be subject to all of the same laws. There are different laws that govern the exercise of the forces involved in the nature of water and those involved in the nature of gold, yet (1) these laws are combined in a unified system of natural laws and (2) these bodies are subject to a set of common laws with which the different laws, arising from their different natures, are consistent, but from which they are not derived. These are strictures on any natural philosophical explanation of organic bodies, which also represent important differences between the logical and physical or natural conceptions of a system that Kant will argue are crucial for all natural philosophy. As bodies, organic bodies must be subject to the same laws that govern the exercise of the forces essential to matter as such, and as complex bodies, organic bodies must be composed of inter-related material parts. It does not follow from this, however, that the specific kinds of systematic relation characterizing these parts are all brought about and preserved according to the same general laws through which inorganic bodies are generated and cohere. The same general point, I think, can be made about the natural laws emerging from the actions of souls and those of bodies, and, then about the laws emerging from the action of free souls in nature and those of 'brute' souls, but that is the topic for a further project that will make use of the work done here.

⁶⁰This is part of the significance of realizing that the objects under discussion are already part of a world in which there is a necessary order arising from the universal system of relations between all substances. If we were considering things merely abstractly, we might worry whether two things could be combined in the same system without conflict. If we start with concrete objects, however, any conflicts arising in our thinking about them must be products of our improper characterizations, or of the limits of our insight into the grounds of their compatibility.

that are natural to it. The interaction between this exercise and that of the forces natural to other elements explains the particular determinations and changes of each of the parts, which explain those of the whole aggregate of parts that we refer to as the body.⁶¹ The elements involved in these explanations are ‘found’ in nature only in various connections, but we are able to isolate them from their physical relations, experiment with or speculate about the effects of their activities in isolation, and group them together under logical headings according to identity of effect. We represent them abstractly, according to their logical possibility or essence, within a logically arranged system of concepts, but we can also think about them according to their real possibility or nature as the active principles responsible for the determinations and changes of the actual bodies we observe.

The common cause that we think of as responsible for the real and logical possibilities of these elements, of their relations to each other, and of their existence, is the first real ground of the possibility of all things, or God.⁶² Once the system of these elements is created, however, the

⁶¹ See Section III, §§ 430-31, of the *Lectures on Metaphysics* notes taken by Herder. (28:49)

⁶² This conception of God is the central theme of the *OPA*. The first section provides an a priori argument that Kant thinks is the only basis on which a truly scientific demonstration of the existence of God can be grounded. The second section shows that this conception is extremely useful for conceiving of the systematic unity of nature under laws, and that it suggests itself to anyone who thinks carefully about the grounds of the various kinds of unity we observe in nature. The third section argues that none of the three traditional theistic proofs is adequate to the task of grounding a rigorous demonstration. I am not sure why commentators have been puzzled by the structure of this work. Schönfeld [2000] devotes nearly seven pages to trying to clear up the confusions he points to in Schmucker [1980], Gebler [1990], and Beiser [1992]. He makes an interesting point about the difference between a *Beweis* and a *Beweisgrund*, claiming that the work contains two proofs (*Beweise*) given on the same ‘proof-ground’ (*Beweisgrund*), but neither the utility of this distinction nor its application to Kant’s text is clear to me. If he means by *Beweis* or ‘proof’ the same thing Kant refers to by the latinized term *Demonstration* in the title, a term Kant might have chosen in order to avoid using the phrase ‘*Beweisgrund zu einem Beweis*’, then Schönfeld’s interpretation has to deal with the difficulty presented by Kant’s claim in the preface that the “demonstration... has not yet been discovered” and that what he is “offering here is merely an argument in support of a demonstration.”(2:66) That is, rather than two demonstrations, the work offers none. Alternatively, if Schönfeld simply means that Kant provides two less than demonstrative arguments or ‘proofs’ that make use of the same conception of possibility as a ‘proof-ground’, then he runs into trouble with his own claim that “Kant takes ‘proof’ to refer to a deductive demonstration”. (p.197) Because of this, he claims that there are two arguments, but only one proof (i.e., only one deductive demonstration). These claims are also made in close proximity to the claim that Kant provides “an a posteriori demonstration” (p. 191) and that Kant provides “two distinct demonstrations”. (p. 194) Even if these latter claims are merely statements about how it might appear to someone who does not yet understand Kant’s intention or procedure, his somewhat indiscriminate use of ‘demonstration’ muddies the very waters he is attempting to clear up. It is not surprising that Schönfeld finds implausible the view, argued for in Fisher and Watkins [1998], that

natural exercise of their forces according to the natural laws governing this exercise is sufficient for the generation and maintenance of complex order in nature. If we were provided with *a priori* knowledge of the essence of matter and the most general forces and laws governing the determinations and changes of bodies, we would not be able to deduce from this knowledge the complex and harmonious variety of particular kinds of natural body and of particular natural laws with which experience presents us. Starting from this variety, however, we are actually successful in discovering regularities among natural bodies for which we can formulate mathematical laws that can be understood as instances of the most general laws governing the determinations and changes of matter *as such*. Before trying our hand, we cannot be certain that this systematizing activity will succeed in any particular case of complex order, since our inability to deduce such order from the laws of motion leads us to think that it is contingent from the standpoint of these laws. Finding out that, despite this, a particular orderly arrangement in nature can be understood to follow necessarily from particular laws that can be subsumed under these laws, fills us with a sense of wonder that brings with it an even more lasting conviction that the entirety of nature is grounded in an intelligent first cause than does the immediate recourse to artifice whenever we come across objects whose connection to these laws is not obvious.⁶³

Kant still makes an important use of the line of argument from the *OPA* in the *CPR*. Schönfeld seems to think that the only purpose this line of argument serves is to demonstrate deductively that God exists. If he were right about this, then his appeal to Kant's establishing God as a merely regulative principle in the first *Critique* would support his claim that the pre-Critical proof must have been a failure. Kant's lengthy discussion of the utility of this line of argument for natural philosophy in Section 2 of the *OPA*, however, comprises the bulk of a work that begins by professing only to provide materials for a demonstration and ends by claiming that the demonstration itself is not really so necessary. The 'extensive utility' of the idea of a single ground of all possibility is precisely the kind of thing Kant has in mind in the first *Critique* when he claims that the real importance of the theoretical, purely ontological, idea of God is the use we make of this idea as a principle regulating our systematic investigation into nature. That Kant no longer thinks the line of reasoning leading to this idea is a ground from which we can proceed *a priori* to demonstrate God's existence, while not insignificant, does not undermine the importance of this idea for securing the greatest possible extension of our reason. As I hope to make clear below, this idea of *noumenal perfection* or the *transcendental ideal* remains the ultimate rule of unity for our attempts to transform the mere aggregate of relatively unified particular experiences of objects in the world into a systematic and scientific view of a unified system under natural laws, "without which [rule] we would have no reason... no coherent use of the understanding... and no sufficient mark of empirical truth". (A 651/B 679)

⁶³ See 2: 95, where Kant discusses the feeling of sublimity engendered by the intellectual comprehension of the necessity of order and harmony in the natural world.

Developing our own capacities as reasoners requires that we not simply appeal to artificial design whenever we observe order and harmony in nature, even if this order is exactly what we think would be necessary in order to accomplish the ends of rational or other living beings.⁶⁴ The methodological injunction to explain what we observe in terms of the *order of nature* receives general metaphysical justification, in Kant's view, through the argument that the possibility of any kind of orderly connection between distinct things in the world presupposes a common ground of the possibility and existence of these things. This, again, guarantees that all bodies in the natural world will be capable of interacting in regular and harmonious ways according to laws that govern the exercise of their natural, efficient-causal, forces. It does not rule out, however, that some *natural* determinations and changes of particular kinds of bodies will not be subsumable under the above outlined *necessary order of nature*.

In the case of organisms, in Kant's view, particular natural bodies exhibit a kind of functional unity between heterogeneous material parts that renders them suitable for accomplishing ends (such as growth, nutrition, and reproduction) without which the unity of the parts cannot be preserved.⁶⁵ We cannot explain the processes through which the material parts and capacities of these beings are developed according to the model of previously existing elements that aggregate through the exercise of their natural forces. The common cause of the particular kind of interaction characterizing *parts* of the same individual organic *body* seems to be the seed from which the parts themselves grow through the appropriation of material from without.⁶⁶ The common cause of the particular kind of interaction characterizing *individuals* of the same *natural kind* seems to be the first member or members of the series of seeds and seed producing organisms, which series branches out into the particular manifold of contemporary co-existing and potentially interbreeding individual organisms of that kind.⁶⁷

⁶⁴ 2: 97

⁶⁵ 2: 152

⁶⁶ 2: 114

⁶⁷ This becomes even clearer in the work from the 1770s, to which I will turn in the Chapter II.

Accordingly, although some determinations and changes in organized bodies can be explained according to the material nature they share with all bodies, others require explanation in terms of natures that they share only with other members of their natural kind. This natural kind in the case of organic bodies is not the totality of co-created instantiations of the same logical kind that act differently only according to the different connections in which they exist in nature (like material elements), nor is it a totality of individual complex bodies that are each individually generated out of material elements and exhibit similar forms (like heavenly bodies). The kind natural to organic bodies is, rather, a series of successively generated members that both *grow out of* and have the capacity genuinely to *produce* other members of the same kind. This aspect of the *order of nature*, which is not common to the most basic constituents of matter themselves or to all complex bodies composed of these, is the kind of order Kant is concerned to explore under the heading of the *contingent order of nature*.

Conceiving of the natures of organic bodies in this way provides a kind of indirect insight into the causal grounds responsible for natural kinds, and for similarities and differences in individuals of the same kind, that is explanatorily relevant, even though it does not actually render the processes through which individuals are generated from others of their kind intelligible *to us*. That is, we can know through observation that there are regularities between natural phenomena, which regularities are actually useful in generating hypotheses about the past, the present, and the future, even without having insight into how the various efficient-causal forces that are independently necessary for generating these regularities are related to each other (in the nature of the body in question) and to the forces grounding the determinations of other bodies (in nature as a whole) so that the mutual exercise of these forces determines each to their respective effects.⁶⁸ Discovering the natural laws governing the activity of these forces, individually and in combination, is what would be needed to render the natural generation of organisms intelligible *to*

⁶⁸2: 111

us, whereas the mere existence of such natural laws is all that is required to render them intelligible *per se*.⁶⁹

Conceiving of the possibility of such natural laws, in Kant's view, requires that we think of each organism of a particular kind as causally linked in a chain extending back to the first members of its kind. In this manner, Kant believes we can conceive indirectly of the possibility, or intelligibility *per se* of phenomena into the real grounds of which we have no *a priori* insight. The real contingency and purposiveness of the unified structures in an individual organism could, according to this view, be grounded in the confluence between the lawful exercise of the powers and capacities comprising its nature and the lawful exercise of the natural forces of external causes. The capacity for the particular kind of interaction between two individuals required to produce a new organic body of the same kind could be grounded in the mutual possession of the same force that is partially explanatory of their own generation as organic bodies. In this way, the essential characteristics common to all fully developed members of a kind (e.g., the rationality common to mature humans), the particular features used to differentiate between distinct and well-defined groups of individuals within the same kind (e.g., the reproductive organs of males and females) as well as features whose location on a continuum makes such groupings problematic (e.g., permanent hair and skin color) and accidental features that are generally attributed to external causes (e.g., temporary hair and skin color) could all have necessary grounds in the nature shared by the distinct individuals that are factually grouped together as members of the same kind.

In Kant's view, this kind of natural teleology does not lead to naturalism, even though it locates the proximate grounds of various kinds of purposive unity within nature. If, as Kant believes, we posit natures as ontological grounds of observed unities, and we have no *direct* insight into how they are possible or how they achieve their effects, we must concede that these natures might themselves be grounded in something supernatural. If their possibility is not

⁶⁹2: 115

ultimately grounded in something beyond nature, then each nature is either a brute fact about the world that is unintelligible *per se*, or it is intelligible *per se* and without reference to anything else.⁷⁰ Regardless of which of these we choose, the fact that individuals of different natures are also related to each other in regular ways (*e.g.*, as predator and prey, or photosensitive and source of light) will be unintelligible *per se*. In the first case, these relations will be just as unintelligible as the possibility and existence of the natures themselves. In the second case, the existence of any individual nature will be intelligible without reference to anything else, and there will be no explanation, in the sense of ontological ground, for the *de facto* agreement or harmony between the determinations grounded in *this* particular nature and those grounded in the natures of other beings.

This agreement, whether necessary or contingent, however, is one of the central aspects of the natural world that provides us with a reason to begin thinking about natures in the first place. That is, if the regular agreement between the motion of one body and that of another, or between the parts of an organism, between an individual organism and others of its kind, or between the needs of an individual organism and the things in its environment that satisfy these needs, are all inexplicable or unintelligible *per se*, then it is hard to see the point in the considerations of natural causality that lead to the positing of natures in the first place.⁷¹ If we start with the conception of some kind of complex thing (a world, a species, a body) and claim that its existence and properties result from a multiplicity of simpler parts, the intelligibility of the resulting whole is not simply a matter of the intelligibility of the parts themselves. The relations

⁷⁰ It could, of course, be intelligible by reference to some other nature from which it stems. Avoiding an infinite regress or vicious circularity, however, would require ruling this out, so natures that are intelligible by reference to others must be able to be traced back to natures that are intelligible *per se* or to brute facts.

⁷¹ This is a point even closer to the one Watkins [2005] makes about the role of general natures in the *ID*. See note 58 above. The consideration of these natures seems to me important for Kant's distancing himself from a naturalistic understanding of causal natures as well. This role, moreover, does seem to be stressed in the *OPA*.

of the parts to each other, or their combination into a complex whole, must also be intelligible, if the parts are to render the complexity with which we started intelligible.⁷²

If relations between individuals are unintelligible *per se*, then these relations, and the complex wholes grounded in them, are either impossible or they are simply brute facts. Presumably the supporter of naturalism would not want to take the route of denying the possibility of complex wholes, so it seems that brute facticity is the only way to go. On this view, then, complex wholes in nature are as they are, and nature itself as a complex whole is as it is, and could not be otherwise, completely independent of the natures of the individual things that are related to each other in the world. This means that the way the world is does not actually depend on the ontologically prior natures of the individual things in the world, and the regular and lawful unity and harmony amidst the variety of natural phenomena, which leads to positing natures in the first place, is necessary and unintelligible *per se*.⁷³ Kant's strategy in the *OPA* seems to be to show that naturalism, like reductive mechanism, takes what are generally accepted to be necessary conditions for various kinds of order in nature to be sufficient conditions for this order. In both cases, what starts as a valuable research program is turned into a dogmatic ontology that ends up rendering either impossible or unintelligible *per se* the very things it claims

⁷² For instance, the particular size and shape of a complex body is not rendered intelligible simply through the existence of each of its atomic parts and the natural tendency of each of these parts to move downward through empty space. Nor are the voluntary motions and involuntary ideas of a particular human being rendered intelligible simply through the existence of an indivisible mind and of the particular mode of extended substance that is its body. The intelligibility of the parts of some whole may be interesting and important in its own right, but if these parts are such that the relations between them are unintelligible, then the parts, and ultimately the natures of these parts, are rendered irrelevant to the intelligibility of the whole.

⁷³ If we were to claim that the parts are intelligible only in terms of their relations within the whole and, thus, are not ontologically prior to the whole, we would either be giving up on the idea that there are causal natures underlying the parts, or we would be admitting that these natures are not intelligible *per se*. If we choose the latter route, a naturalistic interpretation that wanted to preserve any intelligibility at all would require the identification of nature in the sense of a totality of objects under laws, with nature in the sense of the ontological grounds for the determinations and changes of a substance. The natural world would be, as Spinoza maintains, the only substance. Spinoza is free to insist that this view renders particular things and their connections in nature intelligible *per se*, but this is done at the expense of their intelligibility for those of us who have not yet achieved the theosophic vision of the whole from which the intelligibility of the parts and connections have to follow.

to render intelligible *to us*.⁷⁴ For Kant, it is the promised unity of ontological and epistemological principles of explanation that suggests naturalism to us in the first place, and not any insight into its necessity or into the impossibility of any other view. If it involves ontological claims that cannot be justified methodologically, and that render connections that we view as in need of explanation absolutely or fatalistically necessary and inexplicable, then naturalism undermines the task for which it is adopted.⁷⁵

For Kant, the successes of naturalism and mechanism as methodology point us away from, rather than towards, their adoption as ontology. It is their perceived failure on their own grounds as ontological claims capable of providing foundations for the natural sciences, however, and not the desire to make room for scientifically questionable things like contingency and purposiveness, that actually leads Kant to reject them in metaphysics. This rejection does, in fact, provide Kant with room to develop a metaphysical grounding for natural philosophy that he thinks is better able to reconcile mechanical and teleological causality within nature, but this rejection is not made on external grounds *in order to* allow for this reconciliation.⁷⁶ Rather, Kant appeals first to the *necessary* unity and harmony among natural phenomena that *are* mechanically explicable as leading to the need to deny the absolute self-sufficiency of matter and to posit ontologically prior grounds that explain the possibility of matter and the laws of motion. This is done, first, through appealing to forces that constitute the natures of the natural or physical substances that ground bodies. These natures provide *necessary* grounds for the universal

⁷⁴ This is the general error that Kant will begin to refer to as transcendental subreption in the *ID*. If we take the subjective conditions under which alone we can positively identify some event in nature as following from the *order of nature* to be the objective conditions under which alone an event is included in the *order of nature*, we will be bound to undermine the possibility of understanding what we experience (fatalistic or skeptical naturalism) or of experiencing what we understand (dogmatic or problematic idealism).

⁷⁵ This is one of the problems that leads Kant to perceive the need to subject the claims of pure reason to a transcendental critique.

⁷⁶ I take a similar view on Kant's arguments for the possibility of freedom, and of the efficacy of freedom in the natural world in the Critical period. The burden of proof, it seems to me, falls on the person who claims insight into the ultimate grounds of causality in nature, from which it purportedly follows that all human actions are grounded sufficiently in external stimuli and/or features of the human that are beyond rational control. Even if a completely deterministic system were sufficient to account for all phenomena in nature, it is not clear that only such a system could account for these, which is what would be required to overturn a robust sense of human freedom.

harmony or agreement among their effects, but the existence of these substances is not alone *sufficient* for this harmony.

Each of these substances is intelligible *per se* and independently of every other, so it is logically possible that all of them could exist without standing in any real relation to the others.⁷⁷

The harmony or agreement between the effects grounded in the natures of these substances is grounded sufficiently only if the substances are also related to each other. The connection of these substances into a world, in virtue of which they become *parts* whose natures and causal relations are explanatory of the features of composite *wholes* within the world, is possible only because they all depend on a common ground for their natures.⁷⁸ Accordingly, even mechanical explanations of natural wholes in terms of pre-existing parts and their motions, and naturalistic explanations of events in terms of natural bodies, forces, and laws, presuppose a unified world of mutually related substances. *Qua* substances, the parts of given natural wholes can be conceived independently through their logical essences or their physical natures, but *qua* parts of compounds these same substances are necessarily co-coordinated in such a way that their determinations and changes are connected with each other as real grounds of the determinations and changes of the whole.⁷⁹

The real possibility of such a world, as a totality of causally connected finite substances of various natures, itself requires a single supernatural ground, according to Kant. The nature of this single ground is intelligible *per se* without reference to anything else, and provides the

⁷⁷ This is a fairly standard understanding of substantiality, though there is disagreement in the modern period concerning whether the independence of substance is from every other substance whatsoever, or simply from every other finite substance. If it is interpreted as the former, Spinozism results. The other major figures in the modern period who offer theories of substance allow that there can be finite substances, whose only strictly necessary dependence relation is on God. For Kant's explicit use of this conception of finite substance in the pre-Critical period, see *ND* (I: 413), *Physical Monadology* (I: 477-80), *ID* (2: 406-10).

⁷⁸ Clear expressions of this claim can be found in the *ND* and the *ID* (see note 75). This is also a central part of the view, expressed in the *UNH* and the *OPA*, that the unity and harmony that follows with necessity from the laws of motion is evidence for, rather than against, a single source of all of the objects subject these laws. See, e.g., 1: 263-64, 2: 95-96, 2: 99.

⁷⁹ For a discussion of Kant's use of the notion of a real ground in his pre-Critical response to Hume, see Watkins [2005] pp. 166-170.

ground both of the intelligibility *per se* of all other natures and of the, albeit indirect, intelligibility *to us* of itself and of the possibility, existence, and connection of distinct substances into a unified world. Although this being is a necessary and sufficient condition for the world, and the actual world is *necessitated* through the spontaneous creative activity of this being, the world is not itself *necessary*.⁸⁰ Kant is aware of the problems that stem from privileging reductive, analytical, or logical unity as paradigmatic for the intelligibility of unity amidst diversity.⁸¹ He conceives of God's perfection, not in terms of a single force operating according to a single law, but in terms of the perfectly harmonious interaction between the greatest possible understanding and the greatest possible will. In this way, he is able to avoid the conclusion, which Spinoza accepts and Leibniz tries to avoid, that the world is simply a logically necessary emanation from God's infinite perfection.⁸²

⁸⁰ Kant is aware, as was Leibniz, of the importance of the modal distinction between the necessity of the consequence and the necessity of the consequent. Even if the world is a necessary result of God's action, it does not follow that the world is itself necessary.

⁸¹ This is a central point in which Kant's ontology differs from Wolff's. For Wolff, the unity of a substance and of its capacities is conceived of analytically in terms of simplicity. The monad, whether physical or spiritual, is a single fundamental power or force, from which alone all apparently different capacities and determinations stem. God is a perfect (infinite) power of representation, and human minds or souls are imperfect (finite) powers of representation. The capacities or faculties of the mind that Kant here refers to as understanding and will, and which correspond to Leibniz's representation and appetite, are treated by Wolff as merely different capacities of the soul's fundamental power of representation. Kant's active faculty of cognition (understanding or intelligence) and passive faculty of (or receptivity to) cognition (sensitivity), which are distinguished in the ID, are also conceived of by Wolff as merely different results of the same effort to represent parts of the world. These effects are distinguished, causally, in terms of what this effort represents and, phenomenologically, in terms of the degree of clarity and distinctness of the representation. This is the source of Kant's claim in the ID that the "illustrious Wolff has, by this distinction between what is sensitive and what belongs to the understanding, a distinction which for him is merely logical, completely abolished, to the great detriment of philosophy, the noblest of the enterprises of antiquity, the discussion of the character of phenomena and noumena, and has turned men's minds away from that enquiry to things which are often only logical minutiae." (2:395) For Kant, a finite substance is not a fundamental force, but is the real ground of distinct forces that constitute its nature, and that are the grounds explaining why a determination or change is attributed to a substance. For a discussion of the importance of Wolff's work both in transmitting aspects of Leibnizean thought into the eighteenth-century German context, and in setting the terms of the debate concerning causality in which Kant develops his own views, see Watkins [2005].

⁸² Leibniz's intellectualism causes him problems, according to some, because of the necessary entailment relation between the intellectual representation of the perfection contained in some simple or complex thing and the appetite or volition to create that thing. His talk of possibilities striving for existence according to their degree of perfection, moreover, invites the interpretation that the real world is ontologically necessary because it is the best of all possible worlds. I think a more charitable reading of Leibniz's view, which as we will see below is not the one Kant provides in the *OPA*, is to claim that God's intellect is the

Because the *necessary order of nature* points to the need for a supernatural ground of the possibility and existence of the natural world, Kant believes that naturalistic explanations of events and arrangements in nature pose no genuine threat to traditional religious beliefs, and that natural theology does not depend in any essential way on the existence of artificial arrangements in nature.⁸³ This provides Kant with a way of separating natural teleology from theology, and arguing that natural forces exercised according to natural laws are in fact responsible for order, unity, and harmony in nature. This is the case whether the harmony in question is the harmony between motions of bodies that are necessary from the standpoint of the laws of motion, or whether it is between motions and other changes of bodies that are contingent from the standpoint of these laws. The regularity of these latter changes and their harmony with the former should lead us to seek their causes in particular forces and laws that are systematically related to the most general forces and laws of nature, even if we cannot derive their possibility *a priori* from these forces and laws. According to Kant, this procedure ultimately leads to greater unity in ontological and epistemological grounds of natural explanation than does the *a priori* commitment to the view that all natural determinations and changes in bodies are attributable to a single kind of natural substance exercising a single kind of force according to a single kind of law.⁸⁴

ground of the eternal truths or possibilities that 'strive' to be selected by God's will, so the resulting world is neither absolutely necessary nor is it a necessary emanation from God. Wolff's view, however, does not allow for the same distinction and leads him far closer to Spinozism than he would like to admit. It seems to me that Wolff's emphasis on analytic unity is one of the factors prompting the rise of vitalistic pantheism at the end of the eighteenth century among a generation of thinkers schooled in Wolffian systematic thought, but also aware that mechanistic explanations leave too much of nature's unity and diversity either unexplained or unnatural. For interpretations of Leibniz's view, see Adams [1994], Rutherford [1995], Kulstad [1991]. For a general discussion of Wolff's philosophy, see Beck [1969]. For discussions of the notorious pantheism controversy in Kant's time, see Beiser [1987] and Zammito [1992]. For reactions to Wolff's stress on analytic unity and the problems posed for causality in general, mind-body interaction, and human freedom, see Watkins [2005].

⁸³ Both of these points are made at various places in the *UNH* and the *OPA*. The clearest extended discussion is in the Fifth and Sixth Reflections of Part II of the *OPA* (2:116-37).

⁸⁴ A naturalistic grounding of this view leads to a mechanistic reductionism that sacrifices explanatory power through insistence on a particular kind of logical unity and necessity, for which natural philosophy seems to provide countless counter-examples. A theistic grounding of the reductionist view can take us in at least two directions. The first, roughly Newtonian direction, ends up sacrificing both the unity of nature

Contingent Unity Aimed at Perfection

The theistically grounded natural philosophy Kant develops in his pre-Critical period, especially in the 1760s and 1770s, involves an attempt to overcome shortcomings of both the Newtonian and Wolffian approaches to the *order of nature*. The generation of a body that is characterized by a manifold of capacities and parts that exhibit *contingent unity* and are *aimed at perfection* cannot be explained *by us* as the result of the same natural forces and laws that ground the possibility of matter, in Kant's view. This is the claim that leads Kant to support *TMU*. The fact that we cannot explain the generation of a natural body mechanically, however, is not itself sufficient either for including it in a *contingent order of nature*, or for claiming that it cannot be generated naturally. There are several reasons Kant maintains this view.

Primary among these is the fact that not all aspects of the natural world lend themselves as straightforwardly to mechanical accounts as do the heavenly bodies. Some more particular aspects of the natural world have often seemed to require us to posit grounds beyond those involved in the nature of matter *as such* in order to understand the empirically discovered regularities involved in nature. If we do this too quickly, we run at least the following two risks. The first risk involves violating generally accepted maxims of natural philosophy in multiplying

and explanatory power. It sacrifices unity by attributing the initial systematic arrangement of the cosmos and its occasional repair directly to divine artifice. Explanatory power is sacrificed through the failure of attempts to explain the natural generation of one organism from others in terms of the aggregation of distinct material parts that are mechanically 'copied' from those of their parents, and that re-arrange themselves according to forces similar to those of attraction and repulsion. The second, roughly Wolffian direction, also ends up sacrificing the unity of nature and explanatory power. Unity is sacrificed by conceiving of the mechanically explicable functioning of the cosmos as artificially directed by and for the ends of rational beings, and as requiring suspensions of the natural order to achieve particular purposes, which then require the restoration of this order. Explanatory power is sacrificed by the attempt to explain the natural generation of one organism from others in terms of the mechanical process of unfolding a previously existing organic structure that has simply been 'housed' in one parent or the other. In both of these theistically-grounded natural philosophies, all natural events are attributed to the mechanical workings of matter, and all purposiveness is attributed to the artificial workings of reason. For a discussion of the traditional teleological views of the order of nature to which Kant is responding in the *UNH* and the *OPA*, see Schönfeld [2000]. I will return to the significance of the Wolffian and Newtonian views for Kant's own view in my discussion of the *CTJ*.

the causes beyond necessity, and potentially undermining the hope for unifying our knowledge of nature. The second risk is one that is more general and that ultimately poses a much greater threat to all areas of human life, in Kant's view. Although my primary focus here is on issues internal to the natural philosophical investigation of organisms, understanding what is really at stake for Kant requires considering the larger context in which Kant develops his views as well. I believe the following thought-experiment will help me elaborate on one of the concerns that I think is important for Kant's views on organisms and teleology throughout his writings.

There was a time, prior to Newton, when vortices were considered necessary for mechanical explanations of the motions of heavenly bodies and the behavior of liquids, gases, light and electrical phenomena were thought to be:

- 1) Explicable in terms of the transfer of motions between solid parts,
- 2) Results of natural forces other than those made use of in physics, or
- 3) Incapable of being explained naturally

Now, imagine we are faced with choosing one of these options for explaining the behavior of liquids, gases, etc. Let us say we have despaired of reconciling our *a priori* commitment to mechanism with our observations of the behavior of various gases and liquids, but rather than choosing 2) and giving up on this commitment to mechanism, we choose 3). We form the opinion that chemical phenomena do not result from natural causes. If we realize that the combination of gases and liquids in the Earth's atmosphere is necessary for life, we might be struck by the fact that the very things whose existence and activities we cannot explain according to the *order of nature* are also purposive for living beings. This realization could lead us to wonder about this arrangement and could even lead us to the subjective conviction that whatever non-natural being = x that is the cause of the presence in nature of this special provision possesses

not only the ability to represent this arrangement and the power to create it, but also the desire to institute this arrangement for the sake of living beings.

In this case, we take the *perfection* of some aspect of *the world*, or, as Kant discusses it in the *OPA*, its conduciveness to the needs of beings with capacities for representation and desire (*i.e.*, living beings), as evidence of the *perfection* of its cause, or the possession of understanding and will (*i.e.*, higher faculties of representation and desire). We can, perhaps, understand that there may be a subjective, psychological pull to go from considering this being= x as the cause of *some perfect aspect* of the world to considering this same being as *cause of the world*. Even if we were to grant the legitimacy of this move and set aside, for the moment,⁸⁵ the idea that the need for special provisions in such a case could strike us as an equally convincing argument for the *imperfection* of this *cause of the world*, we are still faced with the following difficulty.

What do we do when we find out that someone such as Kant supports the claim that positing attractive and repulsive forces of differing intensities in the fundamental elements of matter can provide a unified ontological account of the generation and motions of the heavenly bodies as well as of the elastic material medium, or aether, that explains fire, liquids, gases, and electrical phenomena? Are we going to exhibit the virtues of a good natural philosopher and be open to judging his claims according to whether or not they are sound physical hypotheses? Recall, our virtue may already be suspect, given that our *a priori* commitment to mechanism has already led us to reject natural causes other than those currently being made use of in physics. If we prefer to resort to supernatural causes rather than accept that our current physical theory is inadequate to account for some of the most common phenomena in nature, it seems somewhat unlikely that we will accept a view that maintains that this physical theory is useful in certain circumstances, but requires what some would call a supplementation, and others would call an entirely different foundation, if it is to be genuinely universally applicable.

⁸⁵ I will return to this issue in 1.4 below.

If we have become unwilling or unable to approach these claims with the same openness to and desire for the truth that led to our strong convictions in the first place, we might be likely to accuse someone like Kant of re-introducing the occult qualities of the scholastics, of undermining the only real basis for our faith in a creator God who is concerned with the welfare of human beings, or of arrogantly engaging in speculations far beyond the reach of human capacities. Rather than relying on criteria genuinely relevant to questions concerning what we can and cannot explain naturally and reflecting on the objective and subjective reasons for our individual and collective successes and failures, we might be likely to engage in polemics and invoke the authority of reason, of nature, or of scripture, (depending on whose favor we are courting) as a way of winning a sophistical victory that quiets our opponent and, ultimately, debases the very sources of knowledge and meaning that we are claiming to hold sacrosanct.

Of course, it is possible that we would not do any of this. Anyone familiar with the history and philosophy of science in the modern period, however, should be able to understand why someone in Kant's position would take an interest in issues concerning the legitimate use in natural philosophy of ideas like perfection and purpose. These ideas *both* seem to be required for talking about what it is in nature that we want to understand and explain *and* seem inevitably to lead to disputes concerning their proper definition and usage that bring in considerations from religion, ethics and politics in substantive, rhetorical, and dialectical ways. According to my interpretation, Kant is both sincere and right in claiming that his own views on organisms and the use of teleology in natural philosophy both challenge a *particular kind* of theological view of the *order of nature* and, at least, pose no threat to theism in general as a coherent and powerful view of the world and the place of human beings in it.

In Kant's view, even if it were the case that the representation of the benefits for living beings was the ground of God's choice to create the aether, and it were thus *aimed at perfection*, the unity in nature between the laws governing respiration and those governing the emission of light from the sun, as well as the unity between these laws and the laws of gravitation, results

from a single ground and, so, is necessary. Thus, even if some feature of the natural world is actually purposive, is even created *because* it is purposive, and is unintelligible *to us* from the standpoint of our current physical theory, it does not follow that it cannot be brought under the *necessary order of nature*. This means that Kant sets the bar fairly high for appealing to causes beyond nature in explaining particular arrangements in nature. From the standpoint of natural philosophy, in both the pre-Critical and Critical periods, in fact, Kant does not think there is any legitimate appeal to any cause other than one the causality of which is a natural efficient-causal force, with which we are familiar through its effects, and that is determined to its effects according to a natural law that we discover through observation.

He never denies that events in nature may have other explanations, and he certainly does not think that natural philosophy is the only important standpoint from which to consider nature, but he is also willing to admit that there are aspects of nature that are unintelligible *to us*. Without some further guarantee that what is unintelligible *to us*, is also unintelligible *per se*, however, it is illegitimate to conclude for any *x* that *x* cannot be generated through natural causes, on the basis of the unintelligibility *to us* of its natural generation ‘in the light of everything we know’.⁸⁶ As Kant develops the view in the 1760s that intelligibility involves more than merely logical possibility, he provides a way of understanding how we can consistently be committed to the reality of something the grounds of which are unintelligible *to us*; *i.e.*, in this case the reality of *natural teleology*, or of natural forces exercised according to natural laws producing effects that exhibit the kind of contingent and purposive unity that we associate with our own intentional production according to a plan.

According to Kant’s view, the *real possibility*, or *nature*, of an individual organism involves a contingent connection of distinct capacities that are related to each other in ways that allow the individual to function and survive in its environment. For example, the capacities to see, hear, and smell are all present in certain organisms, and these capacities rely on the presence

⁸⁶ 2:114

of complex material structures through which they can be exercised, or organs. Each organ is uniquely suited to the exercise of the capacity associated with it, as a result of the systematic connections between its parts, and each organ also has systematic relations to all of the other organs in the body. These cannot be understood as purely physical, spatial relations between independent parts. The eye, for instance, is systematically related to the heart not only because the heart circulates the blood necessary for the functioning of the eye, but also because the capacity of sight exercised through the eye is partially responsible for the capacity of the organism to locate and appropriate the food necessary for the maintenance of the heart and its beating. All of the various so-called *organ senses*⁸⁷ work together in maintaining the integrity of the organs throughout the whole body, including the integrity of the very organs through which they are exercised.

The functional unity of the complex capacities and the spatial unity of the complex parts are contingent, in Kant's view, because the grounds in virtue of which an organism can see are not identical to the grounds in virtue of which the same organism can hear or smell, nor are the relevant sets of grounds necessary results of some more fundamental common ground.⁸⁸ In other

⁸⁷ In eighteenth-century physiology, there is a distinction within the general capacity of sensibility between those capacities whose exercise depends on specific organs (e.g., sight and hearing) and what is sometimes called the communal sense or the vital sense. According to Albrecht von Haller, whose work clearly impacts Kant's thinking on issues surrounding organisms and teleology, there are capacities in organisms that are attributable neither to mechanical arrangements of parts, nor to an immaterial soul that uses an organized body as a tool for the exercise of its capacities. Sensibility, for instance, is a capacity had by any part of the body which, when stimulated, makes the organism aware of that fact. The effects that external objects have on our sense organs produces, according to von Haller, an influx of fluids through the nervous system to the common seat of the various nerves, which is called the common sense. This is used by von Haller, in part, as a way to answer the same question concerning the seat of the soul which had led Descartes to his famous conjectures about the pineal gland. Both see rational thought as the essential characteristic of the soul and accept the task of explaining other functions of organisms in terms of purely bodily processes. Accordingly, both are faced with the issue of how the soul can be aware of the state of the body and of bodies external to it. An important difference in their views is that von Haller accepts a more Newtonian approach, positing forces as the causes of regular effects in the body that cannot be explained purely mechanically, but which he also does not want to attribute directly to the soul. This issue is important for Kant's discussion of soul-body interaction in *Dreams*. For discussions of von Haller's significance in this context, see especially Hall [1969], and Roe [1981].

⁸⁸ Kant thinks these are unified grounds of a common body, but they are structures and capacities that are not common to all matter as such, nor even to all compound bodies, nor to all parts of the same organic body. If I am right in thinking that Kant is in general agreement with aspects of von Haller's view, then the various motions of muscles can be explained in terms of irritability and those of nerves in terms of

words, if we had complete insight into the bodily structure and mental capacity that allowed an organism to see, we would not be able to deduce that the same organism can hear, nor would we have any insight into how it can do so upon discovering empirically that it does. It is not logically, ontologically, or physically necessary that sight and hearing work together or that eyes and ears occur together in organisms. In organisms in which these capacities happen to be combined, however, the harmonious workings of the organs through which they are exercised and the harmony of the effects of their mutual exercise are necessary as a means for the flourishing, or perfection, of the whole organism of which they are capacities and parts. This is the feature of organisms to which Kant wants to draw our attention in saying that organisms exhibit a contingent unity that is aimed at perfection:

...[I]f the ground of a certain type of similar effects according to one law is not also the ground of another type of effect according to another law in the same being, the unification of these laws is then contingent, or a contingent unity prevails among these laws. What happens in the thing according to these laws occurs according to a contingent order of nature. Humans see, hear, smell, taste and so on; but it is not the case that the same characteristics that are the grounds of seeing, are also the grounds of tasting. Other organs are required for hearing and for tasting. The unification of such different capacities is contingent and, since it aims at perfection, artificial. There is, further, artificial unity within each organ. In the eye, the part that allows light to enter is different from the one that refracts it, and it is yet another part that receives the image.⁸⁹

The creatures of the plant and animal kingdoms continually present the most wonderful examples of a contingent unity that, nonetheless, accords with the greatest wisdom. Vessels that draw up sap, vessels that take in air, those that process the sap, and those that evaporate it etc., a great manifold, where no individual part is capable of producing the effects of the other, and where the arrangement of the parts for the perfection of the whole is artificial, so that the plant itself with its relations to such different ends constitutes a unity that is contingent and the product of choice.⁹⁰

They [i.e., ordinary physico-theologians] continually talk about the unity, hit upon through great wisdom, of so many useful characteristics of the atmosphere, the clouds, the rain, the wind, the dusk etc. etc., as if the characteristic through which the air is responsible for producing the wind, were connected to the characteristic through which it draws up vapors, or through which it becomes thinner at higher altitudes, by means of a wise choice. They construe this connection in the same way as they construe the connection in an animal, such as a spider, where the various

sensibility, but there is no common capacity that serves as ground for these distinct but related capacities of the organism. If this is right, then the presence of a soul would be a sufficient, but not a necessary, condition for the distinction between the organic and the inorganic.

⁸⁹ 2:106

⁹⁰ 2:107

eyes with which it watches out for prey are connected with the wart from which the spider's thread is drawn out as from a nipple, and with the delicate claws or the balls of its feet by which it sticks the thread together or holds on to it. In the latter case, the unity in the combination of useful characteristics (in which perfection consists) is manifestly contingent and to be attributed to a wise choice. In the first case, however, the unity is necessary and, if merely one of the above-mentioned capacities is attributed to the air, it is impossible to separate the other from it.⁹¹

Even if I could understand completely all the springs and pipes, all the nerve ducts and levers, as well as the mechanical lay out of all these, I would still be amazed at how it is possible for so many different functions to be united in one structure, at how well the processes for reaching one end allow themselves to be coupled with those through which another end is achieved, at how this very same assembly serves in addition to maintain the machine and to repair the effects of accidental injuries, and at how it was possible that a human could be so delicately woven together, yet last for so long despite the many occasions on which it could be destroyed.⁹²

From these passages, we can see that the primary reason Kant places plants and animals in a *contingent order of nature* is that each of the parts of such beings serves an end, according to natural laws governing the processes required to bring about this end, while, at the same time, all of the parts are combined to form a unitary structure for which these are ends. That is, the whole is composed of parts, or organs, the combination of which appears to be grounded in an idea of the sorts of processes required for maintaining such a whole. If we take the spider as an example, it has eyes that serve in seeing according to the laws of optics, which are connected in a single structure with (among other parts serving other ends according to other laws) a wart that serves in drawing out thread for its web according to the specific laws governing this process. These parts all function together, though according to distinct laws, in such a way that the spider can capture its prey, i.e., the ends of seeing and making a web are subordinated to the more general end of capturing prey. This end too, one would presume according to the logic outlined thus far, is subordinated to the end of nourishment, which is ultimately aimed at the growth and/or preservation of the unitary structure composed out of these parts, namely, the spider.

⁹¹ 2:119

⁹² 2: 152

The crucial issue for Kant in distinguishing the organic from the inorganic is not so much whether the individual processes characteristic of organisms can be understood in terms of the mechanisms through which they are carried out. His discussion of the mechanical layout of the springs, pipes and nerve ducts indicates that there is no *a priori* reason to assume for any given individual process within an organism that it is not intelligible, *per se* even if not *to us*, in such a way. His concern, rather, is to show that the possibility that these processes be combined into a unified structure the perfection of which is the end of all of these mechanical means is unintelligible *to us* solely by appeal to the forces whose exercise gives rise to the essential characteristics of matter and the laws of motion. In the *OPA*, Kant attributes this possibility directly to a wise creator; however, this attribution does not undermine our natural philosophical investigation of the generation and maintenance of organic bodies any more than claiming that matter itself ultimately relies on a single intelligent ground for its possibility undermines our investigations of the natural laws according to which order in the cosmos more generally is generated and maintained.

Maintaining, despite the contingent unity among the capacities and parts of an organism, that individual organic bodies are the necessary effects of natural forces, exercised according to natural laws, requires that we conceive of the ontological grounds of the various contingently related capacities and parts as unified in the nature of the organism. The real *possibility* that these grounds be unified in such a way as to give rise to contingent unity and harmony among their effects must be given through a being with understanding and will, in Kant's view. This does not, however, prevent us from conceiving of the *existence* of individuals with particular natures as effects of natural forces exercised according to natural laws. These laws will not be identical to, or instances of, the most general laws used in explaining the origin and maintenance of systematic order in the cosmos, but they need not be any less natural for that. The universality and necessity of the laws of motion with respect to matter does not guarantee their sufficiency for explaining all natural determinations and changes in bodies. Every natural body is subject to these laws, but

there is nothing to prevent us from claiming that the forces whose combination and regular exercise give rise to these laws are also combined with other forces, in other combinations, that give rise to other laws according to which natural determinations and changes in bodies follow.

Considered solely from the standpoint of what follows from the essence of matter and the laws of motion, the determinations of a body and the changes of its determination that result from the interaction of these particular forces with the fundamental forces of matter *as such* are contingent. Accordingly, these determinations and changes cannot be explained *mechanically*, either in the narrowest sense of mechanical explanation that makes use only of the essential features of matter and externally impressed motions, or in the somewhat broader sense of physical-mechanical explanation that attributes (either essential or externally added) universal forces to matter or to the substances that ground matter. Because of this, claiming that the determinations and changes in organic bodies are results of the *mechanism of nature*, in the broadest sense meaning ‘results of the exercise of efficient-causal natural forces according to natural laws’, requires positing a *contingent order of nature* in addition to, and in harmony with, the mechanically explicable *necessary order of nature*.⁹³

⁹³ It is this broadest sense of mechanism, as efficient-causal nexus, that Kant thinks is required by the understanding’s legislation to objects of experience in the Critical period. Confusing this sense with narrower senses of Cartesian or Newtonian mechanical explanation is what makes it seem impossible to include the generation, as formation and not merely unfolding, of organized beings within nature. Both the Cartesian and Newtonian versions, however, rest on limitations of our cognitive capacities which would not apply to a being that could intuit actually existing wholes all-at-once, without proceeding successively through the various appearances of the parts and determining objectively which determinations are co-existing and which are successive through the use of categories. That is, it is a tenet of our natural philosophy that complex bodies are explained by the temporal process of generation out of previously existing simpler parts, but there is nothing, as far as we know, to prevent it from actually being the case that complexity is, ontologically speaking, just as fundamental as simplicity. This particular line of thinking does not emerge explicitly until the *ID*, but it does so, in part, as an attempt to fill out in more detail a possibility that Kant wants to leave open in the *OPA*, namely, that despite our inability to explain their natural generation, organic bodies are in fact generated through the exercise of efficient causal powers internal to nature according to natural laws.

Natures and Natural Explanations

Kant conceives of a nature as a real causal ground for natural explanations of the determinations and changes of particular substances. It is not an idea or a concept that provides logical unity for our representations of various distinct individual substances, or of various states of an individual substance. Accordingly, natures are not eternal and unchanging essences that provide us with a discursive representation of the characteristics that an indeterminate number of individual things share. They are, rather, the ontological grounds that explain *why* an individual substance has the characteristics that we represent in constructing our concepts of what it is that is shared by an indeterminate number of individual things that we call by the same name.⁹⁴ That two things have the same *essence* means they are of the same *logical kind*. That two things have the same *nature* means that they are of the same *natural kind*.

If we are to conceive of these inscrutable natures as intelligible *per se*, and not simply as brute facts about the world, we must think of them as having an ultimate ground in something outside of the world. If, further, this supernatural ground is called on as explanatory of the harmonious connection of contingently related forces within the natural ground of the unity and purposiveness of organic bodies, this supernatural ground must be a being that possesses capacities analogous to, though also significantly different from, our capacities of understanding and will.⁹⁵ In us, these capacities can be used to point to the real grounds of possibilities through the observable characteristic marks that follow from these grounds, and to bring about what is thought of as possible through the external manipulation of available materials according to the representation of these marks. This is an artificial or technical process, but it is one that goes on within nature, through the use of natural capacities and instruments, and that brings about the

⁹⁴ See *ND* (I:409-10), *Lectures on Metaphysics* (28:49).

⁹⁵ 2:88

existence of something the *possibility* of which is already grounded sufficiently in the natural capacities of natural beings.⁹⁶

The absolute ground of the real possibility of an artificial order in nature requires an understanding capable of representing the connections between contingently related forces in the natures of individual organisms and relating these natures to each other in such a way that their interaction can produce a genuinely new individual of the same natural kind that can interact with others of its to kind to produce new individuals, etc.⁹⁷ This understanding also has to be exercised in combination with a will that aims the unified systems of parts and capacities grounded in these natures towards the development and exercise of these purposive capacities, which constitutes its

⁹⁶ 2:153

⁹⁷ The understanding referred to in this context is not limited, as the human understanding is, to the use of concepts as representations of what is common to a multiplicity of different things. It is an archetypal understanding or an intuitive intellect, in which the real possibility of all other things is provided an absolute ontological ground. When Kant comes to make a systematic distinction between understanding and reason in the *CPR*, he will argue that our representation of such a being, and of the ideas we think *as if* they were the archetypes of things in the intellect of this being, is the contribution that reason makes to our empirical cognition of nature. I argue below, in Ch. III, that one significant impetus for Kant to modify the view of the intellect presented in his *Inaugural Dissertation*, and to introduce this central distinction in the *CPR*, is the need to clarify and defend the view of a natural species that he develops in the *OPA* and makes use of in the essay *On the Various Races of Humans*. The intellectual representation of a species through a concept of the understanding is the merely logical representation of the *characteristic mark* that is shared by an indeterminate multiplicity of real or possible things. This representation is related to other representations in a *system of empirical concepts* that is required for the identification of individual members of the species and is sometimes published in books that are called *natural histories*. The intellectual representation of a species through an idea of reason is the representation of an *individual thing* that endures through time and exists in real causal relations to other *things* in a system of natural *things*. In this sense, a species is not what the intellect grasps when it calls forth a concept. It is the *thing itself* existing in nature that provides the real dynamical grounds for each of the natural bodies that we can discover to share the characteristic mark that is called forth by the intellect. The representation of a real ground of unity and order for a multiplicity of *sensibly given intuitions* is what the understanding is capable of achieving a priori through its categories and principles, according to the *CPR*. The representation of a real ground of unity and order for a multiplicity of *empirically given objects*, however, is a task that requires a regulative use of reason's pure transcendental ideas. The kind of natural history that Kant defends in the essay *On the Various Races of Humans* requires that there be a legitimate empirical use of these, otherwise wholly transcendent, ideas. This is something that is denied by other natural historians, such as Buffon, who follows Hume in distinguishing sharply between empty truths of reason and substantive matters of fact, and Herder and Förster, who emphasize sensible standards for judgments concerning species and are openly hostile to what they take to be the arbitrary intrusion of our reason into the classification of natural varieties and species.

flourishing or perfection.⁹⁸ Accordingly, the supernatural ground of the *contingent order of nature* can bear only a very remote analogy with our capacities of understanding and will.

In the *OPA*, Kant provides a metaphysical grounding for the natural philosophical investigation of the contingent and purposive unity exhibited by organisms through appeal to the forces constituting their natures and the interaction of these forces with those constituting the natures of other beings. These natures, and the more general harmonious interaction of various different kinds of force in nature, are themselves, in turn, grounded in the divine understanding. This two-part grounding, with its commitment to real interaction between efficient-causal forces in nature, allows Kant to maintain a view of generation that combines *TU* and *Gf* with the denial of *TI*. Regardless of the fact that the natural formation of a new individual organic body is unintelligible *to us*, we can still maintain the view that this formation is grounded sufficiently in the interaction between the forces constituting the natures of parent organisms and the forces constituting the natures of other bodies. Through observation of regularities in the organic realm, we can even arrive at an understanding of the particular laws according to which this process occurs, without having insight into precisely *how* the underlying causality is exercised.

This enables us to provide natural-causal explanations of a range of features of organisms, even though organisms are subsumed under a *contingent order of nature*. These explanations will always be couched in terms of particular laws and forces that are discovered through the systematic observation of those organic bodies that we take to be their effects. They will, thus, presuppose, rather than explain, the real possibility and existence of organisms, which remain facts that we cognize only through experience and that are unintelligible *to us*.⁹⁹

⁹⁸ 2:107-08, 2: 119, 2:131

⁹⁹ It is not simply that we are forced to posit fundamental forces into the possibility of which we have no insight that renders the possibility of organisms unintelligible to us. If that were the case, there would be no explanatory asymmetry for us between the generation of heavenly bodies and the generation of organic bodies. As I see it, the differences between the two cases come down to the issues of universality, mathematization, and purposiveness. The Newtonian forces are posited as the ontological grounds of the universal and essential features of all bodies and of the mathematically describable laws governing the motions of matter as such. If we invoke forces or capacities, like sensibility or irritability, to explain

Moreover, to the extent that these natures are conceived of as ontological grounds of the purposive unity among parts and capacities in the organism, the efficient causal forces made use of in our explanations will also be conceived of as internal to the body in question, as exercised according to natural laws, and as striving to bring about this perfection. Accordingly, for Kant, our efficient-causal explanations of particular features of organisms will have to take place from the standpoint of a commitment to *natural teleology*. The ends realized through nature's mechanism, in the broad sense, are not the artificial ends of rational beings that are external to the objects that serve as means. Rather, they are the natural ends or needs of the organism itself, which the organism is set up to achieve through the 'blind' exercise of its natural causal powers.¹⁰⁰

Although Kant does think there is a significant difference within nature between the organic and the inorganic, the view of the *OPA* also bridges the gap between these two through rejecting other common attempts at doing the same. Kant tries to overcome the somewhat unhappy marriage of mechanism and teleology found in both the Newtonians and the Wolffians of his day by accepting the conclusion that they are both unwilling to accept, *i.e.*, that the natural generation of organisms is unintelligible *to us*. This frees Kant to agree generally with both groups that mechanical explanations of natural events are what is required to render these events intelligible *to us*, while denying that all aspects of the efficient-causal nexus constituting the *mechanism of nature* are grounded sufficiently in the exercise of the same forces that give rise to the most general characteristics and changes of matter as such.

regular processes in organic bodies, neither of these criteria are met. Further, what it is that these capacities explain is the ability for certain configurations of matter to carry out processes that are directed to ends, such as awareness of the environment and motion towards or away from objects in the environment, that are necessary for the maintenance of the wholes of which the particles, fibres, tissues, and liquids having these capacities are parts. Kant claims, at 2:90, "the expression 'perfection' always presupposes relation to a being endowed with cognition and desire." Accordingly, even if cognition and desire can be explained without recourse to living matter or an animating principle, in an individual or world soul, beings that are aware of their surroundings and are moved by this awareness are systems of material structures whose connections are purposive.

¹⁰⁰ This, I take it, is the same general conception of organized beings, as causes and effects of themselves, that Kant will argue for in the Analytic of the *CTJ*.

Kant does not believe, with Newtonians such as Malebranche and Buffon, that organic bodies are generated through the aggregation of previously existing material parts. Nor does he believe, with Wolff, that organisms are generated through the mechanical unfolding of previously existing material wholes. Yet, he does maintain that they are generated through natural processes, and that many of the processes involved in their functioning can be understood as *analogous* to the functioning of a machine. The above-sketched reconstruction of the view of the *OPA* should provide a sense of Kant's view concerning the consistency of *TU* and *Gf* with the rejection of *TI* within a non-reductive and non-naturalistic ontological grounding for the possibility of natural teleology. The task of the next section will be to look more closely at the particular *epigenetic* and *preformationist* accounts of the natural generation of organisms, the rejection of which provides Kant with the occasion to voice his commitment to *TU*.

1.3: *Epigenesis vs. Preformation as Accounts of Natural Generation*

According to Kant's view in the *OPA*, it is intelligible *to us* that an arrangement in nature could involve contingent and purposive connections between parts, because we have some insight into the grounds of artificial arrangements through reflection on our own activities.¹⁰¹ It is also intelligible *to us* that an arrangement in nature could result from the 'blindly' determined motions of previously existing parts, because we have some insight into the grounds of the essential determinations of matter and of the changes of spatial determination in bodies.¹⁰² What we do not have any insight into are the grounds of contingent connections that aim at perfection resulting from the motions of previously existing parts unguided by any intention. If we insist that we can explain the generation of organisms by appeal to natural causal processes into which we do have insight, as contemporary supporters of both *preformation* and *epigenesis* maintain, Kant thinks

¹⁰¹ 2:88

¹⁰² 2:100

we are faced with alternatives that are equally problematic for the intelligibility *per se* of the natural generation of organisms. According to Kant, avoiding these alternatives requires that we reject the claim that the natural generation of organisms is intelligible *to us*.¹⁰³ In this section, I will begin with a general outline of what I take to be the implicit reasons for Kant's explicit criticisms of both sides of the eighteenth-century debate concerning the generation of organic bodies in the *OPA*. I will then turn to consider these explicit criticisms in the context of the origin and development of this eighteenth-century debate. Finally, I will provide my understanding of the conclusion Kant reaches concerning theories of generation in this work.

Natural Generation and Mechanistic Explanation

The first alternative for attempting to render the natural generation of organic bodies intelligible *to us* maintains the contingent unity and purposiveness of the connections among the capacities and material structures of organisms, by explaining these through an analogy with our own intentional production of artifacts. This attempt, however, threatens to render the natural generation of organisms unintelligible *per se*. That is, it seems impossible to maintain this analogy without claiming that the *natural* generation of organic bodies is an *artificial* process.

Even if we attribute mind-like features (such as life, perception, desire, aversion, or spontaneity)

¹⁰³ No supporters of *preformation* or *epigenesis* in the eighteenth century support what could be called pure versions of these theories that make no concessions to supporters of the other theory. This may be due to the fact that neither version, in its purest form, is supported by what is actually observed to happen in the generation of organic bodies, and most natural philosophers in the eighteenth century are less concerned with what reason decides has to happen than they are with reasoning about what experience tells us does happen. Accordingly, with respect to dialectical disputes between, e.g., Albrecht von Haller and Caspar Friedrich Wolff, it is hard to imagine that both sides could have agreed on a crucial experiment to decide the issue. I agree with Roe [1981] that these men seemed to be working with different conceptions of explanation, even if I am not entirely convinced by her account of the sources of this difference. I believe Kant saw this as well, though he was not convinced that either was able to deliver what they promised, even according to their own standards. Like other supporters of *preformation* von Haller seems to sacrifice naturalness for the sake of maintaining intelligibility *to us*. Like other supporters of *epigenesis*, C.F. Wolff seems to sacrifice intelligibility *to us* for the sake of maintaining naturalness. Although the latter is closer to what Kant recommends in his own writings, insofar as C. F. Wolff's theory is supposed to make the natural generation of organisms intelligible *to us*, Kant also remains sympathetic to von Haller's criticisms that C. F. Wolff is no better able to do this than is Buffon or Maupertuis.

to organic material parts¹⁰⁴ and claim that these features explain the ability of the parts to transform themselves into a systematic structure, Kant would claim that we cannot *understand* the contingent and purposive connections through which these parts form a unity, without conceiving of the activity of each as subordinated to a plan for the whole.¹⁰⁵ Unless the natural exercise of the power of each part is also somehow adapted to the exercise of the others through reference to the ends of the whole, the *de facto* harmony between the parts in serving these ends is, contrary to our hypothesis, unintelligible *to us*.

The plan for the whole, which we could introduce in order to save this intelligibility, cannot be something grounded in the very arrangement of parts for which it is to serve as the plan.¹⁰⁶ It also cannot be attributed to an external mind, if the process is to be a natural one. The

¹⁰⁴ This is precisely what Newtonians such as Maupertuis and Buffon do in their accounts of the epigenetic development of organic bodies out of previously undelineated masses of matter. Kant is never entirely willing to follow them in this, though my sense is that he does not do so in the pre-Critical period primarily because the empirical grounds on which we would be tempted to do so always involve our experience of organic compound bodies that involve *contingent unity aimed at perfection*. Accordingly, we have no reason to think that any of these mind-like features are monadic properties of the same physical elements that fill space and offer resistance, rather than being either emergent properties of a body organized in a particular way, or properties conferred on a complex body by a non-material substance that is capable of animating it. Although he differs from Descartes concerning the ultimate ontological and epistemological status of the distinction, Kant also sees no prevailing reasons to give up on the notion that extension is the mark of the material and thought is the mark of the mental.

¹⁰⁵ This is similar to one of von Haller's criticisms of Buffon in the foreword to the German edition of Buffon's *General Natural History*, a version of which he will also repeat in response to C.F. Wolff. See Buffon [1750], Roe [1981]. The difference between Kant's response and that of von Haller is that, whereas von Haller argues that the forces proposed by Buffon and C.F. Wolff cannot account for the generation of a particular kind of organic body (i.e., they cannot explain why in a particular case a chicken is the result rather than a frog) without making use of some kind of direction or preformation, Kant argues that we cannot understand how these forces could be alone explanatory of such effects unless we think of them as guided in this way. While Kant's criticism may seem weaker than von Haller's, I think it is just as strong an indictment of the view. It is one, moreover, that simply provides the ground for the disagreement, rather than putting forth a stronger claim that seems to follow from it, but for which we do not have independent grounds. As we will see in Chapter III, this is the same general strategy Kant will use to argue against the view of *epigeneis* put forth by Herder, under the inspiration of C.F. Wolff, in his *Ideas*.

¹⁰⁶ It would be an obviously vicious circle to claim that the plan without which distinct molecules (a), (b), and (c) cannot be brought into a particular arrangement (bac) is provided by the very arrangement (bac) that would be impossible without this plan. It is obviously quite a different matter if we say that we cannot understand how these molecules come together to form this arrangement (bac) unless we think of (a) as representing (bac), b as representing (bac), and c as representing (bac). In the latter case, however, we can no longer claim that we are explaining how the representation (bac), or the plan for the whole, is possible, since we are thinking about each of the elements as already in possession of the plan.

parent organisms must accordingly, provide the plan for the whole.¹⁰⁷ Each of the individual parts must be produced, by corresponding parts in already given wholes, in such a way that they are already fitted to their role in the subsequent whole before being mixed together with the other parts. After being mixed, each could subsequently find its proper place through the exercise of intrinsic forces, the result of which is the formation of a purposive structure of organs, or a genuinely new organic body. The problem remains, however, that the intelligibility *for us* of such a view relies on the analogy of *seeking* and *finding* ones proper place within a whole. Even if it is possible for individual material parts to do this through the exercise of natural forces that are *not* actually guided to their effects through a previous conception of these effects as ends, it is unintelligible *to us* how this happens.

If we claim they are actually guided in this way by individual ‘minds’, we are faced with the issue that it is unintelligible *to us* that material parts could have ‘minds’.¹⁰⁸ It is even less intelligible *to us*, then, that the ‘minds’ of these material parts could each be exercised independently in such a way that the result of this exercise is a contingent unity that aims at the perfection of the whole. The only way this process could become intelligible *to us* is if the parts are actually guided to their proper places by a mind external to them. Of course, in this case, their connection into a purposive unity is artificial. Accordingly, if we assume the intelligibility *for us* of the natural generation of contingent and purposive connections between material parts in an organic body, and offer an explanation of the processes through which this happens on analogy with mental causes, we are forced to conclude that these connections are artificial. In other words, the *natural* generation of organisms is unintelligible *per se*.

¹⁰⁷ This is a central feature of the views of Maupertuis and Buffon. There is a plan for the whole that precedes the particular configuration of the individual parts, but it is not a blueprint or an idea of how they should be connected. It is, in cases of sexual reproduction, a pair of exemplars from which the individual parts come and the general form of which these parts strive to reproduce. For discussions of Buffon and Maupertuis, see Gasking [1967], Hall [1969], and Larson [1994].

¹⁰⁸ See note 99 above.

Alternatively, we could maintain that organic bodies result from the motions of material parts without any external agency, and claim that their natural generation is intelligible *to us* on analogy with the processes involved in the generation of inorganic bodies. Just as in the first case, however, it is not clear that this attempt to render the natural generation of organisms intelligible *to us* does not undermine its intelligibility *per se*. How can we maintain this analogy while avoiding the claim that the apparently contingent connections between the material parts and the capacities of an organism are either really necessary or are fundamental contingencies that have no intelligible grounds?¹⁰⁹ If the connections between material parts in an organism are necessary results of determinations or motions grounded in the nature of matter, we explain away the apparent contingency of these connections and are left with the unintelligibility *per se* of the *appearance* of contingency and of the *de facto* appropriateness of these necessary connections for the survival of the organism.¹¹⁰ The existence of such purposiveness would guarantee us that it is

¹⁰⁹ If organization follows from the essential characteristics of matter, it is not clear how something could be both material and inorganic. We could choose to save our prior commitment to a natural explanation of the generation of organic beings by claiming that all bodies are organized, only some are so to a lesser degree than others, but there seem to be no reasons for claiming this aside, perhaps, from a desire to salvage our commitment to a principle that experience not only does not suggest, but which it also seems to refute. A ‘modest’ appeal to the limits of our understanding as the reason that we cannot discern the organization of apparently inorganic bodies would fly in the face of the previous assurance that this same understanding is secure enough to convince us a priori that all bodies must be organized. This general line of argument seems to me to be involved in Kant’s rejection of various views of the continuity of forms in nature, whether pantheistic, materialistic, or spiritualistic. I will return to this point in 1.5 below as well as in each of the subsequent chapters.

¹¹⁰ This is a point Kant makes more explicitly against Spinoza in the Dialectic of the *CTJ* (5: 393-4), but it is one that seems to me to underlie the view of the *OPA* as well. If the real contingency of connections between things in the world is denied, which Spinoza does in claiming that these connections are blindly necessary results of the absolutely necessary being (*Ethics* Bk. I, Prop. 29-33), then it is merely the appearance that these connections are contingent that remains to be explained. Spinoza offers a famous account of this appearance in the Appendix to Book I of his *Ethics*, but there are problems with this account from Kant’s perspective. Kant starts with the more traditional view, defended also by Leibniz, that there are features of *this* world that are necessitated as results of God’s activity, but that remain contingent upon God’s choice. This world does, as a matter of fact, contain beings whose capacities are related to one another, and to other beings, in the particular ways that Spinoza invokes in accounting for the appearance of contingency, purposiveness, and order in nature. That is, it contains beings that have bodies composed of organs, and that have souls with sensible and intellectual cognitive capacities. We may wonder whether Spinoza actually has a good argument establishing that the soul-body union is *not* an ontologically contingent *connection* between beings with different natures, which is also a necessary condition for the human soul to be active in corporeal nature. Spinoza’s appeal to our imagination, desire and intellect cannot convince someone in Kant’s position that he needs to abandon the view that there *are* such contingent connections in nature on pain of *contradiction*. The capacities Spinoza appeals to in *explaining*

possible, but purposiveness would have to be either a fundamental feature of the natural world common to all bodies, which it does not appear to be, or a fundamental and contingent feature of only some bodies.¹¹¹

The main point is that if the intelligibility *for us* of the connections of parts in an organism amounts to the necessity of these connections, we will be forced to explain away one apparently distinguishing feature of organisms (*i.e.*, contingent unity), and to posit the other as an inexplicably necessary or inexplicably contingent feature of bodies (*i.e.*, purposiveness). Attributing the purposiveness of the connections in organisms to fate or to chance, however, fares no better in making their natural generation intelligible *to us* than does attributing it to artificially directed causes, and just is the admission that it is unintelligible *per se*.

Both of the above alternatives begin as understandable attempts to make the natural generation of organisms intelligible *to us* through explaining it in terms of causal processes, into which we do have some insight. In each case, however, the assumption that the natural

away the appearance of contingency, while necessary grounds *in relation* to this appearance, could *themselves* be contingently connected in the nature of the human being, whose possibility, existence, and connection with other beings in the world is contingent on the will of God. Kant would need to be convinced on other grounds that there *are* no contingent features of this world, because there *cannot* be any contingency, in order to feel compelled to admit that contingency, purposiveness, and order are merely confused appearances. This is, of course, a conclusion that Spinoza draws in Book I of the *Ethics*, but Kant has what seem to me to be philosophically defensible grounds for denying that Spinoza has actually established this conclusion. Spinoza begins the *Ethics* with a list of merely nominal definitions, or claims concerning what is generally understood by terms such as ‘cause of itself’, ‘substance’, ‘attribute’, ‘mode’, and ‘God’. If Kant is right, such definitions provide *starting points* for philosophical *inquiry* into the real grounds of the characteristics referred to in these nominal definitions. They are not themselves *first principles* for geometrically ordered demonstrations of truths concerning the existence of God and the geometrical necessity of apparently contingent connections between things in nature. Granted, this methodological point alone does not decide the substantive issue that separates these thinkers. Given the clear difference in their starting points, however, it is no surprise that Kant does find Spinoza’s views implausible in their own right, and it is no stretch to attribute to him the view that they are also unsupported by Spinoza’s arguments. It is also easy to understand why he would find it unhelpful to explain purposiveness, which is nominally defined in the *CJ* in terms of the *lawfulness of the contingent* and which Kant discusses in reference to bodies that exhibit *contingent unity aimed at perfection* in the *OPA*, by appeal to real grounds that render this *contingency* a mere figment of the imagination and this *unity* a necessary result of the one substance in which all natural bodies inhere.

¹¹¹ If we claim, instead, that these connections are necessary results of determinations and motions that are not grounded sufficiently in the nature of matter, then their intelligibility to us depends on our having insight into their further grounds. The only grounds other than those involved in the nature of matter that we have insight into, however, are those involved in the nature of mind. This leads us to the problem with the first alternative discussed above.

generation of organisms is intelligible *to us* leads to the claim that it is unintelligible *per se*. The features Kant believes we actually use to identify organisms and to distinguish them from other kinds of things in nature result from artifice, according to the first alternative, and are blindly necessary or radically contingent, according to the second. In either case, the *natural* generation of contingent unity and purposiveness is unintelligible *per se*. Faced with the option of either insisting on fate or chance as playing a determining role in the natural generation of organisms or accepting that considerations of intelligibility lead us to claim that organisms require artificial causes, it is no great surprise that most eighteenth-century thinkers opt for the latter.

From Kant's perspective, contemporary supporters of *epigenesis* opt for a mechanical explanation of the formation of organic bodies from previously existing organic parts, but the supposed intelligibility of the account relies on thinking of these organic parts as natural causes working according to an idea of the whole; *i.e.*, as working artificially or technically. Contemporary supporters of *preformation* opt for a more straightforwardly artificial explanation of organisms. The act of creation provides the ontological grounds for generation, which is called a natural process because the successive changes through which the created structure becomes visible and grows are explained on analogy with the natural functioning of an artificially produced machine. Differences of view concerning the ontological starting points for the natural process of generation are what lead to the eighteenth-century dispute between *preformation* and *epigenesis*. Both sides start from a general commitment to the mechanical explicability of natural processes and argue that their theory is the only way to make it intelligible *to us* that the processes characteristic of organisms are natural processes.

This dispute is one primarily concerning whether *Gf* or *Gu* is more consistent with the shared commitment to mechanistic explanation in natural philosophy, and with the shared optimism concerning the powers of human beings to discover the explanatory grounds of the phenomena investigated in natural philosophy. *Mechanistic explanation* in this context does not signify a primarily epistemological or methodological commitment. It signifies, rather, an

ontological commitment concerning how nature actually works, which requires and justifies the adoption of a particular methodology for recreating in our knowledge the same systematic connections that exist between things in nature. The *mechanical philosophy* of the seventeenth century¹¹² involves several general conceptions of mechanistic explanation that continue to inform the natural philosophy of the eighteenth century, two of which seem to play a central role in the debate concerning the natural generation of organic bodies. According to one of these conceptions, mechanistic explanations account for complex material wholes in terms of independent and simple material parts and the transfer of motion through contact. According to the other, mechanistic explanations presuppose complex material wholes and explain the motions of the material parts within these wholes in terms of the systematic relations through which motions are (actually or apparently) transferred from one part to another, whether through contact or at-a-distance.

It is this latter conception, prompted by both Leibniz and Newton in their own ways, which accounts for the commitment among eighteenth-century thinkers to the idea of a *clockwork universe*.¹¹³ This conception works fairly well for investigating and explaining many aspects of the functioning of organisms, which do bear some analogies to aspects of the functioning of a clock. It requires, however, that we make the same kind of principled distinction between the formation of an organic body and its subsequent functioning that we make between the artificial production of a clock and its natural functioning, and that Newton makes between the supernatural generation of order in the solar system and the natural maintenance of this order.¹¹⁴

The desire to maintain both the ontological unity of nature and its intelligibility *for us* according

¹¹² For a comprehensive overview of the various views on mechanism in the seventeenth-century, see Chapter 18 of Garber and Ayers [1998].

¹¹³ All mechanistic views seem to lend themselves to, or receive support from, this analogy in one way or another. It is the particular combination of theism with mechanism, and the more than merely analogical conception of the world based on the idea of a clock as a mechanically functioning artifact brought about for a purpose, however, that is most relevant to eighteenth-century attempts to explain the generation and functioning of organisms mechanically.

¹¹⁴ The increasing realization of the artificiality of this distinction is one of the central reasons for the breakdown of preformationism at the end of the eighteenth-century. We will see below (Chapter IV) that this issue plays an important role in Kant's strategy in the *CTJ*.

to this model is one of the impulses pushing natural philosophers in the direction of *Gu* and *preformationism*.

Nature's complexity far surpasses what we are able to observe, as telescopes and microscopes are making increasingly clear at the time, so apparent uniformity in the earliest stages of embryonic development need not be counted as incontrovertible evidence against the presence of complex organic structures.¹¹⁵ If conditions of mechanical explicability require that natural changes within bodies involve the preservation and transfer of motion between parts within a systematic whole, then the natural motions of these parts cannot be the ontologically and temporally prior grounds of the systematic arrangement of the whole. The natural generation of an organism, then, must be simply the successive motions of parts within an already organized body, the existence of which cannot itself be explained naturally.

Dissatisfaction with the increasingly *ad hoc* manner in which supporters of this view attempt to account for the generation and functioning of organisms, leads other committed mechanists in the middle of the century to combine the above alluded to conceptions of mechanism in an attempt to explain the production of systematic unity and its maintenance and functioning as continuous processes.¹¹⁶ These attempts begin with complex wholes and explain the motions of the parts within these wholes in terms of their systematic relations to each other. Some of these motions, however, result in the mechanical production of relatively independent and simple material parts, the natural motions of which can then serve as the ontologically and temporally prior grounds for the formation of a genuinely new systematically arranged whole. This is the general causal model employed by mechanists in the middle of the eighteenth-century

¹¹⁵ For a discussion of the role of microscopy particularly in the eighteenth-century debate between von Haller and C.F. Wolff, see Roe [1981]

¹¹⁶ It is no surprise that one of the leading proponents of this view, Maupertuis, was also involved in important work on heredity, and another, Buffon, is responsible for a conception of the species in terms of inter-breeding individuals. Preformationists' original hypotheses to account for natural kinds lead to difficulties especially in explaining hybrids and the resemblance of offspring to both parents.

to render *preformation* unnecessary through rendering the *epigenetic* formation of organic bodies intelligible *to us*.

Despite the significant differences in these views, however, both involve somewhat uneasy combinations of natural and artificial causality. I take Kant's analysis of the problems for both sides to be that they arise from a shared commitment to the mechanical explicability and intelligibility *for us* of the causal processes involved in the natural generation of organic bodies. Given this general commitment, both wind up stretching useful analogies with causal processes familiar to us, which are legitimate methodological principles for trying to conceive of the unity of nature in its organic and inorganic aspects, into dogmatic claims about the ontological basis of the unobservable processes that explain the gradual emergence of organic structures in apparently homogeneous masses of matter in seeds or eggs. The ontological claims concerning organic bodies that result from these attempts lead both sides unwittingly to sacrifice the very unity and intelligibility of nature that all sides agree it is the goal of natural philosophy to preserve.

Kant agrees that it is through mechanistic explanations that the generation of natural bodies and the functioning of artificial machines are rendered intelligible *to us*. He denies, however, that the ontological unity of the natural world requires that all natural processes be such that mechanistic explanations can render them intelligible *to us*. There is no legitimate reason, accordingly, to insist that natural objects that resemble artificial machines in some respects are really artificially produced and naturally functioning machines (*preformation*). Nor do we need to insist that they are necessarily or randomly produced aggregates (*mechanical epigenesis*) or that they are naturally produced and naturally functioning machines (*physical-mechanical epigenesis*). None of these attempts has so far actually made good on its promise to render the natural generation of organisms intelligible *to us*, and in doing so each threatens to undermine any assurance that it is even intelligible *per se*.

Accordingly, both natural philosophy and metaphysics stand to benefit from distinguishing between the mechanically explicable *necessary order of nature*, which is

intelligible *to us* and *per se*, and the *contingent order of nature*, which is intelligible *per se* but not *to us*. This means that we are required to conceive of organisms in terms of natural forces and natural laws that we are familiar with only through experience of their effects *and* that we cannot render intelligible *to us* by deriving them from, or subsuming them under, the fundamental forces and laws that are necessary with respect to matter. Although this non-reductive approach may appear to threaten the unity of nature, Kant thinks that a closer look at alternatives pretending to maintain this unity will reveal that they are actually destructive of it. Maintaining our commitment to the systematic unity of nature actually requires the admission that not all natural determinations and changes in bodies are intelligible *to us* according to a single kind of force operating according to a single kind of causal law.

Natural Generation and the Fruitfulness of Nature

The central place in the *OPA* where Kant deals explicitly with the debate concerning the generation of organisms is within a discussion of the methodology appropriate for investigating different kinds of orderly arrangements in nature. Despite the beauty and complexity of the outward form of natural products such as snowflakes, he draws attention to the fact that no one assumes that a special seed is required to account for them. The possibility that matter forms itself into such complex patterns cannot be accounted for by us simply through the supposition of attractive and repulsive forces, but this alone does not mean that the laws governing crystallization cannot themselves be understood as particular consequences of more general laws of material nature.

There is agreement, however, that organisms do grow from seeds. The primary disagreements mentioned in the previous section of this chapter arise concerning questions such as whether these seeds are produced by parent organisms or whether they are created, whether both parents contribute seeds to the production of a new individual or whether the individual is

already present in the seed of the mother or of the father, and whether the seed contains a fully formed organism in miniature or whether it contains the rudiments of some or all of the organs. Kant's own views on organisms and teleology cannot be understood adequately without considering his explicit assessment of the debates concerning these issues. Because of its centrality for establishing the nature of Kant's contribution to these debates, I will quote the following lengthy passage from the *OPA*.

Nonetheless, nature is rich in a certain other type of product, where all philosophy that reflects on the mode of formation is forced to abandon the path [of the necessary order of nature]. Great art and a contingent connection through a free choice that accords with certain intentions is there apparent and becomes at the same time the ground of a particular law of nature, which belongs to the artificial order of nature. The structure of plants and animals shows an arrangement, for which the general and necessary laws of nature are insufficient. Now, it would be absurd to view the first generation of a plant or animal as a mechanical by-product from general laws; however, a two-sided question still remains, which the furnished grounds leave undecided, namely, whether each individual plant and animal is formed directly by God and, thus, of supernatural origin, and it is simply the propagation, i.e., the occasional transition for the purposes of unfolding, that is trusted to a natural law, or whether certain individuals of the plant and animal kingdoms, while themselves of supernatural origin, nonetheless have a capacity we cannot understand to generate their kind, and not simply to unfold them, according to a regular law of nature. Difficulties present themselves on both sides. It is perhaps impossible to make out which are the greatest, but our concern is simply to take note of the preponderance of reasons insofar as they are metaphysical. How a tree, for example, should be able through an inner mechanical constitution to form and model the sap in such a way that, in the bud of the leaf or in the seed, something should come about that contains a similar tree in miniature, or out of which such a thing could come to be, can in no way be understood according to all of our knowledge. Buffon's inner forms and the elements of organic material, which, in the opinion of Maupertuis, join together as a result of their memories according to laws of desire and aversion, are either precisely as incomprehensible as the thing itself, or are invented entirely arbitrarily. Is it the case, though, that in order to avoid following a theory of this type one must throw another one out there oneself that is just as arbitrary, namely, that all of these individuals are of supernatural origin, since one cannot grasp their natural mode of production? [...] In the latter case the origin of all such organic products is seen as supernatural, however, one believes that there is something left over for the natural philosopher when one allows him to play with the manner of gradual propagation. One would do well to keep in mind, however, that through this one does not diminish the supernatural; for whether this supernatural generation occurs at the time of the creation or gradually at different times, there is nothing more supernatural in the latter case than in the former. The entire difference stems not from the degree of direct divine action, but solely from the 'when'. Concerning the former natural order of unfolding, however, it is not a rule of the fertility of nature, but rather a method of evading the issue. For, through this method not the least degree of direct divine action is spared. Accordingly, it appears unavoidable either to attribute the formation of the fruit in each pairing directly to a divine action, or to allow to the first divine

arrangement of plants and animals a capacity truly to generate their like thereafter, and not merely to unfold them.¹¹⁷

This passage begins with a statement of what is a commonplace in the study of organic nature in the eighteenth century, namely, that organic beings cannot ultimately originate from the purely mechanical workings of matter alone. As discussed above, even the staunchest supporters of mechanical explanation in the organic realm, i.e., those who claim to be able to explain the formation of individual organisms through mechanical processes, make use of special organic molecules and at least one previously given, fully formed organism, as the basis of their explanations. That is, they do not make the claim “give me matter, and I will show you how to make a caterpillar”, but rather, “give me two caterpillars, and I will show you how these caterpillars make another caterpillar”.¹¹⁸

Given this fact, it may seem odd that Kant mentions this possibility, even if he does so only to brand it as absurd. If we keep in mind, however, that this and similar denials of the mechanical explicability of the first origins of organic beings take place in contexts where Kant also provides a mechanical account of the origin of the order observed in the solar system; i.e., in the context of a general natural history, this may not seem so odd. That is, the following analogy may come to the mind of a reader of Kant’s text. Previously we had thought that the laws of motion were sufficient to account only for the *maintenance* of order in the solar system, and now you are telling us that they are likewise sufficient to account for the *generation* of this order. We had also thought that particular laws deriving from the laws of motion were sufficient only to account for the *maintenance* of order in the organic realm (e.g., the pumping of the blood, the beating of the heart), are you trying to tell us that these are likewise sufficient to account for the generation of this order? Kant’s answer, of course, is a resounding ‘no’.

¹¹⁷ 2:114-15

¹¹⁸ This is a paraphrase of Kant’s rhetorical question in the *UNH*, “Ist man im Stande zu sagen: Gebt mir Materie, ich will euch zeigen, wie eine Raupe erzeugt werden könne?” Kant’s question is itself a paraphrase from Voltaire.

The two-fold question that is left undecided by this answer is the basic question concerning the generation of organisms in the eighteenth century. The response to this question divides natural philosophers into supporters of *preformation* and supporters of *epigenesis*. The *theory of preformation* is often, and in many cases rightly, associated with the claim that God created all individual organisms directly, with future generations literally encased in each other and awaiting their proper time to begin unfolding. What appears *to us* to be the production of a new individual is really only the increase in size and visibility of an already existing organic structure. Although the development of organisms appears to begin with an undifferentiated mass that becomes delineated successively into organs, according to *preformation* these organs are either merely too small to be seen or are transparent in the earliest stages of development.

The *theory of epigenesis* is originally put forth as the descriptive claim that organic structures appear to be formed naturally *from within*, or without any external agent responsible for forming them.¹¹⁹ Descartes' commitment to universal mechanism and his rejection of both occult qualities and final causes in physics leads him to attempt an explanation of how these structures arise through natural processes ultimately grounded in the externally impressed motions of material parts. Other Cartesian thinkers,¹²⁰ those less inclined to prefer the Cartesian metaphysics of nature to that of the scholastics,¹²¹ and natural philosophers who find shortcomings in the application of Descartes' ontology to organisms,¹²² end up rejecting Descartes' attempt to provide a mechanistic explanation of epigenetic phenomena, and develop versions of *preformation* that aim to provide an alternative grounding for mechanistic explanations of the phenomena associated with the generation of organic bodies.

¹¹⁹ Harvey (1578-1657) introduces epigenesis as a merely descriptive view of generation, without claiming to be able to provide an account of the causal processes responsible for it. For a discussion of the significance of Harvey for later thinkers, see Gasking [1967].

¹²⁰ Most notably Malebranche.

¹²¹ Most notably Leibniz.

¹²² E.g. Swammerdam, Leeuwenhoek and Hartsoeker.

Partially on the basis of microscopic observations of plants, and consistent with his general denial of any causal powers whatsoever to finite substances, Malebranche puts forth an *encasement* theory of *preformation*. If matter is merely *res extensa*, defined by extension and the passive potential to take on form, it is obvious regardless of appearances that matter itself cannot be responsible for its own formation. As he does with the production of ideas, voluntary motions of the human body, and motions of matter more generally, Malebranche claims the true cause of the formation of organisms is God. In order both to save the appearances and to avoid rendering natural philosophy entirely irrelevant, however, Malebranche claims that there is an *order of nature*, which is the order of occasional causes that is investigated by physics.

Observed regularity and order in nature, both in general and in the organic realm, are *described* in terms of the physical laws governing the actions of occasional causes, but they are grounded immediately in the activity of the divine will. It is because of the perfection of this will, and not because of any truly causal natural necessity, that there are discoverable regularities in nature that can lead us to, the strictly speaking mistaken, idea of the natural world as functioning according to natural forces governed by natural laws. The encasement theory, then, is a somewhat natural way for someone like Malebranche to account for the regularity with which organisms apparently produce new parts and new organisms of the same kind. They cannot do this through their own power, the apparent transfer of motion between material parts does not seem sufficient to account for the unified structure of the whole, and dissection of buds reveals that the parts of the future flower are already there folded in upon themselves. Rather than claiming that generation is the miraculous creation of a new individual and cannot be subsumed under the *order of nature*, Malebranche claims that generation is the orderly unfolding of a previously formed organic structure. Rather than claiming that this organic structure exists throughout all time in seed form somewhere in nature until it finds the proper place to begin unfolding, he claims that it has been encased within the seed of its parent, which has been encased within the seed of *its* parent, which has been encased within the seed of *its* parent, etc.,

all the way back to the first organism of its kind, which is created with the seeds of all future generations encased within it.¹²³

Leibniz accepts a similar theory of generation, though he rejects the ontology of Malebranche as an account of the regularity and order observed in nature. According to Leibniz, the view of material substance accepted by Descartes and Malebranche is incoherent. In Leibniz's somewhat more traditional view, genuine *substantiality* requires genuine *activity*. The passivity of *res extensa* is an indication that matter is not a substance, but a phenomenon that is grounded in the activities of substance. If the immediate ground of the existence, determinations, and changes of *both* bodies *and* minds is God, as maintained by Malebranche, then God is really the only substance and the distinction between God and nature is a distinction between two standpoints on the same thing, or a distinction between considering Being as the active *natura naturans* or as the passive *natura naturata*. In other words, Leibniz agrees with Spinoza that a consistent Cartesian cannot avoid pantheism, but he sees this as a reason for rejecting Cartesianism rather than a reason for adopting Spinozism.

Maintaining a real distinction between the *order of nature* and God's (fatalistic or miraculous) activity requires positing the existence of finite created substances that are endowed with real causal powers, according to Leibniz. The unity of powers or forces of a substance constitute its nature, and this nature is causally responsible for the changing determinations of the substance. A natural change, for Leibniz, is one whose ground is internal to the substance undergoing the change and that strives or aims to take this substance from a state of lesser perfection to a state of greater perfection.¹²⁴ Accordingly, natural changes involve efficient causes *and* final causes that can both be specified by reference to the nature of the substance involved. It appears to us that cases of change in the natural world, such as motions and the

¹²³ Malebranche subscribed to the view, known as *ovist* preformation, that placed the entire series of future generations within the first female of every species. Others were led to an *animalculist* view, which places future generations in the first male, largely on the basis of microscopical observation of spermatazoa.

¹²⁴ AG 214-5

transfer of motion between inorganic bodies, are the results of external efficient causes that aim at no end. The reason for this, according to Leibniz, is that we are considering complex phenomena that result from what is not truly a substance *per se*, but is a mere aggregation of distinct substances that we call by a name like ‘rock’.¹²⁵ It appears to us that other cases of change in the natural world, such as the motion of an animal towards a source of food or away from a predator, are the results of internal efficient causes and do aim at some end. The reason for this is that we are considering complex phenomena that are grounded in what truly is a substance, or a true unity that results from the subordination of the distinct substances that constitute the body of the animal to the simple substance that constitutes its substantial form, or its soul.¹²⁶

Leibniz does not try to reduce all natural changes in the bodies of our experience, including the apparently end-oriented formation and functioning of organisms, to the *blind* mechanism of independent material parts and externally impressed motions. Rather, he tries to render the natural changes in bodies, including the apparently blind transmission of motion from one body to another, intelligible according to an organic model.¹²⁷ What this organic model amounts to is internally or spontaneously generated action towards an end, ontologically speaking, and a natural mechanism involving externally generated motions within a system of interrelated material parts, phenomenologically speaking.¹²⁸ Although Leibniz conceives of the soul of an organism as a substance ontologically distinct from the substances that constitute its organic body, the nature of the individual soul is such that it provides the substantial form for a particular individual organic body, and the natures of the substances composing its body are such that they are co-coordinated with each other through their subordination to this soul. It is not metaphysically impossible that the one exist without the other, but it is contrary to the *order of nature*. That is, if the soul were to exist in nature without its body, it would still be characterized

¹²⁵ AG 86, 103, 319

¹²⁶ AG 168, 208-9, 222

¹²⁷ AG 319. For a discussion of Leibniz’s panorganicism and its relation to his view of the optimal *order of nature*, see Rutherford [1995].

¹²⁸ AG 220-1, 319

by the same series of representative states, because this series is grounded *sufficiently* in its nature alone.¹²⁹ The only difference would be that its representative states would not harmonize with those of the other substances in the universe. The universal harmony of the spontaneously generated representative states of all substances, however, is what constitutes the perfect *order of nature* that characterizes the best of all possible worlds, for Leibniz.¹³⁰

This is the beginning of the line of reasoning that requires Leibniz to adopt a *preformationist* view of the generation of organisms. Aggregates of substances that we merely refer to as independent things can be formed naturally, but substances *per se* can begin only by creation.¹³¹ In order to maintain the *order of nature* worthy of God's choice, the world cannot be subject to the frequent miracles that would be required if a new organism were created every time one is apparently formed in nature.¹³² The only option, then, it seems is to claim that each organism, as true union of body and soul, has existed since the creation. Further considerations of the perfection of the *order of nature* explain why it is that organisms resemble each other in significant ways, but are never completely identical; why it is that organisms are encased within each other in such a way that it gives rise to the appearance that like actually produces like; and that organisms are equipped with the tools they need to survive in the particular environments in which they are found. Still further considerations of this perfect order also lead to the idea that between any two existing things in nature there is both an internal, conceptually specifiable and non-relational, difference and a third existing thing that resembles each of them more closely than does the other.¹³³

These Leibnizean principles, of the *identity of indiscernibles* and the *continuity of natural forms*, together necessitate the view that nature is a *great chain of beings* containing an infinity of natural forms that are systematically related to each other through logical relations of identity and

¹²⁹ AG 214

¹³⁰ AG 143-4

¹³¹ AG 140, 207, 213

¹³² AG 176, 209, 222-3

¹³³ I will return to this issue in the discussion of Chapter III.

difference with respect to internal characteristics, and that are hierarchically arranged according to the perfection of each. From Leibniz's perspective, nature consists of an infinity of simple substances, and an infinity of organisms, each of whose bodies consist of an infinity of substances. Each of these substances differs from every other only according to its degree of perfection, so there is no principled difference between the finite substances that are elements, the simples composing rocks and crystals, those composing organic bodies, those providing the substantial forms of plants and animals, and, finally, those that are the rational souls of human beings.¹³⁴ What is more, all of the infinitesimal, perfectly continuous, changes in each of these substances are brought about entirely spontaneously, all aim at the perfection of the individual substance, and all are in complete agreement with the changes of every other substance, which means that all actions also aim at the perfection of the whole.

This perfect order involves *natural teleology*, or the striving of each individual to effect change towards the end prescribed in its nature, and *supernatural teleology*, or God's co-ordination of all of these changes into a perfectly harmonious whole. This order also results, for Leibniz, in a perfectly mechanistically explicable order of co-existence and succession in the states of well-founded spatio-temporal phenomena, or bodies. Some of these are phenomena of mechanical aggregation of independent parts and others are phenomena of externally initiated motions in previously formed natural machines. Although there is perfect continuity between the substances grounding these phenomena, there are also differences in the manner of their connections to each other that explain our need to adopt a different form of mechanical explanation for order in the 'inorganic' realm from the one adopted for order in the 'organic'

¹³⁴ This is a point on which there is somewhat of a tension in Leibniz's thinking. On the one hand, considerations of continuity lead him to downplay the differences between natural beings that could be thought of as gaps in natural forms. On the other hand, a commitment to traditional conceptions of the significant difference between human beings and their relation to God leads him to emphasize the difference between human minds and animal souls. This tension is also found in eighteenth century thinkers who are all, to one degree or another, influenced by Leibniz.

realm.¹³⁵ There is no problem concerning the unity of natural philosophy from Leibniz's perspective, however, since both kinds of order among phenomena are, at least in principle, explicable according to mechanical laws.¹³⁶ These laws are, in turn, grounded in the intelligible order of simple substances whose changes arise spontaneously from their own natures in perfect agreement with those of other substances. This is a general characterization of the perfect *order of nature* that Leibniz envisions when he claims that this is the best of all possible worlds and is, thus, the world worthy of choice for the perfect creator.

The influence of Leibniz on eighteenth-century thinking, especially in the German and French speaking world, seems to be as ubiquitous as it is partial.¹³⁷ That is, almost everyone seems to be influenced by one or another aspect of Leibniz's thought in metaphysics, mathematics, and natural philosophy, but almost no-one is straightforwardly a Leibnizean, in the sense of someone who accepts all or even most of what appear to be his central commitments.¹³⁸ This, I think, sheds as much light on the issues central to the natural philosophical investigation of organisms in the eighteenth century, and on the particular position Kant develops within this debate, as does any other consideration stemming from the development of metaphysics and natural philosophy in the modern period. No philosopher in the eighteenth century is more frequently thought of as a Leibnizean than Christian Wolff, despite the fact that Wolff grounds his philosophy in a Cartesian manner and differs from Leibniz concerning central issues in

¹³⁵ AG 174-6, 221

¹³⁶ Leibniz's dynamical theory of substance, with its view of bodies in general as well-founded phenomena resulting from the exercise of teleologically active forces, and of organic bodies as infinitely articulated divine machines, is a metaphysical view that is not invoked in the context of physical explanations. These explanations are exclusively mechanistic in Leibniz's view. This means that they make reference solely to efficient-causal laws of nature and the mechanisms through which natural change is effected. This is a general point of agreement between Leibniz and Kant that has not been noted sufficiently in the literature on the *CTJ*.

¹³⁷ For discussions of this influence, see Watkins [1998b] and Wilson [1995].

¹³⁸ Christian Wolff, who maintains a distinction between physical monads and spiritual monads, and who is not fully committed to the theory of *pre-established harmony*, is clearly not an orthodox Leibnizean. One exception to this claim may be Alexander Baumgarten, whose *Metaphysica* provides the textbook from which Kant lectures in his metaphysics courses throughout his career, and whose *Initia philosophiae practicae primae* and *Ethica philosophica* served as bases for Kant's lectures on moral philosophy.

ontology. What is more, despite the infamous enmity between Leibniz and Newton,¹³⁹ French Newtonians in the eighteenth century are often fairly close to Leibniz on certain issues bearing directly on natural philosophy.¹⁴⁰

One divergence from Leibniz common to both Wolffians and Newtonians, which affects the debate concerning organisms and creates tension with other Leibnizean aspects of their thought, concerns the ontological status of matter. Wolff, for instance, agrees with Leibniz that matter is not substance, but a phenomenon dynamically grounded in substances; however, he characterizes the substances grounding matter in terms that recreate the genuine ontological divide between bodies and minds that Leibniz had attempted to overcome.¹⁴¹ Leibniz claims that bodies and their motions are phenomena explained in physics by derivative passive and active forces, which forces are themselves grounded metaphysically in the primitive active and passive forces that are intelligible *to us* on the model of the striving for perfection of rational souls. The *motive* forces made use of in physical explanations are derivative of the *representational* forces characterizing the soul-like substances grounding bodies.¹⁴²

Wolff claims, rather, that each of the individual substances that ground bodies is a single fundamental motive force, from which all of the changes of that substance or, what is the same, all modifications of that force are derived.¹⁴³ The same is true of souls, except that instead of a single motive force, the individual soul is identified with a single fundamental representative force, from which all changes in the soul or modifications of its representative state are

¹³⁹ This was brought on by the priority dispute concerning the invention of the differential calculus, which each man appears to have invented independently of the other. The *Leibniz-Clarke* correspondence and Leibniz's polemical "Against Barbaric Physics" stem from this controversy. Parts of the former and the whole of the latter are translated in AG.

¹⁴⁰ Chief among these is the issue of continuity in nature, which is taken by thinkers like Buffon, LaMettrie, and Diderot, who reject Leibniz's spiritualistic hylozoism in favor of a materialistic version, and transform the *great chain of beings* into an historical account of progress in nature.

¹⁴¹ Wolff accepts that the monads grounding bodies have powers that differ in kind from those characterizing the monads that are rational souls or minds.

¹⁴² AG 117-38

¹⁴³ §§ 584-615, Wolff [1983] I would like to thank Eric Watkins for making his unpublished translations of Wolff's text available to me.

derived.¹⁴⁴ Wolff is forced to accept *pre-established harmony*, not on the Leibnizean basis that the phenomenal effects of a substance are grounded sufficiently in the exercise of the active and passive forces that constitute the nature of the substance, but on the basis that the single force that *is* the substance is alone sufficient to explain its own changes and, thus, to ground changes in the phenomena.¹⁴⁵

Thus, in Wolff we have a non-interactive dualism according to which the motions of bodies are spontaneously generated and blind, and the adjustment of these motions to ends must be by and for minds. Since finite minds are simply fundamental forces, the efficacy of which is limited to changes in their own representational state, if the motions of matter are in any sense ‘for’ these minds, they have to be ‘by’ a mind more powerful than these.¹⁴⁶ Leibniz could explain purposiveness in material nature by reference to the natural strivings of the substances constituting inorganic bodies, and the natural striving for the perfection of the mind-body composite on the part of all of the substances constituting an organism, prior to appealing to God as the ultimate artificer of the entire system of substances and their perfectly harmonious strivings. The only option open to Wolff seems to be the direct appeal to God as producer of material machines, the motions in the parts of which are intentionally directed at the ends of beings externally ‘connected’ to these machines, or souls. Thus, it is obvious that Wolff must opt for *preformation* as well in accounting for the generation of organisms.¹⁴⁷ His ontology, however, leads to a view far more straightforwardly analogous the view of the *clockwork universe*, and one that much more obviously denies any real fruitfulness to nature than the *preformationist* view of Leibniz.

¹⁴⁴ §§ 742-48, 753

¹⁴⁵ §§ 599-601

¹⁴⁶ This is what leads to the view of miraculous interventions in the order of nature and restorative miracles that are discussed in Schönfeld [2000].

¹⁴⁷ §§ 439-56, Wolff [1981] deal with the generation of humans and animals.

Wolff's view is the more direct, and more vulnerable, of Kant's targets in the *OPA*, both in the above quoted passage and more generally throughout the text.¹⁴⁸ This view and others like it are also the targets of Newtonians, such as Buffon and Maupertuis, whose epigenetic accounts of the natural generation of organic bodies Kant also criticizes in the above passage. Although he is obviously more sympathetic to their views than he is to that of Wolff concerning the generation of organisms, he finds problems with their epigenetic accounts that, it seems to me, are also best understood in terms of the legacy of Leibniz and the ontological status of matter.

Like Wolff, Buffon ascribes a different status to matter than does Leibniz. Unlike Wolff, however, he views matter as substantial. Buffon's materialism leads him to speculate about mechanical procedures within organisms that mold material parts from within, and that then send these parts to a central place within the body where they form aggregates. These are then mixed with aggregations of parts from another organism to produce the embryo, in which this mixture of parts from both parents then proceeds to rearrange itself successively into an organic structure. This occurs through the, materialistically conceived, guidance that the parts receive from the parent organisms. In justifying his speculations, Buffon makes appeal to the continuity of progressively more complex forms in nature, and the observable similarities between the processes through which complex inorganic bodies are formed and the processes involved in embryonic development.¹⁴⁹ This opens up the further speculation that the mechanical forces attributed to inert bodies and the vital forces attributed to living bodies may differ from each other simply in degree.¹⁵⁰

Such a view could be considered either as deriving 'life' from what is essentially lifeless, or deriving 'lifelessness' from what is essentially living. Either way, it represents a kind of reductive approach to the unity of nature that draws whatever plausibility it has from empirical

¹⁴⁸ This is not to say that there are not substantial disagreements between Kant and Leibniz, but it is to say that the Wolffian view of the *order of nature* is more obviously problematic.

¹⁴⁹ See Buffon [1750-52], Larson [1994]

¹⁵⁰ This is a speculation that is taken further by other French thinkers such as La Mettrie and Diderot.

research carried out according to the idea that this unity should be conceived in terms of a single kind of force operating according to a single kind of causal law in a single kind of substance.¹⁵¹

The *great chain of beings*, for Leibniz, is first and foremost, an ontological commitment about the natures of immaterial substances based on *a priori* considerations stemming from the possibility and perfection of the intelligible world. In Buffon, and others in the eighteenth century, it becomes a commitment argued for on empirical grounds, through generalization from observation and speculation about the transformative powers of matter.¹⁵²

Kant seems to think that even if we were to accept that matter is substantial and that it is possible to attribute life, or a property analogous to life, to the independent material parts out of which organic bodies are formed, Buffon's view would still leave the contingent and purposive unity of organisms unintelligible *to us*. That is, if all that this life does is make it possible for organic molecules to rearrange their spatial locations relative to each other through their own power or agency, and we presuppose that these molecules are *in fact* responsible for generating a particular form, we could appeal to this capacity to help us understand the possibility that the molecules can generate motions without any external agency in producing this form. If we start simply with the molecules and this inscrutable capacity to move themselves, however, we still have no idea what leads them to move in the particular ways they do in assuming the particular form characteristic of a particular kind of organic body.¹⁵³ Even if we could observe them doing this repeatedly and unfailingly, which of course we cannot, we would still have no idea *how* they do it.¹⁵⁴

¹⁵¹ This is the kind of unity that Guyer sees Kant taking as his model in the first *Critique*, and that organisms threaten to undermine in the third. As I understand Kant's view, he is never committed to this idea except as one of several methodological maxims that create a fruitful tension, which is productive of greater empirical cognition of both unity *and* diversity in nature.

¹⁵² This is especially apparent in Diderot and, in a slightly less materialistic way, in Herder, as we will see in Chapter III.

¹⁵³ Roe [1991] points to this as a difficulty for both Buffon and Maupertuis.

¹⁵⁴ For Kant, discovering the regular sequence of events leading up to a particular event may be necessary, but it is certainly not sufficient, for rendering the particular event intelligible or explaining its occurrence *a priori*, through its antecedently determining grounds. Even the further step of discovering or providing the law according to which the event follows from previous events or states is not yet sufficient. Intelligibility

If we are even to conceive of an organic body as something more than a mere collection of spontaneously active molecules that we refer to as a single thing, we have to posit a principle that provides genuine unity for these parts.¹⁵⁵ Space cannot provide this principle for us, according to Kant, on somewhat Leibnizean grounds, but not grounds that beg the question against a materialist. That is, Kant also believes that spatial unity is grounded in non-spatial unities, but there is a more straightforward reason here, that Buffon himself ought to accept. If we were to take ten sheep from the same parents and put them together in the same pen, we can refer to them as a ‘flock’, but most people would be willing to admit that a flock is not an organism. Nor would anything change, it seems, if they all came together in an open field under their own power, moved amongst themselves in regular ways, or formed a circle around an injured member that resulted in this member being protected from attack by a wolf. That is, we could consider conditions beyond mere spatial proximity, and maintain that an organic body is an aggregation of distinct material parts, each of which is formed by the right source, all of which are spatially related to each other, and the interactions of which actually do keep the parts, and thus the whole, intact. In such a case, we would still need something to help us understand the distinction we actually make between this flock and the genuine organisms that are its members. If the individual parts exist prior to the whole, it is not clear that we can conceive of any kind of mere change in spatial relations that would help us understand how a true unity amidst these parts results from the actions of each.

This is what Buffon attempts to do through appeal to the *interior mould* and Maupertuis, in a slightly different way, through attributing features analogous to memory, desire, and aversion

requires that we have insight into the ontological grounds of a determinate state or change and into the manner in which these grounds are determined to their effects. Accordingly, in the, it seems rather unlikely, event that Buffon’s claims about organic molecules and the interior mold are true descriptions of the unobservable basis of the emergence of structures in an organic body, these elements do not form part of a genuine explanation of the natural generation of organisms. His descriptions are purported to be of the supersensible processes that ground the appearances, but this alone does not mean that Buffon has explained what Harvey was content merely to describe.

¹⁵⁵ On this point, I believe Kant is in agreement with Leibniz.

to organic elements. Again, whether or not such models are intelligible *per se* or true is not the primary issue in Kant's criticism. His claim is simply that they do not make the natural generation of organic bodies intelligible *to us*. On this point, it is difficult to take exception with Kant. This point, moreover, is one that Buffon cannot afford to take lightly, given his own claims about natural versus artificial methods of classification. Buffon famously argues against Linnaeus and von Haller that taxa of an order higher than species are artificially constructed classes, whereas species are natural classes constituted by interbreeding individuals.¹⁵⁶ If Buffon's view is unable to account for the real unity of these individuals, however, then not only is it possible that a *species* is a mere aggregation of individuals that happen to share observable characteristics and that happen to stand in particular spatial and temporal relations to each other, but the same could be true of the so-called individual organism as well. One of the central points involved in the eighteenth-century debate over natural classification is whether the spatio-temporal order of relations between observable phenomena is a better indication of the ontological principles of the *order of nature* than is the discursive representation of systematic relations of similarity and difference in the monadic predicates of individual bodies. If Buffon's attempt to characterize the intelligible grounds of the natural generation of organic bodies leaves him unable to account for the unity of an individual organism through natural means, then his criticism that Linnaeus' classifications are artificial lose their power.

At the time Kant is composing the *OPA*, the general attitude within the German speaking world is that some form of *preformation* must be involved in accounting for precisely those characteristics of plants and animals in virtue of which Kant distinguishes them from other natural products; *i.e.*, they consist not merely of independent parts, but of organs that are unified through their systematic and purposive relations to each other and to the whole of which they are parts. It is generally accepted that all plants and animals originate from, or exist originally as,

¹⁵⁶ For more on this point, see Larson [1994].

seeds or eggs.¹⁵⁷ Beginning with a set of generalizations from extensive observation, namely, that plants and animals consist of systematically related organs and that they originate from seeds or eggs, it is fairly easy to understand why many opt for the theory of *preformation* as the only way of explaining the phenomena associated with the formation and development of a new, or apparently new, individual. As Kant claims above “[h]ow a tree, for example, should be able through an inner mechanical constitution to form and model the sap in such a way that, in the bud of the leaf or in the seed, something should come about that contains a similar tree in miniature, or out of which such a thing could come to be, can in no way be understood according to all of our knowledge.”¹⁵⁸ In other words, it is unintelligible *to us*, if we are eighteenth-century natural philosophers, that an organism can produce something as apparently simple as the seed or the egg is, that is nevertheless able to develop, according to natural laws unguided by any plan, into an organized structure capable of both maintaining itself as an individual and propagating the species.

For the purposes of a mechanical explanation of the processes by which individuals develop and maintain the structures they exhibit, most think it necessary to presuppose that the seed is really not so simple to begin with, *i.e.*, that there is actually an articulated structure present in the seed, though unobservable, the growth of which through the appropriation of nutritive elements results in the observable structure we eventually perceive. The acceptance of such a presupposition commits one to some form of *preformationism*, but it does not dictate the acceptance of one form of this theory over another. It is established in the middle of the eighteenth century that not all organs become visible simultaneously.¹⁵⁹ Certain organs become visible well before others, and these latter appear to be generated successively from the former organs. Accordingly, the version of *preformationism* that holds each individual to be fully

¹⁵⁷ By this time, spontaneous generation has been largely discredited as a possible account of the purposive structures of plants and animals. See Gasking [1967].

¹⁵⁸ 2: 114-5

¹⁵⁹ This is the central issue that leads to the dispute between von Haller and C. F. Wolff in the latter half of the eighteenth century.

articulated in miniature and simply to increase in size becomes increasingly untenable. In light of these observations, a new version of *preformationism* is suggested, according to which it is not the case that the seed or egg contains a fully formed individual in miniature. According to this view, the seed contains, rather, pre-formed germs, or primordia of the eventual organs that are characteristic, not of a completely determinate individual, but of the kind or species from which the individual stems.

This version of *preformation*, accepted with varying degrees of commitment by Haller and Bonnet,¹⁶⁰ seems to have some advantages over the version that holds each individual to exist fully formed since the creation. Not only is it able to incorporate the above mentioned observations invoked as support for an epigenetic account of generation, but it can also, at least to some degree, take what we would now call environmental considerations into account in explaining the particular ways in which individuals develop. That is, the individual is not completely determined by internal factors to unfold in the way it eventually does regardless of the contingent circumstances in which this unfolding takes place. Rather, features that have long been understood to be correlated with differences in the development of individuals of the same species, *e.g.*, the health of the mother and the climate, can be incorporated into our accounts of diversity in the organic world. Despite these advantages with respect to the theory of *individual*

¹⁶⁰ For details on Haller's views in general, see Larson [1994], and Gasking [1967]; for an extended discussion of his experiments concerning embryonic development in chickens, and his debate with Caspar Friedrich Wolff, see Roe [1981]. Bonnet's views are also discussed in each of these places. For a view on the role Haller-Bonnet preformation plays in Kant's developing attitudes towards generation, see Phillip R. Sloan [2002]. I disagree with Sloan concerning both the development of Kant's views on generation and the role these views plays with respect to Kant's general epistemological project. For present purposes, it is only the former disagreement that is relevant. Sloan claims that Kant changes his mind about the view of generation put forth in *OPA* and the early essay on race, a view he sees as a Haller-Bonnet type of preformation, deciding finally for an epigenetic account. As we will see in what follows, I think it makes more sense to see Kant as committed to an epigenetic account of the formation of the individual, but one which makes use of the notion of pre-formed germs characteristic of the species in accounting for certain features of the individual. Further, I think he continues to maintain this position at least into the *Critique of Judgment*, where he refers to the *theory of epigenesis* as a *theory of generic preformation*.

preformation, however, there remains a significant difficulty with this view, namely, in accounting for the undeniable facts surrounding heredity.¹⁶¹

It is on this crucial point that the proponents of *epigenesis* in the middle of the eighteenth century, most notably Buffon and Maupertuis, have an advantage over those who deny to nature the ability to generate genuinely new organic bodies. The chief advantage of these accounts is that both parent organisms actually contribute materials from which the new organic body is formed, so they are far better equipped to deal with the growing body of facts concerning heredity that are being discovered in the eighteenth century.¹⁶² The chief disadvantage, as discussed above, is that it is not obvious that the claims concerning the precise mechanisms by which these facts are accounted for are true, or ultimately capable of accounting for the processes involved in the formation of a new individual.

This fact alone, however, does not require that we abandon the theory altogether and claim, instead, that each individual is created directly by God. Kant acknowledges that there are difficulties, on both sides of this debate, which he is not currently in a position to resolve decisively.¹⁶³ Recognizing, correctly it seems on the basis of the terms in which this debate is couched in the eighteenth century, that none of the arguments adduced for the truth of one theory or for the falsity of the other is conclusive, Kant opts for a qualified endorsement of that theory which seems to him most in line with the metaphysical and methodological position argued for in his work, namely, the theory of *epigenesis*. The qualification of this endorsement, however, is such that it may appear that he is granting to the *preformationist* all that she requires, *i.e.*, that regardless of how far we are able to carry out our investigations of organic phenomena according to natural laws governing the interaction of material parts, eventually we will have to have

¹⁶¹ For both Haller and Bonnet, ovist preformation seemed to be the most attractive solution to the problem of accounting for generation. The primordia of the new individual exist in the mother's egg prior to fertilization, however, so there can be no constitutive role played by fertilization and, accordingly, the tendency of the offspring to resemble both parents is left unaccounted for.

¹⁶² For a discussion of Maupertuis' role in discovering these facts, see Gasking [1967].

¹⁶³ The kind of approach to dialectical disputes that Kant takes in the *OPA* will become central to his understanding of what is involved in a critical approach to philosophically vexing questions.

recourse to a non-material principle of design in accounting for the unity of these parts in a structure of the type discussed above.

I take Kant to be making a suggestion here that he will repeat in discussing the various possibilities for accounting for the generation of organic bodies in the third *Critique*, namely, that any defensible epigenetic account of the generation of organic beings will differentiate itself from preformationist theories not by rejecting all appeal to immaterial principles, but, rather, by getting clear on precisely where in our explanations these principles are required. His suggestion in the *OPA* for grounding an epigenetic account are that, perhaps, “certain individuals of the plant and animal kingdoms, while themselves of supernatural origin, nonetheless have a capacity we cannot understand to generate their kind, and not simply to unfold them, according to a regular law of nature”,¹⁶⁴ and that we should “allow to the first divine arrangement of plants and animals a capacity truly to generate their like thereafter, and not merely to unfold them.”¹⁶⁵

What this suggestion shares with the *theory of preformation* is commitment to the following claims:

Pre1) The first individuals of any particular species are created directly by God

Pre2) All further members of this species develop according to natural laws from this initial arrangement

The primary difference between Kant’s view and that of other *preformationists* concerns the way in which *Pre2*) is interpreted. If it is interpreted to mean that these further members are actually present, as fully formed miniatures, in the initial arrangement, and the laws of nature govern merely their unfolding, then all individuals are created directly by God and one holds the theory of *individual preformation*. If, alternatively, it is interpreted to mean not that all future members of the species are *actually* present in the initial arrangement, but, rather, that the first

¹⁶⁴ 2: 115

¹⁶⁵ 2: 115

individuals are created with a capacity to form new individuals of the same species according to natural laws, then only the first individuals are created directly by God and one holds the theory of *generic preformation*. Within this latter theory there is room for disagreement concerning precisely what each parent to the generation of the offspring contributes, what precisely the earliest stages of development in organisms involve, and how the natural forces responsible for the successive development of the organic body are determined to their effects.

While Kant himself does not make this claim here, I think reading him in this way serves not only to make good sense of his treatment of these issues in *OPA*, but also to make sense of his, otherwise somewhat odd claim in the third *Critique*, that the *theory of epigenesis*, which has been seen, by modern natural philosophers¹⁶⁶ and contemporary commentators¹⁶⁷ alike, as starkly opposed to the *theory of preformation*, is really a version of this theory. Even if this is the right way to understand these features of Kant's thinking about the generation of organic bodies, however, it is still not sufficiently clear precisely why Kant opts for *generic*, rather than *individual, preformation*. As I see it, there are two primary reasons for this. I will discuss one of these reasons only briefly here, since I treat it in detail in the next chapter, and then I will devote the final section of this chapter to a discussion of the other.

As mentioned above, one of the primary virtues of epigenetic accounts of generation is that, at least in the cases of what we now call sexual reproduction, both parent organisms contribute materials to the physical constitution of the offspring. Accordingly, the well established fact that offspring tend, though not always in straightforward ways, to resemble their parents can be more satisfactorily accounted for by such an account than it can by its

¹⁶⁶ Buffon, Wolff, and Blumenbach all put forth their theories as rejections of the fundamental assumptions of *preformationism*.

¹⁶⁷ Zammito [2003] and Sloan [2002] stress the differences between these approaches and, in doing so, I believe ignore one of Kant's most interesting suggestions concerning the debate, and one of the central reasons for Kant's continued insistence on the need for some kind of pre-formation in accounting for the ultimate origin of species of being whose members are generated epigenetically.

alternative.¹⁶⁸ Further, the *prima facie* causal role played by factors external to the individual in accounting for variation between individuals of the same species need not be explained as a merely contingent, harmonious correlation. Not only are these facts better accounted for in this way, but the account provided also enables us to fix a physical, to some degree experimentally useful, criterion by which to make judgments concerning genera, species, varieties, etc. In other words, the answer to the above question concerning *generation* has important implications for another of the most contested issues concerning the organic world in the Eighteenth Century, namely, the proper basis for the *classification* of natural products.

Given Kant's interest in a particular kind of natural history, *i.e.*, in the systematic investigation of nature according to the physical, historical processes by which it has come to exhibit the order we currently observe in it, it should be no surprise that Kant would favor an account of the generation of organic bodies that allows us to conceive of the features on the basis of which we classify them as results, not only of ontological grounds considered abstractly, but also of *historical*, natural-causal processes. More specifically, as we will see in the following chapter, Kant wants to establish connections between the *logical system of nature*, which subsumes individual natural products under class concepts according to outward similarities, the *geographical system of nature*, which reveals variations among members of classes that are correlated with the places on the Earth in which they are found, and the *historical system of nature*, which seeks to trace the temporal series of events that have led to the current state of the natural world. The projected end of this activity is to reduce the number of seemingly distinct classes of organic body through the use of hypotheses, grounded in empirically discovered laws, concerning the lines of descent that have led to the diversity of forms observed in nature. Positing initial members of these classes as grounds for the physical laws by which they produce further members, which develop differently due both to internal (hereditary) and external

¹⁶⁸ For a discussion of Maupertuis' work in heredity, see Gasking [1967]. The issue of heredity, as we will see, becomes of central importance for Kant's views concerning the use of teleological principles in natural philosophy.

(environmental) factors, is, like positing an initial state of the universe in which material elements are distributed throughout space, an admission of our need to think of the regress in historical antecedents as terminating in a first member.¹⁶⁹

1.4: Natural Teleology and the Perfection of the World

All natural determinations and changes, according to Kant's view in the *OPA*, have as their efficient causes natural forces that are determined to the production of their effects in accordance with natural laws.¹⁷⁰ Kant draws a distinction, however, between the *necessary order of nature* and the *contingent order of nature* according to the specific manner in which the various forces responsible for producing a complex object or event are combined. If the forces involved are all determined to effects that accord with the universal laws of motion, or with particular laws that can be subsumed under these, the orderly and harmonious connections between their effects follow necessarily from this common ground, and the object or event is part of the *necessary order of nature*. If a variety of particular forces are responsible for the production of an object or event, and these forces are determined to their effects in accordance with really distinct causal laws, however, the orderly connection between these forces, laws, and effects is a contingent connection, and the object or event is part of the *contingent order of nature*.

As we have seen, Kant develops this distinction and includes plants and animals in a contingent order that is, nonetheless, natural in the *OPA*. I have also claimed that this essay contains the first detailed formulation of central aspects of the view concerning organisms and teleology for which Kant will argue in the *CJ*. The general aim of the *OPA* is to provide what Kant considers to be a new basis for an ontological demonstration of the existence of God,

¹⁶⁹ As we will see in Chapter III, the discussion of the cosmological ideas in the *CPR* involves an interesting modification of this view.

¹⁷⁰ 2: 103

together with a new assessment of the proper aims and methods of natural theology (or physico-theology). In the course of the work, Kant argues against the views of Spinoza, Leibniz, Wolff, and Newton, as well as against a variety of other metaphysicians, natural philosophers, and theologians on a variety of, what could seem to be merely loosely related, points. The unifying theme, I contend, both of Kant's particular criticisms of others and of the work in general, is that none of these thinkers has provided a metaphysical grounding for natural philosophy that is adequate to, or entirely consistent with, the *perfection* that these thinkers all agree characterizes both God and the world.¹⁷¹

Against Wolff, Kant argues that *a posteriori* methods of proof alone cannot establish the existence of a truly supreme being, that a teleological conception of nature rooted in its utility for human beings is needlessly anthropocentric, and that the *individual preformationist* view that each organism is the direct result of divine causation is unwarranted. These three criticisms together express Kant's view that Wolff is unable to provide adequate characterizations of the perfection of both God and nature. Kant thinks the same criticism applies to Newton as well. Newton's appeal to God as the immediate cause of the order of the solar system, and as the force responsible for occasionally restoring this order are central targets of Kant's nebular hypothesis. Kant deems his own hypothesis of the origin of the solar system superior to Newton's account, largely because it gets rid of these appeals and is also able to account for real deviations from what one would expect to characterize an arrangement artificially instituted by a perfect being. As we have seen, Kant also sees the growing tendency among Newtonians to combat the *individual preformationist* views of Wolff and others through theories of *physical-mechanical epigenesis* to present significant problems for understanding and explaining organic bodies and their distinctness from other natural products. Although Kant agrees that allowing to natural beings the capacity to produce others of their kind is the alternative more consistent with the

¹⁷¹ This may seem like a point of contrast with the theme of the *CJ*, about which there has been dispute concerning whether anything, and if so, precisely what, unifies the two parts of the final installment in the Critical system. It seems to me natural to think that this theme is perfection.

perfection of nature, he thinks the particular theories current at the time for explaining *how* this happens are inadequate.

Pointing out and, where possible solving, the various problems he sees in the dominant Wolffian and Newtonian approaches to understanding and explaining the *order of nature*, and the precise role of God in producing this order, seems to me to be the overarching aim of the *OPA*.¹⁷² Kant's introduction of two orders of natural causality within a unified and harmoniously functioning whole of nature, the possibility and existence of which is grounded in the 'Supremely Perfect Being', is his attempt to provide a basis for a systematic view capable of dealing with the entire range of issues central to eighteenth-century metaphysics and natural philosophy. The most significant theme unifying these various issues, from Kant's perspective, is the idea of perfection. In the *OPA*, Kant develops a view of perfection that departs from the common tendency within the tradition to equate perfection with reality.¹⁷³ Kant explicitly rejects the idea that God's perfection is correctly understood in terms of infinite reality and the idea that the divine intellect is an infinitely more powerful version of the human intellect.¹⁷⁴ These ideas together lead to the implicit rejection of the idea that the perfection of the world requires that there be a finite being corresponding to each of the infinite degrees of reality separating God's perfection from nothingness, or that the world is a *great chain of beings* in the sense maintained by Leibniz.

The problems Kant sees with the equation of perfection with reality are clear in his remarks about God's all-sufficiency. Standard responses to the problem of evil face difficulties, in Kant's view, because they conceive of the natures or essences of things as independent of God, and simply grant to God the power to create whichever world contains the most reality or the

¹⁷² This is the reason for beginning with an a priori argument that differs in important ways from the Cartesian and Leibnizean ontological arguments based on perfection, and for denying the equation of perfection with reality that leads to difficulties in distinguishing God from the *order of nature*. See 2: 90.

¹⁷³ 2: 90

¹⁷⁴ 2: 154

most perfection.¹⁷⁵ Because finitude and imperfection are necessarily identified in any view that equates infinite being with absolute perfection, such a view must admit that there are aspects of the world that are less than fully perfect. A standard theodicy merely relieves God of the blame for those aspects of the world that are metaphysically necessary, or are parts of all possible worlds, and which are ultimately beyond God's control. God does not will these imperfections, since a perfect will would desire only the perfections contained in the world. Imperfection or evil is a necessary, but unintended, consequence of the act of creation.

Kant argues that if we conceive of God as the ground of all *possibility* as well as of everything that exists, we will understand that the world must be perfect, but not in the sense of containing the greatest magnitude of reality consistent with its essential finitude. Rather, the world is perfect in the sense of being the result of a perfect choice, or being what is chosen through the harmonious combination of the greatest possible understanding and the greatest possible will.¹⁷⁶ Because all reality is grounded in God, whether as an actual determination (e.g., understanding and will) or as a result of actual determinations (e.g., impenetrability and extension),¹⁷⁷ there is perfect harmony between the essences or possibilities of all things whatsoever. Further, because God's understanding grounds the possibility of all other things, God's will is responsible for the existence of all other things, *and* these two capacities are unified in God, whatever exists will be the result of the greatest possible unity between the greatest cognition and the greatest desire. The unity characterizing these active powers is God's perfection itself, and whatever diversity of things is grounded in the combination of these powers will necessarily be a unified system characterized by harmonious relations between its parts, or a perfect world.¹⁷⁸

¹⁷⁵ 2: 151 Kant's reflections on optimism (*Reflections 3703-5*) from the 1750s and his essay on optimism from 1759, express a similar point of view. These are translated in Kant [1992].

¹⁷⁶ 2: 153

¹⁷⁷ 2: 79-80

¹⁷⁸ 2: 153-4

This view of the perfection of the world is central to Kant's claims about the relation between efficient causes and final causes in nature in general, as well as in the particular realm of plants and animals. Because the necessary features of space and the essence and existence of matter have a common ground in God's intellect, there is a systematic unity to the natural world that involves both the harmonious *formal* relations between objects that are investigated by geometry,¹⁷⁹ and the harmonious *real* relations between the natural forces that ground the extension and impenetrability of matter and the laws of motion.¹⁸⁰ These forces and laws are the real, internal or ontological, grounds of the relational characteristics thought about in the essence or possibility of matter, namely, extension and impenetrability. Kant thinks that although the harmonious relations between objects and events in nature often appear contingent, and understandably fill us with the sense that these objects or events must be due to special provisions, appealing to final causes too quickly undermines our appreciation of the real unity of nature. What is truly amazing, in Kant's view, is that so much apparently contingent unity, harmony, utility and purposiveness is actually the effect of the exercise of natural forces that are determined to their effects through natural laws and are *not* guided by any particular intentions.¹⁸¹ Of course, if nature is the product of the most perfect intention carried out in light of the most perfect representation of possibilities, then all connections between cause and effect can also be interpreted as connections between means and ends, but these means will not generally have to be artificially instituted for particular cases.¹⁸² The more nature accords with the ends of beings that are in some ways like ourselves, but does so in such a way that we can explain the causes of this

¹⁷⁹ This is the kind of objective, but merely formal, purposiveness that Kant discusses in § 62 of the *CTJ*.

¹⁸⁰ This *necessary order of nature* is, roughly, the order for which Kant will provide metaphysical foundations in the *MFNS*.

¹⁸¹ In this connection, Kant refers to Maupertuis' proof of the principle of least action (2: 98), which Kant believes is a better ground on which to base natural theology than are the contingently purposive arrangements in nature involving plants and animals. As we will see in Chs. III and IV, the continuity of nature is one of the central themes that Kant addresses in his discussion of the *order of nature* and of teleological principles in the Critical period.

¹⁸² This is the universal view of teleological connections that Kant shares with Leibniz and that provides the grounds for a through-going natural teleology that sees organized beings as both the agents and the benefactors of natural change.

harmony in terms of the *necessary order of nature*, the greater is our conviction that the possibility and existence of nature are grounded in the understanding and will of the perfect being.¹⁸³

As the introduction to this chapter indicates, Kant's general position might lead one to suspect that he would be committed to explaining everything in nature as part of this necessary order. Although methodological considerations aimed at maintaining a certain kind of unity in our explanations do lead him in this direction, both metaphysical and natural philosophical considerations lead him to recognize a need to distinguish animals and plants from other natural products. From the standpoint of metaphysical considerations, properties like understanding, will, and life cannot be attributed to matter, in Kant's view.¹⁸⁴ The vital processes and actions of human beings and other animals cannot be the necessary results of the same natural forces that ground the essential determinations of matter alone, nor can they be grounded sufficiently through simply adding a vital force to matter. Kant agrees with the general consensus at the time in maintaining that matter is essentially inert. He also agrees that the *ratio cognoscendi* of life is self-motion. The *ratio fiendi* of self-motion in a living physical being must, accordingly, be provided by some non-material substance that stands in particular causal relations to the material parts that constitute the body; *i.e.*, a soul. These metaphysical considerations are certainly significant for understanding Kant's perception of a need to distinguish humans and other animals from inanimate products of nature, but they are not the central considerations to which Kant

¹⁸³ This subjective conviction is something that Kant continues to respect in the Critical period, even when he no longer believes we can provide any demonstration that could turn it into objective cognition of the existence and characteristics of the all-sufficient ground of nature.

¹⁸⁴ 2: 87-8 This is a view that Kant will continue to maintain in the Critical period, which requires that the animating principle of bodies be attributed to the supersensible ground of the matter of bodies. This move is essential to the attempt to maintain a commitment to the inertia of matter, while also allowing that life is a natural cause of corporeal phenomena.

appeals in natural philosophical contexts where organisms are under discussion, and they are also not appealed to in the *OPA*.¹⁸⁵

In this context, Kant appeals just as often to plants as he does to animals and humans. He does later speculate about whether it is right to think of plants as alive, despite the fact that they do not move themselves,¹⁸⁶ but in none of his writings up to and including the *CJ* does he think that his view concerning organisms depends on a particular answer to this question. Accordingly, even if we don't admit the existence of non-material souls, or immaterial spirits, Kant thinks we do have to admit there is an important distinction between organic and inorganic natural products. Both plants and animals are complex functional unities in which the parts are formed in such a way as to serve as tools, or organs, for the exercise of various powers or capacities that have no necessary connection to each other as particular manifestations of a single, fundamental power or force.¹⁸⁷ There is, however, a *natural* connection between these powers and between these organs, and we can discover the laws governing both the formation of the organs and the exercise of the powers through observation. To say there is no *necessary* connection between powers is simply to say that the possibility of the one is independent of the possibility of the other, *e.g.*, the possibility of the capacity for sight is independent of the possibility of the capacity for hearing. To say that there is a *natural* connection between them is to say that they are really connected in natural beings of a certain type, *e.g.*, some natural beings that make use of sight also make use of hearing.

¹⁸⁵In these contexts, as we will see, the capacity to preserve oneself and one's species is the essential capacity that distinguishes plants and animals from other kinds of body in nature.

¹⁸⁶Cf. *Dreams* (2: 330-2)

¹⁸⁷Here, it appears that the work done on vital forces, such as sensibility and irritability, by von Haller play an important role in Kant's thinking. These are not powers that are under the voluntary control of the animal, but they do operate in ways very different from the ways in which attractive and repulsive forces operate. For more on von Haller's physiological views, see Roe [1991] and Hall [1969]. The issue of the reducibility of vital forces to a single fundamental vital force divides physiologists like von Haller from others like La Mettrie. Kant's own discussion of fundamental forces is not so much aimed at deciding issues of reducibility, which are beyond our capacities, as at conceiving of the principle of synthetic unity for a manifold of forces that are given to us through a variety of different effects. This is a little noted, but I believe central, aspect of Kant's approach to organisms and teleology in the *CTJ*.

Kant does not deny that we should attempt to reduce the complexity of the various powers and capacities of plants and animals by thinking of them as results of more basic capacities, nor does he deny that we can think about the structures and motions of the parts of plants and animals according to the analogy with man-made machines. We cannot, however, reduce all of these capacities to the same fundamental force or forces at work in inorganic nature, and we have no compelling reason to accept that comparisons with the ‘blind’ mechanical workings of inorganic matter or with the ‘guided’ workings of artificially constructed machines are anything more than distant analogies. In Kant’s view, neither the natural mechanistic approach of the supporters of *physico-mechanical epigenesis* nor the artificial mechanistic approach of the supporters of *individual preformation* can account for the formation and functional unity of the parts of a plant or animal. Even if we allowed that organic molecules were alive, it is not clear that the mere spatial rearrangement of previously formed molecules through forces analogous to attraction and repulsion could explain the unity of an organism (*mechanical epigenesis*). The unity lacking in a mechanical aggregation of parts is present in a machine, and a machine is something that can be used by a separate living thing to achieve its ends, but the appeal to artifice for each individual machine is an admission that nature cannot produce the functional unity of a plant or animal (*individual preformation*).

Kant agrees that the *possibility* of this unity must be grounded ultimately in the divine *understanding*, and he thinks the *existence* of the ultimate natural causes of the unity of the individual must be direct results of the divine *will*, but his commitment to preserving the perfection of nature leads him to conceive of the individual as truly the product of natural causes. The central reason Kant sees for including plants and animals in a *contingent order of nature* is that the above-mentioned functional unity observed in these beings is both contingent and aimed at perfection. That is, the capacities exercised through the parts of an organism (*e.g.*, seeing through the eye, hearing through the ear, pumping blood through the heart) have no essential connection to each other, but the parts are set up in precisely the way required in order that the

whole out of which they are composed be able to achieve the mediate ends (*e.g.*, finding food, processing food, repairing injuries) that are necessary means to the ultimate end (perfection) of the organism. The harmony between the way organisms *are* and the way they *have to be* in order to develop their capacities fully indicates that the *possibility* of such a systematic connection of parts is grounded in the mind of a being in which there is the greatest possible unity between understanding and will, or between the cognition involved in the consideration of the most efficient way to achieve an end and the desire involved in seeing to it that this end is realized. In Kant's view, the possibility of any natural species of plant or animal is grounded in God's understanding, and the existence of the original members of this natural species are the direct results of the divine will, but subsequent members are generated in accordance with natural laws grounded in this original organization.¹⁸⁸

Kant claims in the *OPA* that we cannot understand how plants and animals are generated, but it is fairly clear that he thinks that metaphysical considerations of the perfection of the world should lead us to the view that they are in fact generated through natural processes. The *individual preformationist* view takes our inability to understand the natural production of organisms as evidence for the claim that they cannot be produced naturally, the theory of *mechanical epigenesis* takes the commitment to their natural production as support for the attempt to explain this production mechanically, while Kant's view of *epigenesis* as *generic preformation* combines the commitment to there being a *natural* explanation with the admission that *we* cannot provide it. The regularity with which organisms are generated provides us with the ability to come up with generalizations concerning the conditions under which generation occurs and concerning the stages through which it proceeds, but all of these facts are just as consistent with the *individual preformationist* view that what we are observing is the natural unfolding of a divinely produced seed as it is with any of the versions of *epigenesis*.

¹⁸⁸ 2: 108

At the time Kant is writing, there are no clear empirical grounds for preferring any one of these views to the others.¹⁸⁹ What is more, methodological considerations can adjudicate between competing interpretations only in cases where the parties agree concerning their ends. If we are looking to nature to find evidence of God's existence, the methodological injunction to explain everything naturally will hold no sway over us. The natural theologian does not have the same end as the natural philosopher, and the methodology of the latter may be contrary to his or her purpose. If we are looking to nature in order to understand and explain the processes through which natural beings are produced and changes in nature occur, there is agreement about the end, but our methodological principles alone cannot tell us whether or not the end is actually achievable, or at what point we can legitimately give up on eventually achieving it.

There are certainly facts that are clearly recognized in the latter part of the eighteenth century about the roles of heredity, nutrition and environment in the development of individual organisms, which do seem to favor the theory of *mechanical epigenesis*. That is, if the individual is actually produced by its parents and its developmental processes are actually causally influenced by what the individual appropriates and by other features that characterize its environment, then a significant range of regularities and divergences in the organic realm turn out to be the results of natural causes operating according to natural laws. Natural philosophy would be advanced by this realization, however, only if *mechanical epigenesis*, or some other natural-causal theory, is right in its claims. Otherwise, it might be both necessary and entirely legitimate to appeal to considerations of the harmony of the world as explanations of God's choice to outfit individuals for their environments, to encase the seeds of future generations within each other in

¹⁸⁹ Roe [1991] provides a good discussion of the role of theoretical commitments in informing what von Haller and C. F. Wolff 'see' when they observe the development of chicken embryos. Although there appears to be good reason to reject *individual preformationism*, as all parties to late eighteenth-century debates do, these reasons have just as much, or more, to do with the kinds of theoretical commitment that Kant will discuss in terms of *regulative principles* in the Critical period as they do with actual observations that provide a conclusive empirical refutation of the theory.

such a way that it appears that like gives rise to like, or to create multiplicities of individuals that resemble each other but are never identical.

Even if we agree that the simplest explanation is the best one, it is also right to require that any suggested explanation be coherent and that it be explanatory. The view of *individual preformation* seems to have both of these virtues, whereas it is not clear that *mechanical epigenesis* has either. What is more, there is no obvious way in which the latter explanation is any simpler than the former. Accordingly, the only clear advantage to the theory of *mechanical epigenesis* is that it makes fewer appeals to supernatural principles. This, however, is no reason for preferring it, unless we have independent grounds for thinking that it might also be true, or an independent guarantee that there really is nothing beyond nature that could be explanatorily relevant. Kant rightly sees that the independent grounds for believing it is true are questionable.¹⁹⁰ Furthermore, the guarantee that there really is nothing beyond nature could be had only if we could be certain that the generation of organisms really is a purely natural process, which is exactly the point in contention. The supporter of *individual preformationism* would certainly admit the claim that we do not understand God's reasons or actions, but he would also be justified in replying in defense that we also do not understand the natural production of organisms.

If empirical and methodological considerations are unable to settle this dispute, and Kant himself does not claim to understand how organisms are generated, what explains his rejection of both of these views and his choice of a position, which he will later call both *epigenesis* and *generic preformation*, maintaining that individual organisms are genuinely produced through natural-causal processes? The immediate response has to be that metaphysical considerations lead him to this view, but we might wonder which ones precisely. He is clearly not a dogmatic naturalist, so it cannot be that he merely insists that everything has to be the result of natural

¹⁹⁰ That is, he sees what are now considered to be the actual difficulties with the view that make it a dead end. He also recognizes that one of the central difficulties confronted by the view is the attempt to explain generation in terms of a model of spatial rearrangement of previously existing parts (see Jacob [1973]).

causes alone. He also admits the possibility of miracles,¹⁹¹ so he does not even believe that all events *in nature* must result solely from natural causes. Finally, his view involves the claim that the first organisms are created directly by God, so it is not even the case that all *organisms* result solely from natural causes. Why, then, does he not simply agree with the view of *individual preformation*?

The answer is that in addition to the lack of independent warrant for thinking that no organism can be produced naturally the view is inconsistent with Kant's conception of God's perfection and the perfection of God's creation. The same criticisms that Kant directs at Malebranche and Leibniz concerning their views of natural causality in general¹⁹² apply equally to their *individual preformationist* views concerning the generation of organisms. Malebranche's *occasionalism* cannot provide a genuine ground for distinguishing between miracles and the *order of nature*, and Leibniz's *pre-established harmony* cannot truly distinguish between the *order of nature* and an artificially instituted agreement between the effects of independent and causally isolated natures. The true *order of nature* in these views is in the divine understanding alone, and not actually in the world of our experience.

What we experience as the *order of nature* in terms of spatial, temporal and causal relations between physical objects is the mere appearance of a connection between causally impotent substances (*occasionalism*) or between causally isolated substances (*pre-established harmony*). The connection between the actual infinities of coexisting causally isolated Leibnizean monads, in virtue of which they all occupy the same world and which we represent as space, is really nothing beyond the thought of their connection in the divine intellect. The harmonious correspondence between the successive states of these monads, which we represent as the temporal series of changes in spatial objects, is merely the result of God having chosen that

¹⁹¹ 2: 111

¹⁹² These are found explicitly in the major theoretical works that serve as bookends for the pre-Critical period, namely the 1755 *ND* (1: 415-6) and the 1770 *ID* (2: 409). For a discussion of these sections in the context of Kant's developing view of physical influx, see Watkins [1995a]

set of monads, or world, in which there is the greatest possible harmony or agreement among the greatest possible diversity of distinct individuals.

Kant finds it problematic to entertain the idea that there could be worlds in which the changes of one substance are not harmonious with those of every other substance. The subsequent claims that it is a real advantage for our world over other possible worlds that the changes in its substances harmonize perfectly with one another, and that this advantage explains why God chose to create this world instead of another, are genuinely maintained as a way of stressing God's perfection. In Kant's view, however, these claims actually express a fairly low opinion of this perfection. Praising God for having chosen a perfectly harmonious world involves claiming, either, that possible worlds are ontologically independent of God, and so not all of them are harmonious, or, that some effects of God are less than maximally perfect, so some of the worlds grounded in God's intellect are less than perfectly harmonious.¹⁹³ Neither of these options seems, to Kant, to do justice to God's perfection.

The conception of the *order of nature* that follows from this view is equally problematic. In addition to other considerations, Kant finds it contrary to an adequate conception of the perfection of the world that it should be a merely ideal connection between causally isolated substances. Bringing about the most general harmonious relations between the states of all substances in the world by way of the mutual interaction of these substances, through the exercise of a relatively small number of efficient causal forces and laws, is more consistent with God's perfection and the perfection of the world than is securing this harmony through ensuring that each of the infinity of substances changes its own state according to an internal law in a way that is also consistent with the changes of state of all other substances. In the former case, a relatively small number of laws cover the changes of all substances in the world, whereas in the latter there is a unique law for each of the infinity of individual substances.

¹⁹³ 2: 153-4

The same general considerations apply to the issue of *individual preformationism* in the organic realm. If each individual organism has existed since the creation, and God has devised a way to encase generations within generations within generations, etc., that seems like a testament to God's power and perfection. From another perspective, however, it seems to undermine this very perfection. If we assume that nature's inability to form matter in such a way as to produce the structure of an organism is a constraint on God in creating the world, then the ingenuity to come up with such an arrangement and the power to enact it is amazing. But, why should we assume that God is, in fact, constrained in this way? If the possibility and existence of nature is grounded in a perfect God, there seems to be no reason that organisms could not be able to generate other organisms through natural-causal processes, rather than merely carrying them around until it is their proper time to begin the process of unfolding. The creation of a few original organisms with the power to generate others of their kind seems, to Kant, to be a truer expression of God's perfection than is the view of *individual preformation*. The further development of these individuals through the real interaction between the fundamental forces, powers, or capacities combined in their natures with those of other organisms, and with the fundamental forces constitutive of matter, further, seems to be a truer expression of the perfection of the world than is the view of *pre-established harmony*.

Chapter II: Organisms and Teleology in the 1770s

2.1: Generation and Classification

As we saw in Chapter I, Kant has an interest from very early on in his career in the study of nature, not simply as the object of mathematical physics, but also as a complex system involving various kinds of unity and harmony between the effects of diverse natural things. His lectures, first on physical geography and then later also on anthropology, are the place where he continues to pursue this interest for his entire academic life. Through his preparation for these lectures, Kant kept himself more aware than is often realized of the tremendous growth of knowledge in eighteenth-century Europe concerning the geography, the various species of plant and animal, and the various societies of human being, in other parts of the world. One of the primary aims of these lectures is to provide students with a sense of the diversity of the world that would meet them when they left the university, and to prepare them to exercise their capacities not simply in academic pursuits but in practical matters or in life. In the 1775 essay on *Races* that serves as an advertisement for his physical geography lectures, he writes:

Physical geography, which I am advertising through this essay, belongs to an idea that I have of a practical academic training, which I can call a preparatory exercise in the knowledge of the world. It is this worldly knowledge, which provides a pragmatic aspect for all of the previously obtained arts and sciences, through which these become useful not merely for academics but also for life, and through which the now mature apprentice is introduced to the arena of his destination, namely the world. There stands before him a two-fold domain, of which he needs a preliminary synopsis, so that he can order all future experiences in it according to rules: **nature** and **man**. Both parts, however, must be reflected on cosmologically within it; namely, not according to what is note-worthy about its object in isolation (natural philosophy and empirical psychology), but according to what their relationships to the whole in which they stand, and in which each occupies its place, present for us to take note of.¹

¹ 2: 443

It is this idea of the world, as the place in which the bodies and souls or minds that we come into contact with are viewed more concretely, though still systematically, in terms of the physical and/or cognitive and/or technical, aesthetic and practical needs and interests of *life* (in its human and non-human manifestations), that provides the ultimate standard for the empirical use of our judgment, according to my understanding of Kant's thought. This idea is the 'bridge' between the theoretical consideration of the world, according to *first principles of what is*, and the practical consideration of the world, according to *first principles of what ought to be* through freedom. It is this idea, which will eventually provide the unifying theme of the two halves of the *CJ*, that provides a non-doctrinal basis both for common life and for the philosophical hermeneutics required for the greatest possible extension of our knowledge of nature.² It is also the idea involved in the kind of systematic *natural history* of organisms that Kant believes requires us to make use of *natural teleology*.

2.2: Natural History and Natural Teleology

From Kant's lectures on physical geography, the following general picture of *natural history* and its role in human cognition emerges. *Natural history* (*Naturgeschichte*) shares with both *system of nature* (*Systema naturae*, *System der Natur*) and *natural description* (*Naturbeschreibung*) the concern to provide a systematic view of the diversity observed in nature, or a concern with the *order of nature*. That is, each of these aims to discover and apply principles by which the seemingly endless variety observed in the world, revealed both by personal experience and by the reports of others, can be ordered into a whole, the basic outlines of which can be grasped by our finite intellects and made use of in our judgments. The primary difference between *natural history* and *natural description* is that the former takes as its primary object courses of events in the world (*Lauf der Welt*, *Weltlauf*), whereas the latter deals primarily with

² For more on this idea, see Düsing [1968] and Makkreel [1990].

the showplace of the world (*Schauplatz der Welt*).³ In other words, *natural history* deals with spatio-temporal series of events, and *natural description* classifies things in nature and their relations to each other at a given time.⁴

Both of these pursuits, further, share a concern with arriving at a physical, rather than a merely logical, system of nature. That is, the various systems of nature, of which Kant mentions Linnaeus' *Systema naturae* as an example, judge two or more things to be related to each other just in case each exhibits a common observable property or set of observable properties, which is referred to in eighteenth-century systematics as a *characteristic*.⁵ Relations between objects in the natural world, according to this view, are logical relations of similarity and difference (expressed in *characteristics* involving such properties as the size, color, number, shape and arrangement of observable parts). These relations are construed on the model of conceptual

³ This 'showplace' can be taken to indicate both a place where marvelous and extraordinary things are exhibited, and simply a place where things are seen more generally. While this distinction is not central to the points I want to make here, it is an important one concerning general attitudes towards nature in the Eighteenth Century. For a suggestion as to the role this distinction plays in Kant's own thinking about physical geography, see Stark [2001].

⁴ Den Inbegriff aller Gegenstände nennt man Welt. Es läßt sich also auch eine Wissenschaft denken; deren Gegenstand die Welt ist d. h. die alles in sich vereiniget, und das heißt Weltkenntniß. Diese Wissenschaft wird die wichtigste und nothwendigste von allen Wissenschaften seyn, weil ohne sie alle andre nur isoliert, nicht in Verbindung ständen. Sie macht das Ganze aus; alle andre Wissenschaften sind nur theile von ihr. Alles wird in ihr mit einander verbunden. - Diese Weltkenntniß geht auf 2 Gegenstände; auf den Schauplatz der Welt und auf den Lauf der Welt. Von uns ist die Erde eine Welt, weil sie alle die Dinge in sich begreift, womit wir in Gemeinschaft stehen. Vor uns wird also auch Weltkenntniß nur so viel heißen als Erdkenntniß. - Den Schauplatz der Natur erwägt die Geographie, den Lauf der Natur die Geschichte. Beide also zusammen machen die eigentliche Weltkenntniß aus – (Barth, p3)

Wenn wir nun alles dasjenige, was Erfahrungen in sich enthält, Historie nennen, so werden sich 2 Theile derselben gedencken lassen.

<Beschreibungen> a) Die Geschichte desjenigen, welches zu einer und eben derselben Zeit geschiehet, dies ist die Geographie, welches nach den verschiedenen Gegenständen, wovon sie handelt, bald die physische, moralische, bald die Geographie der Gelehrsamkeit genennet wird.

<Erzählungen> b) Die Geschichte desjenigen, welches zu verschiedenen Zeiten geschehen, welches die eigentliche Historie ist, und nichts anders als eine continuation der Geographie ist, daher es zu der größten Unvollständigkeit der Historie gereicht, wenn man nicht weiß an welchem Orte eine Sache geschehen ist. (Pillau, 1784 p.2)

⁵ Wir können aber unsern Erfahrungs_Erkenntnißen eine Stelle anweisen unter den Begriffen oder nach Zeit und Raum wo sie wirklich anzutreffen sind. Die Eintheilung der Erkenntniß nach Begriffen ist die logische Eintheilung; die Eintheilung nach Zeit und Raum ist die physische. Durch die logische Eintheilung wird ein systema naturae wie zE des Linnaeus; durch die physische Eintheilung wird eine geographische Naturbeschreibung zE. das Rinder_Geschlecht wird gezählt unter die vierfüßigen Thiere oder unter die mit gespaltenen Klauen. Dieses wäre eine Eintheilung in meinem Kopf also eine logische Eintheilung. Das Systema naturae ist gleichsam eine Registratur des Gantzen, da stell ich ein jedes Ding unter seinen Titel, wenn sie gleich auf der Welt in verschiedenen weit entlegenen Plätzen seyn. (Kaehler, p. 9)

classification according to genus and specific difference.⁶ A *physical system of nature*, in contrast, judges two or more things to be related either 1) *geographically*, according to spatial relations among natural objects existing at the same time, or 2) *historically*, according to the places these objects occupy in a series of natural changes.⁷ It is ultimately the combination of these two kinds of physical relation into a system that is involved in a true *natural history*, *i.e.*, geographical classifications and descriptions of the current state of the world are the *explananda* for which we provide an *explanans* that involves historical considerations as well.

Accordingly, there is a two-fold relation between these attempts at a physical system: on the one hand, the present state of the world as it is described in geographical terms by *natural description* is the result of the historical processes in nature that are the objects of *natural history*, and, on the other, the framing of hypotheses concerning what processes need to be assumed in order to account for the current state of the world, which is central to *natural history*, relies on the previous acquaintance with this state that is the goal of *natural description*. Another way of

⁶ For a detailed view of Linnaeus' general methodology and actual procedures in coming up with his *Systema naturae*, see Larson [1971]. For an account of the controversies arising between the three most well-known naturalists of the Eighteenth Century, namely Linnaeus, Haller, and Buffon, and the influence these have on the study of nature up to Kant, see Larson [1994].

⁷ Alle unsre Erkenntniße der Welt werden geschöpft aus der Erfahrung, entweder aus eigener Erfahrung, oder aus Nachrichten von anderer Erfahrung. Diese Nachrichten sind nun entweder Beschreibungen oder Erzählungen. Iene gehören zur Geographie, diese zur Historie. Die Beschreibungen beziehen sich nun entweder auf Dinge, wie sie itzt zu gleicher Zeit sind, denn gehören sie zur neuen Geographie, oder auf Dinge, wie sie vormals zu einer und derselben Zeit gewesen sind, und denn gehören sie zur alten Geographie. Erzählungen aber müßen allemal Nachrichten von Dingen zu verschiedenen Zeit seyn, also eine Reihe von Veränderungen, die sich mit den Dingen nach einander zugetragen haben, in sich enthalten. Darin besteht der wesentliche Unterschied der Beschreibungen und Erzählungen, sowie der Geographie und Historie. Ordnung bringen wir in unsre Begriffe, wenn wir einen ieden derselben in unserm Verstande seine Rechte Stelle anweisen. Wenn wir nun einem Dinge unter unsern Begriffen eine Stelle geben, so heist das seine logische Stelle; betrachten wir es aber nach der Stelle, die es auf der Erde selbst <hat>, so ist das seine phisische Stelle. So ist z. B. die logische Stelle aller Bäume in dem einzigen Verstandesbegriff Baum; ihre phisische Stelle aber auf der Erde so verschieden, als die Gattungen von Bäumen verschieden sind, oder vielmehr so verschieden, als die Stellen auf der Erde verschieden sind, wo dieser oder jener Baum steht. Nun nennt man ein System der Anordnung aller Dinge in der Welt nach Begriffen, ein System der Natur; eine Beschreibung aber aller Dinge in der Natur nach den Stellen «*ℓℓ*» welche sie wirklich auf der Erde einnehmen; heist: phisische Geographie. System der Natur und phisische Geographie sind also nicht unterschieden im Obieckt, denn sie erwägen beide einerlei Gegenstände, nämlich den Schauplatz der Natur, sondern ihr Unterschied besteht blos in der Verbindung dieses Gegenstandes. Das System der natur hat nämlich blos mit der logischen Stelle der Dinge zu thun, die phisische Geographie aber allein mit der phisischen Stelle. Hieraus folgt, daß Dinge die unter derselben Gattung stehen, sich logisch verwandt sind; diese Dinge aber nur geographisch benachbart seyn können, wenn die Plätze welche sie wirklich einnehmen, nahe an einander liegen. (Barth, pp.4-6)

putting this is to say that *natural description* is the *ratio cognoscendi* of a physical order in nature for which *natural history* seeks the *ratio fiendi*.⁸ Kant talks about geography as the substratum for history, because it is through an investigation of the objects in various parts of the world and their relations to other objects that we discover regularities or rules through which we form hypotheses about the forces and laws that determine the series of events leading to the current state of the world in its natural (inorganic and organic) and anthropological senses.

Requiring as it would, first, a complete description of the character and relations of all natural objects at the present time and, then, an account of how these objects came to be as they are, a completed *natural history* can be only an idea which we endeavor to approximate as closely as we can given the incompleteness of our knowledge of nature. As it currently stands, however, not a great deal of progress is being made in the direction of realizing this ideal, according to Kant, due to the prevalence of works in *natural description* that are being called natural histories, the denial of a significant distinction between *natural description* and *natural history*, and the prevalence of logical, rather than physical, systems of nature.⁹

⁸Was ist nun ehe, Geschichte oder Geographie? Die Geographie liegt der Geschichte zum Grunde, denn die Begebenheiten müßen sich doch worauf beziehen. Die Geschichte ist immer im Flusse aber die Dinge verändern sich und geben zu gewißer Zeit eine ganz andere Geographie, also ist die Geographie das substratum. (Kaehler 1774, p. 16)

⁹Das Wort Geschichte in der Bedeutung, da es einerlei mit dem griechischem Historia (Erzählung, Beschreibung) ausdrückt, ist schon zu sehr und zu lange im Gebrauche, als daß man sich leicht gefallen lassen sollte, ihm eine andere Bedeutung, welche die Naturforschung des Ursprungs bezeichnen kann, zuzugestehen; zumal da es auch nicht ohne Schwierigkeit ist, ihm in der letzteren einen andern anpassenden technischen Ausdruck auszufinden. (8:163)

Was aber den bezweifeln, ja gar schlechthin verworfenen Unterschied zwischen Naturbeschreibung und Naturgeschichte betrifft, so würde, wenn man unter der letzteren eine Erzählung von Naturbegebenheiten, wohin keine menschliche Vernunft reicht, z.B. das erste Entstehen der Pflanzen und Thiere, verstehen wollte, eine solche freilich, wie Hr. F. sagt, eine Wissenschaft für Götter, die gegenwärtig, oder selbst Urheber waren, und nicht für Menschen sein. Allein nur den Zusammenhang gewisser jetziger Beschaffenheiten der Naturdinge mit ihren Ursachen in der ältern Zeit nach Wirkungsgesetzen, die wir nicht erdichten, sondern aus den Kräften der Natur, wie sie sich uns jetzt darbietet, ableiten, nur bloß so weit zurück verfolgen, als es die Analogie erlaubt, das wäre Naturgeschichte und zwar eine solche, die nicht allein möglich, sondern auch z.B. in den Erdtheorien (worunter des berühmten Linné seine auch ihren Platz findet) von gründlichen Naturforschern häufig genug versucht worden ist, sie mögen nun viel oder wenig damit ausgerichtet haben. (8:161-62)

Dahero haben wir Naturbeschreibung, aber nicht Natur_Geschichte; dieser Name ist sehr falsch, den einige brauchen, und indem wir nur den Nahmen haben, so glauben wir auch die Sache zu haben, und denn denkt

The above outline shows that Kant is continuing to develop the program of the *OPA* according to considerations developed in the *ID*. Genuinely systematic investigations of nature are cosmological for Kant, in the sense of the *sensible world* that he begins to discuss in the *ID*. The *order of nature* is approached in terms of physical systems involving matter (*simples*), form (*connection*) and entirety (*world*). The *nature* of a thing is an ordering principle that serves as the enduring dynamic ground of the existence and connection of the parts of that thing into a whole. Kant adopts this cosmological perspective for 1) the natural world as a whole consisting of kinds that are contingently related to each other according to laws of nature, 2) distinct kinds of individual that are contingently related to each other in natural species according to natural laws, and 3) distinct individuals the parts of which are contingently related to each other according to natural laws. Because the ordering principles involved in the world are not conceived by Kant on the model of isolated mathematical functions that uniquely determine the values for each of the successive iterations of the rule (*i.e.*, the simples are not windowless monads), the whole that emerges from the coordination of the parts is one characterized both by genuine fruitfulness and variation *and* by law-governed relationships.

This is what gives rise to the *contingent order of nature*, or the *lawfulness of the contingent*, governing natural processes that, unlike the motions of the heavenly bodies and the behavior of material elements more generally, require *us* to think of them as *aiming* at the *perfection* of individuals, species, and the world. The *perfection* of individuals requires that they continually develop the capacities through which they strive towards the complete satisfaction of the needs determined by their natures. The *perfection* of the species requires that the fruits of this development be passed on through successive generations. The *perfection of the world* involves

keiner daran an solcher Natur_Geschichte zu arbeiten. Die Geschichte der Natur enthält die Mannigfaltigkeit der Geographie, so wie sie in verschiedenen Zeiten gewesen ist, aber nicht wie es jetzt zu gleicher Zeit geschiehet, denn das ist Natur_Beschreibung; wenn ich aber die Begebenheiten der gantzen Natur wie sie zu allen Zeiten beschaffen gewesen vortrage, so liefere ich eine NaturGeschichte. (Kaehler, 1774 p. 14)

the maximum of harmony and unity between the various individuals and species that are all striving to perfect themselves.

We have already seen, in the *OPA*, that Kant disagrees with Leibniz's contention that the *perfection of the world* involves a *pre-established harmony* between the actions of all substances and that it involves the *preformation* of all organisms. In his work on natural history, we see that he also rejects Leibniz's *nominalism*. Kant treats species of organisms as real wholes, in which the parts are connected to each other through a common *generative force*. All three of these disagreements with Leibniz are of a piece. For Leibniz, the world is a perfectly harmonious artificial agreement between individual natural substances whose changes follow solely according to a private law unique to them. For Kant, the commonality of ground provides for the possibility of a harmonious natural agreement between individuals and kinds according to common laws that are binding on all. With this overview of natural history and teleology in place, we can turn to look at the essay on races that Kant publishes in 1775, and the theory of generation presented there.

2.3: Generation and the *Generative Force (Zeugungskraft)*

In his 1775 essay *On the Various Races of Mankind*, Kant makes use of the idea of a *generative force (Zeugungskraft, zeugenden Kraft)* that is common to all members of a species (*Gattung*),¹⁰ and provides the real ground of the unity of the species. This text is an important source for Kant's developing views on the generation of organic bodies at the end of the pre-Critical period. It also shows Kant dealing with issues of central importance for his view concerning *natural* versus *artificial* methods of classification and the correlated distinction

¹⁰ The term *Gattung* is often translated as *genus* when it occurs together with *Art*, which is translated as *species*. In *Naturgeschichte*, according to Kant, there is no difference between genus and species, and the term *Gattung* carries with it the sense of generation on which his species concept is based. I will use the term *species* in referring to Kant's view of a multiplicity of potentially interbreeding organisms.

between *natural history* and *natural description*. Since these are arguably the most important topics involved in the discussion of the organic realm at the end of the eighteenth-century, as well as in Kant's critical accounts of organisms and teleology, the position set out in this lecture deserves some attention.

The aim of the essay is to establish that, and to some extent how, the various races of humans have come about through the migration of members of the same physical species into various regions of the earth. Kant is arguing against the view that the differences in physical appearance of the inhabitants of various parts of the world requires us to postulate different species of human being, and, what is the same at the time, different local creations. From Kant's discussion of this topic it is possible to extract elements that apply more generally to other organic natural products as well. As in the *OPA*, Kant's concern is not to provide a natural explanation of the first origins of organic beings. The creation of original members of the species serves as an unreachable *terminus ad quem* for the historical regress of generations.

If anything, Kant's particular idea of creation serves to advance the scientific investigation of order in nature by drawing attention to the fact that our temporal knowledge proceeds from the present backwards, through the use of hypotheses formed on the basis of our knowledge of the forces and laws governing the world as we find it, and as it is reported to have been by our predecessors. Whether they are put forth in the language of science or of theology, deductions from merely rational, moral, or aesthetic considerations of what *must have* been the case *in the beginning* are purely speculative. In eighteenth-century Europe, there is no generally recognized cognitive access to a time before there were complex multi-celled organisms living on the earth. If that has changed, it is no doubt due, in part, to thinkers like Kant who realize that the rejection of theism alone does nothing to make the natural world more intelligible to us. By itself, atheism does not decide any issues concerning *whether*, *when*, or *how* different species of organism have come about. The general commitment to natural kinds also does not decide any

particular issues about what constitutes a natural kind or *whether*, and if so, *which* groups of animal or plant currently living on the Earth can be traced back to common ancestors.

Kant's intention is to provide a hypothesis that could explain the variety exhibited among members of the same species according to natural causes, the existence of which is known to us through observation of their effects. In order to accomplish this, Kant begins by addressing the definition of a species or the account of the necessary and sufficient conditions for membership in a species:

In the animal kingdom the natural classification into species and sub-species is grounded in the common law of propagation, and the unity of the species is nothing other than the unity of the generative force, which holds thoroughly for a certain manifold of animals. Accordingly, Buffon's rule that animals that produce fertile offspring with one another (regardless of the difference in outward appearance there may be between them), belong to one and the same physical species, I actually view as merely the definition of a natural species of animal in general, in contrast to all scholastic species of animals. The scholastic classification is made according to classes and orders animals according to similarities. The natural classification, however, is based on lines of descent and orders them according to relationships with respect to generation. The former accomplishes a scholastic system for the memory, the latter a natural system for the understanding; the former intends only to bring the creatures under titles, the latter to bring them under laws.¹¹

Here Kant makes a distinction between two ways of considering and classifying nature that, as we will see is based on the distinction between the logical and real uses of the intellect, and which will continue to play a central role in his Critical reflections on organisms and teleology.¹² On the one hand, there is the scholastic classification which groups various beings

¹¹ Im Thierreiche gründet sich die Natureintheilung in Gattungen und Arten auf das gemeinschaftliche Gesetz der Fortpflanzung, und die Einheit der Gattungen ist nichts anders, als die Einheit der zeugenden Kraft, welche für eine gewisse Mannigfaltigkeit von Thieren durchgängig geltend ist. Daher muß die Büffonsche Regel, daß Thiere, die mit einander fruchtbare Jungen erzeugen, (von welcher Verschiedenheit der Gestalt sie auch sein mögen) doch zu einer und derselben physischen Gattung gehören, eigentlich nur als die Definition einer Naturgattung der Thiere überhaupt zum Unterschiede von allen Schulgattungen derselben angesehen werden. Die Schuleintheilung geht auf Klassen, welche nach Ähnlichkeiten, die Natureintheilung aber auf Stämme, welche die Thiere nach Verwandtschaften in Ansehung der Erzeugung eintheilt. Jene verschafft ein Schulsystem für das Gedächtniß; diese ein Natursystem für den Verstand: die erstere hat nur zur Absicht, die Geschöpfe unter Titel, die zweite, sie unter Gesetze zu bringen. (2: 429)

¹² In the *ID*, Kant discusses the logical use of the intellect as a matter of comparing concepts regardless of their source in order to bring them under more general concepts. The real use of the intellect, in contrast, involves taking fundamental intellectual concepts such as *substance*, *cause*, and *existence* and using them to generate representations that serve as first principles for judgment in theoretical and practical contexts. Cf. §§ 5-9 (2: 393-7) I will return to this issue in discussing the doctrine of ideas in the *CPR* in Chapter III.

according to observable *characteristics*, and, on the other, there is the natural classification that groups individuals within sub-systems of nature whose parts are unified by a common *generative force*. Although Kant makes no mention of Linnaeus here, the latter's system of binomial nomenclature provides the paradigm for artificial methods of classification in the eighteenth century.¹³ Kant does mention Buffon, who is the leading critic of artificial methods in general and of Linnaean rational systematics in particular. In noting that Kant adopts a somewhat Buffonian approach to the natural species, I believe that commentators have missed an important aspect of what Kant is claiming in this passage.¹⁴

As I see it, from the standpoint of the dialectical dispute between Buffon and Linnaeus, Kant is claiming that Buffon is actually on the losing end. Linnaeus, as Kant presumably knows, also countenances the possibility of a natural classification, but thinks that an artificial classification is a necessary tool, and is all that we have *for now*.¹⁵ All three agree that we ought to be after a natural classification, but Kant realizes that Linnaeus actually *does* what he intends to do (and, by the way, is generally recognized from his own time up to the present as having made significant and lasting contributions to the study of natural order), whereas Buffon fails in his attempt to "bring animals under laws". By attributing a definitional status to Buffon's rule,

¹³ This system was introduced as a standardized method of reference for plants and animals and as a replacement for the common names, in various languages, prevalent in the various regions where these genera, species, and varieties occur. Classifications are made according to a relatively small number of features that characterize the genus, and particular species are generally characterized according to the differences in number or arrangement of these features of the general characteristic. The name of each species is a combination of two Latin terms (thus, binomial nomenclature). The first of these terms is common to all species that make up the genus. The second is unique to the individual species in question and, ideally, brings to mind the characteristic of the species. Thus, there are several senses in which this system is correctly referred to as a scholastic system for the memory. First, it is based on the scholastic logic of the composition and division of hierarchical classes by way of genera and specific difference. Second, it is introduced as a method of reference that replaces the variety of regional names with standardized names that provide a clue to the characteristic of the species. These standard names are far easier to remember than the various regional names in various languages, and carry with them systematic relations to other names. Linnaeus admits his system is artificial, since the choice of characteristics for various taxa is often made on the basis of convenience, and this can have a significant impact on the groupings that one gets within a particular class or genus. Kant will mention Linnaeus at a crucial point in the *CJ*, the significance of which seems not to have been fully appreciated.

¹⁴ Cf. Sloan [forthcoming]

¹⁵ Cf. Larson [1971]

Kant does not actually appear to be recognizing some achievement of Buffon's. Rather, I take him to be saying that Buffon has provided an analytic truth that nobody contests. The real classificatory work is done by deciding what particular things *in nature* are related to each other through that rule, and the real theoretical work is done by providing a viable ontological model of the real ground for the shared capacity to produce fertile offspring. Making a systematic use of Buffon's law, or treating it as a principle for synthetic judgments and not merely an analytic definition, requires representing the species as more than an indeterminate series of generations. The unity of the natural species requires a law of this series that turns the merely temporal order of succession into a causal order of interacting natural beings. Kant realizes that Buffon's own theory of generation does not provide the requisite model, and he is offering another theory in its place.

This is not just a matter of polemics for Kant. He thinks he knows why Buffon's model fails and he also thinks he can provide the outlines of a better model that will be applicable to and practicable for further research in the area. Buffon's model fails, in Kant's view, because Buffon uses the same merely logical, or psychological, distinction between empirical facts and their ontological grounds that the Wolffians and Hume use. Buffon sides with Hume concerning the distinction between *relations of ideas* and *matters of fact* in rejecting Linnaean systematics. It provides merely logical divisions and essential definitions, which, like the truths of mathematics, are certain, but according to Buffon and other eighteenth century thinkers, the certainty of these 'truths' is bought at the price of analyticity and arbitrariness. Buffon relies, instead, on empirical truths, or the constant succession of like following like in our experience. This experience gives rise to an understanding of rules that can be brought under natural laws, which can be used as hypotheses for natural historical accounts.¹⁶ Kant admires this procedure up to a point, but he thinks that Buffon has given us merely a different kind of *natural description*, while at the same

¹⁶ For an account of Buffon's method, see Lyon and Sloan [1981] and Sloan [forthcoming].

time criticizing Linnaeus for not providing a truly natural system or a *natural history*, which was not Linnaeus' intent anyway.

Buffon's theory of generation treats the physical parts of the embryo as the real grounds of its development into an organized system. According to Kant's view, which he begins to express most clearly in the *ID*, this theory is doomed to failure because the spatial and temporal parts of a body are simply limits on the spatial and temporal extension of that body.¹⁷ What Buffon is seeing when he looks at embryos are observable stages in a dynamic process. The unobserved grounds of the state of the body and of its transformation are not the parts of the body itself, in Kant's view. They are, rather, dynamical forces that serve as the real grounds for the body, and for its change from a *non-organized* mass to an *organized* system of structures. Buffon is guided by empirical investigation, but no more so than are others, and his speculations about the bases for transformation merely posit, at the unobserved level, entities that are analogous to what we perceive (i.e., the explanatory grounds of complex bodies are simpler bodies, their capacities and their spatial and temporal relations). Kant agrees with Buffon that our investigations have to go beyond private states of consciousness called *observation of empirical facts*, and he is just as careful as Buffon is in not merely inventing explanations.

Kant rejects, however, the dogmatic materialist approach that takes the real grounds we call on in our explanations of corporeal phenomena to be things that are just like the observable bodies of our experience, only smaller. He also rejects the psychologistic empiricism that sees us as gleaning empirical facts from observation and that takes the subjective conviction concerning necessary connections that arises through repeated observation to be the functional equivalent of cognition of natural laws. From Kant's perspective, I believe, we could say that rejecting the *rationalistic* criterion of clear and distinct ideas as the mark of the scientific in favor of the *empiricist* criterion of forceful and vivid impressions merely replaces a dogmatic use of *reason*

¹⁷ Kant introduces the theory that space and time are a priori forms in which we intuit objects as they appear to us, and not as they are in themselves, in the *ID*. Cf. §§ 13-15 (2: 398-406).

with a dogmatic use of the *imagination*. Neither of these actually provides us with a secure basis on which to proceed in natural philosophy.

Accordingly, neither the system of Linnaeus nor that of Buffon represents anything beyond a logical use of the intellect in describing the workings of nature, though the former does this in an atemporal and logical way, while the latter does it in a spatial and temporal way. Linnaeus *would* be grouped with the Wolffians *if* he were claiming to be doing fundamental ontology, but he is not. Buffon *is* grouped with the Newtonians because he takes the spatial and temporal ‘parts’ of bodies to be independently existing things that explain the determinations and changes of bodies. If *natural history* is to go to progress beyond a merely systematic description of nature, according to Kant, we need a real use of the intellect, or an ontological model of organic bodies that involves substances and their causal powers as real grounds for the unity of individual organic bodies and of the species of which the individual is a member.

The real grounds of the individual and the species are intelligible, in the *ID* sense of *noumena* as what “cannot by their own quality come before the sense of the subject”¹⁸, so we cannot have knowledge of them *as such*. We can, however, have a kind of *symbolic cognition* of them, through abstract universal concepts.¹⁹ The content for this cognition is provided by our conception of fundamental forces, which we posit on the basis of our experience of the effects of their various capacities, and which we think of as responsible for these capacities and their effects. The unity of the causal grounds of the development and exercise of these capacities we think of as provided by a *substance*, to which these capacities are attributed as consequences of the forces combined in the nature of that substance. Accordingly, even the automatic (or

¹⁸ 2: 392

¹⁹ This *symbolic cognition* appears to be no more than discursive cognition or thinking in the *ID*. Kant points to the same discrepancy between intuiting and thinking in § 10 of the *ID* that he discusses in the *CTJ* as responsible for our ability, and our need, to think of *organized beings* as *natural ends*. He also invokes the same distinction between our own passive intuition and the active intellectual intuition that we can think of as an archetype for things (2: 396-7). In Chapter III, I will suggest an interpretation of the inadequacies of the view of the *ID* for grounding the systematic cognition of nature that Kant conceives of as involved in a genuine *Naturgeschichte*, and in Chapter IV, I will discuss the role of the idea of an archetypal intellect in Kant’s transcendental idealist solution to the antinomy of judgment.

autonomic) functions that we explain according to analogies with the capacities of machines, *e.g.*, the capacity to pump blood through the body, or to grind food with the teeth, are referred as *effects* to the exercise of the same fundamental forces that ground the capacity to see prey and to move towards it. Although the latter capacities are generally taken to be definitive of animal life, the former have to be unified with them if they are all to be thought of as *capacities of the animal* that are natural to the species of animal from which it comes.²⁰

The exercise of these fundamental forces takes place in an efficient-causal nexus involving the forces natural to other substances, so the effects of this exercise are not uniquely determined by the nature of the animal. There are real relations of dependence between the organism and its parent organisms, and between the organism and the environment in which it is born, develops to maturity (should it survive), reproduces (should it reproduce), and dies. All that is ‘pre-formed’ in relation to the individual, in Kant’s view, is the *capacity* to develop, mature, and reproduce, which follows with necessity from the nature of the species, and the tendency to develop particular characteristics that are contingent from the standpoint of the species, but that are determined by hereditary factors. Without the appropriate environmental circumstances, none of this will actually happen. It is not a foregone conclusion, as it is with other *preformationists*, which seeds will develop, how, and in what circumstances.

While the talk of fundamental dynamic forces and causal natures may sound strange from the standpoint that Kant is a committed Newtonian,²¹ I think Kant conceives of the process of arriving at knowledge of them in the same general way that he conceives of achieving self-knowledge. Kant denies we have any direct, intellectual intuition of the self, so we have to

²⁰ In the essay *Dreams of a Spirit-Seer*, Kant discusses the traditional Aristotelian distinction amongst souls into the vegetative, the animal, and the rational. Although he sees no reason to treat these as really distinct in beings, like ourselves, that possess the capacities associated with each, he does see the physiological grounds for distributing these among the very different members of the class of beings that “grow and reproduce their kind.” (2: 331) As we will see, in the *CTJ*, Kant focuses on the distinction he takes to be primary between the members of this class of natural being (*organized and self-organizing beings*) and other kinds of visibly complex and variously purposive bodies.

²¹ For this view in general, see Friedman [1992]. For this view specifically in relation to Kant’s views on organisms, see Ginsborg [2004]. For a general view of Kant’s model of causality that appears to be far closer to Kant’s texts and that involves clearly Leibnizean elements as well, see Watkins [2005].

achieve symbolic or discursive cognition through experience of objects of inner and outer sense; i.e., the soul and the body. I reflect on the appearances of the (psycho-physical) self until I gain experience, and then it is through this experience, with the help of concepts, that I come to think of myself as an enduring being having the capacities of sensibility and intellect. When I think more carefully about what this means, and employ intellectual concepts to consider the real grounds of the possibility of my having these capacities (to know, to feel, to will, to cause movement in my body through my willing, *etc.*) I think about myself as a substance with some basic causal powers from which these capacities stem, and I think of these powers as the grounds of my capacities and of the contingent and unified harmony among their effects. I no more have sensible knowledge of myself *as such*, than I do of other organisms *as such*, but there is no principled reason to insist that I cannot have knowledge of both of these, *as unifying grounds* of powers and capacities that I know about through their effects.

I think this is the fundamental insight of Kant's between the *OPA* and the essay on *Races* that allows him to offer a theory of generation that he thinks is superior to any of the others available at the time.²² Not only does it provide our empirical knowledge with a genuine seat in nature, and allow a view of the natural development of our innate capacities for intelligence and moral action, it also allows the further development of our own cognitive capacities in nature through the natural philosophical investigation of the varieties of naturally produced beings that resemble us and differ from us in interesting and useful ways. This investigation can be guided by the excellent work in *natural description* and systematics that people like Linnaeus have already provided, and we can hope that it will move us in the direction of the natural classification or *natural history* for which Buffon is unable to provide an adequate grounding. If I am right about this, then Kant's contribution to untangling the serious theoretical knots on the way to a truly scientific biology has been underestimated by Kant scholars and by historians and

²² There is evidence that something like this is the case provided in notes from Kant's metaphysics lectures during the 'silent decade'. See especially *Metaphysics L₁* (28: 239-40).

philosophers of science alike. Now, for a closer look at some of the details of Kant's view in the essay on *Races*:

Only one single natural cause can be adduced for the unity of the natural species, which is just the unity of the generative force that holds in common for the members of the species, namely, that all the members belong to one single line of descent, from which they all have sprung despite their differences, or from which they at least could have sprung.²³

Despite the somewhat unfortunate wording here, I think Kant's intention is rather clear.

There are two possible causes of the unity of a species, or two possible explanations of the fact that a group of individuals are able to produce viable offspring together. The first of these is that each individual in this group is *actually* a member of a continuous series of causally related individuals whose possibility, existence, and connection to others of the same species is grounded in the *generative force* that gives rise to the phenomenal or observable *characteristic* of the species. The second of these is that each individual *could have been* a member of such a series. What Kant means by this '*could have been*' is to allow for the possibility that for any one species it was not a single, original pair with the ability to produce fertile offspring that was created, but rather several pairs. If these several pairs are indeed members of the same species, then by definition, each member is capable of breeding with the appropriate member of each other pair or their descendents, and producing offspring that are capable of the same. They and their offspring would all be members of the same physical or natural species, despite the fact that not all members of the species are likewise members of a single causal series. In such a case, different local creations could have been invested with the same causal nature, which includes the same *generative force*.

Kant decides for the former alternative, despite what appears to be the empirical indeterminacy of the issue, on the basis of the claim that the latter, insofar as it postulates several

²³ Von dieser Einheit der Naturgattung, welche eben so viel ist, als die Einheit der für sie gemeinschaftlich gültigen Zeugungskraft, kann man nur eine einzige natürliche Ursache anführen: nämlich, daß sie alle zu einem einzigen Stamme gehören, woraus sie unerachtet ihrer Verschiedenheiten entsprungen sind, oder doch wenigstens haben entspringen können. (2: 429-30)

local creations, ‘multiplies the number of causes beyond necessity’. It is not entirely clear, however, that this does not beg the question against the proponent of such local creations. That is, someone wanting to bring this as a criticism of a particular position is responsible for showing that the position in question is actually guilty of some error. The claim that one ought not multiply causes beyond necessity is certainly true, but insofar as it amounts to the claim that ‘one ought not multiply causes further than one ought to’ it is analytically true. Surely a proponent of local creations would hold, just as Kant does, that they are postulating only so many causes as are required to account for the phenomena in question. If it turns out that the variations among members of a species, or their distribution over the face of the earth, is so great that it cannot be accounted for through the assumption of a single, original pair, then the postulation of several local creations does not in fact amount to a multiplication of causes beyond necessity.

Fortunately, Kant does not end his discussion at this point. Rather, he goes on to show how he thinks it is possible to explain the tremendous variation within a species by postulating only a single, original pair and various climates in various regions of the earth. The basic outline of the position is as follows. The *generative force* definitive of a species does not uniquely determine the features of the individual. It contains, rather, the grounds for the development of a range of characteristics. Environmental factors, such as air-quality, intensity of the sun, and quality of nourishment, also play a role in the development of the individual. Thus, the environment works somewhat like a selective mechanism for determining which of the possibilities contained in the *generative force* will actually develop. When the offspring of the original pair spread out into different regions of the earth, those that find themselves, *e.g.*, in a hot, humid climate develop different characteristics than those that find themselves in a cold, dry climate. After a number of generations, some of these characteristics become hereditary and can no longer be influenced by subsequent moves from one climate to another. In this way a certain degree of variety is achieved among members of a unified species. Further, since these variations do not fundamentally alter the *generative force*, *i.e.*, all the individuals remain members of the

same species, and individuals that are relatively dissimilar can combine to produce fertile offspring sharing characteristics with each parent. This process can be repeated indefinitely, with the result that there is almost no limit to the variety that can be achieved while still maintaining the unity of the species.

The details of this position are somewhat complex, but we can see that Kant provides a much more developed account of organic natural products and the need for judging them teleologically than is found in the *OPA*. Further, the general position is one that Kant will continue to defend throughout his Critical period. Accordingly, a closer look at some of these details is warranted. The following, somewhat lengthy, passage is a good place to start in considering these details.

The grounds of a determinate unfolding that lie in the nature of an organic body (plant or animal) are called *germs* if this unfolding concerns particular parts. If it concerns only the size or the relation of the parts to each other, however, I call them *natural dispositions*. In birds of the same kind, which are yet to live in various climates, there lie *germs* for the unfolding of a new layer of feathers if they live in a cold climate, which are held back should they dwell in a temperate climate. Since in a cold land the grain of wheat must be protected against damp cold more so than in a dry or a warm land, there lies in it a *previously determined capacity*, or *natural disposition*, to bring forth gradually a thicker skin. This *solicitude of nature* in equipping her creature for all manner of future circumstances through hidden inner provisions, so that it maintain itself and be suited to the difference of climate or of soil, is worthy of admiration. In the migration and transplantation of animals and plants it also brings about apparently new types, which are nothing but deviations from the type and races of the same species, whose *germs* and *natural dispositions* have simply developed in various ways over the long course of time.

Contingency or universal mechanical laws cannot bring about such adaptations. Therefore, we must view *occasional unfoldings* of this kind as *pre-formed*. Even in cases where *nothing purposive shows itself*, the mere *capacity to propagate its special assumed character* is already proof enough that there was a special *germ* or *natural disposition* for this to be met with in the *organic creature*. For external things can certainly be *occasional*, but not *productive*, causes of that which is necessarily inherited and provides for resemblance. Just as chance or *physical-mechanical causes cannot produce an organic body*, so too they cannot introduce something into its *generative force*, i.e., cause something that propagates itself, if it is a particular shape or relationship of the parts. The air, the sun, and diet can modify an animal body in its growth, but they cannot at the same time supply these modifications with a *generative force* such that they would be able to reproduce themselves even without these causes. Rather, what should *propagate itself* must have been already in the *generative force*, as previously determined to an *occasional unfolding* according to the circumstances into which the creature can come, and in which it should continually maintain itself. For, it cannot be that something can enter the *generative force* that is foreign to the animal, and that would be able gradually to distance the creature from its original and essential determination, and to produce true degenerations that perpetuate themselves.

The human being was determined for all climates and for every condition of the soil, therefore there must be in him various *germs* and *natural dispositions* that lie ready eventually to be either unfolded or held back, so that he might be *suitied to his place in the world*, and in the succession of generations *appear to be native to this place and to have been made for it*. We will go through the entire human species in the wide world according to this concept and introduce *purposive causes* of its deviations from the type where we have *no insight into the natural causes* and, alternatively, *natural causes* where we are *not aware of the purposes*. Here I'll simply remark that the air and the sun appear to be the causes that influence the *generative* force internally and produce a lasting development of the *germs* and *dispositions*, i.e., that can ground a race. In contrast, the particular diet can certainly bring forth a breed of humans; however, its distinguishing characteristic disappears quickly in transplantation.²⁴

²⁴ Die in der Natur eines organischen Körpers (Gewächses oder Thieres) liegenden Gründe einer bestimmten Auswicklung heißen, wenn diese Auswicklung besondere Theile betrifft, Keime; betrifft sie aber nur die Größe oder das Verhältniß der Theile untereinander, so nenne ich sie natürliche Anlagen. In den Vögeln von derselben Art, die doch in verschiedenen Klimaten leben sollen, liegen Keime zur Auswicklung einer neuen Schicht Federn, wenn sie im kalten Klima leben, die aber zurückgehalten werden, wenn sie sich im gemäßigten aufhalten sollen. Weil in einem kalten Lande das Weizenkorn mehr gegen feuchte Kälte geschützt werden muß, als in einem trocknen oder warmen, so liegt in ihm eine vorher bestimmte Fähigkeit oder natürliche Anlage, nach und nach eine dickere Haut hervorzubringen. Diese Fürsorge der Natur, ihr Geschöpf durch versteckte innere Vorkehrungen auf allerlei künftige Umstände auszurüsten, damit es sich erhalte und der Verschiedenheit des Klima oder des Bodens angemessen sei, ist bewundernswürdig und bringt bei der Wanderung und Verpflanzung der Thiere und Gewächse dem Scheine nach neue Arten hervor, welche nichts anders als Abartungen und Racen von derselben Gattung sind, deren Keime und natürliche Anlagen sich nur gelegentlich in langen Zeitläuften auf verschiedene Weise entwickelt haben.

Der Zufall, oder allgemeine mechanische Gesetze können solche Zusammenpassungen nicht hervorbringen. Daher müssen wir dergleichen gelegentliche Auswicklungen als vorgebildet ansehen. Allein selbst da, wo sich nichts Zweckmäßiges zeigt, ist das bloße Vermögen, seinen besondern angenommenen Charakter fortzupflanzen, schon Beweises genug: daß dazu ein besonderer Keim oder natürliche Anlage in dem organischen Geschöpf anzutreffen gewesen. Denn äußere Dinge können wohl Gelegenheits-, aber nicht hervorbringende Ursachen von demjenigen sein, was nothwendig anerbt und nachartet. So wenig als der Zufall oder physisch-mechanische Ursachen einen organischen Körper hervorbringen können, so wenig werden sie zu seiner Zeugungskraft etwas hinzusetzen, d.i. etwas bewirken, was sich selbst fortpflanzt, wenn es eine besondere Gestalt oder Verhältniß der Theile ist. Luft, Sonne und Nahrung können einen thierischen Körper in seinem Wachstume modificiren, aber diese Veränderung nicht zugleich mit einer zeugenden Kraft versehen, die vermögend wäre, sich selbst auch ohne diese Ursache wieder hervorzubringen; sondern was sich fortpflanzen soll, muß in der Zeugungskraft schon vorher gelegen haben, als vorher bestimmt zu einer gelegentlichen Auswicklung den Umständen gemäß, darein das Geschöpf gerathen kann, und in welchen es sich beständig erhalten soll. Denn in die Zeugungskraft muß nichts dem Thiere Fremdes hinein kommen können, was vermögend wäre, das Geschöpf nach und nach von seiner ursprünglichen und wesentlichen Bestimmung zu entfernen und wahre Ausartungen hervorzubringen, die sich perpetuirten.

Der Mensch war für alle Klimaten und für jede Beschaffenheit des Bodens bestimmt; folglich mußten in ihm mancherlei Keime und natürliche Anlagen bereit liegen, um gelegentlich entweder ausgewickelt oder zurückgehalten zu werden, damit er seinem Platze in der Welt angemessen würde und in dem Fortgange der Zeugungen demselben gleichsam angeboren und dafür gemacht zu sein schiene. Wir wollen nach diesen Begriffen die ganze Menschengattung auf der weiten Erde durchgehn und daselbst zweckmäßige Ursachen seiner Abartungen anführen, wo die natürlichen nicht wohl einzusehen sind, hingegen natürliche, wo wir die Zwecke nicht gewahr werden. Hier merke ich nur an: daß Luft und Sonne diejenigen Ursachen zu sein scheinen, welche auf die Zeugungskraft innigst einfließen und eine dauerhafte Entwicklung der Keime und Anlagen hervorbringen, d.i. eine Race gründen können; da hingegen die besondere Nahrung zwar einen Schlag Menschen hervorbringen kann, dessen Unterscheidendes aber bei Verpflanzungen bald erlischt. Was auf die Zeugungskraft haften soll, muß nicht die Erhaltung des Lebens, sondern die Quelle

In this passage, Kant treats several issues with which we are already somewhat familiar from the above discussions. Recall that in the *OPA* Kant expresses an aversion to the theory of *individual preformation*, both in the form that maintains that all organisms are created simultaneously and in the form that takes the individual to result from a miracle at the time of conception. Although he does not think he can establish with certainty the falsity of this theory, his commitment to treating events in nature as following according to laws governing natural causality provides him with reasons for preferring an alternate explanation of the production of organisms. The above passage, with its reliance on pre-formed *germs* and *dispositions*, may accordingly appear to represent either a change in Kant's view or, if this passage is consistent with the position of the *OPA*, evidence against my claim that Kant there favors an epigenetic account of the generation of organic bodies. Some commentators have suggested that his view here is taken over from von Haller's *germ theory of preformation*. While the terminology certainly is, there are aspects of Kant's view that make me think that he has consciously modified this view in light of considerations stemming from his own metaphysics. If we look more closely at the above passage, I think we will see my suggestion has to be right.

If one pays attention to the role these *germs* play in Kant's account, it is obvious that he is not a *preformationist* in any of the usual senses. This should become clear if we focus on the following two questions, namely, 'what are these *germs* intended to explain?' and 'what role do they play in this explanation?' The answer to the first question is that they are invoked primarily in the explanation of variations among members of the same *physical species* or, viewed from another perspective, in the explanation of variation through adaptation of members of a single line of causal descent. The answer to the second question is that they play a role as necessary, but not sufficient, conditions of the particular ways that individual members of a species vary from

desselben, d.i. die ersten Principien seiner thierischen Einrichtung und Bewegung, afficiren. (II: 435-7) All emphasis is my own.

each other. Both of these factors of Kant's reliance on pre-formed *germs* indicate that his position diverges significantly from traditional accounts of *preformation*.

This discussion takes place within an essay that not only begins by defining the physical species in causal terms, but also proceeds to place emphasis on the role of both parents in accounting for the characteristics exhibited by their offspring. Neither traditional *pre-existence theories* nor von Haller's *germ theory* involve these elements. If each organism is in fact, as *preformationists* contend, created directly by God, then there is no sense in contending that the unity of the species is constituted by a causal series of descent. A proponent of such a theory could maintain a causal account of the unity of the species, *i.e.*, one could claim that each member of the species is the effect of a creation according to an archetype in the divine understanding, but not one that involves the real causal relations between individuals that Kant here supports. Further, both the *ovist* and *spermatocist* versions of pre-formation, including the *germ theory* that Kant is *adapting* and not *adopting* from von Haller, claim that the organism is pre-formed in one parent or the other prior to the act of fertilization. The other parent can serve as a vessel for protecting the young during the early stages of development (*spermatocist*) or provide a stimulus to trigger the developmental process (*ovist*), but in neither case can both parents play a constitutive role in determining the inherited features of the offspring.

In addition to the role that both parents play, Kant also ascribes a role to the environment in which the organism develops in accounting for the characteristics of the individual. Not only are these characteristics not uniquely determined by the pre-formed germ lying ready for development in the sperm or the egg (as the *preformationist* would have it), but they are also not uniquely determined by the combination of the sperm and egg in conception. Kant's examples of cases where *germs* and *dispositions* need to be invoked, *i.e.*, in explaining the development of a new layer of feathers for a bird and a thicker skin for a grain of wheat, make it clear that what characteristics an individual actually exemplifies are partially determined by the inheritance from both parents ('the nature of the organic body') and partially determined by environmental factors

such as climate ('contingency, or universal mechanical laws'). What are contained in the 'nature of the organic body' are dynamical grounds for the development of a range of characteristics, but these alone are not sufficient grounds. Nor are the environmental factors themselves sufficient to determine these characteristics. Both of these sources, however, do contain *necessary grounds* for this determination, which when taken together are sufficient for determining the characteristics of the individual.

From the above passage, we can also see the development of Kant's position concerning other issues that will become prominent in the critical period and, especially in the third Critique, namely, the *lawfulness of the contingent* and the various kinds of *purposiveness* in nature. In the previous chapter, I discussed Kant's conception of the *contingent order of nature* in the *OPA*. The distinguishing feature of this natural order is that it involves *contingent unity aimed at perfection*, or bodies with particular arrangements of parts that exhibit a unity and harmony that cannot be brought about and maintained by the universal laws governing the interaction of matter alone. The contingency of this order is due, on the one hand, to the contingency of the characteristics of certain natural bodies from the standpoint of the laws of motion, and, on the other hand, to the fact that the bodies that give rise to this order are originally the products of choice. In the *OPA*, however, Kant concentrates almost exclusively on the structure of organic bodies, *i.e.*, the internal relationships between their discrete parts, considered relatively independently of their similarities to and differences from other organic bodies, and the role of the environment in determining these. In contrast, the essay we are currently considering draws explicit attention to these latter aspects and, in so doing, introduces another aspect of contingency that is, nevertheless, subject to lawful regularities.

I will illustrate this further aspect of contingency using Kant's example of a species of bird. We can start with the fairly uncontroversial claim that some birds have x number of layers of feathers, while others have $x+1$ layers, and that this difference is not alone sufficient for classifying these birds as individuals of different species. Accordingly, we can say that the

precise number of layers of feathers is contingent with respect to this particular species of bird. If we are told prior to seeing a particular bird that it is an individual of this species, we will not be able to conclude from this information alone that it has x number of layers of feathers. It does not follow from this contingency, however, either that there is no *causal explanation* for the differences exhibited by birds of the same species, or that such a causal explanation has to be given in terms of particular intentions of the designer of such birds. While this may seem like an obvious point to us, it is one that *cannot* be taken for granted in the context of eighteenth-century *natural history*. That is, Kant's proposal for explaining these differences represents a position that does not enjoy universal consent among philosophers and natural historians of his time.

Let us assume that all parties in the dispute will accept that there is some *causal* explanation for an individual's exhibiting properties that are contingent with respect to the species or for variations among individuals of the same type. The manner of this causal explanation still provides room for dispute. A Leibnizean, for instance, would be forced to admit, on the basis of adherence to the principle of sufficient reason, that there is some cause or reason for an individual bird's having x number of layers of feathers. Given the Leibnizean commitment to *preformation* and *pre-established harmony*, however, this cause or reason would have to be located in the causal nature of the individual organism.²⁵ If we ask the further question concerning the fit between the bird's having x number of layers of feathers, or the bird's nature more generally, and the environment in which the bird actually lives, the Leibnizean will make appeal to a *pre-established harmony* between the corporeal substance(s) grounding the appearances of the bird and those grounding the appearances of other bodies in its environment. The particular bird would have the same number of layers of feathers regardless of where it lived; if it did not, it would not be *that* particular bird.²⁶ The fact that birds with x number of layers of feathers are found in warmer climates, and those with $x+1$ layers in colder climates, is explained

²⁵ AG 214

²⁶ This is a correlate of the causal isolation of substances that is talked about in terms of a complete concept in Leibniz's earlier work and in terms of a dynamical law of the series in his later works.

by the fact that such an arrangement is *more perfect* than an arrangement in which birds equipped for colder climates live in warmer climates and *vice versa*. Further, the fact that birds of the same type differ with respect to this feature at all is explained by the fact that a world in which such variety is found is *more perfect* than a world in which it is lacking. Accordingly, there are causal explanations for these features of the natural world, but these ultimately appeal to the principle of sufficient reason, which, for Leibniz, is a rational principle of perfection followed by the divine will in creating this best of all possible worlds. In other words, the natural teleology that Leibniz adheres to at the *individual level* requires supernatural and artificial explanations at higher levels of order, in order to explain the apparent fit between things that are not causally connected.

Kant's causal explanations of features of individuals that are contingent with respect to the species, while not completely eschewing teleological considerations, take an importantly different form. Rather than appealing exclusively to the nature of the individual organic body (which, for Leibniz, is analyzable *per se* into the natures of the infinity of monads constituting it), which Kant agrees is the ground of the series of changes through which the enduring individual goes, Kant appeals to the confluence of the *nature of the species* of the organism, the *inherited capacities* of the individual, and *nature more generally*. Thus, if we are concerned to discover why this particular bird has x number of layers of feathers, while other birds of the same type have x+1 layers, we will begin by asking about the climate in which this bird lives, rather than dissecting the bird indefinitely and then being tempted to end the discussion by simply claiming that variety among individuals of the same type represents a perfection.

If we find out through investigation that, in general, birds of the same type tend to have fewer layers of feathers in warmer climates, and more layers in colder climates, then we have discovered a regularity for which we can attempt to find a law. The *quantity of caloric* in the atmosphere,²⁷ and the laws governing its changes, are not alone sufficient grounds for a material

²⁷ *Caloric* is an eighteenth-century term referring to the fluid that was then thought to be the cause of the phenomenon of heat within bodies.

body to either develop or resist the development of a new layer of feathers, so these laws alone do not explain this regularity. They represent occasions on which a body that has a particular capacity comes to exhibit the characteristic associated with it. These are not, however, *occasions* for some being external to the process to make an adjustment. The external *occasions* are real grounds that either overcome the real grounds already holding the body back from developing a new layer, or contribute to these real grounds. When these grounds are taken together with the previously given constitution of particular material bodies (*i.e.*, those having *germs* for such a development) they can be explanatory of *such* bodies coming to develop a layer of feathers in colder climates that is absent from *such* bodies in warmer climates.

Generalizing from this example, we can claim that, for Kant, certain features of organic bodies remain contingent from the standpoint of the species, although they are subject to law-governed regularities resulting from the confluence of the nature common to the species (*i.e.*, the *generative force*, *germs* and *dispositions*) and the laws governing external nature (*i.e.*, the laws of motion, together with the particular laws governing various other kinds of natural bodies). In this way, Kant can account for one of the aspects of the phenomenon he will later refer to as the *lawfulness of the contingent*, and that he previously referred to as *contingent unity aimed at perfection*.

This position concerning the role of environmental features in the development of the individual and in the explanation of the variety observed between individuals of the same species has significant consequences for Kant's view on the necessity for and utility of invoking teleological principles in the explanation of natural phenomena. Consistent with his proposed *method of physico-theology* in the *OPA* is the tendency to avoid invoking particular intentions in each case where a seemingly, or even genuinely, purposive arrangement is found. For instance, in the case of the bird there is a correspondence between a particular arrangement of its parts and an end that is considered to be a good for the bird. It is in accordance with the ends of the bird, *i.e.*, it is *zweckmäßig* for the bird, that it is able to maintain its life in a cold climate, and the

development of another layer of feathers *seems* designed to enable it to do that. Thus, we might be tempted to say that *this* particular bird was designed with *this* particular climate in mind, *that* particular bird of the same species was designed with *that* particular climate in mind, *etc.* Doing so would provide an explanation both of the fact that a particular bird has a particular number of layers of feathers, and of the fact that birds of the same kind differ with respect to this feature. In both cases, moreover, features of the environment would enter into the explanation. They would do so, however, merely as grounds taken into account by an intelligent designer in reflecting on the optimal designs for particular birds, or the optimal environments for particular designs.

In Kant's view, this method of accounting for purposiveness in nature ignores the possibility that features of the environment could play a *natural* causal role in the development of characteristics that are at the same time purposive.²⁸ Of course, Kant himself does invoke teleological considerations here, *e.g.*, he refers to the "solicitude of nature in equipping her creature for all manner of future circumstances", and claims "[t]he human being was determined for all climates and for every condition of the soil". It is important to note, however, that in the explication of what is meant by these phrases, it is clear that Kant invokes teleological considerations in accounting for purposive potentialities that are contained in the shared dynamical ground of the species, and not for the particular purposive characteristics that individuals actually exhibit. He completes the sentence concerning human beings by claiming "therefore there must be in him various *germs* and *natural dispositions* that lie ready eventually to be either unfolded or held back, so that he might be suited to his place in the world, and in the succession of generations *appear to be native* to this place and *to have been made for it.*"

This passage indicates that Kant is providing an explanation for the fact that individuals *appear* to be designed for their particular place in the world, though, in fact, they *are not*. Rather,

²⁸ In addition, assuming a particular ground for each particular purposive arrangement, certainly qualifies as a case of multiplying causes. The question then becomes, whether this multiplication is one that is beyond necessity. For Kant it is, and to the extent that his own account of purposive arrangements makes use of fewer causes for explaining the same phenomena, and these are as far as possible natural causes, he believes it is to be preferred.

external natural causes (i.e., the air, the sun, diet, etc.) have combined with the *germs* and *predispositions* characteristic of the species so that, over the course of generations, there arises a ‘fit’ between the individual and its environment. Of course, these *germs* and *predispositions* must be instantiated in individuals, if they are to be characteristic of the species. It remains the case, however, that it is the individual *qua* member of the species, rather than *qua* individual, that is the bearer of these characteristics. This may seem to be a rather negligible distinction, but it has wide-ranging consequences with respect to Kant’s views on organic nature and the extent to which it is legitimate to invoke teleological principles for understanding the organic realm.

Recall that Kant believes the universal mechanical laws of nature are alone insufficient for accounting for the generation of an organic body. Accordingly, he sees it necessary to postulate the creation of an original pair, itself capable of generating organic bodies, (which are, themselves, capable of generating organic bodies, etc.) for each species. This original pair must be considered as *pre-formed*, which Kant consistently uses to refer to forms that cannot be accounted for by the universal mechanical laws of nature. The causality involved in bringing about pre-formed bodies cannot be *solely* the same forces that characterize those causes that act according to universal mechanical laws. It must, rather, be the activity of a cause that acts *in accordance with a conception of how the bodies are to be formed, i.e.*, it is a teleological causality. It does not follow, however, that the causal forces have to be determined to their effects *by* such a conception. The condition of acting *in accordance with an idea* is filled by causes that act in accordance with an *idea* that *we have formed* through observation of the regular ways in which organic bodies are formed and function. The causality does have to be one that *tends toward* the organization of the body, if it is to play the explanatory role for which we call on it, but this *tending toward* is something common to our thought of dynamical forces in general. If it happens to be the case that we cannot make sense of the particular way in which a force tends towards the satisfaction of natural needs of natural beings, that is a limitation on *our*

understanding, and not an indication that the object is an *artifact* rather than the product of natural causes.

Kant does think this leads us ultimately, on pain of regress, to form an *idea* of an original pair that is a product of teleological causality. This can be only an *idea in our minds*, however, since there is no *aiming at* or *tending towards* with respect to the Divine Will, in Kant's view.²⁹ Because the possibility of such beings is represented as a good, these beings exist by *fiat*. We cannot even invoke the model of reflection on possibilities according to the principle of sufficient reason and intellectually determining which of a series of perfections is most perfect, unless we also realize that, in doing so, we are reflecting on things according to our *own intellectual standards* and not according to God's.

Here, we see further ground for Kant's rejection of particular versions of another of Leibniz's favorite ideas; namely, the idea of a *great chain of beings*. As helpful as the logical idea of a perfect continuity of forms is for pushing our investigations into natural diversity, and as sublime as the representation of the continuity of metaphysical forms from God, or even just below, to the lowliest slumbering monad is, the idea is one that results from starting with the *human intellect* as a model and thinking of the *perfecting* of this intellect by granting it the capacity to follow out all of the discursive connections that we cannot. As Kant has maintained since the 1750s, and as we see again in the *ID*, the difference between God's intellect and our own is not one in degree of clarity and distinctness, or any other degree for that matter. According to Kant, God as archetypal intellect, would have a perfectly intuitive intellect, and would not be constrained to refer to objects *symbolically* through concepts, regardless of how complete. If Leibniz's use of this idea is merely analogical, then Kant has no problem with it.

If any substantive use of the view is made in determinate judgments about what can and cannot be the case in *nature*, however, then he will take such claims as misguided. Kant's ideas do, however, lend themselves to another conception of the *great chain of beings*; namely, the

²⁹ Cf. *Negative Magnitudes* (2: 201)

conception of nature as composed of genuinely causal chains of individuals causally connected to other individuals and their environment within a unified system under natural laws. A similar view will, in fact, be emphasized later by someone who is often credited with founding modern anthropology, and who is also an influential supporter of an epigenetic theory of generation that is quite similar to Kant's own; namely, Johann Friedrich Blumenbach. Blumenbach publishes his dissertation *On the Natural Varieties of the Human Species*, in which he defends the same basic view that Kant does, a year after Kant publishes the material we have been looking at.

Kant later mentions Blumenbach's embryological theory approvingly, and one of Blumenbach's students, Christoph Girtanner, publishes a book in 1796 *On the Kantian Principle for Natural History*, which attempts to combine the views on natural history Kant publishes in the 1780s with Blumenbach's views on the *habitus* of an animal as the basis for an ahistorical natural classification. It has been assumed, as far as I know without evidence, that Blumenbach influenced Kant's work and was partially responsible for a 'change' in Kant's view.³⁰ As I currently see it, the chances are good that Blumenbach's work on the *formative drive* was appealing to Kant because it was further confirmation, from a physiologist growing in stature in the scientific community, of the power of his own model for dealing with phenomena that neither *preformationism* nor other views of *epigenesis* could handle quite as well. I see no reason to accept that Kant changes in any substantive way the basic view he develops and publishes in the 1770s, when Blumenbach is beginning his career at Göttingen. Accordingly any influence between the two is more likely to have been in the other direction.³¹ It is also possible that each arrived at their views independently through reading common literature or through reflecting on the work of von Haller and the dispute he carries out with Caspar Friedrich Wolff in the 1760s

³⁰ See Sloan [2001]

³¹ I have to admit that this is a suggestion made by Robert Bernasconi in private conversation about an earlier draft of this chapter, in which I had not worked out Kant's view to the point that I have since. I worked the details of the view out on my own, however, without any substantive suggestions from him. I have found his work helpful, however, both in distinguishing my own view from his and in gaining a better appreciation of some issues that are closer to his concerns than they are to mine.

and 1770s concerning embryonic development.³² It is clear that Kant and Blumenbach are both influenced by von Haller, and they are both somewhat closer to his view than to the particular view of *epigenesis* offered by C.F. Wolff. Neither, however, is in full agreement with von Haller concerning the *germ theory of preformation*.³³

2.4: Conclusions Concerning the Pre-Critical View

If I understand the progression of Kant's thoughts correctly, the insights of the 1760s into the need to distinguish between the analytic conceptions of grounds involved in Wolffian metaphysical considerations of essences and the conception of real grounds required for causal explanations of natural phenomena leads to the view of the *OPA*. This view maintains that, despite the unintelligibility *to us* of forces like Newtonian attraction, a genuinely systematic knowledge of nature both requires and legitimates their adoption into our ontology. This opens up the possibility of conceiving of the *contingent unity aimed at perfection* exhibited by organic bodies in terms of efficient-causal forces exercised according to efficient causal laws, even though these laws cannot be deduced from or even subsumed under the laws of motion. In Kant's view, the real grounds of the bodies we experience in nature are related to each other within a unified system of substances with causal natures consisting of forces, the effects of which are both these bodies and the various laws that govern their regular actions. The relations between the effects that occur according to these laws are, in some cases, necessary relations, but in others they are contingent.

³² See Roe [1981] for a detailed account of this debate.

³³ Roe [1981] discusses the fact that von Haller actually accepts a version of *epigenesis* for a time in the middle of the century before developing his germ theory of preformation. It appears that all three men share similar reservations concerning the views of Buffon, Maupertuis, and C. F. Wolff, which lead Kant and Blumenbach to a somewhat more modest estimation of just what the *generative force* or the *formative drive* can be invoked to explain.

We cannot know *a priori* what kinds of forces are involved in providing the real grounds of bodies or how they are determined to their effects, so we also cannot rule out that the causal natures of organic bodies involve forces that are responsible for directing the development of the organic structures that allow them to function. Attempts by Maupertuis and Buffon to explain how this could work in terms of elements of bodies invested with vital forces are unsuccessful, largely because they cannot explain how a contingent *unity* arises from an aggregation of previously existing parts. Methodological and metaphysical considerations, however, tell against standard versions of *preformationism*, so we should consider the processes involved in the generation of organic bodies to be natural processes, even though we do not understand how they could be.

The problem with both sides in the debates concerning generation in the mid- to late eighteenth century is that they both assume that the material parts of the body must provide the real grounds of the development of organic structures within a body. Getting clearer on the view that the spatio-temporal ‘parts’ of a body depend on the body itself, and the dynamical forces grounding the continuous series of states of the body, rather than the body depending on its parts, allows Kant to work in the direction of his own view of the generation of organisms through a *generative force* that provides the real ground of unity for the individual and the species. The idea of God developed according to the intellectual concepts acquired through reflection on experience, moreover, provides a ground for a view of natural teleology that combines the realization that the *idea* of the ends realized through efficient causal processes is in our minds, while also holding that the ends realized through these processes are the natural ends of the organic beings whose generation and functioning we are concerned to investigate. The use of such ideas allows Kant to begin to provide the grounds for a natural history that goes beyond the merely logical and physical descriptions of nature found, consciously in Linnaeus, and unconsciously through the failure of his own theory of generation, in Buffon. This is my understanding of the complex view on organisms and teleology that Kant develops in his pre-

Critical natural philosophy. With this view in place, I will now turn to consider some significant changes in Kant's view that are introduced with the 1781 edition of the *CPR*.

Chapter III: Organisms and Teleology in the 1780's

Introduction

In the Critical period, Kant continues to maintain a close connection between organisms and teleology. Although he does not devote much space in the *CPR* to an extensive treatment specifically of organisms, he does address many of the issues related to treating them within natural philosophy there. Kant's view in the *CPR* involves a justification for a teleological approach to investigating natural arrangements that, like the view we have seen developing thus far, requires us to posit the grounds of these purposive arrangements in nature. The purposiveness of nature in particular cases leads us to think of natural connections more generally, including those that we would otherwise have no reason to think of in terms of ends, as governed ultimately by teleological laws and to think of the possibility of the natural world as grounded in a highest intelligence that legislates to nature in a completely universal fashion. In Kant's view, this projected universalization allows a two-fold investigation of nature, in terms of teleological connections (*nexus finalis*) and in terms of physico-mechanical connections (*nexus effectivus*), that benefits the advance of our knowledge of nature as long as we do not pretend to derive any particular connections *a priori* from assumed knowledge of the principles governing the exercise of this highest legislative intellect.

In the *CPR*, however, Kant denies that we can have any substantive knowledge concerning things-in-themselves through the speculative use of reason. Thus, any attempt to understand organisms that presupposes such knowledge or, alternatively, that amounts to such knowledge, is bound to fail according to the principles of *transcendental idealism*. Thus, one might think that in order to be consistent, Kant must weaken his claims about the use of

teleological principles in thinking about the possibility of organisms. In the *OPA*, Kant still thought it was possible to provide a theoretical demonstration of the existence of God, and in the *ID*, he discusses the ideas of God and of *noumenal perfection* as providing standards for both our theoretical and practical judgments. His views concerning organisms and natural teleology in the pre-Critical period are directly related to his views concerning God; specifically, God is thought of as the principle of the possibility, existence, and connection of all substances in the world, and as the *summum bonum*, or the source of all the perfections that objects have and of their striving to develop fully the capacities that are grounded in their natures. If we look at the text of the *CPR*, however, we can see that Kant does not actually weaken his claims in any significant way about the need to judge organisms teleologically, or about the role of the idea of God as the ultimate principle for these judgments.

How is it possible for Kant both to deny that we have theoretical knowledge of things-in-themselves, and to maintain a legitimate place for what is an apparently theologically grounded natural teleology? The general answer to this question should, I hope, be clear from the preceding discussion of Kant's views in the pre-Critical period. It is not on the basis of any assumed prior knowledge of God's existence that Kant bases his claims about the need for teleological judgments about organisms. Nor does he think that the possibility or existence of organisms provides us with any genuine knowledge of the existence and characteristics of God. His strategy for dealing with organisms in the *OPA* is to begin with the *Thesis of Unintelligibility* as evidence for a disjunctive claim, namely, *either* we can refer the existence of each individual organism directly to supernatural causes and accept *Gu*, *or* we can posit active forces in nature that are other than those responsible for the essential determinations of all bodies, and support *Gf*. Had he taken the side of the *preformationists* and accepted *Gu*, his commitment to *transcendental idealism* in the Critical period *would* be inconsistent with his earlier view. He does not do this, however. Rather, Kant accepts that we have no direct insight into the ontological grounds of bodies, whether *a priori* or through experience. He then claims it is more consistent with the

shared commitment of natural philosophers to explanation in terms of the *order of nature* to maintain *Gf*, despite our inability to understand *how* the natural formation of organic bodies is ultimately *possible*.

Kant's metaphysical justification for maintaining a natural philosophical commitment to the unity of the *order of nature* in its necessary and contingent parts relies on appeal to the consistency of this commitment with the idea of the perfection of the natural world, with the actual development of our cognitive and moral capacities towards our own perfection, and with the idea of the perfection of God. Does this mean that his view depends in any substantive way on knowledge of the existence and perfection of God? It seems to me that the answer to this question is, no. In arguing against the views of dogmatic metaphysicians, Kant tries to show that his view is actually *more consistent* with fundamental commitments of theism than are his opponents' views, in the hope that this will provide other theists with reasons to prefer his view. That is, Kant does not have to prove that God exists as a perfect being in order to argue that his own views concerning the possibility of the *order of nature* provide a more adequate conception of God's perfection than do the views of Malebranche, Spinoza, Leibniz, Wolff and the physico-theologians. Whether he is correct in thinking that a perfect God does exist, or in thinking that his conception of God's perfection is the most adequate conception possible for human beings, is a separate matter altogether.

Kant is arguing that we should make *less* appeal to God's special provisions in reflecting on and attempting to explain particular aspects of the *order of nature* than do his opponents. If his opponent wants to argue with him about this, he or she will have to assume the burden of proof involved in demonstrating that God does exist, and that God *could not* have created a natural order involving complex and purposively arranged bodies that are capable of generating other members of their kind naturally. The opponent cannot claim humbly that all that we can know is that God *did not* create such beings, because this is precisely the point at issue. Our inability, whether *de facto* or in principle, to understand how such beings are possible would

warrant the claim that God creates each organism individually only if we had independent reasons for claiming both that we can understand the real possibility of all natural products and that God does, in fact, exist. The conclusion left to be drawn by the impartial judge, theist or not, is that it is likely not *piety* that leads to the acceptance of *individual preformationism*, but it is more likely to be a commitment to a particular set of metaphysical and natural scientific claims that can be rejected without doing damage to the central tenets of either faith or philosophy.

Kant does think he has a more adequate conception of God's perfection than do the supporters of *individual preformationism*, but he thinks the *proof* of the adequacy of this conception is not purely logical or dialectical. Whether his *a priori* argument in support of a demonstration of the necessary existence of such a being in the *OPA* is sound or not, he takes the proof of the adequacy of his conception to come in the form of the "extensive usefulness" of this idea, i.e., the idea of the all-sufficient ground of possibility, for both extending and unifying the scientific study of natural objects. Kant thinks it benefits both religion and the sciences if we view nature not as a *cabinet of curiosities* continuously pointing us *beyond nature* to the laws of an entirely different kind of being (i.e., laws of freedom), but as a single domain in which objects of genuinely different kinds stand in a variety of real causal relations to one another. The idea of a relatively self-sufficient system of natural substances and natural causal powers provides the *a priori* principles that we use to regulate our empirical inquiry into the grounds of both the real diversity and the real unity of this system.

Kant never relinquishes his commitment to his view of God's perfection or to the superiority of this view over straightforwardly theistic attempts to ground the *order of nature*, even in the Critical period, when he has given up on the possibility that this idea could serve as the basis for a theoretical demonstration of God's existence. What is more, even in the first *Critique* itself, Kant claims not only that we are justified in a *moral* belief in the existence of God, but also that the kind of *physico-theology* he develops in the *OPA* "must everywhere necessarily

produce” a doctrinal belief in the existence of God.¹ We are, of course, free to dispute the truth of his claims about the naturalness or the necessity for humans to interpret the ultimate grounds of nature in theistic terms. There is nothing obviously inconsistent, however, in Kant’s simultaneous acceptance of the claim that doing so is a natural need of human reason and of the claim that we cannot have determinate knowledge of the *things-in-themselves* that ground the objects of the senses. Both of these claims seem, to me at least, to be central to the position of *transcendental idealism*. What is more, one of the most significant aims of the *CPR* appears to be establishing the view that theoretical reason is legislative to the understanding and its objects through the idea of a relatively self-sufficient system of natural substances and natural causal powers that provide the *a priori* principles of real diversity and real unity within the system of nature.

As I understand the development of Kant’s position leading up to the *CPR*, *transcendental idealism* does not force Kant to modify his pre-Critical views concerning the ontological and methodological presuppositions involved in our scientific investigation of organisms. The central theses of *transcendental idealism*, rather, grow out of Kant’s continued reflection on the metaphysical foundations of the necessary and contingent orders within the systematic *order of nature*, and on the cognitive principles presupposed by our determinate knowledge of particular aspects of this order, during the pre-Critical period and the silent decade. Already in the 1770 *Inaugural Dissertation*, Kant posits an ontological distinction between *phenomena* and *noumena*, restricts our empirically based theoretical knowledge to the former, diagnoses errors he will come to attribute to *transcendental realist* assumptions about the subjective conditions of our knowledge, and provides a set of subjectively valid principles, or maxims, for freeing and extending the use of the intellect with respect to nature.

In the ‘silent decade’, Kant makes use of aspects of this view in arguing against Buffon that the logical use of the intellect involved in rational systems of classification, like the one

¹ A 827/ B 855

provided in Linnaeus' *Systema naturae*, plays an important role in the development of a genuinely historical and causal natural history (*Naturgeschichte*). Kant also makes use of the dynamical theory of matter that he develops in the early 1760s, and that he will continue to defend in the Critical writings, to provide a fairly detailed model for representing the unity of the various determinations of individual animal bodies, for explaining regular variations between animals of the same natural species in both hereditary and environmental terms, and for grounding the capacities that Buffon makes use of in his criterion for membership in a natural species. The view of the essay on the *Various Races of Man* provides a model of nature as a system of interacting efficient causes, among which are the causal natures of species of organism. The exercise of the natural causal powers of these causes results in the empirical characters of bodies that endure through time in natural bodies in general, and that endure through successive generations with regular variations in plant and animal bodies. The view appears to be the same as the one provided in the *OPA*, in which a unified *order of nature* that includes both a *contingent order* and a *necessary order* is projected as the basis for our scientific investigations of both inorganic and organic bodies.

According to the view of the *ID*, the *originary intuitions* of space and time provide the form for all empirical intuition, so the pure sciences of space and time (i.e., geometry and mechanics) can be made use of in an a priori *science of sensory things*, or in an intellectually ordered system of cognitions concerning the quantifiable determinations of sensible things; namely, bodies (physics) and minds (psychology). The universal and necessary, but merely *formal*, orders of possible relations between the spatio-temporal states of distinct bodies in nature, however, are not alone enough to provide a theoretical framework for addressing all aspects of the observable *order of nature*. This is the case, it would appear, precisely because we abstract from the *specific differences* between bodies of different kinds when we consider them simply in terms of their extensive magnitudes, or their determinate sizes, shapes, and positions. Actual empirical considerations of existing bodies involve the recognition of features of the regular

series of changes within plant and animal bodies that point us to their possession of capacities that are stimulated to develop or not *in accordance with* external factors, but that cannot be explained as mere *results of* external influences on the matter that constitutes their bodies, e.g., in birds, the *capacity* to generate an extra layer of feathers in colder climates, and the *capacity* to generate other bodies of the same kind are presupposed by the actual development of these bodies in the particular circumstances in which this *actually* occurs.

We cannot appeal to external factors in understanding how some actual body = x is determined to undergo a change of this kind, unless we already understand that x is a body *of a particular kind* that shares a range of capacities to be determined in particular ways with other bodies *of the same kind*. In the case of the bird, we cannot understand these capacities solely in terms of fundamental powers or capacities of (physically or metaphysically) simple elements that make up this body, or that make up bodies of this kind. Representing individual plant and animal bodies as unified systems that are generated naturally, and that develop the specific characteristics they exhibit through a combination of internal and external causal factors requires us to represent these bodies as products of the activity of a *causal nature* that is unique to the species of which these bodies are members. The *generative force* to which Kant appeals in the 1775 essay on races is thought as the active cause of the unfolding of *pre-formed germs*, or of the capacities natural to the species, in the particular historical and geographical contexts in which individual members are generated, grow, and produce new organized parts of their own bodies, and new organized bodies that are parts or members of the same natural species. This model allows us to deal in systematic ways with particular characteristics that are *contingent* with respect to the species, that cannot be understood as results of identical inner grounds and differing external circumstances, and that are generated in particular individuals in regular or *lawful* ways.

Kant adopts a teleological maxim that guides investigation in cases in which we discover purposive relations between an organism and its environment and do not yet understand the natural mechanisms through which the characteristics that render the organism capable of

preserving itself in that environment are produced. The maxim is that whatever characteristics are *contingent*, *inherited*, and *purposive* ought to be considered as results of purposive predispositions that are originally contained in the species, that are ‘selected’ by the *mechanism of nature* and that become ‘fixed’ through successive generations. Kant believes this allows us to understand the generation and inheritance of intrinsic differences, or differences in natural *capacities* that are also *realized* differently in differing environments, between individuals of the same natural species in a way that is consistent with the view that all individuals of the species share a common nature and stem from a common line of descent. This model is presented in an anthropological context in this essay, as part of an argument against the view that the ‘varieties’ of human being are not related to each other in anything more than the descriptive, comparative sense of sharing a common empirical character. The model itself, however, is one that Kant applies to natural species more generally and the teleological considerations involved in the natural philosophical investigation of these species are based on a standard provided by the self-preservation of the species.

Despite the claim that *transcendental idealism* does not force Kant to change his general views on organisms and teleology in significant ways, there are some changes introduced in the *CPR* that do bear directly on the position he develops in the 1760s and 1770s. The most important changes for the purposes of my discussion are related to Kant’s continued reflection on the importance of providing an ontological grounding for the kind of natural system of classification that he discusses under the idea of a genuine *natural history* (*Naturgeschichte*). Reflection on this idea seems to provide one of the significant motivations for Kant’s introduction of a distinction within the intellectual faculty between *understanding* and *reason*. It is also involved in the specific form taken by the distinction within the *use* of reason between the *logical* and the *transcendental* use, and in the view that the legitimate role for reason in theoretical cognition is in providing ideas, of relatively and absolutely unconditioned ontological conditions, that serve as rules for our inquiry into the empirically discovered *order of nature*. It is within the

context of his assessment of the concepts, principles, and aims of reason in the ‘Transcendental Dialectic’ that Kant discusses the systematic unity of nature, natural purposiveness, and natural teleology. Because these are the issues most important for understanding Kant’s views on organisms and teleology in natural philosophy during the Critical period, my discussion in the following chapter will begin by addressing those sections of the *CPR* that concern the aims and methods of our empirical use of reason.

There are aspects of Kant’s view of natural history that appear to require him to make some significant changes in the approach to intellectual cognition that he takes in the *ID*. The particular kind of representation of a natural species that Kant favors is unlike the theoretical idea of an *ens realissimum* and the practical idea of *noumenal perfection*, as ideas of the efficient cause of the possibility and existence of all perfection in finite things and of the final cause of the striving for perfection that is natural to these things. The ideas of God and of moral perfection are purely intellectual representations of something that “cannot by its own power come before the senses of the subject”. The real use of the intellect that Kant discusses in the *ID* is aimed at keeping these ideas free from determinations that express the merely subjective conditions under which we can have empirical cognition (elenctic), so that we can use them as first principles for the theoretical and practical use of our judgment (dogmatic).

The natural species is the ontological kind whose members receive their finite share of perfection from God and strive to perfect the capacities that are natural to them, but the theory of the *ID* does not appear to be able to account for our representation of the members of this species as parts of a real unified whole. Empirical concepts of natural kinds result from the merely logical use of the intellect in reflectively comparing the characteristics of sensibly given individuals and subsuming the concepts of these individuals under more general concepts. The theory presented in the essay on races, however, portrays the natural species as a real unity that is grounded in a common *generative force* or *power*, and Kant insists there on the distinction between a *species concept*, which occurs in a system of relations to other concepts, and a *natural*

species, which occurs in nature. He introduces the generative force as the real ground of the empirical character that we represent *intuitively*, in calling forth an image of the species, and *discursively*, in relating the species to other species of bodies in a comparative system. Individual plant and animal bodies do ‘come before the senses of the subject’, and we represent them intuitively, as complex individuals, and discursively, as members of classes of existing things nested within other classes of existing things. It does not appear, however, that these bodies actually come before the senses ‘of their own power’.

We are aware of the enduring and changing phenomenal *states* of individual plant and animal bodies, and it is through these states that we come to represent the *capacities* that are peculiar to these bodies. These bodies, however, are not individually existing entities whose capacities are grounded in their own individual natures, or ‘their own power’, in Kant’s view. They are, rather, products of the *generative power* contained in the causal nature of the species, which acts *both* through the parent organisms that produce these bodies *and* through these bodies themselves in continuously generating, maintaining, and reproducing the observable form common to the individual members of the species. It is the natural species that has ‘its own power’, but this is an object that comes before the senses of the subject only *through* the derivative powers and capacities of individual plant and animal bodies. As an individual, the natural species is an object that cannot be given in any possible empirical intuition, and that is not the sum total arrived at through the aggregation of its parts.

The existence of the species is presupposed by our determination that some individual body is, or exists as, a part or member of the species. The *cosmological concept* of a natural species that Kant makes use of in natural history, thus, cannot be grounded simply in a logical use of the intellect or in a merely discursive representation of a set of characteristics common to an indeterminate number of separate individuals. Nor, however, is it something that can be represented through a pure idea of something that entirely transcends the *order of nature*. It appears, rather, to require a ground in a principled use of the intellect that Kant introduces first in

the *CPR* as alone capable of providing real systematic unity for our empirical cognition. Kant believes that this systematic unity must be achieved through the action of the intellect. It cannot be achieved through its action directly on the material (intuitions) provided by the senses, however, since the action of the intellect through the a priori forms of sensibility (space and time) and the a priori forms of logical judgment (categories) provides the merely discursive cognition of existing things that is the province of the understanding (*Verstand*). It also cannot be achieved, in Kant's view, merely through the systematic arrangement of the empirical concepts of existing things that we gain through experience, because this can provide nothing more than a more extensive *logical* representation of the species.

The principled use of the intellect that is required for systematic empirical cognition in general, and for empirical cognition of natural species of organized being in particular, is not one that acts on the products of the understanding and merely organizes them according to a rational plan. It is, rather, one that acts on the a priori concepts and rules of the understanding and provides *them* with the direction necessary for empirical concepts to be related to one another in systematic ways. Kant argues that without systematic relations between empirical concepts, the kinds of mediate or inferential judgment that characterize the use of reason could not be made concerning actual objects of experience. No one who has any interest in empirical science, however, would want to admit that it is wholly illegitimate to draw inferences from what they observe or from the experiments that they set up in order to discover the principles involved in the *order of nature*. Empirically minded physiologists and natural historians, such as Buffon, argue against the use of reason in natural philosophy, while maintaining that observation provides us with physical truths, and that the discovery of regularities in nature provides us with law-like generalizations that can be used in projecting backwards to form hypotheses concerning the historical antecedents of the order we currently observe. Kant argues, in the 'Appendix to the Transcendental Dialectic' that this kind of procedure, which is just as necessary for discovering the particular natural laws according to which the planets trace regular paths around the sun as it

is for discovering the particular natural laws according to which organized bodies are generated and maintained, is based on a presupposition concerning the empirically discoverable *order of nature* that can have its source only in our reason.

The *elenctic* part of the ‘Transcendental Dialectic’, as I understand the view of 1781, is aimed to keep what Kant now thinks of as the pure transcendental ideas, namely, the ideas of the soul and the world, and the ideal of God, free of any determinations that stem from the subjective conditions for our determinate cognition of sensible objects (i.e., space, time, and the principles derived from the schematization of the categories). Doing so allows us to make a regulative use of these ideas as first principles, or as ideas of beings that are not *subjects* in relation to the laws of nature, but are *sovereign* in relation to these laws, or are the supersensible real grounds of the phenomenal objects that *are* subject to these laws. This is not done merely for the sake of the practical use of our reason, as is commonly thought to be the case. It is done, rather, for the sake of the theoretical use of our reason, although according to an analogy with our own capacity for self-determination through practical ideas. These first principles are rules for generating cognition only with respect to nature, but that is precisely what Kant believes to be the *genuine* concern and *legitimate* object of theoretical philosophy.

Putting theoretical philosophy on the right track, however, requires more than the mere recognition that we cannot have theoretical knowledge of God, freedom, and immortality. It also requires overcoming the prejudice that nature and the sensible world are the same thing and, thus, that all appeals to super-*sensible* principles as explanatory grounds of natural phenomena are appeals to super-*natural* principles. We can establish a solid foundation for the *natural sciences*, in Kant’s view, only if we both *allow* appeals to the former (i.e., the supersensible) and *reject* appeals to the latter (i.e., the supernatural) in providing explanations of natural phenomena. Kant also believes that this distinction is required to provide a consistent model for thinking the

transcendental freedom that is presupposed by our *practical freedom*.² The discussion of the possibility of *transcendental freedom* in the section on the ‘Antinomy of Pure Reason’, however, appears to be just as important for establishing the legitimacy of the *general* view of a natural species of organism as it is for attributing to one *particular* natural species a will that is free from external natural determination. That is not to say that Kant attributes transcendental freedom to natural species of organism. It is to say, however, that Kant’s view of the active powers contained in the causal natures of these species *both* allows him to conceive of the possibility of transcendental freedom in a way that is consistent with phenomenal determinism *and* provides the basis for his account of the epigenetic capacities of natural species of organism in general.

In the ‘Appendix to the Transcendental Dialectic’, Kant argues that the genuine theoretical use of a pure transcendental idea comes in providing an analogue of a sensible schema for turning the rational *law of continuity in nature* into a principle or a rule that can be used by the understanding for investigating the systematic connections between sensibly given particulars.³ The pure transcendental ideas are products of reason that allow us to think sensibly unconditioned (*super-sensible*) real grounds of unity for the manifold of natural powers that our experience requires us to posit as causally responsible for the enduring and changing states of phenomenal objects. This makes the, otherwise wholly indeterminate, *law of continuity in nature* into a rule that tells us to seek principles of unity for the various relations between objects in nature, without ignoring the genuine differences between these objects. The particular interpretation Kant places on the *law of continuity in nature* in the *CPR* will become one of the central points of contention,

² It appears to me, however, to be somewhat anachronistic and contrary to Kant’s own methods to claim that the interests of practical reason are what require us to posit the distinction between the sensible world and its supersensible grounds. This is a distinction for which Kant argues on clearly theoretical grounds from the 1750s through the 1790s, even if he does decide during the 1760s, and then stress during the 1780s and 1790s, that the interests of practical reason provide us with grounds for claims about *super-natural* objects that the interests of theoretical reason *neither* require *nor* legitimate.

³ Sensible schemata are products of the imagination that render the logical forms of judgment (categories) applicable to objects given in intuition. It is through these schemata that the relational and modal categories become rules for generating empirical knowledge. Kant discusses these in the first section of the ‘Analytic of Principles’, ‘On the schematism of the pure concepts of the understanding’, beginning at A 137/B 176.

first, between Kant and Herder, and then, between Kant and Förster, in the disputes leading up to the composition of the *CTJ*. These disputes are clearly involved in Kant's decision to reformulate this law in the *CJ* and to attribute it to the reflecting power of judgment as the transcendental principle of the purposiveness of nature for our cognition.

As Kant addresses it in the 'Appendix to the Transcendental Dialectic', this law not only encourages, but it also enables, us to think a unified *order of nature* in which there are real synthetic connections *both* between the various powers of a given natural substance *and* between all the various substances given in nature. The former connections can be thought as providing the *sufficient condition* for the capacity of a given substance to exist in a particular determinate state, which is a *necessary condition* for its actually being in that state. The latter connections can be thought as providing the remaining *individually necessary* conditions that are *jointly sufficient* for the substance actually to be in that state. Our ability to think the relation between the coordinated powers in a substance as a real relation that is simultaneously the ground of the various capacities of the substance, in Kant's view, depends on the use of ideas of reason. Our ability to think the relation between the capacities and determinate states of one substance and the capacities and determinate states of another substance as a real relation that provides the temporally antecedent ground of the changes of determinate state in each of these substances, in Kant's view, depends on a priori intuitions and discursive forms of judgment.

The combination of these is what allows us, in Kant's view, to think the *mechanism of nature*, or the efficient-causal nexus *between* natural substances, as having its ground in the *causal natures* of these substances. This is the basic model of natural causality that Kant develops as a modified version of the *theory of physical influx* in his pre-Critical writings, which serves as the basis for his views in the *OPA*, the essay on races, and the *CTJ* concerning the possibility of empirical investigations of the generation and maintenance of organic bodies that proceed according to generally mechanistic principles of natural science. It is this model that makes ideas of reason both necessary for and applicable to the empirical investigation of the real

grounds of unity, variety, and diversity in nature, by enabling reason to direct the ways in which we experience nature; i.e., to set up observations and experiments through which we come to discover and unify the particular, empirical laws that govern the actions and interactions of empirically given objects of different kinds.

Because we are constrained to think the dynamic causal natures of substances in which these laws are grounded through ideas of reason, and we think the totality of synthetic connections between these substances as the super-*sensible* real ground of the phenomenal *order of nature*, we are also constrained to think the unity of this latter connection by appeal the idea of ideas, or the *transcendental ideal* of the all-sufficient ground of the possibility, existence, and connection into a real whole of the dynamic grounds of natural phenomena. Kant does not believe we literally see all things in God, that absolute space and time are the *divine sensorium*, or that our finite intellects possess a kind of *confused omniscience*. He does, however, think he can capture what is compelling about the metaphorical expressions of Malebranche, Newton, Leibniz and other modern Platonic Idealists through the view that the pure transcendental ideal provides an analogue of a sensible schema for the systematic employment of the understanding in natural philosophy. The theoretical idea of God, as Kant discusses it in the ‘Appendix to the Transcendental Dialectic’, provides a schema for thinking the *law of continuity in nature* in terms of a perfect purposive unity that is grounded *in nature itself* and, thus, admits of being investigated according to the above model of causal natures and efficient-causal mechanisms. This idea lies behind the acceptance by rigorous mathematically and empirically minded scientists of methodological maxims that, on *other* interpretations, would be the death of natural philosophy and of natural theology. That is, if the relation ‘x is purposive for y’ were not a *natural* relation, or one grounded in the *nature* or *natures* of x and y, then we could not hope to provide a *natural* explanation of purposiveness and we could not hope to base our view of, or argument for, God’s absolute perfection on the perfection observed in the *order of nature*. It is

clearly as one of the *rules for the direction of the mind*⁴ in natural philosophy that physiologists adopt maxims such as “everything in an animal has its use and proper end [*Nutzen and gute Absicht*]”.⁵ There really should be no worry that there is some inconsistency involved in appealing to final causes and to efficient causes within natural philosophy, in Kant’s view, since no one who is actually concerned with the practice of natural philosophy has any trouble distinguishing between the idea of a natural *telos* and the idea of a supernatural intention.

Although Kant makes explicit mention of the natural scientific investigation of organisms only in the ‘Appendix to the Transcendental Dialectic’, looking at the general doctrine of ideas developed there in relation to the views on physiology, natural history, and natural theology developed in his pre-Critical writings allows us to see a far more significant, well-developed, and positive theory of natural species of organism and of the use of teleology in natural philosophy there than is often recognized to be the case. It will also allow us to see in the next chapter that the ‘Dialectic of Teleological Judgment’ is largely a recapitulation of the view, already expressed in the ‘Transcendental Dialectic’ of the *CPR*, that reason must ultimately take precedence over the understanding and sensibility, if we are to maintain the standards for natural scientific explanation that most active participants in the various debates within the natural sciences take to be authoritative. In the particular case at hand, the point is that *transcendental*

⁴ I take it that Kant’s discussion of *regulative* principles is not intended to be the introduction of anything new into philosophy. It seems to be merely a reminder to one who would quibble about the use of such ideas that in uncharitably attributing a particular interpretation of what are clearly methodological principles to a dialectical opponent, one can achieve a merely Pyrrhic victory that wins favor only among others who know precisely as little about the nature of purely spiritual beings, or about how God acts in nature as they do, or as anyone else involved does. For an example of the kind of view I think Kant has in mind, see the somewhat abusive remarks that La Mettrie directs at von Haller and other modern physiologists in the Preface and the first section of his *Man a Machine*. This work is of potentially great importance for the dispute between Kant and Herder in the 1780s. Herder appears to have adopted a view concerning the *palingenesis* of the human spirit that La Mettrie claims, almost certainly ironically, not to be able to rule out as a possibility. Kant ends his essay *What is Enlightenment*, which expresses a view concerning the development of human beings that will be at the center of the dispute between he and Herder, with a clear reference both to his own theory of organic generation and to La Mettrie. Speaking about the ‘germ’ to *think* freely that is presupposed by the capacity to *act* freely, Kant claims that “it even influences the principles of governments, which find that they can themselves profit by treating man, who is *more than a machine*, in a manner appropriate to his dignity.” (8: 41-2 emphasis in text)

⁵ A 688/B 716

idealism concerning the matter of various kinds of bodies in nature is the only way for us to preserve our commitment to *empirical realism* concerning natural species of organized being and, thus, our commitment to the possibility of a natural-causal account of the generation and functioning of plant and animal bodies. The ‘Dialectic of Teleological Judgment’ does contain some interesting reflections on the possibility that, from the point of view of an archetypal intellect, the contingency of particular members of species with respect to the concepts through which we represent their essential characteristics would not occur. As interesting as these considerations are, and as important as they are to Kant’s view, however, they appear to me to be reiterations of a view that Kant expresses as early as the 1755 *Nova dilucidatio* in distinguishing his own view of the difference *in kind* between our discursive intellect and the intuitive intellect we think as the antecedent ground of possibilities the we can cognize only empirically.⁶

The real differences between the first and third *Critique* on the specific issue of organisms and teleology, I believe, concern the discussion of the empirical concept of an *organized being*, the rational idea of a *natural end*, and the appeal to a *self-propagating formative power of nature*, in the ‘Analytic of Teleological Judgment’. Kant insists there, in a way that he does not in the *CPR*, that our experience of plant and animal bodies is the only thing that guarantees the reality of our concept of an *organized being* and, thus, is the only thing that can justify our introduction of the idea of an end of nature into natural philosophy. This is a difference between the *CPR* and the *CTJ* that has led to a variety of somewhat speculative interpretations of the relationship between these works. If these works are compared without attention to the particular view presented in the *OPA*, to Kant’s life-long interest and engagement in the empirical disciplines of physiology and natural history, and to his interest in contributing to the theoretical bases of these disciplines through his own original work in transcendental philosophy, there are admittedly rather large gaps that one cannot be blamed for filling in by reference to general themes and other issues in which Kant is clearly also interested.

⁶ 1: 391

The reasons for Kant's insistence on plant and animal bodies as the objects in our experience that legitimate the use of ideas of reason in the investigation of natural order, as well as for the specific character of the discussions provided in the 'Dialectic' and the 'Doctrine of Method' in the *CTJ*, are best understood in the context of disputes in which Kant becomes involved in the 1780s, specifically concerning the empirical warrant for positing fundamental natural forces, the analogical basis on which we conceive the activity of these forces, and the use of the *law of continuity in nature* in natural history. In the period between the 1781 publication of the first edition of the *CPR* and the 1790 publication of the *CJ*, Kant is presented with several occasions on which to address publicly issues concerning both the aims and methods of natural history in general and the generation and classification of organized beings in particular.

In 1784 and 1785, Kant's former student, Johann Gottfried von Herder, publishes the first two parts of his *Ideas*.⁷ In this work, Herder shows support for the epigenetic account of generation offered by Caspar Friedrich Wolff,⁸ and denies that there is any need to rely on pre-formed *germs* in accounting for the generation of organized beings. Herder's account of natural history also makes use of the idea of a *great chain of beings*, not simply as a tool for comparative anatomy or descriptive systematics, but as an ontological, historical, and apparently moral account of nature's progression through various lesser physical forms until it arrives at the perfection contained in the human form. Herder's views concerning the generation of organisms, the proper basis for a natural classification, the use of ideas in natural history, and the use of the natural sciences to establish or buttress claims about the place of human beings in creation and the immortality of the human soul, are all opposed to Kant's own published views.

⁷ The full title of this work is *Ideas for a Philosophical History of Mankind* (1784 ff). For a far more sympathetic view of Herder's work than the one we find in Kant, see Zammito [1992, 2002].

⁸ For details concerning Wolff's embryological views and his dispute with von Haller, see Roe [1981]. For a different reading of the significance of Wolff's work in relation to Kant's, see Hunemann [2007]

Kant publishes an anonymous critical review of the first part of Herder's *Ideas* in the *Neue allgemeine Literaturzeitung* in 1785.⁹ Before the end of the month, an anonymous criticism of this review appears in the *Teutsche Merkur*, accusing the reviewer of orthodoxy and intolerance.¹⁰ By the end of 1785, Kant responds to this criticism, reviews the second part of Herder's *Ideas*, and publishes the essay *Determination of the Concept of a Race of Humans*. These writings together serve as an elaboration and defense of the ontological and methodological approach to the natural history of organized beings that Kant develops over the course of his thirty years of thinking, writing, and lecturing on topics central to natural history. Herder's work does not, as far as I can see, prompt Kant to change any of his central commitments concerning the relationship between metaphysics and natural philosophy or concerning the natural philosophical investigation of organisms.¹¹ It does, however, prompt him

⁹ As correct as his assessment of Herder's work is now generally recognized to be, it leads to an increasingly hostile estrangement between Kant and his former student. Zammito [1992] refers to Herder's biographer, Rudolf Haym, who thinks that Kant revealed the 'halftruths and confusions' of Herder's work (p. 391, note 43). Zammito himself also admits that Kant's criticisms are justified. Despite this, however, both think that Kant was unfair to Herder. Zammito takes Herder's genuine surprise at the review to be an indication that Herder was not knowingly going against Kant. The only way, it seems to me, that this could be true, is if Herder neglected to read not only the essay on race from the 1770s, but also the *CPR*. Herder's view is in opposition both to Kant's particular views about organisms and natural history, and to the doctrine of ideas of the 'Transcendental Dialectic'. I cannot help but think that Kant felt like he was being attacked in two different ways. First, as a public intellectual; the work that he had taken nearly a decade to bring to publication, and the conclusion of which was that the use of ideas in theoretical contexts could be secured only through the recognition of their role in bringing about systematic knowledge of nature, is not having the kind of success that he had envisioned. Second, as an educator; Herder is a student who attended the lectures that Kant would later think of as preparation for the use of the products of the arts and sciences in developing one's own mature judgment about the world. The *Ideas* seems to represent a use of these products, rather, as sources of inspiration for the kind of idiosyncratic and incommunicable visions of the workings of the spirit world that Kant finds detrimental to the establishment and maintenance of the communities in which scientific and ethical practices can develop and be maintained.

¹⁰ The review was written by Reinhold, who would soon be largely responsible for the spread of Kant's philosophy through his *Briefe Über die Kantische Philosophie*.

¹¹ I see no reason to accept the views of Zammito [2003] or Sloan [2002, forthcoming] that Kant undergoes a significant change in his stance towards generation in the 1780s. The fact that Kant begins to use the term *epigenesis* only after Herder borrows it from C.F. Wolff itself has no bearing on the substance of the view to which he refers through the term. The evidence garnered for the supposed change in Kant's view is largely terminological, and the arguments are predicated on attributing to the earlier Kant a view that he seems to me never to have held. Zammito emphasizes (to the point of hyperbole) a fairly narrow conception of Kant's commitment to Newtonian science, and both attribute to Kant a straightforward acceptance of von Haller's *germ theory*. I have argued, in Chapters I and II, that neither of these interpretations is correct. Kant's views of the 1760s and 1770s appear to already be more progressive and more in line with the 'most effective currents' in the Eighteenth-Century study of life than are Herder's

to reiterate these commitments and to insist on the importance of distinguishing between speculations that are guided by an indeterminate but powerful feeling of the *connectedness of things*, on the one hand, and philosophical reflections on natural history that are guided by hypotheses formed in accordance with reason's, also indeterminate, demand for *systematic unity* in our *knowledge of nature*, on the other.

The 1785 essay *Determination of the Concept of a Race of Humans*, which attempts once again to determine this concept precisely and to argue that it refers to a significant natural distinction within a physical species of causally related organisms, prompts a critical reply from the naturalist Georg Förster towards the end of 1786.¹² Kant feels obligated to defend his view once again, against what he takes to be a mere misunderstanding on Förster's part. He does not do this, however, until after he has completed the revisions for the 1787 edition of the *CPR* and has written the *Critique of Practical Reason*, which he had initially intended as an appendix to the second edition of the first *Critique*.¹³ By the time he returns to a public defense of his views on natural history, Kant has already decided that in addition to the *a priori* principles for the faculties of *cognition* and *desire* discussed in the first two *Critiques*, there is also an *a priori* principle for the faculty of *feeling pleasure and displeasure*.

Thus, he has decided that in addition to theoretical philosophy and practical philosophy, there is a third part of philosophy, namely, *teleology*, the principles of which he will treat in a

views of the 1780s. What Zammito sees as a reactionary stance in the late 1780s and 1790 is, I believe, better seen as Kant's impatience with Herder. Zammito seems to share with Lovejoy [1959] the idea that 'degree of allowance for transformism' is the most significant criterion for assessing the contributions to biology made by thinkers prior to Darwin.

¹² Förster addresses Kant's methodology and conclusions in a two part essay, entitled *Noch etwas über die Menschenraßen*, published in the *Teutsche Merkur* in October and November of 1786. Förster's comments in this piece appear to betray a lack of understanding of Kant's systematic aims and views. He accuses Kant of trying to force nature into categories that she does not respect, and defends a view of classification that sounds much like that of Buffon. He treats as somewhat of a platitude the contention that we must investigate nature according to a plan, and is either unaware of, or dismisses without argument, Kant's view that without reason's idea of the systematic unity of nature we could not secure even the empirical use of our understanding.

¹³ See the introduction to the *Critique of Practical Reason* provided in the Cambridge Edition of Kant's *Practical Philosophy*.

separate “Critique of Taste”.¹⁴ His response to Förster’s criticisms in the 1788 essay *On the Use of Teleological Principles in Philosophy* comes after he has reached the decision to write a third *Critique* that he initially conceives of as dealing with teleology. This essay contains the most explicit expression of Kant’s general argument for the need to judge organisms teleologically prior to the *CTJ*. The basic position, as we will see, is identical to that of the *OPA*, however. An organized being is one in which everything is related to everything else in a system of means and ends, and we cannot conceive of the possibility of these specific dependency relations without appeal to the idea of a rationally determined will. The most significant developments in Kant’s view concerning organisms and teleology between 1781 and 1790 are not changes to his views concerning what organisms are, how they are generated, or how the natural philosophical investigation of organisms differs from that of inorganic nature. The Critical view on these internal, substantive and methodological, issues are pretty well in place by 1781. The changes that lead to the *CJ* have to do, rather, with Kant’s developing understanding of the possibilities for a transcendental justification of the principles guiding our use of the various faculties of the human soul, and with his recognition of the need to stress the differences between his own approach to natural philosophy, natural history, and natural teleology and the vital-pantheistic approach that will come to be identified with nineteenth-century *Naturphilosophen*. Accordingly, they are focused largely on the further philosophical defense of the legitimacy of the substantive and methodological views concerning organisms and teleology that Kant has been working on since the early 1760s.

¹⁴ See the Letter to Reinhold from December 1787. Guyer discusses this letter in his Editor’s introduction to the Cambridge Edition of the *Critique of the Power of Judgment*. Interestingly, in reference to teleology in that introduction, Guyer claims it is “a subject about which [Kant] had largely been silent since his comments almost twenty-five years earlier in the *Only Possible Basis*.” (xxi) It should be obvious from the considerations of the previous chapters that I disagree with Guyer here. These same considerations, together with the 1787 letter to Reinhold, also makes it extremely unlikely that Kant’s thinking proceeds in the stages discussed by Zammito [1992]. From the very beginning natural beauty, purposiveness in nature, systematic knowledge of nature, and human free action in nature are closely related themes in Kant’s thought. I tend to agree generally with Kuehn [2001] pp. 344-345, who reminds us that these issues are connected in Kant’s thinking going all the way back to 1755.

In the following chapter, I will begin by addressing both the doctrine of ideas and the doctrine of nature contained in the ‘Transcendental Dialectic’ of the *CPR* (3.1). I will then discuss the importance of Kant’s relation to Leibniz for the development and the expression of central aspects of his view of the *order of nature* in the *CPR* (3.2). Following that, I will turn to discuss the significance of the doctrine of the regulative use of cosmological ideas for Kant’s approach to two related issues in natural history and physiology (3.3), for his approach to justifying the idea of a fundamental power (3.4), and for his view of a two-fold approach to natural continuity (3.5). Finally, I will turn to discuss the most relevant issues at stake in the disputes in which Kant is involved between 1781 and the 1790 publication of the *CTJ* (3.6). I will provide evidence for the claim that the view of natural history and of natural species that Kant develops in the 1760s and makes use of in the 1775 essay *On the Various Races of Humans* is one of the motivations for the doctrine of ideas that he provides in the *CPR*.

The bulk of the last of these sections will be devoted to Kant’s defense of his own views on organic generation, natural history, and teleology in his critical reviews of the first two parts of Herder’s *Ideas*. Kant attempts to clarify the differences between his own views and the epigenetic theory of generation offered by Caspar Friedrich Wolff, which is a largely speculative theory from the point of view of Kant’s critical standards concerning scientific hypotheses. Herder takes this speculative theory as providing scientific credentials for his own, even more speculative, history of nature. Kant sees this move as involving a temporalization of the logical view of continuity that is made use of in *Naturbeschreibung*; i.e., it provides us with a historicized version of the rational idea of a *great chain of beings*. The way in which Herder does this, according to Kant, undermines the view of the perfection of nature that this idea involves, and that Herder needs if he is to make use of the *order of nature* as an analogical basis on which to rest our hopes concerning the spiritual nature and immortality of individual human souls.¹⁵

¹⁵ That is, if natural teleology is equated with *progress* towards some future state, rather than with the endurance through change and variation of a perfect *order of nature*, then the perfection of nature is not

I will provide a somewhat detailed discussion of what I take to be the very real differences between the apparently similar views of Kant and Herder, and reproduce some passages that will allow the reader to see the centrality of physiological and natural historical issues to Kant's thinking during the 1780s. I will then address the central aspects of Kant's reply to Förster in the essay *On the Use of Teleological Principles in Philosophy*. There, Kant takes the issues of the empirical grounds for positing the existence of a fundamental natural power, and of the rational grounds for an analogical conception of the activity of this power, to be the central ones at stake in the physiological and natural historical disputes that lead to differences concerning the precise nature and status of appeals to the idea of the perfect *order of nature*. This discussion will provide the relevant context for making the argument of the final chapter of the present work concerning the role of Kant's views concerning the physiological basis for natural history in the argument of the *CTJ*.

3.1: Reason and Nature in the *Critique of Pure Reason*

In the final section of the 'The Transcendental Doctrine of Method' of the *CPR*, 'The Architectonic of Pure Reason', Kant provides the following analogy between the concept of a scientific body of knowledge and the concept of an organized animal body:

Under the legislation of reason our cognitions definitely cannot be rhapsodic. They must, rather, comprise a system, in which alone they can support and further the essential ends of the system. I understand by system, however, the unity of manifold cognitions under an idea. This is the rational concept of the form of a whole, insofar as through this concept the extent of the manifold as well as the place of the parts relative to one another is determined a priori. The scientific rational concept, thus, contains the end and the form of the whole that agrees with it. The unity of ends, to which all the parts are referred and under the idea of which they are coordinated, brings it about that every part can be measured according to the cognition of the others, and no contingent additions or indeterminate magnitudes of perfection that have no previously determined

something that exists in nature and that *we happen to judge* according to ideas. It is, rather, something that *exists only in our ideas*, in comparison to which the order we observe in nature is 'not there yet', and we are supposed to hope that it is 'yet to come' despite the fact that no experience can provide us with any reason to think that it will.

boundaries take place. The whole is constructed organically (*articulatio*) and not heaped together (*coacervatio*); it can grow internally (*per intus susceptionem*) but not externally (*per appositionem*), like an animal body, the growth of which adds no members, but makes each member stronger and more fit for its end, without any change of proportion.¹⁶

Discussions of Kant's views concerning the positive legislation of reason often focus on his practical philosophy and the view of the second *Critique* that pure reason can be practical by legislating to the will through its ideas. Kant's first *Critique* treatment of theoretical reason, however, is characterized by the view that reason is also legislative to nature in providing the systematic aspect in virtue of which an increase in empirical knowledge constitutes a contribution to the growth of the natural sciences. Kant believes that it is because of the use of reason that we are able to have a system of knowledge, or a science, where we would otherwise have nothing more than a mere aggregate of empirically discovered facts.

As we see in the above passage, Kant thinks such a system requires an idea that provides a representation both of the form of the connection of the parts in the whole and of the end according to which the fitness of the parts, individually and in their connections, can be judged. It is the relation to a common end that confers on a manifold of cognitions the coordination and unity necessary for it to qualify as a science. Just like animal bodies, the whole of a science is constructed organically, through the successive articulation of all of its parts in their relations to one another. It is not generated through the mere addition of part to part. Similarly, having been constructed, or sufficiently articulated so that the systematic outlines of the whole have been rendered apparent, a science, like an animal body, grows through the increase in size and strength of its members, which renders these coordinated parts better suited to the end common to them all.

Kant claims at the end of the 'Transcendental Dialectic' of the *CPR* that a completed critique of the *a priori* sources of the elements of our cognition (intuitions, concepts, and ideas)

¹⁶ A 832-3/B 860-1

should convince us that the genuine vocation or end of the speculative use of our reason is to make use of these elements in “inquiring into nature up to its very foundations [*bis in ihr Innerstes*] according to all possible principles of unity, among which the unity of ends is the foremost, but never to ignore its boundaries, beyond which there is nothing for us but empty space.”¹⁷ Clearly, for Kant, the *a priori* intuitions of space and time dealt with in the ‘Transcendental Aesthetic’, and the *a priori* concepts and principles of the understanding dealt with in the ‘Transcendental Analytic’ are not the only, or even the foremost, principles of unity required by our scientific cognition of nature. Providing the *a priori* representation of the end to which our individual acts of cognition are subordinated, and through which the products of these acts become coordinated in a systematic fashion, rather than being merely placed next to one another rhapsodically, is the role that reason plays in our cognition, according to Kant.

The representations through which reason plays this role are ideas, which Kant takes in the Platonic sense of representations to which no particular object of our sensibly conditioned experience could ever, in principle, be adequate. For Kant, ideas are representations of the unconditioned grounds of unity for various objects that are given to us empirically as mutually conditioned and conditioning. The central ideas discussed by Kant in the ‘Transcendental Dialectic’ are what he calls pure transcendental ideas, namely, the ideas of the soul, the world, and God. Each of these is the thought of the unconditioned, not in itself, but *as* containing the totality of conditions for intuitions that are given as conditioned, or as the ground for the synthetic unity of a multiplicity of conditioned relations (categorical, hypothetical, or disjunctive).¹⁸ The idea of the soul is the thought of the unconditioned ground of the synthesis of categorical determinations (or monadic predicates) in a subject. The idea of the world is the thought of the unconditioned ground of the synthesis of hypothetical relations between the members of a series.

¹⁷ A 702/B 730

¹⁸ Kant discusses the view that these ideas are arrived at through *prosyllogisms* that start with some conditioned object of intuition and proceed to the idea of the totality in the synthesis of conditions for this object in the second section of the first book of the ‘Transcendental Dialectic’, ‘On the Transcendental Ideas’. A 321-33/B 377-89

The idea of God is the thought of the unconditioned ground of the synthesis of mutually conditioning disjoined parts in a system. Despite the central role played by these pure transcendental ideas, the ideas of the soul, the world, and God are not the only ideas Kant discusses in the ‘Transcendental Dialectic’.

In fact, the representation of nature and the representation of a natural species are also representations to which no empirically given object can correspond completely; i.e., they are ideas. They are, however, neither *pure* transcendental ideas, the sources of which Kant investigates in the ‘Transcendental Dialectic’, nor practical ideas of ends that serve as determining grounds for our will. Rather, they are representations of ends (*Zwecke*) that are used to think an architectonic connection between bodies of empirical knowledge, on the one hand, and empirically given bodies of particular kinds, on the other. As I understand Kant’s doctrine of ideas in the ‘Transcendental Dialectic’, the *idea of nature* is the ‘rational concept of the form of a whole’ that provides the end for the empirical use of our reason, and the *ideas of natural species* are the parts whose ‘place relative to one another is determined a priori’ by reference to this idea. Kant thinks that the pure transcendental ideas can be invoked in constructing a scientific doctrine of nature, but only once their use has been secured against common errors in judgment through the elenctic discussions provided in the sections on the ‘Paralogisms of Pure Reason’, the ‘Antinomy of Pure Reason’, and the ‘Ideal of Pure Reason’. The remainder of this section will be focused on Kant’s view concerning these ideas and the development of this view between 1770 and 1781.

Ideas of Nature and of Natural Species in the ‘Transcendental Dialectic’

In his general discussion of ideas at the beginning of the ‘Transcendental Dialectic’, Kant claims:

Not simply in cases where human reason shows actual causality, where ideas become efficient causes (of actions and their objects), namely, in the case of morality, but also in the consideration

of nature itself, Plato justifiably sees clear evidence of its origination out of ideas. A plant, an animal, the regular arrangement of the construction of the world (presumably thus also the entire order of nature) show clearly that they are possible only according to ideas; that although no individual creature, under the individual conditions of its existence, is congruent with the idea of the most perfect of its kind (just as little as man is with the idea of humanity that he himself carries in his soul as the archetype for his actions,) that nevertheless the former ideas in the highest understanding are individual, immutable, thoroughly determined, and the original causes of things, and nothing except the whole of their connection in the cosmos would be purely and simply adequate to such an idea. If one abstracts from the exaggeration in the expression, the spiritual flight of the philosopher necessary to ascend from imitatively contemplating the physical aspects of the order of the world to architectonically connecting these according to ends, i.e., according to ideas, is an endeavor that deserves to be respected and followed... for in contemplating nature experience provides the rule and is the source of truth.¹⁹

We see here that the ideas Kant has in mind in discussing the *order of nature* as a whole, and the orders of species of plant and animal, refer to totalities of sensible objects, each of which can presumably be an object for our discursive empirical judgments concerning the physical aspects of the sensible world. These ideas, however, represent these empirical objects as connected *to each other* through an original principle of causality. Kant appears to be claiming that the idea of the *order of nature* demands that the whole of the connection of *all* physical objects is thought by reference to an individual, immutable, thoroughly determined, idea of the *perfect order of nature* that serves as an archetype in the highest understanding. Similarly, the idea of a species of plant or animal demands that the whole of the connection of *all* bodies of a particular kind be thought by reference to a similar idea of the *perfection* of the species.

These ideas are apparently supposed to be conceived by us on analogy with the idea of humanity that we make use of as an archetype for our actions, with the understanding that there is a significant difference between the cases at hand and the case of our practical self-determination. Interestingly, this difference is *not* that in the latter case the idea itself makes actions in conformity with it possible. Rather, the difference is that, in the case of the ideas of the *order of nature* and of species of plant or animal body, *experience* can be relied on for the reflective or contemplative ascent from physical objects in the world to architectonic connections in terms of

¹⁹ A 317-8/B 374-5

ends. Experience of what is the case in nature leads us to standards of ontological perfection or completeness to which each individual member of natural wholes is subject, as their common end, but to which no individual is itself adequate ‘under the individual conditions of its existence’. Neither the *order of nature* nor the *natural kind* of which a particular plant or animal is a member, according to this view, is a class of distinct individual bodies that we represent according to shared characteristic marks. They are, rather, unified manifolds, or individuals, that are articulated into indefinite manifolds of bodies that are themselves articulated into manifolds of bodies, *ad indefinitum*.

In claiming that the ideas of the *order of nature* and of plant and animal species are ‘individual, immutable, and thoroughly determined’, Kant appears to be saying that these are unconditioned relative to a synthesis of categorical determinations (i.e., they are individual subjects), that they are unconditioned relative to series of synthetically related members (i.e., they are immutable grounds of change), and that they are unconditioned relative to a system of synthetically related disjointed parts (i.e., they are thoroughly determined). In claiming that they are ‘the original causes of things’, Kant appears to be saying that they are the real inner grounds of the possibility, existence, and connection of all bodies, and of all individual plant or animal bodies, respectively, that are their members. Finally, in claiming that Plato exaggerates the ascent from sensible particulars to the contemplation of their architectonic connection, and that reflection on nature is guided by experience, Kant appears to be claiming that our ideas of species are empirical concepts of existing things that have somehow been brought into connection with principles of reason.

The *order of nature* as a whole, and the orders of particular products of nature, as thought through the rational ideas that serve to unify our cognition and to provide it with the form of a system, are dynamical wholes involving *both* the appearances in the world of sense *and* the inner principles of causality that connect these appearances in systematic ways. The former, the *order of nature* as a whole, is the object of the kind of general or universal natural history that Kant

offers in terms of a roughly Newtonian *cosmogony* in his *UNH*, and recapitulates in his *OPA*.

The latter, the orders of particular products of nature, are objects of the kind of particular natural history that Kant deals with extensively in the compendium he assembles for his lecture course on physical geography. By considering each of these through rational ideas, rather than simply according to spatial and temporal considerations, Kant appears to be expressing the same kind of disagreement with Buffon we see him expressing in the 1775 essay on race. Despite the latter's insistence that observation of physical truths grounds the universal and particular parts of his natural history, Kant believes that Buffon's methodology cannot actually allow him to advance beyond the mere description of these truths and the merely indefinite extension of the cosmological series in which the events they describe occur.

For Kant, it is only by referring these series to some relatively and absolutely unconditioned inner principles of causality that we advance towards a physical explanation of the capacities that we refer to in including particular members of these series in general classes. That is, the capacity, e.g., to produce viable offspring through the mixing of matters (female *ovum* and male *spermatozoa*) is actually a capacity of all members of natural species that produce offspring in this way. The *fact* that a particular animal body is produced through this process allows us to *infer* that this body will share the capacity of its progenitor, but *this* kind of appeal to a priori grounds is very different from the kind that can be taken to be an *explanation* of some given fact. Buffon's 'explanation' of the possession of this capacity by a particular member of a series refers to the *same* capacity in a previous member of the series, from which this member follows according to a known law. The 'explanation' of the possession of this capacity by this previous member appeals to the *same* capacity and the same law, etc.

Kant merely insists that there be some other explanation, since the question concerns what it is that explains the capacity that we already presuppose is shared by any individual member of the series we want to pick out. Presumably, there must be some explanation that makes reference to some existing thing or things, if it is an actual capacity of an actually existing

body that we are interested in. The previous members of the natural species have passed on, but if they were members of a natural species that survives to this day while they were alive, then the species cannot merely be the series of its successive corporeal parts. It existed at a point in time at which many of these parts were *yet to be*, and it exists at a point in time at which many of these parts *are no longer*, so there must be some way of conceiving this species in terms of *what it is* that endures through the various moments of time at which it is correct to say that its individual members are present. This is the function played for Kant by the *generative force* contained in the causal nature of the species. It provides the *real ground* for the capacity referred to in the mere definition of a natural species of organism, and the real ground for the descent with hereditary and environmental modification that results in the fact that “no individual creature, under the individual conditions of its existence, is congruent with the idea of the most perfect of its kind”.

The ‘Transcendental Dialectic’ of the *CPR*, as I understand it, argues that the ideas of the soul, of the world, and of God become more than purely transcendent representations of independently existing things-in-themselves, when they are brought into connection with the phenomena in the sensible world through enabling us to think the real grounds of natural species and the real grounds of nature as a whole. It is through the idea of the general and particular aspects of the *order of nature* that reason’s ideas are brought into connection amongst themselves, with the concepts of the understanding, and with sensible intuitions, as ‘possible principles of unity’ for our empirical cognition. The following passage from the discussion of the ‘Antinomies of Pure Reason’ is crucial, I believe, for appreciating Kant’s Critical views concerning the *order of nature*:

We have two expressions: **World** and **Nature**, which up to this point have been run together. The first designates the mathematical whole of all appearances and the totality of their synthesis in the large as well as in the small, i.e. just as much in the progression of the same through composition as through division. This same world is called nature*, to the extent that it is considered as a dynamical whole, and one does not look to the aggregation in space or in time, in order to arrive at its magnitude, but to the unity in the existence of appearances. Now, the condition of that which occurs is called the cause, and the unconditioned causality of the cause in

the appearance is called freedom, however, the conditioned is called a natural cause in the narrow sense. The conditioned in existence in general is called contingent, and the unconditioned necessary. The unconditioned necessity of appearances can be called natural necessity.

*Nature taken adjectivally (*formaliter*) designates the connection of the determinations of a thing according to an inner principle of causality [*nach einem inneren Prinzip der Kausalität*]. However, under nature substantively (*materialiter*) is understood the sum of appearances, insofar as these are thoroughly connected in virtue of an inner principle of causality [*vermöge eines inneren Prinzips der Kausalität*]. In the first sense one speaks of the nature of liquid matter, of fire etc., and makes use of this word merely adjectivally; however, if one speaks of the things of nature, one has a subsisting whole in mind.²⁰

From these passages, it is clear that Kant thinks of *nature* as a term for the world when it is thought, not simply in terms of the spatial magnitudes of sensible objects at a given point in time and the successive changes in sensible objects over time, but as a subsisting whole, the manifold appearances of which are connected to one another, as conditions of what occurs and conditioned occurrences, according to an inner principle of causality. The world can be represented as a series of spatial relations that we think serially in terms of the processes of dividing what is composed of relatively simple parts and of composing relatively complex things from relatively simple parts. The world can also be represented as a series of temporal relations that we think serially in terms of present moments that have passed, present moments that are to come, and the present moment that divides the one from the other. If we are concerned simply with measuring the magnitude of some body through comparison with that of some other body, or measuring the duration of some occurrence in time through comparison with that of some other occurrence in time, we are thinking simply about manifolds of homogenous elements, or appearances in the *sensible world*.

If, however, we are concerned to *think* the existence of things, of which we are aware *sensibly* in terms of their spatial or temporal magnitudes, then we have to think some inner principle that unifies the members of those series of appearances that we refer to as parts of the

²⁰ A 418-9/B 446-7

spatial extension and the temporal duration of a thing, or as aspects of its overall state.²¹ This takes us beyond the mathematical (geometrical and mechanical) conception of the *sensible world* and leads to the thought of the real (physical and dynamical) grounds of the spatial extension and temporal duration of sensible objects. If we think about these sensible objects in terms of the visibly similar kinds we come across in the world, and we posit an inner principle of causality common to the members of a particular kind, then we have the conception of the *nature* of the kind in question ('the nature of liquid matter, of fire, etc.'). This is the formal or adjectival sense of the term *nature* that Kant calls the 'connection of the determinations of a thing according to an inner principle of causality'. Through it, we represent the real existing correlate to the logical *essence* of the kind, or the inner ground of the unified manifold of sensible characteristics that we use to identify existing bodies as members of general classes of body.

If we think about the regular relations between objects that are not of the same visibly similar kind, such as the regular and observable effects on liquid matter of bringing it close to fire, and we think that the spatial extension of each of these objects at different points in time depends on inner principles of causality, then we have to think of the spatial and temporal relations *between them* as dependent in some way on the causal natures of each. This thought leads us naturally to pose the kinds of question Kant poses in the *UNH* and the *OPA*, namely:

How would it be possible that things of different natures should endeavor in connection with one another to bring about such splendid harmonious and beautiful [arrangements], even to the ends of such things that to a certain extent find themselves outside the sphere of dead matter, namely to the use of humans and animals, if they did not recognize a common ground, namely an infinite understanding in which that which pertains to the essential properties of all things is planned?²²

²¹ I take this to be the same point that Leibniz makes in denying the substantiality of purely passive Cartesian *res extensa*. If there is nothing that is actively grounding the extension of a body, then there cannot be any extension, i.e., extension is not alone sufficient to characterize a thing or a substance. If there is no inner principle of causality, there is no thing; thus, whatever it is that is active in grounding the extension of bodies is the substance. In terms of physics, or the mathematical estimation of the various magnitudes of bodies, we can treat bodies as merely extended things. From the standpoint of metaphysics, however, the existence of bodies requires explanation in terms of the causal natures, or substantial forms, that provide the 'laws of the series' of corporeal phenomena.

²² 1: 225

Who would wish to maintain that in an extensive manifold, in which each individual thing had its own completely independent nature, everything should nonetheless by an amazing accident be exactly so arranged that it was in harmony with everything else and that unity should manifest itself in the whole?²³

If the mathematically measurable properties of sensible objects lead to ideas of the causal natures that serve to ground the series of appearances attributed to them, then the harmony or correlation between the changes in the sensible properties of one object and the changes in the sensible properties of another requires us to think some kind of correspondingly harmonious relation between these causal natures. Kant's pre-Critical works, as we have seen, involve the view that the most satisfying way to conceive of this harmonious relation is in terms of real two-way causal connections between these distinct natures, which connections are themselves made possible by their one-way causal dependence on a single, common ground. This is the best way, in Kant's view, to account not only for the *necessary order of nature*, or the necessity of the mathematically determinable relations between the appearances of objects, but also for the possibility that events explicable in terms of this necessary order could be subordinated to the needs of beings that are products of a *contingent order of nature*, or of corporeal beings whose inner states include such things as perceptions and appetites.

This contingent order involves the natural functioning of corporeal beings that: take in elements from external nature and make use of them; are aware of the actions of other things in their environments through awareness of the states of their own bodies; represent objects that are and, and objects that are not immediately given; desire states of affairs; and move themselves towards some objects in their environments and away from others. Treating the orderly or regular generation, development, and functioning of these beings as part of a *contingent order of nature*, harmoniously coordinated with the *necessary order of nature* within a single law-governed nexus of efficient causes, in Kant's view, requires thinking of the inner principle of causality for nature

²³ 2: 99

as a whole as what he will characterize in the *CPR* as a synthetic unity of the entire manifold of individual causal natures that are posited as the real grounds of specifically different kinds of natural bodies. This, in turn, according to Kant, leads to the view of a single transcendent, or absolutely unconditioned, real ground of the possibility, existence, and connection of these physically or naturally unconditioned causal natures in a real whole.

What Kant refers to here, in the *CPR*, as the idea of the totality of the series of appearances, or the idea of the world, leads necessarily to the idea of the inner principle of causality for what we cannot represent as a self-sufficient totality. When taken together with these indeterminable series of appearances, this representation of an inner principle of causality provides us with the idea of nature, in the substantive or material sense of this term. When we ask about things like the nature of organized beings, the nature of plants, the nature of animals, etc., we are asking about nature in the adjectival sense of the term. That is, we are interested in the inner causal principle that explains the connection in the *thing* of the various sensible characteristics and observable capacities that we use to distinguish things of *this* kind from other naturally occurring things. In these cases, we will necessarily find ourselves making appeal to inner principles of causality, i.e., natural powers, that differ in *degree*, in *kind*, or *both* from those that explain the particular characteristics and capacities of bodies of other kinds with which these bodies interact within a single causal *order of nature*.

This is what Kant takes to be involved in natural philosophy in general. It is not something that can be achieved simply through the application of the principles of the understanding to particular intuitions. It is something that requires *both* the use of rational ideas as regulative principles and an appeal to systematically instituted experience (i.e., observation and experimentation), in order to make *any* claims whatsoever about real unity and diversity in nature, including claims to the effect that all *apparent* diversity in kinds of natural substance is really merely *disguised* unity, or that all *apparent* differences between members of the same natural species are *really* the results of identical natural predispositions and differences in external

causes. These are the kinds of issue within physiology and natural history over which Kant is at odds, on particular points, with empirical researchers such as Buffon, Maupertuis, von Haller, C. F. Wolff, and J. F. Blumenbach from his earliest writings forward. It appears to me that they are also some of the central issues that Kant hopes to provide a systematic framework for addressing in the ‘Transcendental Dialectic’ of the *CPR*. Given that it is not clear how Kant can maintain the view of natural species of organism he provides in his 1775 essay on races with the tools provided by his 1770 dissertation on the formal and material principles of the sensible and intelligible worlds, it is important to take a look at the way in which he grounds the distinction between *Naturgeschichte* and *Naturbeschreibung* in the *CPR*.

Systematic Cognition of the *Order of Nature*

In the ‘Appendix to the Transcendental Dialectic’, Kant discusses the role that reason plays in bringing about systematic unity in our empirical cognition. By systematic unity, he means the “coherence according to a principle [*Zusammenhang aus einem Prinzip*]”²⁴ of relatively discrete elements. In this case, the relevant elements are empirical cognitions, or empirical concepts that result from the activities of the imagination and the understanding in making judgments about objects of the senses. As far as our cognition is concerned, the relevant principle is an idea that provides the form of a whole *into* which these elements can be placed, which distinguishes this representation from that of an aggregate of elements *out of* which the form of some whole is produced. In Kant’s view, we represent this “coherence according to a principle” as if it were the case that, first, an *ontological* principle is given and, then, particular things and their systematic relations follow from this principle. These particular things and/or their relations are thought as real elements in a real system that is unified through this ontological principle, and our *empirical concepts* of these real elements are taken as cognitive elements within an empirical

²⁴ A 645/B 673

doctrine that we unify under our *ideas* of ontological principles. That is, we think ontological principles as *existing prior to*, in the atemporal sense of *grounding*, the real elements and real connections for which they are principles. We do this despite the fact that our empirical knowledge of particulars in nature is actually presupposed by the hypothetical use of reason that leads us to knowledge concerning the principles of nature (i.e., the elements of bodies, species of natural beings, and fundamental natural powers).

From the perspective of Kant's Critical philosophy, it is not simply the case that what is first in the *order of knowing* for beings like us (images of sensible things) is last in the *order of being*, and what is first in the *order of being* (the *ens realissimum*) is last in the order of our cognition. Rather, there are important, but easy to overlook, distinctions between very different orders to which we can be referring through the phrase *order of knowing*. Knowledge of particular sensible objects is first in the *temporal* order in which we come to have cognition of nature, although reflection reveals that universal principles of sensible cognition (formal intuitions of space and time, forms of judgment, and rules derived from the combination of these) are actually conditions for the possibility of cognition concerning these particular objects. Similarly, particular empirical concepts, or discursive representations of the unity of a manifold of naturally occurring objects, are first in the *temporal* order in which we come to have a systematic representation of the *order of nature*, though transcendental reflection reveals that universal principles of intellectual cognition (ideas of reason) are actually conditions for the possibility of systematic cognition concerning the sensible objects thought through these concepts. In both of these cases there is a sense in which the particular (object or concept) is prior in the *order of knowing*, but there is another sense in which the universal (rule or principle) has priority in the *order of knowing*.

The priority of the genuinely universal rule or principle over particular cognition is priority in the sense of a condition that is a) contemporaneous with and b) unconditioned relative to, what it conditions. Whenever we have empirical knowledge of particulars, we are making use

of universal principles *under* which these particulars are subsumed. For example, whenever we know that one particular body, *a*, is to the left of another particular body, *b*, at T1, we are making use of the forms of intuition, the forms of judgment, and the rules provided by the schematized categories, as universal principles under which particular intuitions and particular judgments are subsumed. We do not add to our knowledge of these principles when we subsume particular objects under them, although we do add to our knowledge of the empirical objects that are subject to them. The priority of the particular (object or concept) over the universal (rule or principle) is not priority with respect to the same, or even the same kind, of universal. It is, rather, priority in the sense of a condition that a) exists temporally prior to and b) is mutually conditioned by, what it conditions. Whenever we have empirical knowledge of general kinds of thing in nature, we have had experience of particular things that are members of this general kind. If we know, e.g., that swans are birds, we are making use of prior experience with particular birds and we are provided with a partial answer to questions both about ‘what swans are’ and about ‘what birds are’.

The general term *bird* is not like the a priori representation of space, or the universal principle of causality, which remain fixed as conditions for our judgments about particular bodies in nature and particular natural causes. We *can* use our concept of a bird as a universal statement in an argument for a particular conclusion (e.g., ‘swans are birds’, ‘*a* is a swan’, therefore ‘*a* is a bird’) or in an argument for a universal conclusion (e.g., ‘birds are feathered’, ‘swans are birds’, therefore ‘swans are feathered’).²⁵ However, as we learn more about feathers, about swans, and about *a*, we *ipso facto* learn more about birds, and as we learn more about birds, we *ipso facto* learn more about feathers, about swans, and about *a*.²⁶ These are not cases of subsuming

²⁵ In his discussion ‘On Reason in General’ in the introduction to the ‘Transcendental Dialectic’, Kant claims that any universal statement can be used as a principle, even one that has been taken from experience through induction, prior to explaining what he means by the use of the term *Prinzip*. (Cf. A 300/B 356)

²⁶ This is so even in cases where the birds we learn about are not *a* and are not swans, and in cases where the particular knowledge we gain is not directly about feathers. If we learn something about parrots, and

particulars under genuinely universal principles that are somehow supposed to be derived from our experience of these particulars. Rather, particular experience leads to particular empirical concepts, under the guidance of principles of the understanding, and to more general concepts that remain empirical regardless of how general they are, under the guidance of reason. Thus, our particular empirical concepts are prior, in the *temporal* order in which our knowledge is *generated*, to the general empirical concepts that we treat as principles in our systems of empirical cognition, or empirical sciences. The generation of these systems, however, takes place through the use of a priori principles of sensibility, understanding, and reason that have priority in an *atemporal* sense over these empirical concepts.

If this were not the case, we could not consistently represent concepts that are *temporally* posterior in the order of knowledge acquisition, e.g., ‘bird’, as nonetheless prior in the order of knowledge in relation to concepts such as ‘swan’, ‘parrot’, and ‘hawk’. We do, however, represent general empirical concepts as *logically* prior in our systematic representation of what it is that we have come to know, and as representations of natural things (i.e., elements, powers, species) that are ontologically prior grounds of the manifolds of particular objects that we come across in nature. Without achieving some clarity concerning these different senses of priority in the *order of knowing*, Kant believes we cannot address questions concerning the ontological priority relations between universals and particulars in the *order of being* or the *order of nature*. The discussion of the role of reason in generating systematic empirical cognition in the ‘Appendix to the Transcendental Dialectic’ really continues the discussion Kant begins in the Appendix that comes at the end of the ‘Transcendental Analytic’, ‘On the Amphiboly of Concepts of Reflection through the Confusion of the Empirical Use of the Understanding with the Transcendental Use’. It is, thus, important in this connection to address some of the central differences Kant sees between himself and Leibniz when it comes to reflection on empirical

parrots and swans are different species of the same logical genus, then we have learned something more about the genus that can serve as a further ground for judgments of similarity and distinctness between swans and other species of the genus.

objects that is aimed at a systematic representation of the *order of nature*. These are also relevant to the differences between Kant's approach to systematic empirical knowledge and those of other eighteenth-century thinkers who deal with the legacy of Leibniz in interestingly different ways.

3.2: Kant, Leibniz, and the *Order of Nature*

In the section on the Amphiboly, Kant discusses what he takes to be the central problem with Leibniz's "intellectual system of the world", namely, that it is grounded entirely in the transcendental use of the understanding, or in the attempt to cognize the inner grounds of objects "solely through comparison with the understanding and the abstracted formal concepts of its thinking".²⁷ Because he subjected the appearances of nature to standards provided solely by the understanding, or he "intellectualized the appearances",²⁸ Leibniz was led to the *principle of the identity of indiscernibles*, to the view that there are no real conflicts between forces in nature, and to the view that the fundamental grounds of bodies are simple, soul-like substances. The general view that emerges from the last sections of the *Analytic* is, I believe, a statement of a difference that Kant takes to be fundamental with respect to other differences between himself and Leibniz. In Kant's view, the idea of an *intuitive intellect* that differs in kind from our own discursive intellect provides a better principle for regulating our reflection on the fundamental grounds of the *order of nature* than does the idea of a *pure understanding* that differs from our own discursive understanding merely in degree. The latter delivers an intellectual system of the world that renders the objective principles of order in nature isolated in themselves and unknowable to us, and allows our systematic empirical knowledge to be little more than a descriptive cataloguing of similarities and differences between naturally distinct entities. The former allows us to maintain that although our own sensible intuition may not provide the only possible cognitive

²⁷ A 270/B 326

²⁸ A 271/B 327

access to the real grounds of the *order of nature*, the subjective principles we make use of in generating systematic empirical knowledge lead us to cognition of real synthetic unities within *and* between objects existing in nature.

Kant identifies four pairs of comparative concepts that we make use of in reflectively considering whether or not the *things* intended by our representations stand in particular relations to one another, i.e., *identity* and *difference*, *unity* and *conflict*, *inner* and *outer*, and *material* and *form*. Kant is not interested in the logical relations between concepts that we analyze in determining, e.g., that the concept ‘plane figure’ is contained in the concept ‘triangle’, or that the concept ‘married’ cannot be attributed to the same subject as the concept ‘bachelor’ without generating a contradiction. He is interested, rather, in reflective attempts to consider real things according to the various elements that we think in representing the possibility of these real things, which explain *why* we observe particular rules concerning how we can and cannot combine our concepts of these elements in thinking a thing according to its possibility. This means he is concerned with the content of our complex and simple concepts and not merely the logical form of complex concepts that can be constructed out of, and analyzed into, conceptual components that we take to be basic. To see the relevant differences that Kant introduces in his view of reflection and systematic empirical cognition in the *CPR*, it will be helpful to discuss some aspects of the relation between Kant and Leibniz prior to the *CPR*.

Kant and Leibniz prior to the CPR

Transcendental reflection, which takes into consideration the sources in our cognitive power of the representations we are comparing, is concerned with what Kant calls in the *OPA* the material ground of possibility, or the basic realities on which those concepts are based that cannot be conceptually analyzed into any more basic parts.²⁹ These are what we make reference to in

²⁹ 2: 80-1

real definitions, as the real grounds in virtue of which objects of particular kinds exhibit the empirical characters that we refer to in nominal definitions, i.e., they are the principles combined in the natures of things. Leibniz characterizes these realities as *perfections*, or positive simple attributes that admit of a highest degree, and he aims his project of a *universal characteristic* at the development of a language in which the analyzable structure of complex concepts would recapitulate the synthetic relations between the simple grounds of complex things. Reflection, for Leibniz, is a process in which we analyze the obscure and confused representation of something, e.g., the sensible awareness of something we call ‘gold’, until we achieve a representation in which there is sufficient intensive clarity, concerning each element, and extensive distinctness, between the elements, that we obtain an intellectual grasp of ‘what gold is’.

This process begins with nominal definitions, or statements of what comes to mind when we hear a term and how we actually use the term in distinguishing the objects to which it applies from other objects. The aim is to provide real definitions through the analytic procedure of moving from what is grounded (in this case, appearances of a yellow metallic substance) to its grounds (in this case, the elements of the thing that explain *why* it appears to be yellow and *why* it is sufficiently similar to other natural substances to be grouped together with them under the title ‘metals’). Leibniz recognizes, but apparently never solves, the potential problem that what is a simple element of our cognition of natural objects, or a concept that *we* make use of in thinking the a priori grounds of the possibility of natural substances and that *we* cannot further analyze into more basic parts, may not be simple with respect to the objects themselves whose possibility we first cognize empirically. Accordingly, we cannot be certain that the result of this kind of reflection on natural objects is actually a priori cognition of the object by appeal to the grounds in its nature from which its empirical character is derived, rather than a merely refined account of our complex concepts by appeal to representations that are cognitively primitive for us. This kind of analytic approach to discovering synthetic definitions relies on the presupposition of isomorphism between our basic concepts of things and the most basic realities, or perfections, of

these things. It is not obviously necessary that there actually be such a correlation, however, nor is it clear precisely how one could go about establishing that this correlation is, in fact, given.

Principles of this sort, which would require a priori proof, if they were to be proven at all, are the kind of principles that Kant believes play an indispensable role in regulating the use of our intellect. Their recommendation comes through the value of the products of our using them and not through insight into their necessary truth. Because we have no absolute guarantee of their truth, and because the value of methodological principles is derived from the ends they serve, rather than from their providing us with a principle to conform to, occasions may arise in which limiting their application or adopting an apparently conflicting principle is actually the better way to proceed in pursuit of the same end that is generally, or for the most part, well-served by this principle. This is not something I merely mention by the way, since the presupposition of a general agreement between the way nature is arranged and the ways we are constrained to go about the process of achieving systematic knowledge of nature is one of the central topics of Kant's mature work in transcendental philosophy. It also seems to be one that Kant tends to approach from the standpoint of a general agreement with the substantive ends of Leibniz and of the Wolffian school tradition, which is coupled with a recognition of central difficulties for establishing, and central problems that arise from applying, the basic principles of theistic metaphysics on which the work of these authors is based.

The central topic of the 'Appendix to the Transcendental Dialectic' is the discussion of ideas of reason as regulative principles for systematic cognition of nature. The central principle that Kant comes to think he can justify a priori through a transcendental critique of our power of judgment (in the *CTJ*) is also, in cognitive contexts, a regulative principle for the reflecting power of judgment. It should not be forgotten, however, that the dynamical principles of the understanding that arise from the schematization of the categories are also regulative principles.³⁰

³⁰ The constitutive/regulative distinction in Kant's discussion of principles is not a simple division under which all uses of any particular principle can be brought. According to the discussion in the 'Analogies of

These principles are central to the cognitive activity of connecting our intuitions in ways that allow us to make judgments concerning the enduring and changing phenomenal states of sensible objects. Kant believes these principles are, thus, constitutive with respect to experience, but this experience is already a kind of systematic knowledge of nature that presupposes a general agreement between the way things happen in nature and the way we are constrained to go about gaining knowledge of nature. In Kant's view, in both the *CPR* and the *CJ*, the a priori justification for adopting principles of this kind in theoretical philosophy requires the acceptance of basic tenets of his transcendental idealism, i.e., the commitment to the distinction *in kind* between the contributions to our cognition made by our sensible and our intellectual capacities, the restriction of the use of the concepts of the understanding to objects that can be subsumed under sensible schemata, and the distinction between the matter of bodies and the real grounds in nature of both their matter and their observable forms. Of these three points involved in Kant's transcendental idealism, only the last is a point on which Leibniz and Kant agree. The other two

Experience', the principles provided there and in the 'Postulates of Empirical Thought' are not "valid of the objects (the appearances) **constitutively** but merely **regulatively**." (A 180/B 222) These principles do not have the *intuitive* certainty of the 'Axioms of Intuition' and the 'Anticipations of Perception'. Their demonstration comes by appeal to the conditions for *thinking* objects that can be *given* sensibly in some possible empirical intuition. These general rules or principles, which regulate the application of the understanding to the appearances of sensibility, *are* valid constitutively in relation to *experience*, because their use is required for the possibility of any empirical cognition of objects (which, according to the view of the *CPR*, requires both *intuition* and *thought*). The rules of sensible intuition and sense perception are valid constitutively because there would be no appearances, or objects of sensibility, without sensible intuition and actual sense perception. Discursive rules for making empirical judgments concerning the order of these appearances, however, are valid of *objects* only i) regulatively, and ii) *as* objects of sensibility, or *appearances*. The *product* of this regulative use is experience, so these same principles are constitutive in *this relation*. Similarly, the principles of reason provide rules for making a priori judgments concerning the real grounds of the objective order of appearances; however, they are valid of objects only i) regulatively, and ii) *as* objects of thought *for us*, whether or not they are also objects of intuition for some (logically possible) pure intellect. As I understand the view of the *CPR*, the regulative use of these ideas of reason is constitutive of the systematic unity of the understanding, though not of the *objects* of the understanding (i.e., the things in general that appear to our sensibility), in a way similar to that in which the regulative use of the principles of the understanding is constitutive of the systematic unity of our cognition of sensible objects, though not of the *objects* of sensibility (i.e., the appearances themselves). Independently of attention to the details of the way in which Kant employs the regulative/constitutive distinction in discussing a particular principle of the understanding (*Grundsatz*) or a particular principle of reason (*Prinzip*), it is difficult to determine what consequences this label has. This general point is of particular importance in deciding what Kant means in referring to the principle of mechanism, which is a principle constitutive of natural science according to the *MFNS*, as a regulative principle for reflective judgment in the *CJ*. I will discuss some of the details of the regulative use of ideas in the *CPR* in the remainder of this chapter, and will turn to discuss the status of the principle of mechanism in Chapter IV.

are aspects of Kant's Critical philosophy that he develops in conscious opposition to the particular means Leibniz employs towards their generally shared ends.

The view Kant offers in the *ID* is that we have two, significantly different, ways of representing the possibility of objects and their connection a priori, which correspond to two different systems of objects, or worlds, about which we can have cognition. Each of these has its own principles of matter and form, which give rise to relations of *mutual* dependence between objects *within* each world. There is also a one-way relation of dependence between the principles of the one world and the grounds of these in the principles of the other, and a one-way relation of dependence between the mundane principles and the ultimate ground of the possibility, existence, and connection of these principles in a world. That is, matter, space, and time, are the material and formal principles of objects and their relations of mutual dependence in the *sensible world*. Despite Kant's commitment to the reality of these principles as explanatory grounds for the enduring and changing states of objects of the senses, he does not believe that they are transcendently real, or self-sufficient, entities. The matter of observable bodies is not substance, and the changes of location of bodies in space are not the mutual interactions of substances. Rather, matter is the spatially extended and temporally enduring phenomenon of the mutual interaction of the substances that are principles of the *intelligible world*.

The real dynamical interaction between substances appears *to us* as the spatially extended and temporally enduring informed-matter of the sensible world because of the laws according to which our minds work in forming the materials provided by its awareness of the internal states of our sensitive bodies. We can have an a priori science of sensory things, or of objects that can come before the senses of the subject, because we can determine the system of possible formal relations between objects of the senses purely mathematically, independent of any particular knowledge concerning the actual material principles of the system. Geometry and mechanics, as purely mathematical sciences of space and of time, are guaranteed to be applicable to phenomena because they are nothing more than systematic elaborations of the formal conditions that our

minds place on all sensible awareness of objects. The universality of mathematical natural science is guaranteed by the very same conditions that render it incapable on its own of providing us with any cognition of the various kinds of matter that constitute the various kinds of bodies that we come across in nature. Accordingly, there is a necessary order in the external relations *between* phenomena that are, themselves, contingent from the standpoint of the laws that govern these relations.

The different kinds of matter in nature are the physical constants that we discover through the analysis of bodies of particular kinds and that we make use of as presuppositions in our mechanical explanations of particular cases of *enduring* and of *changing* with respect to the observable states of bodies. The differences in kind between these matters are *not* something that Kant believes we can explain by appeal to these same mechanical principles. Just as importantly, it is not something that is *explained* by the claim that matter has the capacity to exist in all of these different forms. This claim is merely a statement of the empirically discovered *fact* that requires explanation, and that, in the particular case of organized matter, *leads to* disputes concerning the active power that realizes this capacity in matter in particular cases. The disputes between Leibnizians and Newtonians concerning how best to fill in the gap between the universal laws of mechanics and the particular kinds of bodies that exist in nature is largely one concerning whether or not the active powers capable of introducing organization into matter that, *as such*, is subject to universal laws of motion are powers that can be attributed to specific kinds of matter. That is, the question is whether we can take matter, as a determinate thing that is subject to universal laws and add to *it* in thought a specific power, or form, or do we have to conceive of these specific powers or forms as active at a level other than that in which matter exists as a determinate thing that is subject to universal laws.

Stated in this way, the problem of the generation and maintenance of particular organic forms can be dealt with in the same general way as the problem of the generation and maintenance of the empirical characters of all kinds of body in nature between which there are

specific differences in form. In all of these cases, Kant believes, the specific powers or forms responsible for qualitative differences between bodies have to be referred to the substances that ground the phenomena of nature. Our a priori cognition of these substances is, according to the view of the *ID*, derived from the use of pure intellectual concepts, in thinking things that cannot come before the senses of the subject. We are able to think these intelligible substances as distinct from one another by reference to the purely intellectual standard provided by the representation of the highest reality, which is the ground of all the various lesser degrees of reality that distinguish one natural kind of thing from another. The idea of God as the all-sufficient material ground of the possibility of all other things, which Kant develops at length in the *OPA*, provides us with the basis for a representation of a system according to the laws of the intellect, in which transcendental *matter* (the internal determinations of the all-sufficient being) precedes and conditions the transcendental *matter-form* combination that is the intelligible world (i.e., the system of mutually interacting distinct substances). This is the thought of the transcendently real (extramundane, supernatural) ground of the transcendently real world (*mundus intelligibilis*) that grounds the empirical reality of the *matter-form* combination that is the world of sensory phenomena (*mundus sensibilis*). The latter is a system that functions according to the laws of sensibility, in which our representation of *form* (space and time) is prior to and conditions our representation of *matter* (the matter of bodies).

The material elements for representing the objects of sciences of phenomena are provided to us by empirical intuition, and the material elements for thinking the objects of noumenal cognition are provided to us by pure concepts, such as ‘substance’, ‘cause’, and ‘existence’. Kant agrees with Leibniz that these concepts are not arrived at through the process of abstraction that begins with sensible representations and seeks to discover the real grounds of the synthesis that explains the existence and characteristics of objects that we represent sensibly. They are, rather, concepts that allow us to abstract from the sensible conditions under which objects appear to us in thinking things as they are in themselves. Kant intends the *ID* to re-establish the important

distinction between the natural *phenomena* that we explain synthetically by appeal to their a priori grounds in matter and the mathematically formulated laws of empirical science, and the *noumena* that provide the metaphysical grounds of the physical objects to which these phenomena are attributed. The difference between the sensible and the intelligible is not, as Kant believes it has become in much of modern philosophy, merely one of degree between considering objects as they actually appear to us and considering the *same objects* by reference to mathematically describable entities and laws that we take to explain these appearances.

The ‘way up’ in natural philosophy, or the analytic regress from conditioned appearance to the *natural conditions* of this appearance, does not end once we reach the matter of natural bodies and the space and time in which bodies undergo changes in observable form. Natural philosophy cannot rest there, leaving everything else to supernatural metaphysics, and descend to explain everything from *these* first principles, without seriously jeopardizing the coherence of the project as a whole. That is, if inert matter and the infinite empty forms it occupies are the only *natural* principles of explanation, then it is not *only* relatively complex animals and relatively simple blades of grass that will require constant appeals either to supernatural causality or to blind necessity. We will also require such appeals in explaining such things as the cohesion between the parts of bodies in general, the dissolution of coherence between parts of bodies, the continuity of natural changes, and the unity amidst diversity of the various specific kinds of body in nature. If we accept these regular relations in corporeal phenomena as physical constants, and explain natural phenomena in accordance with them, but we cannot derive them from the only first principles we admit as *natural* principles, then we appear to have an inconsistent mix of principles in our natural philosophy. That is, we either combine the natural and the supernatural, or we combine the rationally intelligible and the blindly necessary, in our *general physics*, and not merely in those “fringe” areas such as chemistry, plant and animal physiology, and natural history, where we just have not yet had ample opportunity to work out the details.

Mathematical representations of the elements and laws of nature remains sensible cognition, for Kant, despite the fact that it enables us to have synthetic cognition of empirical objects, because the term ‘sensible’ is not one that describes the *origin* of the concepts and principles used in generating cognition. Mathematical principles are not derived from experience, but that does not mean that mathematical cognition of objects is intelligible cognition, or that it is cognition of the intelligible grounds of the objects of our experience. The term ‘sensible’ attaches to cognition, rather, because of the kinds of *object* that are determinable in accordance with these concepts and principles. The mathematical laws of natural philosophy are derived from the subjective conditions under which alone objects can come before the senses, so it is a mistake to think that they apply to objects that cannot come before the senses, or intelligible objects. Accordingly, mathematical cognition of the *formal* principles and laws of nature should not be deemed intelligible cognition of nature. Genuinely intelligible cognition of nature requires cognition of the things in themselves or substances that provide the *material* grounds from which the irreducibly qualitative *material* aspects of nature are derived, i.e., the qualitative differences between bodies of different kinds in nature.

Although metaphysical cognition is not essential for pure mathematics, pure mathematics alone is also not natural philosophy. Thus, as far as the view of the *ID* is concerned, it remains the case that intelligible cognition of the grounds of natural bodies is essential for providing a coherent grounding for our cognition of both the *necessary order of nature* and the *contingent order of nature*. The ‘way up’ must proceed beyond the matter and form of the *sensible world* if it is to reach cognition of the first principles of natural philosophy, but in doing so it does not *ipso facto* go beyond nature and appeal directly to supernatural principles on the ‘way back down’. Substances are the natural principles of causality in which natural phenomena are grounded, and their causal natures are the natural powers that ground the cohesion between the parts of bodies in general, the dissolution of coherence between the parts of bodies, the continuity of natural changes, and the unity amidst diversity of the various specific kinds of body in nature. The

appeal to the *intelligible world*, in the *ID*, provides Kant with the same basic model for a maximally coherent natural philosophy for which we see him arguing in the *OPA*, although his discussion of the formal and material principles of the two worlds in relation to the analytic-synthetic procedures of the sciences brings the expression of this view closer to the specific framework in which Kant addresses the subjective sources of the a priori part of natural philosophy in the *CPR*.

Kant on Leibniz and the *Order of Nature* in the *CPR*

By the time of the *CPR*, Kant no longer thinks that we can have theoretical cognition of objects that cannot come before the senses of the subject. The relational and modal categories, which had provided the material ground for thinking the possibility of things-in-themselves in the *ID*, are now merely logical forms of judgment independent of the schema of sensibility that enables us to subsume objects under them in a determinate fashion. They have a “merely transcendental meaning” that is independent of the sensible conditions under which objects can be given to us in intuition, but they do not have a “transcendental use” independent of these conditions.³¹ That is, judgments that involve the concepts of, e.g., substance and causality that are not limited by the subjective conditions of our intuition *are* judgments about things in general, but they cannot be used to determine anything concerning actually or possibly existing individuals, or to subsume individuals under these general concepts. Kant claims, in the *CPR*, that we cannot *posit* the division of *objects* into phenomena and noumena, and the division of the *world* into a sensible world and a world of the understanding, although we can maintain a distinction between *sensible concepts* and *intellectual concepts*.³² The latter are concepts that we

³¹ A 248/B 305

³² At A 249/B 305, Kant addresses the question of whether in limiting sensible cognition to appearances, one is not already ascribing objective reality to the concept of a *noumenon*, or *positing* the division of objects into *phenomena* and *noumena*, and of worlds into a world of the senses (*sensible world*) and a world of the understanding (*intelligible world*). If one distinguishes between the way things appear and

accept problematically and that remind us that, although our sensible intuition is the only source of material with which we can think the possibility of objects in a determinate fashion, we cannot assume that it is the only kind of intuition of objects that is possible.

Noumena are not, according to the view of the *CPR*, intelligible objects for our understanding. They are what we suppose an understanding that is of a kind entirely different from our own would have as its objects, were such an understanding to be really possible and also real. Interestingly enough, in line with some of his earliest remarks concerning the difference

the way things are, and holds that the former are the objects of our sensible intuition, it may seem to follow that the latter are objects for a non-sensible intuition, or an understanding. Kant responds to this by claiming that *our* understanding *does not* relate directly to objects of a non-sensible intuition (or *noumena*). It does, however, think an object in general as the real ground of the appearances, which are nothing in themselves other than representations. That is, the understanding thinks something by *negating what it is not* (i.e., by thinking that is not a representation) as the objective correlate of the unity of apperception that is presupposed by our own representations. The only positive data we have for thinking this wholly indeterminate correlate as *an object* is what is provided by sensible intuition, so we are not actually thinking anything through positive determinations, or positing anything, through the mere concept of an object = x. By granting the distinction between our intuitive representations of things as they appear to the senses (*phenomena*) and the things themselves that appear to the senses in this way (the *non-sensible grounds* of the *phenomena*), we are not required to be actually claiming that the latter are objects of a pure understanding (*noumena*). Unless there are independent positive reasons to maintain that there is some being that intuits objects without being affected by them, there are no reasons to maintain that the non-sensible grounds of *phenomena* are *noumena* in the positive sense. The same applies to the distinction between the *sensible world* and the *intelligible world*, which Kant claims has been used by moderns in a way that is merely “an empty trafficking with words”. (A 256/B 312) Part of the reason for this, according to Kant, is that the “connection of [the sum total of appearances] as it is thought in accordance with general laws of the understanding” has been taken to be the *intelligible world*. This confusion has resulted from a lack of clarity concerning the significant difference between the empirical use of the understanding and its transcendental use. The transcendental use of the understanding does allow us to think the connection of appearances a priori, as a condition for its own empirical use in determining these connections in particular cases. This is done, however, in a merely indeterminate fashion, as a set of general rules, and not as an individual that provides the real ground of the connection of the sum total of appearances. Accordingly, neither the absolute space and time assumed by the Newtonians, nor the unified totality of created monads assumed by Leibniz and the Wolffians, are things that we can determine through the understanding to be *both* the real grounds of the appearances and the real objects of an intuitive understanding. Accordingly the use of the understanding in thinking the real grounds of the appearances in an indeterminate and regulative sense (or in thinking the *noumenon* in a negative sense) does not even amount to, or enable the transition to, the *positive* thought of a *noumenon*, let alone to *positive* knowledge of the objects and connections that constitute an *intelligible world*. This is the point I see Kant making at A 269/B 325 in the ‘Remark to the amphiboly of the concepts of reflection’, and at A 288/B 345 in the discussion of Leibniz’s intellectual system. The *noumenon* cannot be called the object of an entirely different intuition and understanding than our own, because this intuition and understanding are merely *problematic* (in the sense of hypothetical). If there *were* to be some intuitive cognition of the objects we think through our understanding, it *would* have to be some being with a different kind of intuition and understanding that cognized them in this way. We have no reason to assume that our own intuition and understanding are the only kinds possible, but we also have no way of knowing that there really *is* a being that has *intuitive* cognition of the objects we *think* through our understanding. As a problematic concept that reminds us of this situation, the concept of a *noumenon* can be useful, but *by itself* it is not a concept that has any positive meaning for us.

between the divine intellect and our own, Kant maintains in the *CPR* that the categories cannot be used to make determinate judgments concerning noumena, because the kind of intellect for which noumena could be given as objects of cognition is thought, problematically, as a *purely intuitive understanding* that would have no need for discursive representations. Kant refers to the distinction central to his transcendental idealism in the A-edition of the *CPR* in the following way:

Appearances, to the extent that they are thought as objects according to the unity of the categories, are called phenomena. If, however, I suppose things that are mere objects of understanding and, at the same time, as objects that are such that they can be given to an intuition, though not a sensible one (as *Coram intuit intellectual*); objects of this kind would be called noumena (*intelligibilis*).³³

All our representations are actually referred to some object through the understanding, and, since appearances are nothing but representations, the understanding refers them to something as the object of sensible intuition: but in this case this something is only the transcendental object. This means a something = x, of which we know nothing at all, nor could we know anything at all (according to the current condition of our understanding), but which can serve only as the correlate of the unity of apperception for the unity of the manifold in the sensible intuition, by means of which the understanding unifies this same manifold in the concept of an object. This transcendental object cannot at all be separated from the sensible data, since then nothing would remain through which it could be thought. It is, thus, no object of cognition in itself, but rather the representation of appearances under the concept of an object in general, which is determinable through the manifold of appearances.³⁴

Here we see Kant claiming that intuition is the only source of the materials made use of in thinking objects, i.e., it alone can provide the material element of judgments concerning possibility. In *our* case, this intuition is sensible, so all of *our* thought of objects must in some way be related to the forms of *our* sensible intuition, or space and time. Our understanding functions to provide the unity of the appearances through which these appearances are determinate objects for our sensibly conditioned thought, or phenomena. It does this through judgments that require the use of concepts, so all *our* thought of objects must also be related to the forms of *our* discursive judgment, or categories of the understanding. It also projects a real

³³ A 248-9

³⁴ A 250-1

ground that is not represented intuitively or is not among the appearances, as a something = x that is 'what it is that appears' or the ontological ground of unity for these appearances.

We think the appearances as representations of the phenomenal state or the determinations of "an object in general that is determinable through the manifold of appearances." We cannot have any cognition of what this something = x is in itself, or aside from its role as ground of the unity of appearances, from which we could pretend to derive the manifold of its phenomenal states a priori. If we are to think of it as ground of these states, which is the only way we can think it, however, it must serve as a correlate of the transcendental unity of apperception, which similarly is not represented intuitively or is not among the appearances. By this, Kant apparently means that we have to attribute to this something = x a power to unify the phenomenal states we attribute to objects of outer sense through our thinking that is analogous to the power of our apperception to unify the appearances that we think as the phenomenal states of the object of our inner sense.

We have no more data for thinking these objects independently of their relation to the *perceived* states we attribute to them than we have for thinking our souls independently of their relation to the *apperceived* states we attribute to them. We have the same grounds for positing the existence of this something = x, and for attributing to it a power in virtue of which it can ground a variety of phenomenal states, in the one case as we do in the other. The point of the reference to a non-sensible intuition is to call attention to the possibility that the discursive unity provided for the manifold of our sensible intuitions by the schematized categories of the understanding may not be the *only* way that a manifold can be represented as a single, unified individual. An intellect that did not *both* actively unify a manifold of passive states of sensible intuition *and* project an indeterminate ontological ground for the phenomenal states of bodies would appear to differ from our own, not merely in degree, but in kind.

What Kant comes to believe in the 'silent decade' is that sensibility is not a purely intuitive capacity for cognition of phenomena and the intellect is not a purely conceptual capacity

whose real use is in cognition of noumena. Without making judgments, we cannot *cognize* anything and our judgments require more than merely intuitions. Accordingly, sensible knowledge requires the use of concepts. Without referring our judgments to *particular* objects, however, we are not cognizing any *thing*, and judgments about particular objects require intuitions. Accordingly, knowledge of individuals has to be sensible knowledge. If there were some other being that intuited objects in a different way and that made judgments concerning objects in a different way, such a being could potentially think objects directly through the material grounds of their possibility. That is, such a being could cognize objects without first being affected sensibly by the series of effects grounded in these objects, then representing these objects through the use of discursive forms of judgment, as causes of particular contingently given effects, and finally seeking the real grounds that render it necessary that these particular effects follow from these particular grounds according to the *order of nature*.

The *noumenon*, in the view Kant presents in the first *Critique*, is not something that is cognizable *as such* through our discursive understanding, nor can we even posit it as an object that only an understanding capable of perfect conceptual knowledge can cognize *adequately*, though we can still have *some* cognition of it that is relatively clear and distinct. Subtle as the difference can appear to be, Kant does not think that intellectual knowledge is the perfection of sensible knowledge. It is not the result of a process of clarifying and distinguishing what is at first obscure and confused and *coming to have* an intuition of the truth of some contingently given fact. The analogy to the process in which the uninitiated comes to know intuitively that the hypotenuse of a right triangle with sides of 3 and 4 *has to be* 5 without needing to measure it, and is then able to explain why this has to be the case in such a way that others among the uninitiated can come to grasp it as well, is obviously a fundamentally mathematical analogy.

We can agree that it is a useful one for thinking about *our* cognition and *its* perfection, while maintaining that this remains *our* perfection and that our cognition is essentially sensible cognition. That is, even when we make use of mathematical models for explaining the

appearances, it is still *qua* mathematical principles for explaining appearances that we think the principles of these models. We can claim that the next step is, in fact, to leave these models behind and to no longer make use of the spatio-temporal forms of beings in the sensible world in thinking the first natural principles of these forms. This can, it would seem, be done while still maintaining that the intellectual concepts we arrive at in this way are no more than less determinate and less restrictive ways for us to think the natural grounds of the beings of whose existence we can be made aware only through the senses. The place where natural philosophy leaves off and we become involved in discussions of supernatural beings need not be at the point on the divided line that distinguishes between phenomena and the mathematical models we make use of in thinking their grounds, nor need it be at the point where we leave these models behind and make use of purely intellectual concepts. Even the transcendental ideal of God, as the all sufficient supernatural ground of the possibility, existence, and connection of substances in the world, can have a legitimate immanent use in natural philosophy, in Kant's view, as long as the world we are thinking through the use of this idea is the *natural world*.

As soon as our concepts and our ideas are referred to objects in a *realm of grace*, however, we are no longer doing natural philosophy. This appears to be the case for Kant, whether we are considering the shadows cast by physical objects, these physical objects themselves, or the supersensible principles of individual physical objects and of the entire *order of nature*. Kant is just as interested as is Leibniz in distinguishing between the *realm of nature* and the *realm of grace*, and he is also just as interested in thinking about the connection between the two, but Kant believes Leibniz does a disservice to *both* in making the former merely the contingent way in which the latter appears to finite beings such as ourselves. If we do not have an independent set of intellectual principles and standards for judgments concerning the *order of nature*, then there is no genuine *realm of nature*. There is little difference, from the standpoint of the autonomy of the natural sciences, whether the super-sensible causal principle we appeal to in

explaining phenomena is the absolutely spontaneous will of a *single* supernatural being or whether it is the sum total of the spontaneous acts of an *infinity* of finite supernatural beings.

Of course, Leibniz would not agree that he has opted for the latter. In thinking of finite substances, Leibniz is thinking of them as having natures, which are laws of the series of changes that these substances undergo. In the sense of natural philosophy that goes back to Aristotle, it is a study that is concerned with the first principles of change in beings that are subject to change, and Leibniz thinks that it is only the phenomenal states of substances that are subject to change, not the substances themselves.³⁵ Considered independently of the spatio-temporal conditions under which we experience their states, these substances are immutable things in themselves. Leibniz does believe that these substances change, only not in the way that would qualify them as objects of mechanistic physics, *i.e.*, they change, but they do not *undergo* changes in the sense of being forced by the power of some other being to leave the particular state of motion or rest that they are in. To the extent that they are *moved*, it is spontaneously, through the representation of the greater perfection of some other state relative to the state they are currently in. Immutability, from this perspective is not freedom from change, but freedom from the conditions of generation and corruption to which the compound bodies of physics are *subject*.³⁶

I do not think there is much in the above characterization that Kant would object to, except the claim that it is an account of the activities of intelligible natural substances that result in the phenomena treated in mechanistic physics. It seems to Kant to be a description of the activities of the human soul, which would not be entirely out of step with Leibniz's own view, given his emphasis on apperception as the source of intellectual knowledge and on thinking the principles of bodies as soul-like substances. Even if we accept the utility of the analogy with our own apperception for thinking about the ultimate principles of nature, however, we might be prone to think that apperception provides merely a formal principle of synthetic unity for our

³⁵ AG 207

³⁶ AG 209, 213

consciousness of a manifold of intuitions that are derived from *elsewhere*. If this unity is what we strive for intellectually, and achieving it is a matter of going from a less perfect state of awareness to a more perfect state of awareness, then the intuition that provides the matter for the former state has to be ‘worked up’ successively into the intellectual cognition that is achieved only on the point of arriving at the more perfect state. Even if achieving greater perfection is only a matter of introducing more order into the previously existing parts of a manifold, these parts still have to be there in order to be ordered in this new way, and they cannot already have the form that is introduced through the process of ordering.

The view that the *matter* of our cognition rises up out of the depths of our consciousness, if it is to be understood as anything more than a metaphor, would seem to require that the *petite perceptions* be provided by a distinct faculty of the soul, whose representations do not already have the intellectual form that they receive through this process. Otherwise, the view of an internal striving to achieve something that is *in any way* different from what one already has or is and, thus, the model of changing states according to an inner law of causality to which the substance itself *is not* subject, but its phenomenal states *are*, does not seem to make much sense. If we accept this Kantian point, we have the basis for a model of cognition that involves the matter of our thought coming from the mutual interaction of the sensible parts of the organic body with other bodies in nature, and the form coming from the activity of the intellectual capacity on this matter; now as imagination, now as understanding, now as reason.

We also have the basis for the model of natural philosophy that involves the matter of bodies as the enduring phenomenon of the dynamical interaction between the fundamental causal powers of natural substances. We can think these substances as actively striving, in a way analogous to the activity of our own intellectual capacity, *not* to achieve a determinate state and, once there, to maintain it, but to exercise its powers to determine the states of the other substances with which it interacts. In this way, the effects of the activity of the natural powers of bodies, and the effects of the activity of the cognitive powers of our souls are thought of as achieved only

when these powers are exercised in a world, or in a system of real connections between individuals that are mutually dependent on one another for their changes in state. When we abstract these individuals in thought out of *this* world, we no longer have any data for thinking what they may be in themselves, because the content of our thought of what they are is tied up with our representing them in a system of mutually determining relations. This does not mean, however, that they cannot exist independently of these relations, only that they would not exist with the same empirical character that they exhibit due to the interaction between the powers in their causal nature and those of the other substances in the world.

If we fix the term *nature*, as Kant does, by reference to the system of appearances together with their super-*sensible* grounds, then we have a coherent view of a natural world. As long as we think of nature merely in terms of the “totality of phenomena in the sensible world”, the inconsistency of this thought from the standpoint of reason will lead thinkers like Leibniz to one or another form of empirical idealism. Similarly, positing the grounds of the causally determinate *order of nature* in the *realm of grace* will continue to lead people to abandon the basic tenets either of natural science or of morality in case they find themselves unable to do what even proponents of the view admit that we cannot quite do; namely, see *how* causal determinism can or must result from the freely willed actions of intelligent beings. If we take into consideration the limits of the human understanding, which everyone agrees makes this impossible, prior to insisting on the view that makes it necessary, we might be able to combine the above view of the natural world with other, equally legitimate, interests of our reason in a more promising way.

Abstracting individuals from their relations in and to the natural world cancels the empirical character they exhibit in nature and leaves *us* without any data for *thinking* their possibility, but it does not force us to think the annihilation of the being that has this empirical character in nature. What this being may be like in some other relation, or some other set of relations, that have nothing to do with the set of relations that gives rise to the spatio-temporally

observable *order of nature* is not the concern of the natural philosopher, except in the negative sense of having an interest in making sure that presuppositions involved in beliefs about these other relations do not play a role in empirical science or in its metaphysical foundations. According to this way of seeing the outlines of the position of the *CPR*, the distinction between phenomena and noumena is not at all suggested to Kant by the demands of practical philosophy. It is necessitated, rather, by the same insufficiency of the views of modern metaphysicians to account for the *order of nature* that leads Leibniz to his own original synthesis of scholastic, Neo-Platonic and modern ideas. The emphasis in the ‘Transcendental Dialectic’, moreover, is on securing the use of reason in a purely theoretical account of this *order of nature* that avoids the problems for a coherent view of the natural world that he sees in attempts, like that of Leibniz and others, to ground this order in a *realm of grace*.

The specific discussion of Leibniz’s ‘intellectual system of the world’ in the section on the ‘Amphiboly’, which comes directly between the section on ‘Phenomena and Noumena’, from which I quoted above, and the ‘Transcendental Dialectic’ draws attention to what Kant believes is the most significant distinction between himself and Leibniz concerning the use of the understanding. From Kant’s perspective, it may be that it is merely a contingent feature of our intellectual cognitive powers that we think the real grounds of unity for phenomena as ‘mere objects of the understanding’ that can also be given to a non-sensible intuition. That is, since the discursive nature of our understanding leaves it entirely indeterminate *how many* objects can be subsumed under a given concept, and in *how many different ways* these objects can appear, mere objects of our understanding are not representations of individuals as individuals. They are general concepts that refer to some indeterminate number of possible individuals through characteristic marks that all actual or possible individuals of this kind have in common. A *noumenon*, in this sense, or the object intended through such a concept of the understanding, could not be the real ground to which we refer appearances as its phenomenal states, because

‘mere objects of *our* understanding’ are not determinate enough to be individually existing things-in-themselves.

The Leibnizean response to this consideration is to think of an individual as the object intended by a concept that is complete enough to have only a single referent. Leibniz expresses this view in his middle period through the claim that concepts of individuals are *infima species*, or substantial forms that are instantiated in only a single being. The matter of bodies, according to this view, is insufficient to play the role of a principle of individuation for beings that share a common substantial form, because *this* matter is everywhere identical considered independently of particular forms. The material elements of the real possibility of individual bodies in nature, for Leibniz, are individual substances, each of which is a uniquely limited expression of the fundamental perfections that exist without limit in God. These individuals are intuited clearly and distinctly as individuals by the divine intellect, and they are intuited in an obscure and confused fashion by finite intellects as extended masses or bodies.

The principle of form for these material elements of possibility cannot be space and time, because space and time are also everywhere identical considered independently of the particular things that occupy space and that endure through time. The principle of form for each of the individual substances that together ground the phenomenal states of bodies is the law of the totality of the continuous series of phenomenal states that are individually attributed to it as its state. The principle of form that connects all of these phenomenal states in a coherent way, such that we can discover laws that govern the changes in phenomenal state of natural bodies, is the pre-established harmony that provides the essential form of a world that is worthy of being willed to exist by a perfect being. The explanation for why it appears that there are bodies in nature that share a common causal nature is that, in the fullness of things, there are no gaps between forms that would constitute a leap from one form to another, or that would leave a hole that some possible form could fill. Accordingly, we will always be able to find forms that resemble each

other so closely that we overlook their differences and take them to be numerically distinct individual instances of the same substantial form or causal nature.

The titles that appear as names of species in our classifications of this order (e.g., *human beings*, *golden retrievers*) refer to merely nominal essences or sets of common characteristics that we use to subsume a multiplicity of naturally distinct individuals under a class concept. Just as the concept 'triangle' leaves it indeterminate whether the particular thing referred to is isosceles, right, or scalene, the concept 'human being' leaves it indeterminate whether the particular thing referred to is male, female, black, or white. Each existing human being, however, is determinate with respect to characteristics such as these, which are left indeterminate by the essence of the kind, or which are contingent from the standpoint of the general concept under which these individuals are subsumed. It is a mistake in our reflection, in Leibniz's view, that leads us to hypostatize species concepts and to treat them as proper names for individuals that are either ontologically indeterminate (i.e., are neither male nor female, neither black nor white) or that exhibit characteristics that contradict each other (i.e., are both male and female, both black and white).

From the 1750s onward, Kant argues that the mistake is, rather, in assuming that whatever *supposed* differences between things cannot be expressed in terms of pure concepts are not *real* differences between things. *Of course* our concepts of species are not determinate enough to refer to any sensibly given particular individual, because we *do think* of the species in terms of what is common to a real multiplicity of individuals. It is not clear, however, why we should take this as evidence for the claim that species concepts are not names for individuals. Why not approach the fact that no two snow-flakes or no two leaves are perfectly alike from the standpoint of the difference in the external conditions under which these bodies are formed, and account for the similarity in outward form by reference to the identity of an internal ground, or causal nature, that contains a range of predispositions that are actualized differently in different environments? It is true that this will not account for differences that are necessary for the

generation of animal bodies through ‘mixed matters’, which we now call sexual reproduction. However, the idea of an original pair that are purposively outfitted with capacities to generate others of their kind is no less plausible than the idea that Adam (or Eve) contained the seeds of all future generations in his (or her) body, or that these seeds exist everywhere in nature and happen to be somehow implanted in the mother just prior to beginning the process of unfolding.

Kant himself never takes spatial and temporal characteristics to be fundamental, and he never takes the matter of bodies to be an individually existing thing that could serve as the real ground of differentiation between sensibly given particulars that share a common nature. He does, however, attempt to block the move from the *principle of sufficient reason* to the claim that all particular things in the natural world are individual things-in-themselves that can be characterized, even if not by us, solely by appeal to concepts of their intrinsic denominations. His first published discussion of this topic, in the 1755 *Nova dilucidatio*, comes out on the side of conceiving of God’s intellect as a purely intuitive one that represents the real inner grounds of the distinctness and unity of natural bodies without relying on concepts.³⁷ We intuit the outward effects of these grounds in space and time, and we can think the objects whose real differences are revealed to us in this way only discursively, or through general concepts. It is a mistake from Kant’s perspective, however, to think that in order for there to *be* a difference that is revealed to us in space and time, there must be some *prior conceptual* ground of differentiation between the objects perceived to be different. From spatial differentiation between two objects, we can conclude to real difference between objects, but we cannot conclude to real differences in the categorical determinations of objects that can be expressed as the possession by one of these of a monadic predicate that the other lacks. Though it may seem like a subtle metaphysical distinction, the difference between thinking of *noumena* as objects of *pure understanding* that can be intuited as individuals by a non-sensible intuition, on the one hand, and thinking of them as objects of an *intellectual intuition* that we refer to indeterminately through concepts of our

³⁷ 1: 409-10

understanding, on the other, might make a significant difference in the attitudes we adopt to the *order of nature*.

If the understanding is essentially discursive, and we think away the limits placed on its application by sensible schemata, we will be led to posit the existence of an objective correlate to the maximum arrived at through the idea of the perfection (or completion) of the understanding's imperfect (or incomplete) way of representing objects. The *noumenon* will be the object referred to by a concept that is determinate enough to pick out only one possible object, unique in its kind. The elements of this concept will be thought as being taken in all at once by an understanding that differs in degree from our own and, thus, intuits clearly and distinctly the same things that we intuit obscurely and confusedly. If we start from the idea of an intellectual intuition, however, then discursivity is not thought of as essential to intellect and as perfected (or completed) in the divine intellect. Discursivity is thought, rather, as the result of the 'night that darkens our intellect' and forces on us an analytic regress from conditioned existence to the conditions in virtue of which what appears to be contingent can be understood as the necessary result of prior grounds. The ability to synthesize a real multiplicity in the intuitive representation of an individual as a real unity that contains a variety of genuinely distinct and mutually conditioning elements, is the maximum of cognition that we represent as the archetypal intellect that is distinct in kind from our own ectypal intellect. If this is the model we make use of, then the products of the sensibly conditioned discursive acts of our intellect, or *phenomena*, differ *in kind* from the products of an intellectual intuition, or *noumena*.

The intuitive mode of representation allows us to represent intuitively distinguishable things as individuals, and also as members of individual things that are *made up of* individuals, which do not become indistinguishable simply because they are members of more comprehensive wholes. What is an individual in one relation, or set of relations, can be a unity composed of individuals in another relation, or set of relations, and there is nothing contradictory in judging the same thing differently in these different relations, as there would be if we were concerned

with the categorical determinations of things, or the monadic predicate concepts contained in concepts of these things.³⁸ What is harmonious in one relation, or set of relations, can generate real conflict in another relation, or set of relations, and real conflict can arise between positive realities, the net effect of which is the negation of both. This cannot happen if we are considering realities solely through the understanding, according to which negations are merely inherent limitations on the positive reality of some thing, and reality and reality cannot contradict one another.³⁹ The intrinsic powers of something can be represented through the effects these powers have on the states of other things, which cannot be done if we are representing a thing through the understanding alone as existing in a way that is completely determinate in itself due to its inner grounds.⁴⁰

All of these various kinds of relation, which Leibniz rightly treats as violating the conditions of the pure or transcendental use of the understanding, are, Kant believes, necessary for its empirical use in reflecting on and making determinate judgments concerning natural objects. By privileging its transcendental use and subjecting the sensible objects that we think through the empirical use of the understanding (*phenomena*) to its standards, Leibniz denies the reality of the objects of this empirical use; i.e., the various regular relations between sensible objects of visibly similar and visibly different kinds in nature. In Kant's view, this, together with our inability to analyze our perceptions of these sensible objects in a way that would allow us to determine everything contained in their natures, has the effect of undermining the possibility of providing anything more than a merely descriptive cataloguing of the *order of nature*. The best

³⁸ Kant discusses the claim that there is intuitive content to our perceptions of relations that cannot be reduced to a comparison of the monadic predicates of the *relata*, or the view of incongruent counterparts, in the 1768 essay 'Concerning the Ultimate Foundation of the Distinction of Directions in Space'. (Cf. 2: 382)

³⁹ This point forms the basis of one of Leibniz's early attempts to provide the preliminary steps necessary for Descartes' ontological argument. (Cf. AG 25-6) In the 1763 essay on *Negative Magnitudes*, Kant argues not only that positive realities can conflict, but also that change requires that the positive ground of one determination of a substance come into conflict with another positive ground that cancels out the effects of the first ground. This discussion provides the basis for the claim that there can be no increase in perfection in the world, which is a principle that appears to be violated by Herder's view of the history of nature. (Cf. 2: 194-7)

⁴⁰ This is a claim that Kant makes in arguing against the Leibnizean view that space is a necessary consequence of the co-existence of substances in the *Nova dilucidatio*. (Cf. 1: 413)

we can do is arrange these objects under conventionally accepted terms that merely allow us to talk about aggregates of individuals *as if* there were some principle of unity for these aggregates that is more substantial than that provided by our contingent practices of referring to each individual by the same name. The kind of continuity of nature that Leibniz envisions in his *great chain of beings* is one that leaves us with no hope of ever achieving a natural classification, and no hope of understanding why nature should even appear to have specified itself in ways that lend its products to being classified into distinct kinds by beings like us.

The pair of concepts of reflection that Kant addresses as the most fundamental in the section on the Amphiboly in the *CPR*, and which is most directly related to the discussions in the ‘Appendix to the Transcendental Dialectic’ and in the *CTJ*, is the pair *matter* and *form*. In his discussion of this pair, Kant claims the following:

4. Matter and Form. These are two concepts that are so inextricably connected to every use of the understanding that they are the basis for all other reflection. The first means the determinable in general, the second its determination, (both in the transcendental understanding of these terms, in which one abstracts from all difference in that which is given and the manner in which it is determined). Logicians used to call the universal the matter, and the specific difference the form. In every judgment one can call the given concepts logical material (for the judgment), and the relation of the same (through the copula) the form of the judgment. In every being [one can call] the component parts of the same (*essentialia*) the matter; the manner in which they are connected in a thing, the essential form. With respect to things in general, unbounded reality is also seen as the material of all possibility, and the limitation of the same (negation) as that form through which a thing distinguishes itself from other in accordance with transcendental concepts. The understanding, namely, requires first that something be given, (at least in a concept), in order to be able to determine it in a certain way. Accordingly, in the concept of the pure understanding material precedes form, and for this reason Leibniz supposed, first, things (Monads) and their internal power of representation, in order, then, to ground the external relation of things and the community of their states (namely, of their representations) on these. In this way space and time were possible, the former only through the relation of substances, and the latter through the connection of their determinations to each other as ground and consequence. This is how it would actually have to be, if the pure understanding could be referred directly to objects, and if space and time were determinations of things in themselves. If, however, they are merely sensible intuitions, in which we determine all objects solely as appearances, the form of intuition (as a subjective quality of sensibility) precedes all matter (the sensations), and thus space and time precede all appearances and all data of experience, and are what make the latter first possible.

In this passage, we see Kant i) referring to several different kinds of matter-form combination, ii) expressing what he takes to be the fundamental motivation for Leibniz's monadology, iii) agreeing that Leibniz would be right if the objects of the senses and the understanding were things in themselves, and iv) suggesting the correctness of a model for reflecting on objects that is ruled out by Leibniz's view, but that is made possible by the distinction between sensibility and the intellect that Kant himself introduces in the *CPR*. It will be instructive, I believe, to pay some attention to each of the four different matter-form combinations Kant mentions in this passage, before discussing the particular differences between Kant and Leibniz to which the rest of the above passage points us.

The first of these matter-form combinations is that found in *scholastic class logic*, which Linnaeus also makes use of in his *Systema naturae*, and which we have seen Kant discuss in relation to the distinction between *Naturbeschreibung* and *Naturgeschichte*.⁴¹ The universal concept is the determinable matter, or a concept of a general kind of thing that refers to its members through a characteristic shared by all of them. This concept is, thus, indeterminate with respect to each of the various specific differentiae that are taken as particular ways in which the concept can be further determined. The concept 'animal', e.g., is further determinable by logical terms such as 'aquatic', 'land-dwelling', and 'flying'. The product of each of these further determinations of the concept is another concept ('aquatic animal', 'land-dwelling animal', 'flying animal') that is a matter-form combination. Linnaeus' *binomial nomenclature* involves taking the genus term as the determinable matter, and assigning names to the various species of a genus by combining the name of the genus with a term that denotes a specific difference between this species and other species of the same genus. Concepts of genera can also be considered as expressing specific differences between members of families, if we head 'upward' from the

⁴¹ 2: 434

species, and concepts of varieties can be considered as expressing specific differences between members of the species, if we head ‘downward’ from the genus.⁴²

The second matter-form combination Kant mentions here is also a matter of logic, but it is not merely the class logic involved in the previous combination, in which one concept is the matter and the other is the form. This concerns the matter and form involved in the *logic of judgments*, in which each of the concepts involved is taken to be part of the matter of the judgment. These concepts are the determinable materials that are related to each other by the copula in a categorical judgment. These judgments themselves are the elements of hypothetical judgments and disjunctive judgments. Taking into consideration the three qualities and quantities of judgments, the relation of concepts to one another, the two relations of judgments to one another, and the three modalities of these judgments, it is clear that the formal logic of judgments that provides the basis for the transcendental logic of the *CPR* differs in important respects from the traditional syllogistic logic of Aristotle. Kant does continue to base some of his thinking about the understanding (immediate judgments) and reason (mediated inferences or ratiocinations) in this syllogistic logic, but his transcendental logic also clearly goes beyond this tradition.

The third matter-form combination Kant mentions is not one pertaining to concepts and to judgments, but to beings (*Wesen*), whose essential components are referred to as matter, with the particular way in which these are connected in the thing being taken as the essential form (*wesentliche Form*) of these beings. This is a way of thinking about the principle of unity amidst the diverse and changing elements in a thing that is fairly traditional in *natural philosophy*, and it is the way in which Kant himself approaches the formal and material principles of the sensible and intelligible worlds in the *ID*. A world is not simply a collection of independent beings, in the

⁴²This is not an attempt to provide essential definitions, in the Aristotelian sense, that would provide us with knowledge of the nature of the species in question. Accordingly, it need not be preceded by decisions concerning, e.g., whether place names, the names of people who discovered a species, or even the names of ones opponent in disputes concerning classification, represent adequate differentiae for use in naming species of plant or animal.

view put forth there. It is itself a being that is internally articulated into a system of distinct beings, each of which is related to all the others and is capable of causing and undergoing changes of its state that are made possible by the essential form of the world, without the world itself undergoing any changes in its overall state. That is, the essential form of the world is immutable, although each of the material components that are connected according to this form undergoes changes from one determinate state to another. Space and time do not *undergo* change. They are, rather, the principles of all changes in the matter of the sensible world. Similarly, the mutual interaction of substances does not *undergo* change. It is the principle of the changing determinations of substances, which appear to our senses as changes in the matter of the sensible world.

The fourth matter-form combination is one that has to do with things in general (*Dinge überhaupt*). The material for the possibility of things in general is provided by unbounded reality and the limitations on or the negations of this reality are the principles of form through which one thing distinguishes itself from other things. This is a fairly traditional *metaphysical* conception of the relationship between unbounded reality and particular individual beings. Kant himself also makes use of this conception, most notably in the *OPA* but also in the *ID*, for thinking the all-sufficient ground of unity for the particular causal natures whose activity gives rise to harmonious, beautiful, efficient and law-governed connections between particular objects in the world; i.e., as the perfect ground of the perfect *order of nature*.

In the context of the *OPA*, Kant rejects the use of the term infinite reality because of what he takes to be its essentially mathematical significance, leading to the identification of infinite space and time with God's omnipresence. He also rejects the view that God *contains* all perfections, or all positive characteristics, because of the results that thinking about the material ground of all possibility in these terms has for thinking about the reality of the world. If the material ground of all possibility contains all realities, then either God must exercise the fundamental forces that give rise to extension and impenetrability, or these forces must not be

realities. The former option collapses back to the identification of infinite space and time with God's omnipresence, and the attribution to God of a corporeal nature, constant change, and real internal conflict. This is the Spinozism towards which Descartes and Malebranche lead us in denying any fundamental powers to matter, which Leibniz explicitly rejects in his revival of substantial forms as the metaphysical grounds for the mechanism of nature.

According to Leibniz the matter of bodies is grounded in the final-causal activities of soul-like substances. These substances are active in nature through the derivative active and passive forces that we appeal to in mechanical natural philosophy. The fundamental powers of the substance stand to the derivative powers of the body in a relation analogous to that in which the soul stands to the machine-like system of parts that it animates. In Leibniz's case, the soul also actively generates the machine-like system of parts through which it is active in nature and, because the soul and the matter of observable bodies are members of different causal orders, *this* matter is not the kind of thing that the soul *could* interact with in forming and animating its body. Accordingly, the materials that undergo transformation in this process must be provided by the soul itself. The body for which the soul provides the substantial form, and in which it generates the (contingently observable or unobservable) form of a particular machine-like structure that it animates, as well as the other bodies with which this body interacts, are all accorded the status of merely confused representations of the soul's own continuously changing state. Accordingly, we are forced to posit a general and pre-established harmony between these representative states and the representative states of all other created substances in order to ground the appearance, to all of these substances, of an efficient causal-nexus of bodies, while avoiding Malebranche's occasionalist explanation of harmony. As sublime a view of the world as this is, we have seen in previous chapters why Kant believes it is unnecessary in itself and that it does not provide us with much help for saving the view of the *order of nature* or of God's perfection from the alternatives provided by Malebranche and Spinoza.

Understood in this context, we can see the centrality to the development of Kant's own views of the four different matter-form combinations that he addresses in this passage from the *Amphiboly*. The logic of classes is central to his thinking about *Naturbeschreibung* and *Naturgeschichte*; the logic of judgments is central to his own views of formal and transcendental logic; the relation between the essential components of a thing and its essential form is central to his own views in general cosmology and in other areas of natural philosophy, including physiology; and the relation between the material ground of all possibility and the particular forms that result from the limitations of unlimited reality is central to his own views concerning rational and natural theology, and concerning the mechanical and teleological connections between individual things in the *order of nature*. The claims that follow about Leibniz's transcendental use of the understanding and about the differences between this use and his own view of its proper use point to central differences between the views of these thinkers. Just as importantly, however, they prepare the way for the doctrine of ideas that Kant believes is able to provide the means for accomplishing one of the important ends he shares with Leibniz, namely, that of saving the view that there is a genuinely causal *order of nature* from the occasionalist and pantheist alternatives provided by Malebranche and Spinoza.

Kant locates the difficulties he sees with Leibniz's view in the nature of the human understanding, which he believes requires that matter-form relations be represented in such a way that matter precedes form. The general concept precedes the specific determination of the concept; concepts precede their connection to one another in judgments; the component parts of a thing precede their connection in the whole; and unlimited reality precedes the limited realities in particular things. In each of these cases, we represent the *determinable* in general as prior to its determination. It is important to note that Kant does not mean prior in the sense that *a* is prior to *b* if *a* exists at some point in time at which *b* does not, and *b* begins to exist only at some *later* point in time. He means it, rather, in the sense in which it is meant in claiming that a priori cognition of some given fact or some given thing involves understanding what is given in terms

of the more fundamental facts or more fundamental things that render it necessary. That is, I can claim to have a priori cognition of some fact, such as the fact that magnets attract iron shavings, when I have cognition of the relevant properties or powers of the things involved (magnets, iron), and the relevant natural laws according to which interactions of this kind occur (laws of motion), which is such that, *were* I to be in possession of this knowledge independent of any particular experience with these things and their interaction, I *would* be able to deduce the truth of the claim (magnets attract iron shavings) from this knowledge alone. These properties and laws are *prior* to the phenomena they explain, but the fundamental properties of magnets do not exist *temporally* prior to their capacity to attract iron shavings, and the fundamental properties of iron do not exist *temporally* prior to its capacity to be attracted by magnets. If these capacities are grounded in their natures, then at any point in time at which these bodies exist, so do these capacities.

Thus, to say that matter precedes form according to the understanding is merely to say that the thought of something through a concept of pure understanding (or a categorical judgment that determines the thought of a substance through the addition of some predicate) is always the thought of some *thing* that is separable (at least in thought) from this particular determination and to which this determination (again at least in thought) is added. If we are representing some form through concepts of pure understanding, we are representing it as the form of some kind of matter (in the transcendental sense of matter as whatever is determinable, or whatever has the potential to be actualized in a variety of ways, regardless of how it is given or determined). Kant believes that Leibniz looked at external relations and communities of states, which is all that is actually observed in looking at the natural world, from the perspective of the requirements of our understanding. These relations and communities of states are given as contingent facts that depend on some prior ground and our thought of them is the thought of a manifold of forms, or determinations, of some matter, or determinable thing. Thinking this determinable thing (matter) independently of the particular determinations (forms) from which we started, while continuing to think of it as a thing, requires thinking it in terms of some *other* intrinsic determinations (forms)

that can be appealed to as grounds for these external relations and communities of states. The internal determinations or forms of phenomenal substances in space, however, are all powers that involve essential relations to other phenomenal substances in space (i.e., the power to attract other substances, and the power to prevent these substances from occupying a particular space).

The only other powers to which Leibniz *could* appeal for thinking the internal forms of the substances that ground these external relations and communities of states are the powers that he is aware of through his inner sense, or those that ground his thinking. Accordingly, he develops his monadology, which treats the inner grounds of the external relations and states of all substances according to an analogy with the representative powers of the human mind. Thus, space can be derived from these monads as a consequence of the relation between them (co-existence) and time can be derived from the connections of their representations to one another as ground and consequence (succession). The essential form of the world is, thus, derived from its component parts, as it has to be if we are thinking the matter-form combination according to the rules of the understanding, and in abstraction from any consideration of how the determinable (matter) is given to us and the way in which it is determined (form). If we return to these considerations *after* we have abstracted from them and erected an intellectual system of the world, we can *then* claim that when we are representing the world obscurely and confusedly we represent this matter-form combination, not as it is in itself but as it appears to the senses, as an efficient-causal order of bodies in space and time. When we are representing this same combination clearly and distinctly, as it is in itself through the intellect, however, we represent it as a final-causal order of successive representations of co-existing monads.

Whether or not we take this to be an accurate reconstruction of Leibniz's thinking, it does provide us with some insight concerning the particular differences Kant sees between the transcendental idealism of the Critical period, Leibnizean idealism, and his own pre-Critical views. Kant argues in the *CPR* that space and time are not determinations of things in themselves considered under the contingent aspect of our obscure and confused conceptual representations.

They are, instead, sensible intuitions that precede and make possible the judgments through which we determine objects solely as appearances; i.e., they are conditions for the possibility of cognitive judgments concerning phenomena. In doing this, he is claiming that the proper standard for making judgments concerning the possibility of the external relations and communities of states between phenomenal substances cannot be provided in abstraction from any consideration of *how* the determinable (matter) is given to us and the *way in which* it is determined (form). These *are* correctly taken to be merely contingent with respect to the thought of objects in general, but in abstracting from how *phenomena* are given (i.e., to our sensibility) and the way in which they are determined (i.e., through our discursive judgments), we are leaving out what is essential to them *qua* phenomena.

According to standards of intuition, the priority of matter to form need not obtain, so the form that determines the external relations and the community of states of phenomenal objects can be given in intuition independently of any determinable matter of intuition. Leibniz is right to insist against Descartes that in thinking extension discursively, we have to represent it as the extension of some thing. Thus, *res extensa* cannot be the intellectual representation of a thing whose essential form is extension, because the essential form of a thing has to be a determination of the determinable matter provided for thought by its components (*essentialia*). It is, at best, a nominal definition that tells us the sensible conditions under which we make the judgment that some given thing is a body. It does not tell us what it is that is extended, or what it is that grounds or explains the extension we attribute to bodies, so it is not a real definition of a independent thing or a substance.

The sensible conditions for determining that some existing thing is a body, however, are exactly what the intuition of space brings to our cognition, in Kant's view. The intuitive representation of *res extensa* can play this role precisely because it is devoid of any content, and, as a representation of an empty form, it does not alone satisfy the requirements for substantiality provided by the understanding. If we are not taking extension to be a determination of some

thing in general that can be characterized by the concepts of the understanding alone, there is no problem here. This form *would* presuppose matter if it *were* a determination of an independently existing thing in itself. As a sensible intuition, however, it is, *subjectively* a formal condition of our sensible awareness of objects external to us, and *objectively*, a formal condition for the possibility of objects of the outer senses. If we maintain that objects of the senses *are not* objects for the transcendental use of our understanding, we can claim that the forms of intuition precede the matter of intuition, while agreeing that the understanding requires us to think this priority relation the other way around. The form-matter combination provided by the actual sensible intuition of particular objects can then provide the determinable matter that *is* necessary, according to the laws of the understanding, for determining an object in thought through the use of discursive forms of judgment.

In the *CPR*, Kant no longer takes the concepts ‘substance’, ‘causality’, ‘existence’ etc., to provide *material* for thinking the possibility of the things-in-themselves that provide the essential components whose mutual interaction is the essential form of the *intelligible world*, as he did in the *ID*. To the extent that the categories by themselves provide matter for judgments, it is matter only in the *logical sense* of the concepts that precede and make possible any connection through a copula, it is not matter in the *transcendental sense* of the components that must precede and make possible any connection through the essential form of a world. Taken as forms of judgment that are used to determine the matter provided by sensible intuition, however, the categories do contribute to providing the essential form of the connection between these intuitions in cognition. Thus, they are involved, together with the forms of intuition, in providing the formal component of the system of connections between corporeal phenomena. Accordingly, in Kant’s view the laws of the empirical use of the understanding, which involve sensible schemata for thinking objects that can also be intuited, can legislate in a purely formal way to whatever matter is given as determinable in sensible intuition. This legislation is undermined, however, by the intellectual system of the world that results from subjecting the phenomena of nature *directly* to the

conditions of the transcendental use of the understanding, and requiring that space and time be consequences of the co-existence of substances and the succession in their internal states.

Principles that Kant believed at the time of the *ID* were *merely* subjective maxims, stemming from the conditions for the use of our understanding in judgments concerning phenomena, are now thought *also* to provide rules that are objectively valid for the phenomena we judge in this way, because they provide sensible schemata for our logical forms of judgment. The principle “[*n*]othing material at all comes into being or passes away, and all the changes that take place in the world concern its form alone”⁴³ is reformulated slightly in the ‘First Analogy’ of the A-edition as “*All appearances contain that which persists (substance) as the object itself, and that which can change as its mere determination, i.e., a way in which the object exists*”.⁴⁴ This principle provides the schematized version of the category of ‘substance and inherence’. The schema is necessary for using the relation of substance and inherence to think a particular manifold of sensible intuitions as related to a particular ground. The principle is necessary for us to provide the purely formal intuition of time with a material analogue that we think as an enduring thing that provides the determinable matter relative to the forms that we judge to be the determinations of phenomenal objects. The principle “*all things in the universe take place in accordance with the order of nature*”⁴⁵ is reformulated in the ‘Second Analogy’ of the A-edition as “*Everything that happens (begins to be) presupposes something upon which it follows according to a rule*”.⁴⁶ This principle provides the schematized version of the category of ‘causality and dependence’. The schema is necessary for using the relation of cause and effect to think the ordered relations between the parts of a particular manifold of sensible intuitions as following from a particular rule. The principle is necessary for us to provide the purely formal intuition of the continuous succession of moments in time with a material analogue that we think

⁴³ 2: 418

⁴⁴ A 182/B 224

⁴⁵ 2: 418

⁴⁶ A 189/B 232

as an enduring activity that provided the determinable matter relative to the necessary order in which we judge the determinations of phenomenal objects to follow upon one another.

The Appendix to the Transcendental Analytic ‘On the Amphiboly of the Concepts of Reflection through the Confusion of the Empirical Use of the Understanding with the Transcendental Use’, is designed to point us to the role of transcendental idealism in securing the possibility of this a priori conceptual cognition of objects that can be given to us only in experience. We can have determinate cognition of spatial phenomena by reference to their inner grounds only if we take *inner* in a relative sense that is consistent with the view of matter as *phenomenal substance* or as the enduring real ground of the changing determinations we intuit through the senses and judge through the use of concepts. This enduring substance is something we are aware of only through powers that are active in space and that we name after the various effects they generate in regular ways through the mutually limiting exercise of these powers in relation to the powers active in other parts of space (i.e., attraction, repulsion, and impenetrability). The a priori laws governing the generation and maintenance of the determinate states of matter as phenomenal substance can be made use of as principles, but only in the sense of general rules that we have to make use of if we are to add any empirical determination to the thought of the something = x that we think a priori through the understanding as a determinable material ground. What the absolutely inner grounds of this x might be is something we cannot make out at all through the senses. Nor is it something we can determine through the understanding alone, despite the fact that our understanding does lead us to presuppose some absolutely inner grounds as the essential components (*essentialia*) that are combined in the essential form that determines this something = x as a thing-in-itself, or some thing that does not, as its phenomenal states do, have any necessary connection to the conditions of our sense experience.

It is in this relation, as we will see in what follows, that the use of ideas of reason becomes necessary. This use *does not* allow us to determine the concept of the intelligible

ground of the appearances through the understanding alone, *nor does it* allow us to cognize purely transcendental, or entirely transcendent, objects from which we can derive the powers and capacities of phenomenal substances. It does, however, provide us with analogues of sensible schemata, which allow the understanding to make use of the concepts of substance, cause, and community for thinking the supersensible real grounds of natural phenomena independently of the temporal constraints that render these concepts applicable to the phenomena themselves. That is, it allows us to think various orders of relations between the causal powers that we posit as real explanatory grounds of phenomena, according to an analogy with the synthetic unity of the powers of the mind that is necessary for our cognition of these phenomena. Kant appears to believe that by, first, providing an account of the subjective grounds for the empirical use of the understanding and, then, demonstrating that there is no legitimate purely transcendental use of the concepts of our understanding, we can make use of roughly the same line of thinking that leads Leibniz to his monadology for reflectively turning our empirical cognition of the order of external relations and communities of states into empirical cognition of the *order of nature*.

3.3: Ideas of Reason as Rules for Systematic Empirical Cognition

Kant's discussion of the regulative use of the ideas of reason, both in the section on the resolution of the antinomial conflict between the understanding and reason in their concepts of a world, and in the 'Appendix to the Transcendental Dialectic', further the discussion of the differences between his own transcendental idealism and Leibnizean idealism begun in the appendix on the Amphiboly. According to these sections, the dialectical inferences of reason that can threaten both our theoretical cognition and the practical interests that these inferences are generally thought to further arise from a natural progression in our thinking. Understood properly, the products of this progression are what provide our empirical cognition of series of events with the systematic connection that is required by systematic knowledge of the *order of*

nature, or empirical science. Like our intuition of space, ideas of reason are representations that violate the conditions for the use of the understanding. The architectonic connection of parts in a whole does not involve, first, the givenness of the distinct parts (matter) and, then, the connection of these parts in the whole (form). Rather, the whole is thought as unconditioned relative to some totality of mutually conditioning conditions, or as preceding and determining the form and connection of the parts.

This might seem like a case in which we could think, first, the essential component parts, as determinable matter, and, then, the essential form, as the determination, or a case in which we could think first unlimited reality, as the determinable matter of possibility, and then limitations as the determinations or forms through which particular things distinguish themselves from one another. This is, roughly speaking, what Kant himself does in thinking the matter and form of the intelligible world, and the real possibility of these substances and their connection, in the *ID*. This would be legitimate, however, only if the objects under consideration were *purely* transcendental objects, i.e., objects that we think in abstraction from *how* they are given to us and the *way in which* they are determined. In the case of the ideas of the soul and the world, we begin with intuitions of objects that are given in experience and are led by a series of inferences to the idea of the totality of conditions for these intuitions. Reason leads us to posit this condition in thought as *outside* of the series of mutually conditioned appearances, but only because an unconditioned member anywhere *within* such a series would be contradictory. These series are not given all at once in such a way that we could *either* think all the components as essential parts that are related to one another through an essential form *or* determine the particular series as a limitation of unlimited reality.

From Kant's perspective in the *CPR*, starting with objects of experience and seeking the a priori conditions for these objects, never leads to a point at which we make a genuine transition to conceiving of things-in-themselves "in abstraction from all difference in what is given and the way in which it is determined". That is, we are always thinking whatever being we may posit, or

think problematically as a ground of unity for beings we do posit, as given in relation to some series of conditions and as determined in our thought as an unconditioned ground in relation to this series. Even if we were somehow to have empirical cognition of the entire series, and we could treat the members of this series as the essential components that are related to one another through an essential form, this would be the essential form of an entire series of phenomena, and not the essential form of some thing that exists entirely independently of this relation to the phenomena. Alternatively, if we were to start with the pure transcendental ideal of unlimited reality as the material for all possibility and think individual things in themselves as limitations of the realities contained in this being, we would never be able to make the transition to conceiving of these things as also being the intelligible grounds of the series of appearances. That is, if we can conceive of the essential components and the essential form of some being *independently* of its relations to other limited beings, and *independently* of its relation to the phenomena, then the thought of this being does not entail these relations and, thus, does not provide us with any materials for deriving any of these relations from this being. Accordingly, the pure transcendental idea of the soul, as a purely spiritual being, is no help for deriving the actual phenomena of the soul, as the animating principle of an organized body, from their ultimate ground a priori. Similarly, the pure transcendental ideal of God, as the all-sufficient material ground of the possibility of things-in-themselves, is no help for deriving the actual phenomena of the natural world, as a system of connections between the causal natures of the substances that ground the phenomenal *order of nature*, from their ultimate ground a priori.

The experience that the schematized versions of the categories make possible leads us to questions concerning the ultimate conditions for the objects that are given to us that cannot be answered by tracing out the series of conditions for these objects in space and time, nor can they be addressed through freeing the understanding from these conditions and making a purely transcendental use of the categories. The real theoretical use of the intellect is not, in Kant's mind, this use of the categories without any schema for their application to sensible objects. It is,

rather, in providing an analogue of a sensible schema for the “thoroughgoing systematic unity of all concepts of the understanding”, through the “idea of the maximum of division and unification of the cognition of the understanding in a principle”.⁴⁷ Given this schema and empirical cognition of various kinds of bodies in nature, the categories can be used for thinking the supersensible grounds of unity for series whose members are not given to us *all at once*, according to an idea, which is the representation of a formal principle that precedes and makes possible the form-matter combination observed in the individual members of the series that are given to us. One of the important things that this use allows us to do is to treat the form-matter combination observed in the individual plant and animal bodies that we identify empirically as members of a species according to the idea of an essential form that both *unites* all the historically and geographically distinct individuals that comprise the species amongst themselves and *distinguishes* these individuals from individuals of other species. In other words, the use of the ideas of reason allows for the systematic knowledge of the *order of nature* that distinguishes the kind of *Naturgeschichte* that Kant has been developing since the 1750s from the *Naturbeschreibung* that more commonly goes by the name of natural history.

Several passages from the discussion of the ideas that precedes the ‘Appendix to the Transcendental Dialectic’ illustrate this point nicely. Accordingly, it will be instructive to look at these prior to turning to the discussion of the *law of continuity in nature* in the Appendix. The first is a passage that concerns the historical series of generations that is thought to precede the existing members of a species, and reveals some differences from the view of the *OPA* concerning the need and the justification for positing first members of a cosmological series. The discussion of this issue will bring us to the second passage, which concerns the possibility of an organized body that is articulated into an actual infinity of distinct parts. This idea is required by preformationist theories that attempt to think the initial conditions from which the unity of individual organized bodies, the unity of the species, and the potentially unending series of future

⁴⁷ A 665/B 693

generations stem as original members of the series, e.g., those views that take all future members of the human species to have existed (either entire or in their essential parts) in either Adam (spermatocist theories) or Eve (ovist theories). In these passages, Kant argues indirectly for transcendental idealism as a solution to central problems confronting physiologists and natural historians.

The Regress in the Series of Generations

In discussing the use of cosmological concepts as regulative principles, Kant provides an example of the difference between considering the progress of some series from condition to conditioned member, and the regress of a series from conditioned member to its conditions. This not only illustrates the use of ideas in natural history that Kant believes is justified, but it also points to a difference between their use in theoretical contexts and their use in practical contexts that will become relevant in the dispute between Kant and Herder:

One can rightly say concerning a straight line that it could be extended to infinity, and here the distinction between the infinite and the indeterminate further progression (*progressus in indefinitum*) is an empty subtlety. If someone says ‘continue a line’ it is more correct to add ‘indefinitely’ than ‘to infinity’, because the former means no more than ‘extend it as far as you wish’, while the latter means ‘you should never stop extending it’, (which in this case cannot be the intention). Despite this, if we are merely interested in what we can do, the first expression is entirely correct, for you could always make it longer to infinity. The same is the case whenever one speaks merely of progress, i.e., the continuation from the condition to the conditioned. This possible continuation in the series of appearances goes to infinity. From a pair of parents one can proceed through the descending line of generation without end and one very well can think that it really continues in the world in this way. For here reason never requires absolute totality of the series, because it does not presuppose this totality as a condition and as given (*datum*), but rather, simply as something conditioned that is capable of being given (*dabile*) and added to without end.⁴⁸

There are several points worth noting in this passage. First, Kant is drawing a distinction, which in the particular case at hand does not make a great deal of difference, between the mathematical extension of a line according to some rule, on the one hand, and the extension of a series of existing things in the world, on the other. In both cases, we have some given thing that

⁴⁸ A 511-2/B 539-40

constitutes the starting point of a series, or the initial condition, and a rule according to which this series can be extended in the direction of the descending series of conditioned things that follow from this condition. The progress in a series, whether this is a geometrical series or a cosmological series, can be represented as ‘possibly infinite’ without any trouble. This is so because the successive addition of part to part is represented as a process, involving the continued reiteration of the same rule with which we begin the series, the end-point of which can always be put off another step. The totality of the series of successive iterations of the rule according to which we extend a line is not presupposed by the first step in the process, nor is the totality of the successive acts through which particular animals of the same species generate further members of the species presupposed by the first act of generation.

Second, Kant is here making reference to the presupposition that he refers to in the *OPA* as necessary for considering the generation of new members of a species of organism to be a process grounded in the exercise of a natural capacity in accordance with natural laws. He claims there that, despite our inability to derive the possibility of plant and animal generation from some other, more fundamental, natural capacity of bodies, we still ought to avoid attributing the formation of individual members of species of plant and animal to some supernatural cause. This is, Kant believes, more in line *both* with the accepted standards of natural philosophy *and* with the presupposition of a perfect creator than are individual preformationist views and occasionalist views concerning generation. In reference specifically to species that reproduce sexually, Kant claims that we ought to presuppose the original existence of a pair that is created with the capacity to produce new members of the species, rather than merely to protect the seeds of future generations until the time is right for them to unfold. Kant does not pretend to derive anything concerning actually existing members of the species from presumed prior knowledge of this pair, or of the ends for which they were created, he merely posits such a pair as the end of a potential regress that would leave the existence of currently observed species unexplained *in itself*.

In the *CPR*, we can see that Kant continues to be interested in these issues, but we can also see that his view of what we need to presuppose in order to carry out our investigations of cosmological series, such as the one involved in the successive generation of a natural species of interbreeding beings, has changed somewhat. He still believes that *if* we allow ourselves some initial conditions and a rule for deriving other members of a series, we have no trouble extending the series forward to currently present members, or even to future generations, but his views concerning what our current empirical knowledge allows or requires us to posit as the starting point of our natural history has changed somewhat. This can be seen in the passage that immediately follows the one quoted above:

In relation to the task of determining how far the regress continues in the series that ascends from the given conditioned to the conditions, it is entirely different whether I can say it is a regress to infinity, or merely a regress that extends itself indeterminately far (*in indefinitum*). Thus, it makes a difference whether I can climb infinitely higher in the series of progenitors of humans that are currently living, or whether I can merely say that, as far as I have traced backwards, an empirical ground has never been discovered for holding the series to be bounded somewhere, so that I am both justified and at the same time required to seek even further for the progenitors of every forefather, although not to presuppose them.

[...] The series of forefathers for a given human is not given in any possible experience, in its absolute totality, but the regress goes from each member of this generation to a higher, so that no empirical boundary is to be met with that presents a member as absolutely unconditioned. Since at the same time, however, the members that could provide the condition for this do not lie in the empirical intuition of the whole prior to the regress, this regress does not go to infinity (in the division of the given), but rather indefinitely far in the search for more members to those given, which themselves are always given only as conditioned.⁴⁹

Kant sees a basic asymmetry between the *progression* of a series from some given condition to the conditioned things that follow from it and the *regress* in a series from something that is given as conditioned to the conditions for this given thing. Whether or not this is an objective asymmetry for all cognition of series or merely a contingent feature of our reason, it makes a considerable difference concerning how we are able to represent the possibility of something. There is a big difference for us between proceeding from the material grounds of the possibility of some thing that does not yet exist to the existence of that thing, on the one hand,

⁴⁹ A 512-13/B 540-41

and proceeding from the existence of some thing to the material grounds of the possibility of that thing, on the other. In the latter case, which is the one relevant to discovering the grounds of explanation for empirically discovered regularities, reason is constrained to represent the totality of conditions for some thing as a necessary presupposition for whatever is given as conditioned.

If this series involves a temporal regress in members that are given individually, and the totality of this series is not given to us in intuition, Kant believes we are not actually faced with the decision that confronts us in the *OPA*. That is, we do not actually have to decide between the options of saying ‘the series continues backward to infinity’ and ‘the series has a first member’. We are free to maintain that we do not have sufficient evidence to assert either of these, and that extending our knowledge of human history actually requires that we never take any particular member that we have arrived at in our efforts to trace our lineage backwards as being an unconditioned condition for the series. In claiming that “I am required to seek even further for the progenitors of every forefather, although not to presuppose them” Kant is recognizing that the general maxim ‘All members of a natural species of interbreeding animal are generated from other members of the same species according to empirically discoverable laws’ cannot be taken as a genuinely first principle without leading to fairly counter-intuitive conclusions.

If I presuppose that the ontological ground of inclusion in a species is the passive, relational determination ‘was generated by a member of the species’, I actually do not have an empirical principle that I can use to include *any* particular individual in the species. The question ‘is x a human?’ can be answered in the affirmative *only if* the question ‘are the parents of x human?’ can be answered in the affirmative. This can be answered in the affirmative *only if* the question ‘are the parents of (the parents of x) human?’ can be answered in the affirmative. It appears that there cannot be an affirmative answer to this question. If the series ends at some pair of individuals, these individuals cannot be human, because being human requires being generated by humans, and if the series ends with y and z as first members, then y and z cannot have been generated by humans. If the series does not end, however, we will have nothing more than an

endless series of beings that we presume to be humans, but no one of which can be positively identified as such.

Buffon's law, which states that any two individuals capable of producing viable offspring together are members of the same natural species, does not run into this problem, because the series is being regarded as progressive. That is, 'x is capable of generating humans' is the criterion, rather than 'x was generated by humans'. The same feature that renders this criterion immune from these worries, however, also renders it incapable of being used in a genuinely causal natural history. Assuming I am a reproductively viable human, it follows analytically that every prior member of the line of descent leading up to me was also a human. There is no worry about how many prior members there are in this series, because I know that they are all human and I am not resting my answer to the question of whether a currently given individual is human on the answer to whether or not its progenitors are. There is also no worry concerning how many more members there will be, since it is a progressive series that can go on without end. The real question, then, becomes what is it that entitles me to the assumption that I am a human. I cannot appeal to the line of descent leading up to me, because I can judge that these individual members are 'capable of generating humans' only if I know I am a human. I also cannot appeal to the line of descent following me because I can judge that what it is that I am capable of generating is human, rather than some other species, only if I know what it is to be a human. This appears to be why Kant claims that Buffon's law provides a nominal definition of the term 'natural species', but that it cannot provide a genuine criterion on which to base a natural history of species. The judgment '*a* and *b* are members of the same species' is helpful if we already know what species one of these belongs to, and we are not certain about the other. By itself, however, it does not tell us *which* species they belong to, or what it is that makes either one of them a member.

The theory Kant develops in the 1775 essay on races posits a natural power, a generative force, as the ontological ground of the fact that we take note of in adopting the practice of classifying species according to lines of descent, namely, the fact that plant and animal generation

tends to involve the production of new individuals that resemble other individual members of the series of mutually productive beings in complex and regular ways. Accepting the general maxim ‘All members of a natural species of interbreeding animal are generated from other members of the same species according to empirically discoverable laws’ is not the same thing as establishing a first principle on the order of the principles of geometry or of mechanics. It is similar, however, to establishing a principle on the order of the general principle of the permanence of substance or the general principle of causality. It is not a principle in the absence of which we would not be able to determine anything concerning what happens in nature, as the principles provided by the ‘Analogies of Experience’ are, but it is a principle without which we would not be able to investigate certain kinds of regularity in the organic realm. For instance, we would not be able to provide a general criterion for distinguishing between the way we classify naturally occurring kinds of rock, mineral, and crystal from the way we classify naturally occurring kinds of plant and animal.

If our use of a particular mathematical principle or a particular logical principle could be shown to generate a contradiction in its application, we would be required, on grounds of consistency, to reject the principle. The same need not be the case, however, in adopting a maxim for the empirical investigation of existing things according to the real historical conditions for their present conditioned state. If doing so leads us to recognize an apparent inconsistency that *would* arise *were* we to posit as given the entire series of conditions that the universality of the rule *would* require, we are free to maintain that nothing actually requires us to posit this entire series as given. Pointing to this apparent inconsistency might be a helpful reminder that we cannot actually carry out the regress all the way back to the ultimate a priori grounds of the possibility of what is given as actual and as standing in need of explanation. It might also be a helpful reminder that this really was not the task that recommended the principle in the first place and, thus, that this tool *could* still be perfectly adequate to *this* task. If this is so, then there is

nothing wrong with admitting that, as far as the current state of our knowledge is concerned, we have no reason to treat any members that we have come across as the first members of the series.

We might wonder what leads Kant to this apparent change in view concerning the need or the utility of positing an original created pair in accounting for the subsequent generation of individuals who share the capacity to generate others of their kind. The most natural explanation, I believe, is that although the thought of this pair seems to have functioned as a merely regulative principle in the *OPA*, and thus not to have been entirely contrary to Kant's Critical position, he comes to realize that it is not actually essential to the articulation of his view. Much like the speculative cosmogony of the *UNH* that he recapitulates in the *OPA*, it may be that Kant has come to view as largely arbitrary the choice of any *particular set of determinate initial conditions* upon which everything else follows according to the same natural laws that are currently at work in nature. Transcendental idealism follows on the rejection of the view that the objects of our experience are members of a world that meets the standards of the pure understanding, or are parts of a system in which the essential components are substances that are connected by an essential form. It would seem, then, that it is no longer imperative that particular bodies with particular capacities at some particular point in time, T^1 , be thought as the grounds of the existence of bodies with these capacities at some later time, T^{1+n} . What is imperative is that at any particular point in time at which such bodies exist, so do the natural powers that are posited as the causal grounds for the series of determinate states that are taken to be the phenomenal states of bodies that are members of that natural species.

With the development of the theory of the *generative force* as the real ground of the capacity to generate viable offspring, Kant introduces an essential form or a substantial form for the *species*. According to the understanding, this form can be thought only as the determination of some essential components that provide the determinable matter of the thing. The components that provide this determinable matter for the thought of the essential form of the species, however, are thought independently of *how* they are given and *how* they are determined. There is

nothing dictating that the components serving as the transcendental matter relative to the substantial form of the species must be the matter of empirically observable bodies. What is more, the view of transcendental idealism positively excludes the possibility that *this* matter is the kind of thing that *could* play this role (i.e., the empirical reality of the matter of bodies can be maintained only if this matter is taken to be transcendently ideal and, thus, something else is taken to provide the transcendental matter that is informed by the essential form of the species). Whatever the essential components of this something = x are in themselves, we can think this x only as the real ground of the cosmological series of individual members whose existence and determinate forms we treat as the various phenomenal states of the species.

Modern supporters of *individual preformationism* locate the essential components of the species, or all of its members, within the first member of this cosmological series (i.e., either in Adam or in Eve). Other *germ-theory preformationists* do not posit all of these components, or all of the completely formed members of the species, within an original member. They do, however, think that the physical extension of the individual body in the earliest stages of development already contains germs of the structures that will eventually unfold, which are the essential components from which the fully formed individual is generated. This issue is centrally related to the issue of the regress in temporal conditions discussed above in the context of the members of a series of generations. Both *individual preformationists* and other *germ-theorists* attempt to account for the phenomena that support attributing a *generative power* to plant and animal bodies *without* actually being forced to attribute such powers to nature. This requires adopting a view of the species that involves not only positing the first member that actually exhibits the empirical character of the species, but also positing the co-existence of *all* the essential parts that are related to one another by the essential form, or all the members of the species, *as* the species itself. These members all have to co-exist, if the species is to constitute a natural entity, just as the members of the individual body have to co-exist, if the body is to *come to exhibit* the observable structure that *emerges* successively in the natural process of generation.

In Kant's view, this is another result of the transcendental use of the understanding in thinking of the bodies that are given to us through sense experience according to standards for thinking things in general, independently of how they are given and how they are determined. The series of successive generations is given to us in space and time, and individual bodies are determined to be members of natural species through a combination of intuitive and discursive procedures that include: identifying common characteristics of existing individuals, grouping individuals together according to visible similarities and known family relations, and testing hypotheses concerning the possible genetic links between visibly differing individuals and groups that are subsumed in thought under logically formed class concepts. Kant thinks that we can grasp why the temptation exists to posit precisely those initial conditions that would best satisfy the use of our understanding in thinking the objects that are given to us in experience (i.e., first members of the phenomenal series and the co-existence of all members as the essential parts of the species). It is a mistake, however, to take the prior conditions that *would* render some existing thing x intelligible *to us* to be the only prior conditions under which the existence of x *could* be intelligible *per se*; unless, of course, we have some prior guarantee that x is intelligible *per se* and that *our* understanding is the only possible kind of understanding.

It is not clear to me that any non-circular argument can provide us with this two-part guarantee. Thus, if there are empirically based reasons for representing the possibility of organic generation in some other way, and for denying that plant and animal bodies are intelligible objects for our understanding, Kant appears to be right to argue that it is legitimate to do so. If we treat plant and animal bodies according to the rules of the understanding, as individually existing things-in-themselves, and we treat the species of which they are members in this same fashion, as intelligible worlds composed of individually existing entities, then the only way we can conceive of the *order of nature* in which these worlds within worlds co-exist is the one that Leibniz adopts, namely, a divinely *pre-established harmony* between the phenomenal effects of the succession of internal states of each of these individually definable substances. If we start

from our sense experience, and the sensibly conditioned use of the understanding, however, empirically discovered laws, especially those concerning hereditary and environmental variation, require the preformationist to adopt *ad hoc* hypotheses that threaten the view of providential wisdom that otherwise guides their investigations.

The view, e.g., that pre-formed germs of new parts within animal bodies lie ready to unfold in the event that contingent external circumstances lead to the need for new parts (whether through the loss of an already existing part, or the migration of individuals to colder climates) appears to uphold the view of a divinely instituted and naturally unfolding providential order. Thought about carefully, however, the view might equally well be thought to undermine either the maxim that everything in an organized body has its function or the maxim that the individual members of a natural kind are all outfitted with the same essential character and that variation is to be explained by reference to external factors. If we try to save the latter commitment by claiming that nature outfits all individuals with the same stock of germs, but that only some of these end up actually developing, we are increasing the number of parts of plant or animal bodies that never end up becoming *functional* parts.

The germ-theory is based on the claim that the presence in an organized body of some part, x , at some point in time, T^1 , requires the existence in that body of a physical germ of x at any prior point in time, T^{1-n} , at which that body exists. If that is so, then nature would appear to be outfitting all members of a species of organized bodies with germs that are unnecessary for their functioning at T^{1-n} , in case there is some future need, at T^1 , for the parts that develop from these germs. For many of these individuals, this need never arises, so the existence of these germs in these bodies appears to have been merely for the sake of consistency throughout the species. Because the trade-off between consistency and functionality hardly seems to be a decision that *providence* is forced to make, it looks suspiciously like the outfitting of all individuals with an identical stock of germs is done for the purposes of saving a commitment to a particular theory and not for the purposes of saving a commitment to a providential *order of*

nature. If nature were truly to function in the most efficient possible manner in bringing about purposive arrangements, then each individual would be outfitted with only those germs that will be necessary for it to flourish in the particular environment in which it is determined to develop and maintain itself. This, however, would push the germ theory back to the *individual preformationism* from which its supporters attempt to distance themselves.

Kant's own response to these issues in the 1770 essay on races is to claim that the capacity to develop new organic parts should the need arise is not best explained by the previous existence of *material germs* within the matter of the individual plant or animal body, but by the previous existence of a fundamental *generative power* in which there are *dynamic germs* that are held back or expressed depending on the particular circumstances surrounding the development and functioning of the individual. We need not accept that there are any non-functional parts lying ready in the individual body, and we can maintain that although no *individual* body fully develops them, there are no capacities of the *species* that are not developed. The view of transcendental idealism expressed in the *CPR*, as it turns out, is required for viewing the development of the species as something that occurs through an indefinitely extended series. The members of this series are co-existing and successively generated individual bodies, and the series is attributed to the *species* as a unified manifold of changes in *its* enduring state. By denying that individual animals are independently existing things-in-themselves, and that animal species are systematically connected manifolds of individual substances, Kant is able to provide a model of the unity of the natural species through time, and of the natural generation of individuals that differ from one another in significant ways, that avoids the commonly recognized shortcomings of other *preformationist* views.

The Regress in Pre-Formed Parts

There is a passage in the ‘Transcendental Dialectic’ where Kant directly addresses the physiological view that is required by *preformationism*. Kant’s strategy in this passage, as I see it, is to point to objective difficulties that anyone who adopts this view is confronted with. These are not problems for the view from the perspective of transcendental idealism. They are problems for the view that should lead one interested in solving them to recognize that this cannot be done without giving up transcendental realist commitments concerning objects of the senses, i.e., without giving up the view that the bodies of our experience can be subjected directly to the rules of the transcendental use of the understanding. The first of these passages also comes in the discussion of the regulative use of cosmological ideas. We have already addressed Kant’s claim that when some member of a cosmological series is given as a conditioned individual whose temporally prior conditions are *not* given all at once in intuition, we are both *justified* in seeking and *required* to seek these conditions *as if* each of them also has some temporally prior condition, without presupposing that each in fact does. The case is somewhat different when we are considering a regress in the conditions for something that is given all at once in intuition, e.g., when we are considering the successive divisions that can be made in the matter of a given body that exists between definite spatial boundaries. In such a case, we have a regress in conditions for something that is given as conditioned, but the regress is in the conditions for the matter of the body to fill a determinate space in the series of co-existing parts of space, rather than the conditions for a body to occupy a particular position in a temporal series of successively generated members of a species.

Just before the passage I will quote below, Kant argues that the divisibility of the matter that fills a determinate space goes as far as the divisibility of the space that this matter fills, namely, to infinity. This is consistent with his transcendental idealism, but it is not a claim that depends on this view, i.e., it is one that a Leibnizean would accept as part of the reason for

maintaining that the matter of particular bodies in nature is not substantial and requires grounding in the activity of something that is substantial. Kant then turns to pose the question of whether this means, as, e.g., Leibniz maintains, that the regress in the division of *organized* parts of a body would proceed to infinity. Kant's reply is as follows:

...[A]lthough this same rule of progress to infinity in the subdivision of an appearance, as a mere filling of space, applies without any doubt, it cannot be legitimately extended to a multiplicity of parts that are already delineated within the given whole in such a way that these constitute numerically distinct [*quantum discrectum*] parts. Suppose that in every articulated (organized) whole each and every part is in turn articulated, and that one would, accordingly, always meet with new artificial parts [*Kunstteile*] in the dissection of parts to infinity, in a word, that the whole is infinitely articulated. This is not at all something that can be thought, although certainly the parts of matter could be articulated to infinity through their decomposition. For the infinity of the process of dividing a given appearance in space is grounded solely in the fact that through this only the divisibility, i.e., an in itself absolutely indeterminate multiplicity of parts, is given, with the parts themselves becoming given and determined only through the subdivision, in short, [it is grounded in the fact that] the whole is not in itself already divided. This is why the act of dividing can determine in the whole a multiplicity that goes as far as one wishes to proceed in the regress of division. In the case of an infinitely articulated organized body, in contrast, the whole is represented as already divided even in the mere concept, and an in-itself determinate, but infinite, multiplicity of parts is met with in it, through which one contradicts oneself; in that this infinite development [*Entwicklung*] is seen as a never to be completed series (infinite), and yet is also seen as complete in a synopsis [*Zusammennehmung*]. The infinite process of dividing signifies only the appearance as a continuous quantity and cannot be separated from the filling of space, because the ground of infinite divisibility lies precisely in this. As soon as something is taken to be a discrete quantity, the multiplicity of unities in it is determined and, thus, it is always equal to a number. Thus, how far the organization in an articulated body might go can be made out only by experience, and even if this experience could with certainty arrive at no inorganic parts, such parts must at least lie within possible experience. How far the transcendental division of an appearance in general reaches, however, is not at all a matter of experience, but is rather a principle of reason, never to take the empirical regress in the decomposition of the extended, in accordance with the nature of this appearance, to be absolutely completed.⁵⁰

This is a long passage in which several points that are important to the current discussion are being made. The general point is fairly clear, I believe. The intuitive representation of bodies in space provides us with the matter for making as many successive determinations as we wish, or as many further subdivisions within the spatial extension of any product that results from the act of dividing what is given in a body as continuous. The understanding, however, cannot turn this around and represent the completion of this process as the prior ground of the fact that there is

⁵⁰ A 526-7/B 554-5

always another division that *could* be made *should* we choose to do so. The analytic regress from grounded thing to the totality of its grounds can never reach the point that would allow us to provide a genuinely synthetic explanation of this grounded thing in terms of, first, the essential components (matter) and, then, their connection (form) in the whole, if the grounded thing in question is the appearance of a body in space. In Kant's view, there are no fundamental or ultimate material parts in the phenomena of bodies that could provide the components from which to start in the synthetic explanation of the capacity of a compound or complex body to fill a determinate space. An organized body, however, is one in which the extension within the body is not perfectly continuous. Accordingly, it can be thought to involve fundamental parts, at least relatively fundamental with respect to the multiplicity of articulated parts within the extension of the organized body that exist prior to the act of dissecting the body. If we dissect such a body, we find discrete parts (organs), and when we dissect the organs of organized bodies, we discover that these organs are really systems that are themselves composed of discrete parts.

The first point Kant is making is that, if we suppose that at every stage in the process of dissection we will come across parts that are articulated, i.e., that the regress in articulated parts is unending, or the whole is articulated to infinity, we are supposing something that cannot be thought. This alone, however, may not mean that Kant is claiming that the state of affairs is itself impossible. After each particular step in the division that 'cuts the body at its joints', or does not introduce an artificial division in the continuum that did not exist prior to the cut, we are faced with the question of whether or not the separated bodies attained through this cut can themselves be divided in a similar way. We already have an answer to the question concerning whether these bodies can be divided in some way, on the basis of the divisibility of the space that any possible appearance in space must fill. It would appear to be analytically true that the completion of a task that is, in principle, never-ending cannot be thought. However, it does not follow straightforwardly that the thing we represent as possible only in this way is not actually possible.

This would follow only in case we have a guarantee that whatever is possible not only can be *thought* but that its possibility can be thought through the a priori material grounds of this possibility. All of our representations of real possibility, however, depend on materials that cannot themselves be thought through these a priori grounds, though they can be thought according to their a priori formal conditions, i.e., all the matter for our thinking is derived from the matter of our empirical intuitions. The formal conditions for these intuitions being given (space and time), and for our determining the objects given through these intuitions (categories and rules), indicate to us that actually arriving at the last part of the matter of appearances would be the completion of a task that is set as never-ending. The actual givenness of the intuition, however, is an indication that the material conditions for the existence of the object are met, despite the fact that our attempt to represent this existing thing by reference to the a priori material conditions for its possibility involves us in such difficulties. The particular views against which Kant is arguing depend on accepting the general point that from the existence of the organized body, we can conclude to the existence of whatever material conditions render this body possible a priori, or whatever individual parts are presupposed by the complex connection of parts that is observable, at any given point in time, in the body.

The tendency among generally Leibnizean thinkers is to point to the importance of the same distinction between organized bodies and other kinds of body in nature to which Kant is pointing here, in order to note the *similarity* between the structure of organized bodies and the structures of man-made machines, as the basis for the application of mechanical methods of investigation to processes within organized bodies. They also note the insuperable *difference* between man-made machines and products of divine artifice by calling attention to the (potentially or actually) infinite *progression* of members in the series of machine-like products that are generated by other machine-like products of divine artifice, and the (potentially or actually) infinite *regress* in the division of the machine-like structures of these products into other machine-like structures. In both of these cases, our inability to carry out the necessary steps to

follow these infinite series from first member to all co-existing members and successive states of these members is a limiting condition on our ability to explain the existence and functioning of organized bodies by reference to the a priori grounds of their possibility.

Accordingly, it is generally recognized that we cannot think in any determinate fashion the conditions we represent in the abstract as having to be the case in order for what we actually observe to be possible. If the matter of natural bodies is infinitely divisible, and one maintains the Leibnizean view that all *real* multiplicities must be resolvable into true unities, the view that an *organized* body is an organized *being*, and not a mere aggregate of beings, requires the view that organized bodies must be organized ‘all the way down’. That is, whatever extension (multiplicity) is left after any particular division one makes within the body must have *some* unifying principle of form in order for it to be grounded in one of the true unities that qualifies the organized body as a *real* or unified multiplicity. An organized body must be an infinitely articulated system of distinct substances that together ground the extension of the matter into which the visible body can be divided to infinity.

In the above passage, Kant starts with the claim that such a being does not allow itself to be thought, or “*will sich gar nicht denken lassen*”, to which a Leibnizean would likely respond that the reason this is unthinkable is merely a matter of the limited human ability to carry out the actual divisions that we would require. The divisions have to be given prior to our discovery of them, if we are discovering rather than merely introducing them, and the unity of an infinite multiplicity of distinct parts can be seen ‘all at once’ by the divine understanding that is responsible for them. The limits of the human power to conceive the completion of an infinite task should not be taken to be limits on God’s power to create objects that we are constrained to conceive of as possible only in this paradoxical way. The point about the limits of the human understanding is one that Kant is clearly willing to grant, but Leibniz himself is also willing to grant that in certain cases, at least, our inability to conceive of x tells us about the real possibility of x, and not merely about the native limits on our faculties.

For instance, Leibniz claims that ‘the greatest possible number’ and ‘the greatest possible motion’ are contradictory ideas in arguing that we are capable of combining terms in such a way that we fool ourselves into thinking that we are representing some possibility when, in fact, we are not.⁵¹ It is not simply because we cannot carry out all the necessary additions that these ideas *seem* to us to be contradictory, but they seem to us to be contradictory, if we think carefully about the matter, because they *are* contradictory. A finite analysis of the concept of ‘number’ and the concept of ‘motion’ will reveal to us that for any existing thing = x that can be subsumed under either one of these concepts, there is some possible thing = y, such that y is greater than x. Accordingly, combining ‘greatest possible’ with ‘number’ or ‘motion’ does not provide us with a genuine concept, or a concept that involves the thought of a real possibility. In these cases, at least, we cannot rid ourselves of the paradoxical implications of the concepts we invent by taking refuge in the claim that some other intellect could grasp in detail what we maintain is necessary in the abstract.

Kant appears to be making a similar point about the concept ‘infinitely articulated organized body’. He claims in the above passage:

In the case of an infinitely articulated organized body, in contrast, the whole is represented as already divided even in the *mere concept*, and an in-itself determinate, but infinite, multiplicity of parts is met with in it, through which one *contradicts oneself*, in that this infinite development [*Entwicklung*] is seen as a *never to be completed series* (infinite), and yet is also seen as *complete* in a synopsis [*Zusammennehmung*].⁵²

The Leibnizean cannot take refuge in our inability to comprehend the reality to which this concept refers, because the structure of the concept, just like that of the concepts ‘greatest number’ and ‘greatest motion’, makes it such that it cannot refer, according to Kant. To claim that some body is a unity of *determinate parts* appears to be to claim that it is a body with a determinate number of parts; i.e., regardless of how many determinate parts there are, there is an answer to the question ‘how many?’. To claim that this same body consists of an actual infinity

⁵¹ AG 25

⁵² A 526-7/B 554-5 emphasis mine

of *determinate parts* is to say that its *determinate parts* are beyond any *determinate number*. If the parts of a body are such that *each* is distinct from every other, however, it seems that it has to be a merely contingent feature of our understanding that we cannot reach the number of these parts by starting, first, with this one and then adding this one, etc. A being that *could* take each of these parts into consideration at once, and represent them as discrete in a way that we admittedly cannot, would *ipso facto* be representing some *number* of discrete parts, and not some *multiplicity* of discrete parts that is beyond any number.

Kant is willing to admit the possibility that no actual experience could ever reveal a part of an organized body that lacks all organization. Thus, he can agree with, and even argue for, the legitimacy of the principle for empirical investigation that is a correlate of the Leibnizean view, namely, the claim that we should never take any given stage in the process of dissecting the parts of an organized body to have revealed the physically fundamental parts of the body. This leaves open the question of whether at some stage in the division we will actually find a last articulated part, or whether will be able to continue the division into already articulated parts without end. In Kant's view, this is an empirical question that admits of a definite answer only through empirical methods. The view that the matter of each of the parts that would be revealed to us at any step along the way is further *divisible*, however, requires that some articulated part we *could* reach is not already *divided*. That is, if the concept of the individual part *x* that provides the matter for the judgment 'x is articulated' is a representation of the matter of empirically observed bodies, then the predicate concept 'is articulated' that provides the form through which the concept of this *x* is further determined has to be a representation of a form that can determine the matter of empirically observed bodies. The matter of empirically observed bodies is always divisible, thus anything that is a form relative to *this* matter is the form of some divisible thing.

Leibniz posits unities as a way of avoiding the regress that is possible on the side of the *matter* of empirically observed bodies, which would provide us with no transcendental matter for our judgments, or no ultimate realities through which we could think the existence of bodies.

Thus, he is led to accept what are forms relative to the matter of bodies, i.e., the forces that determine this matter, as the transcendental matter that we determine in our judgments concerning the possibility of empirically observed bodies. The concepts of the basic perfections of a thing, or its intrinsic powers, are what provides content for the concept of a thing, and these basic perfections are what it is that is combined in the thing itself that is the object of the concept. If forms require some matter in order to be thought through the understanding, however, then the forms represented as the transcendental matter of our judgments cannot actually be represented as things independently of some matter that they determine. If our judgments are about bodies, however, every form appealed to has to be the form of some extended matter, and all extended matter is divisible into parts. If this divisibility is taken to mean that these parts already exist as divided, then we have to posit another form at every successive stage of the division of matter. This generates an infinite regress in the *forms* that were posited as the unities in virtue of which we could avoid the regress on the side of matter that would have left us with no transcendental matter for our judgments.

The only way out of this for the Leibnizean, it seems, is to insist that it *does* make a difference that the infinity of forms is an infinity of true unities and, thus an actual or real infinity, while the infinite divisibility of matter is the divisibility within a continuum that results from these true unities. In this way, the Leibnizean can represent the essential form of the individual body as the metaphysically primitive power, soul, or soul-like substance, that is represented as active in relation to the derivative powers of the infinity of individuals whose primitive powers ground the extension of the infinitely articulated organized body. The organized body can then be represented as a real unity, in accordance with the standards provided by the understanding. These standards require that *all* the essential component parts exist as individuals, but do not say anything about *how many* component parts this must be, and they require that the essential form determine these individuals as a unity. The infinite divisibility of the matter of organized bodies *would* exclude the possibility of these bodies being true unities unless *were there not* an actual

infinity of forms to provide unity for the extension of its parts and to provide the transcendental matter that is itself unified by the essential form.

From the standpoint of the Leibnizean, then, the empirical sciences will determine how much of this actual infinity we will be able to comprehend, but we can be certain that regardless of how far we go the last organized part *cannot* lie within possible experience. Kant's point in this passage is that it is not genuinely insight into the a priori possibility of organized beings that leads to positing an infinity of articulated structures as the ground of unity for the infinitely divisible matter of the body. The requirements of the understanding dictate only that *some* transcendental matter be given as the essential components that are related through the essential form that renders the organized being a true unity, not that there be an actual infinity of individuals that are determined in this way. It is also not genuinely an a priori commitment to the continuity of nature that leads to positing this. Rather, if Kant is right, it is the empirical regress from a conditioned intuition to the thought of the grounds that would satisfy the understanding's demands for unity concerning what is given in intuition as infinitely *divisible*. If it were not the actual bodies of our experience that we were taking to be true unities, the interminable process of dividing these bodies would not have to be represented by the understanding as the successive discovery of already articulated parts.

A being that genuinely represents these bodies according to the material grounds of their possibility would not be required to represent 'all at once' the object that leads to a paradox for our thinking, i.e., the unification of the infinitely articulated parts of an organized body. It is only because we, first, represent the infinite divisibility of matter and, then, think about how this could be *made consistent* with the view of the real unity of an organized being that we bring together the concepts 'infinite', 'articulation' 'organized' and 'body' in this particular way, namely in such a way that we represent, first, a never to be completed task and, then, the outlines of its having been completed. This is why Kant believes that one contradicts *oneself* in the *mere concept* and that we need not have a priori insight into the nature of things to determine the artificial origins of

this paradoxical view of the *order of nature*. Kant not only does not need to argue that the object represented is impossible, but he does not want to. The object represented is the organized body, and Kant's idealism is not empirical idealism. He merely aims to show that the way this organized body is represented, namely, through a subject concept that is taken to refer to an object of the senses, and a predicate that is thought according the conditions for representing objects in general in a determinate fashion, is really what generates the paradox. Nature may in fact be unfathomably complex, but we need not take this to be proven by the infinite articulation of organized bodies.

From Kant's perspective, it appears to make more sense to begin by carefully distinguishing between the form-matter relation that we represent in the intuition of a body, and the form-matter combination that we represent in the thought of an organized being. In the former case, the form of space can be represented as prior to, and a condition for the possibility of, the matter that fills space. Our intuition of a body provides us with the conditions for judging that it is actual. Our thought of the material grounds of the possibility of this body, in terms of the physical matter that fills space and time, is the thought of the a priori grounds of the synthesis of determinations of the body, but it is not freed from the conditions of *how* the body is given and *how* it is determined. Thus, the physical matter of which we are aware through the intuition of actual bodies never becomes subject to the conditions of the transcendental use of the understanding. The thought of an organized being involves an entirely different form-matter combination, which is subject to the conditions of the understanding. Namely, the essential parts do have to be given as the determinable matter that is determined through the essential form, if the being is to be given. Such a being, however, is never given in intuition, at least not to us. This is the kind of being that we represent through the intellect as possible, through the *matter* for thought that is provided by our empirical cognition of particular form-matter combinations, or natural bodies, and the *form* that is provided by an idea of reason. In the order of our cognition, particular experience precedes the idea of a natural species that we represent in this way. By

itself, however, this experience is a mere aggregate of cognitions and species are objects merely in empirical concepts, which refer to an indefinite multitude of actual and possible individuals through their common characteristic marks. The principles of reason that lead us to generate ideas in general, or the pure transcendental ideas of an ultimate subject, an ultimate object, and the ultimate ground of the possibility and connection of these in a nature, in the formal sense, actually precede the kind of empirical cognition through which we discover and name naturally occurring species. Of course, taking these principles of reason to be means for discovering and filling in the outlines of the *order of nature* requires that we project these ideas as the essential forms that unify the manifold of individual objects that we judge empirically, through intuitive and discursive criteria, to be members of a species. Because these objects are empirically given bodies, however, the particular members of the cosmological series that we identify in this way, i.e., in this case, particular plant and animal bodies, are not given all at once in such a way that we can take them to be the essential components that are organized in the organized being.

Instead of adapting the actually given bodies of our experience to the constraints of the theory, and collapsing all these bodies into a single point as the initial condition for the phenomenal unfolding of the individuals and the species, Kant takes the essential components of the organized being to be empirically discovered natural powers that are combined in the causal nature of the species. This is the object that we represent in the idea of the species of plant or animal, which is causally responsible for, but not identical to, the totality of plant and animal bodies and the totality of their articulated parts. We cannot determine the number of these bodies or the number of their parts a priori, but we have no real need to assume that the multiplicity of these parts is beyond any number. The causal nature of the species exists at any determinate point in time at which any member of the species exists, and it is active in any determinate place in space occupied by the bodies that are its members, but it is not a determinate thing in the same way that these members are. That is, it is not something the intuition of which could precede and make possible our thought of its possibility, as particular bodies are. It is however the thought of

some existing thing, of which we are aware through its regular effects in nature, as the a priori formal condition for the possibility, existence, and connection of particular bodies in nature.

Because of this, Kant believes the intellectual representation of a species of plant or animal is analogous to the sensible representation of space and time, or it plays the same role with respect to the possibility of our systematic empirical knowledge of the members of a species that the intuitions of space and time play with respect to the possibility of experience in general. Kant has similar reasons for denying that the concepts of the understanding can be used for determining the object of this idea, or the natural species, that he has for denying that they can be used for determining the a priori grounds of the structure of space and time. Concepts are inherently comparative, and our primary way of representing individuals, such as space, time, the uniqueness of a space and a time, a particular body, etc., is through intuition. We are prone to *analyze* what is given in intuition into relatively discrete intuitive elements that we compare and contrast, and we are prone to *think* the non-intuitive a priori grounds of what we intuit through concepts, but we can never *derive* the intuitive aspect under which things are given to us as individuals from concepts. No matter how complete we attempt to make a discursive representation in an effort to approximate the kind of representation of an individual that is given in intuition, we always have a representation under which a multiplicity of possible or actual things *could*, in principle, be subsumed.

An idea, however, is an analogue of space and time in the sense that whatever is spatial is located in space, whatever is temporal is located in time, and whatever is, e.g., human is located in the human species. The part-whole relation is not one of distinct individuals contingently or essentially connected in the whole, but one of a whole that becomes successively delineated into its parts by an activity that maintains the unity of the parts and the whole. The part-part relation is not one of common possession of a mark that allows one to determine each through this subsumption, but is one of mutually conditioning grounds of the determinate character and relation within the whole of each part. Both the individual preformationist and the germ-theorist

attempt to capture this interesting aspect of organized beings, but in approaching it from the standpoint of the understanding, they become involved in paradoxical views that tend to undermine the view of the perfection of the *order of nature* that they are attempting to preserve. Kant believes that the distinction between the roles of sensibility and the intellect in empirical cognition, and in systematic rational cognition of what is given empirically, and the correlated distinction between the matter and form of the phenomenal substance of individual plant and animal bodies and the matter and form of our intellectual representations of the super-sensible grounds of these bodies, are necessary for solving the generally recognized problems faced by other preformationist theories in the eighteenth century.

In Kant's view, we do not have to look further into the matter of organized bodies in order to discover the principles of organization that serve as the real grounds of the successive development of visibly organized structures within bodies. The reason for this is that the real grounds of this development are not *in* these bodies in the sense of being extended and articulated parts of these bodies. It is only if we take plant and animal *bodies* to be the organized *beings* that the understanding represents as composed of distinct parts and an essential form, in order to represent them as true unities, that we will be forced to accept the *preformationist* views that are clearly Kant's real target in the above passage. If the organized *body* we are dissecting is *not* this true unity, and the totality of the temporal series of individual organized *bodies* of the same species is *not* this true unity, then the potentially infinite progression involved in the continued existence of the species in time does *not* require an initial state in which an actual infinity of articulated structures is enveloped within the eggs or seeds of the first created member of the series. If the true unity is, instead, the matter-form combination that we posit as the organized powers in the *causal nature* of the *species*, then the organized bodies that result from the action of this nature on the natural powers that give rise to the extension of bodies in general will be unified through their common dependence on a unified natural cause. This answer to *individual preformationism*, from Kant's perspective, also provides the answer to the germ theory. If the

matter of bodies cannot be subjected directly to the standards of the understanding, then we no more need to appeal to pre-formed *primordia* as the ontological grounds of the emerging structures in particular bodies than we need to appeal to fully articulated organic structures as these grounds. The continuous action of the causal nature of the species in maintaining the bodies it organizes, through nutrition, growth, and the production of parts within the individual body, is also the cause of the production of parts within the species, or of the generation of genuinely new members of the species.

This amounts to the claim that transcendental idealism provides a real solution to some of the most vexing issues that eighteenth-century physiologists identify as *their* problems. This solution, moreover, is one provided in terms that most practitioners at the time should find agreeable. That is, these practitioners tend to emphasize the importance of distinguishing empirically grounded reflections on the *order of nature* from a priori speculations based on metaphysics or mathematics. The idea of an original member of the species that contains all future members encased within it is clearly a theoretical construct, which is suggested largely by considerations of what the understanding would require to render the purposive unity of articulated structures within individuals and species intelligible. Empirically grounded reflections on the *order of nature* do lead to the recognition of significant complexity within even relatively simple organized bodies, but it is not observation or experiment that leads us to posit the existence of an actual infinity of articulated structures within an organized body. Supporters of generally preformationist theories in the empirical sciences are required to distinguish between the healthy theoretical constructs that direct observation and experiment in natural philosophy and the a priori speculations of metaphysicians and mathematicians that are fashionable targets of ridicule in the latter half of the eighteenth century.⁵³ This appears to be one of the cornerstones of

⁵³This is the case largely in the French context, in which physiologists such as LaMettrie ridicule the appeal to immaterial principles in natural philosophy and *philosophes* such as Diderot lampoon the commitments of deists and mathematically minded philosophers.

Kant's own approach to theories in physiology and in natural history throughout his long engagement with the empirical sciences, and especially in the Critical period.

I think Kant sees von Haller as taking important steps beyond the views of other preformationists with his theory of dynamic germs, but von Haller seems to share the view of the Newtonians that the physical parts of the body and their capacities are the real grounds or causes of the development of the body. The action of these causes requires the pre-existence of the parts whose actions they are, so some kind of physical structure must already be present if such a structure becomes visible at a subsequent stage of development. This is a step in the right direction, insofar as it moves beyond the idea that the successive states in an organism are uniquely determined by the seed in the same way that a series of numbers is uniquely determined by a successor function. In von Haller's view, however, it is still only the subsequent development of previously existing physical parts in the individual that is attributed to the confluence of the nature of the body and external natural causes.

His dialectical opponent, C.F. Wolff, rejects the pre-existence of any physical structures whatsoever and posits an *essential force* that works on unformed matter in developing the physical structures of the organism sequentially.⁵⁴ This may seem somewhat close to Kant's view, but the *essential force* plays a very different role for Wolff than does the *generative force* for Kant. Its presence in the individual embryo, which starts out as a perfectly unstructured mass of molecules in his view, is the ontologically and temporally prior ground of this mass coming to be an organized body. Kant seems to accept von Haller's criticism that even if the action of such an *essential force* alone could generate an organic structure out of a perfectly un-organized mass of molecules, we might still hope that an explanation of generation would involve an account of the fact that it does not simply generate *any old* organic structure. The product of the process of generation is always the *same kind* of organic structure that its parents have, without ever being an exact copy of the structure of either of them.

⁵⁴ Roe [1981] pp. 112-5

The *essential force* is introduced by Wolff as the *sufficient reason* that renders the outcome of the process uniquely necessary. Accordingly, Kant's line of thinking concerning such a view would likely be as follows: If the outcome is different in different cases of the exercise of the same force, then there would have to be something else at work as well. Consistency would require Wolff either to posit an individual *essential force* for each case of organic generation, or to admit that such a force is merely a necessary, and not a sufficient, reason for the generation of the organic body. The former option would render the theory immune to such criticism, and might be understandable from a dialectical perspective, but as a physical theory, the view would be no better than *individual preformation*. The latter move would render the deductive structure of the explanation envisioned hopeless, which Wolff is unwilling to give up. Kant, of course, thinks all such purportedly deductive explanations of natural phenomena are hopeless. Logical grounds are not real grounds. Real grounds are located in interconnected systems in which changes in determinations require changes in ground. This leads to an additional criticism of the *essential force* that could be made from the tools already at Kant's disposal, though he does not use these tools specifically against Wolff's view until Herder makes use of it in his *Ideas*.

In the section of the 'Transcendental Doctrine of Method' devoted to the discipline of reason, Kant makes the following claims about hypotheses:

If the imagination is not simply to wander, but is to reflect under the strict oversight of reason, something must always be entirely certain in advance and not be invented, or be a mere opinion, and that is the possibility of the object itself. After that it is certainly allowed to take refuge in an opinion concerning the reality of the object, however, in order that it not be baseless, this opinion must be brought into connection as a ground of explanation with what is actually given and, thus, certain, and then it can be called a hypothesis.⁵⁵

The concepts of reason are, as has been said, simply ideas, and admittedly have no object in any experience, but they do not on that account refer to invented objects that are thus posited as merely possible. They are merely thought problematically, in order to ground in relation to them (as heuristic fictions), regulative principles for the systematic use of the understanding in the domain of experience. If one diverges from this use, they are merely entities in thought, the

⁵⁵ A 770/B 798

possibility of which cannot be established, and which cannot, thus, be grounds for the hypothetical explanation of actual appearances.⁵⁶

Although Kant disagrees with von Haller on particular points, his own attitude towards the use of hypotheses in natural philosophy is likely affected by von Haller's views.⁵⁷ The *essential force* is the purported sufficient reason from which the processes involved in generation follow as necessary consequences, according to Wolff. He does not proceed from the actuality of given systems to their real possibility and then pose as *problems to be solved* questions concerning the real grounds and their systematic connection in explaining the phenomena. He uses the *principle of sufficient reason* to proceed, from his own decision about what the phenomena are that need to be explained, to the positing of the existence and necessity, as ontologically and temporally prior ground, of an *essential force*. Because Wolff is committed to the claim that the fundamental parts of bodies can be seen through a microscope, and he sees no organic structures in the first stages of embryonic development under the microscope, he concludes that they *cannot* be there. The sufficient ground of the development of these structures, thus, has to be an *essential force* that forms them out of the fundamental parts of bodies.

In Kant's view, the phrase '*fundamental parts of bodies*' does not refer to any existing thing that could be an object of experience. The molecules that Wolff sees with his microscope are appearances of limits within the continuous extension of the larger body, which have been rendered individually discernible through magnification. They can be treated as relatively fundamental parts of *that* body, but the spatial extension of these molecules can also be subjected to the same analysis. As we have seen above, in addressing the resolution of the Second Antinomy, Kant claims that the argument could proceed in the other direction; namely, where we

⁵⁶ A 771/B 799

In light of his similar discussions in the *OPA*, and his insistence here and elsewhere that he is simply taking the concept of an organized being as physiologists use it, however, this seems to be an unlikely interpretation.

do not see any parts that are not organized, we can be sure that at some stage in the process of division we *would* find non-organized parts. However, we cannot conclude from the fact that the molecules we see do not *appear* to be organized that at no point in the division of their extension would we find organic parts.⁵⁸ As a result, we do not even know that what Wolff is claiming to explain, i.e., the generation of an organized structure out of a perfectly non-organized mass of molecules, is actual or even possible. Thus, even if the *essential force* were the only possible explanation of *this*, Wolff cannot even show that this force is possible, rather than a mere thought entity, let alone that it exists or that it is a necessary feature of the organic world.

In contrast, the phenomena Kant is providing a model of explanation for are the phenomena that all sides in the debate agree are those standing in need of explanation. He is not claiming to explain how previously formed *germs* unfold or how previously non-organized molecules of matter become organized. He makes use of the idea of *germs* as hypothetical grounds the assumption of which allows us to maintain that the generation of organic bodies is natural, but he does not think of the spatial or temporal parts of the body as the real grounds of the development of the body. If the first step has to be to determine whether or not there are actually pre-formed structures in the embryo that we simply cannot see, then we will never get to the second step. Purely rational considerations are useless here, because we are asking about the dynamic grounds of an existing thing. Observations cannot decide the matter either because we can never get to the last possible cut in dissecting a body. The dialectical dispute cannot be resolved dogmatically, *i.e.*, in a positive fashion. As it happens, however, it also appears to be the case that we do not actually require any such resolution in order to move forward with our investigation of nature.

Kant is trying to provide a model of how organic bodies are generated naturally *from other organisms*, not *from* masses of matter. This is the appearance from which all parties start

⁵⁸ Here, the logic of the claim is that the division of the continuous never comes to an end. Accordingly, we cannot know whether the next cut is going to reveal the structure that had been previously occluded, and there will always be a next cut that could be made.

and which all find rather difficult to explain once they 1) abstract from the stages leading up to the production of the mass of matter and 2) proceed with questions that are paradigmatic of the mathematical and mechanical models of explanation; namely, “what are the separate parts that ground the whole?” and “how are they connected to form the whole?”. This is the same general problem that presents itself for any attempt to explain mind-body interaction starting with thinking beings and material beings, or to explain the objectivity of human knowledge starting with minds and their representations. Kant’s suggested solution for these problems also draws on the same general considerations. Mathematical and mechanical models of explanation lend themselves most straightforwardly to the combination of the elements necessary for human knowledge; *i.e.*, concepts and intuitions. If we realize that this is what suggests them to us and not any insight into the real possibility of connections in nature, then we can accept both the centrality of these methods for the purposes of our explanations of series of events in nature *to other beings like ourselves* and the serious limitations inherent in them for providing us with any knowledge of the real grounds we are required to posit for these series.

3.4: Systematic Unity and the Idea of a Fundamental Power

As mentioned above, the *principle of permanence* (*Grundsatz der Beharrlichkeit*) and the *principle of generation* (*Grundsatz der Erzeugung*) in the A edition of the *CPR* correspond very closely to two of the principles that Kant calls *principles of harmony* (*principia convenientiae*) in the *ID*. These latter principles, which he there claims are subjective conditions for the development and use of the intellectual power of cognition, include the principles “*nothing material at all comes into being or passes away*” and “*all things in the universe take place in accordance with the order of nature*”.⁵⁹ In both the *ID* and the *CPR*, Kant treats these as subjective principles according to which we reflect on sensibly given objects so as to expand our

⁵⁹ 2: 418 emphasis in text

empirical knowledge. The key difference between these views is that in the *CPR*, Kant stresses the principle “that which makes cognition possible, which is its condition, that is also the condition of things”⁶⁰, to argue for the objective, but limited, validity of the *principle of permanence* and the *principle of generation*.

Through positing a ground of the spatio-temporal relations between the changing determinations of the bodies external to our own *on analogy with* the ground we reflectively cognize as necessary for the *formative power* to act, i.e., a permanent underlying basis or substance with causal powers, we generate a set of principles according to which our power of judgment can be applied to particular cases of phenomenal change. These principles tell us that changes in our sensible state are coordinated in necessary ways, according to the *order of nature*, to changes in the states of the enduring matter of bodies. Since the principled application of our power of judgment is a necessary condition for our cognition, these principles can be known *a priori* to be applicable to the changes in state of each particular body that is a possible object of sensible cognition for us. Thus, these two *principles of harmony* become principles that are constitutive of the possibility of experience, despite their status as subjective principles regulating our reflection on the matter provided by the senses, once Kant sees their role in enabling us to

⁶⁰ In *Metaphysics Lectures* dated to the late 1770s, Kant discusses the formative power of the imagination that is involved in allowing us to apply the categories to ourselves as the intellectual ground of the series of appearances of the inner sense that we think as awareness of our own states:

We have cognitions of objects of intuition by virtue of the **formative power**, which is between the understanding and sensibility. If this **formative power** is in the abstract <*in abstracto*>, then it is the understanding. The conditions and actions of the **formative power**, taken in the abstract <*in abstracto*>, are pure concepts of the understanding and categories of the understanding. E.g., the pure concept of the understanding of substance and accident comes from the **formative power** in the following manner: the formative power must have something permanent underlying it, besides the manifold that alters, for were there nothing at the foundation of the **formative power**, then it could also change nothing. All highest principles of the understanding *a priori* are general rules which express the conditions of the **formative power** in all appearances with which we can determine how the appearances are connected among themselves; for that which makes cognition possible, which is its condition, that is also the condition of things. Objects must conform to the conditions under which they can be cognized; that is the nature of the human understanding. Understanding *a priori* is thus the faculty for reflecting on objects. The understanding does not go beyond the boundaries of the objects of the senses, but still *up to the boundary*: that is God and the future world. (28: 239-40)

Makkreel [1990] contains a discussion of the various aspects of the formative power of sensibility and relates these to the view of the imagination in the *CJ*.

think the enduring reality that provides our acts of judgment with an *object* to which we refer series of sensible intuitions as the co-existing and successive determinations of its state. The analogy with our cognitive capacity is what provides the relevant ‘analogies of experience’ that are necessary for us to *think* objects that we also *intuit* sensibly.

There is one more principle of harmony discussed in § 30 of the *ID*, which we have already seen playing a central role in the argument of the 1775 essay on the races of humans. It is also a principle for which Kant argues in the *CPR* as a transcendental condition for the possibility of experience by way of a certain analogy with our representation of the substance grounding the activity of our *formative power*. In this case the objective status of the principle, in contrast to that of the former principles, is not limited *a priori* by the conditions of sensibility. It is, however, entirely indeterminate *a priori* how far we can go in applying this principle to the objects that these former principles enable us to think in determinate ways, i.e. to objects of experience. This is the *principle of manifoldness, affinity, and unity* that serves as the transcendental condition for producing the system of empirical concepts that Kant believes is necessary for a *coherent* use of the understanding with respect to objects of experience.

Kant believes that this principle requires, and legitimates, our analogical use of the pure transcendental ideas of intellectual substances, i.e., the soul and God, in thinking about the systematic connections between the real grounds of the *order of nature*, or the internal and external relations between the physically fundamental powers or forces that our empirical knowledge requires us to posit in thought as causally responsible for the changing determinations of phenomenal substance. As we will see below, Kant introduces and provides the first of his Critical attempts at a transcendental justification for our use of this principle in the ‘Appendix to the Transcendental Dialectic’ of the *CPR*. He then continues to defend the particular use he makes of this principle in several smaller essays during the 1780s that deal with the views concerning organic generation, the distinction between *Naturgeschichte* and *Naturbeschreibung*,

and the teleological standard provided by the idea of the self-preservation of the species as a natural end that we see him developing in the pre-Critical period.⁶¹

In the *ID*, Kant introduces the principle that he will use in the 1775 essay on races and, later, justify by reference to the transcendental conditions for the empirical use of the understanding in both the *CPR* and the *CTJ*, between the two principles discussed above, i.e., the principles *nothing material at all comes into being or passes away* and *all things in the universe take place in accordance with the order of nature*. This principle is introduced as follows:

The SECOND principle is the well-known *predilection for unity*, which is characteristic of the philosophical mind and from which has issued the widely accepted canon: *principles are not to be multiplied beyond what is absolutely necessary*. We support this principle not because we clearly see, either by reason or by experience, a causal unity in the world; we are rather driven to search for it by an impulsion of our understanding, which deems itself to have been successful in the explanation of phenomena only if it finds itself able to descend from a single principle to a plurality of grounded things.⁶²

We saw in the previous chapter that Kant invokes this principle in his argument for the unity of the natural species of human beings. It provides part of the motivation for rejecting separate, local creations in the attempt to account for the four races of humans generally recognized by Kant and his contemporaries. Kant defines a race in terms of a particular line of descent within a natural species the members of which exhibit a set of characteristics that are contingent from the standpoint of the species, but that endure through successive generations regardless of external circumstances. He provides a model that accounts for these by reference to

⁶¹ As we will see in the final chapter, it is, ultimately, this same principle that Kant will discuss in the *CJ* as the principle of the formal purposiveness of nature for our cognitive faculties. Kant discusses the *feeling* of this purposiveness as the subjective ground of our aesthetic judgments of beauty, in which the sensible forms of natural objects serve as the occasions for the expression of our vital *formative power* through the playful interaction between the imagination and the understanding. Our aesthetic normal ideas and discursive empirical concepts of classes of plant and animal, which are generated through the self-directed activity of our reflecting power of judgment, are then turned into ideas of natural species by referring the members of these classes of mutually conditioning causes and effects to a *self-propagating formative power*. We posit this power on the basis of our experience of its regular effects in nature, and we conceive it on analogy with our own practical activity in aiming at ends. The *CTJ* is, I believe, largely an argument in defense of the theory of organic generation and of natural history that Kant develops in the 1760s and 1770s, for which he provides a transcendental grounding in the theory of ideas presented in the ‘Transcendental Dialectic’ of the *CPR*, and which is attacked on several fronts during the 1780s.

⁶² 2: 418 emphasis in text. I have changed the translation from the *Cambridge Edition* slightly.

a range of characteristics grounded in the *generative force* of the species, and the role of environmental factors in different areas of the earth in ‘selecting’ from among these, until a time at which particular features become fixed and passed on from generation to generation. This principle of unity, according to Kant, places the burden of proof on those who insist that the differences between the races are such that it is impossible to ‘descend from a single principle’ to this particular ‘plurality of grounded things’. Kant believes it is an advantage of his own model of organic generation that it is more consistent with these principles of harmony, especially the principle of unity and the principle that all changes occur in accordance with the *order of nature*, than are the various other theories of *preformation* and *epigenesis* available at the time.

As he modifies the view of the intellect provided in the *ID*, Kant comes to distinguish between the principles of harmony that become the *principle of permanence* and the *principle of generation*, and the principle of harmony that becomes the *principle of manifoldness, affinity, and unity*. The former become dynamical principles regulating the spatio-temporal order between sensible impressions, and the latter becomes a dynamical principle that regulates our empirical cognition of nature. This happens, however, only once the predilection for unity is paired with a principle of manifoldness that requires us also to pay attention to variety. The former principles are rules [*Grundsätze*] for the transcendental power of judgment in co-coordinating natural phenomena in determinate ways, by subordinating the series in which they occur to the mutually exercised causality of natural substances. The latter is a principle [*Prinzip*] that unifies the products of the use of these rules by subordinating the various empirically discovered powers and capacities of natural substances to a smaller number of fundamental powers. This single principle is divided up into maxims that reflect the two-fold interest of reason in discovering unity amidst diversity, while also paying attention to variety. The concentration is no longer so much on being ‘able to descend from a single principle to a plurality of grounded things’ as it is on being able to

think the “relation of the manifold, without detriment to its variety, under a principle of unity”.⁶³

That is, we do not derive the phenomenal states of substances from their fundamental powers.

We derive them, rather, from one another according to the idea of the fundamental powers that explain their regular relations.

The analogical basis on which we are able to conceive of this kind of relation between the empirically discovered characteristics and powers of things is one that stems from features of our apperceptive awareness of our own powers, in Kant’s view.⁶⁴ By way of conclusion to his discussion of empirical psychology, in metaphysics lectures that stem from the late 1770s, Kant addresses Christian Wolff’s view that the soul *is* a fundamental power of representation. Kant begins by noting that, in his own view, the soul is a substance and that powers are not *substances*, but *relations*. That is, a power is what *relates* a substance to some accidental determination, and explains the attribution of that determination to the substance. Substances are causes, and powers are what relate these causes to their effects.⁶⁵ Taken together with the claim that the soul is a unity, Kant thinks this means that it is obviously true that there is one basic power of the soul from which all of its determinations and changes arise. This is not the most important question concerning the powers of the soul, according to Kant, however:

But this is a wholly different question from: are we are capable of deriving all of the actions of the soul, and the various different powers and capacities of the soul, from a single fundamental power? We are in no way in a position to do this, since we cannot derive effects that are really different from each other from a single power; e.g., the motive power and the power of cognition cannot possibly be derived from a single power, since the cause of the one power is different from that of the other. Now, because we meet with real determinations or accidents of essentially different kinds in the human soul, philosophers seek in vain to derive them from a single fundamental power. It is certainly the main rule of the philosopher to attempt, as far as possible, to bring everything under a single principle, so that the principles of [the sources of] cognition⁶⁶

⁶³ A 662/B 690

⁶⁴ Watkins [2005] contains a discussion of the importance of this analogy for Kant’s general model of causality.

⁶⁵ For a discussion of this issue, see Watkins [2005].

⁶⁶ Ameriks and Naragon follow Lehmann in emending the text from Pölitz to read ‘principles of cognition’ instead of principles of the sources of cognition’. The text from Pölitz makes good sense however, given the contrast between the general maxim concerning *principles* of explanation in the sense of things or powers in the world ‘out there’ that explain why things ‘out there’ are the way they are, and *principles* in the sense of the powers of the mind that allow us provide these explanations.

are not unduly increased. It does not follow from this that we have cause also to reduce the various powers in the human mind to a single power. For example, memory is simply imagining a bygone thing, so it is not a special fundamental power. The imagination itself, however, we cannot further derive. Accordingly, the formative faculty is surely a fundamental power. So, too, is reason and understanding *a priori*. We find, accordingly, that we have to posit different fundamental powers, and cannot explain all phenomena of the soul from one; for who would genuinely try to derive the understanding from the senses? *Accordingly, the cognitive faculty, the faculty of pleasure and displeasure, and the faculty of desire are fundamental powers.*⁶⁷

The main point Kant is making here is that it may be true to claim that all determinations and changes of the soul arise from *its* power, while denying that they all arise from a single fundamental power, because the soul involves a real synthetic unity of fundamentally different powers. The claim that the accidents of a substance stem from the basic power of that substance is trivially true, if we can say nothing more about that basic power or how other powers are related to each other in it. What is more, if, on the basis of a commitment to the ontological unity of the soul, we view ourselves to be faced with a decision concerning which one of the powers *we know it to have* is fundamental, and which ones are derived from this, we are most likely to answer ‘the intellect’ or ‘the will’ or ‘the imagination’. The result will be that we proceed to treat all representations of the mind as spontaneously generated products of the intellect alone, or as products of the will alone, or as products of the imagination alone. If material idealism, voluntarism, or phenomenalism is an analytic result of the presupposition that there has to be a single fundamental power of the soul, then there may be good reasons to check the ‘predilection for unity’ by drawing attention to the fact that no one actually has been able to derive, e.g., the understanding from the senses.⁶⁸

The point of the idea of the unity of a substance, as Kant will develop it in the first *Critique*, is not the hope that I can discover the one power exercised by the one kind of thing that explains everything. This is the *illusion* engendered by the *idea*, to which

⁶⁷ 28:262, emphasis in text

⁶⁸ This is an important point in the subsequent disputes concerning our empirical warrant for positing fundamental powers of particular kinds, which I take to be essential for appreciating the argument of the *CTJ*. I will return to it below in the discussion of C.F. Wolff’s theory of generation and of Herder’s *Ideas*.

Christian Wolff succumbs, and which threatens the estimation of the value of our use of reason among people who are doing real investigations into the systematic unity of nature. The point in the section of the ‘Transcendental Dialectic’ on the regulative use of ideas is that reason requires us to search for the unity, but *never* to think that we have exhausted nature’s variety and have discharged our epistemic duties. The synthetic *a priori* principle of reason concerning the systematic unity of nature involves the expectation that nature involves *affinity* of the manifold, *without* detriment to its *variety*, under a principle of *unity*. To say that a manifold is unified under a principle of unity *can* mean that everything in the manifold follows with necessity from that principle, or is merely a manifestation of that principle. It *can* also mean that a variety of distinct things are related to each other in a real whole by a principle that provides the ground for their possibility, existence, and connection in a whole. The former is the unity of the *lazy reason* that *is* detrimental to the *variety* in nature as well as to the development of the capacities of the reasoner. The latter is the synthetic unity that requires real grounds for its possibility, and real work for its discovery

This discussion, I think, helps us to see how Kant is working towards the view that, with respect to theoretical reflection on nature, experience is decisive, though ideas of reason are required to provide the systematic aspect that turns this experience into natural science. We are forced to begin with a multiplicity of particulars in nature, between which there are some noticeable similarities that are likely to make an impression on us, but we clearly would never arrive at the conclusion that everything in nature is made of the same fundamental material, or everything acts through the same fundamental power, or is subject to a single set of natural laws, merely through experience. In fact terms like *nature*, *fundamental power*, and *natural law*, which many people simply take for granted, would likely not even occur to us if our experience were not relatively orderly, and if this order did not combine with the tendency to go well beyond what is

given in our experience in thinking about ‘what is the case’.⁶⁹ Kant maintains that thinking in this way is not merely something we do for the sake of ordering our experience, or for the sake of formulating and testing hypotheses. Rather the prior commitment to the existence of the objects thought in these ideas is the background against which we formulate and test hypotheses concerning whether some particular power is fundamental, or what particular laws govern the effects of some power. The following passage from the ‘Appendix to the Transcendental Dialectic’ revisits the same issue addressed above:

Among the different kinds of unity according to concepts of the understanding belongs the causality of a substance, which is called “power.” At first glance the various appearances of one and the same substance show such diversity that one must assume almost as many powers as there are effects, as in the human mind there are sensation, consciousness, imagination, memory, wit, the power to distinguish, pleasure, desire, etc. Initially a logical maxim bids us to reduce this apparent variety as far as possible by discovering hidden identity through comparison, and seeing if imagination combined with consciousness may not be memory, wit, the power to distinguish, or perhaps even understanding and reason. The idea of a **fundamental power** – though logic does not at all ascertain whether there is such a thing – is at least the problem set by a systematic representation of the manifoldness of powers. The logical principle of reason demands this unity as far as is possible to bring it about, and the more the appearances of this power and that power are found to be identical, the more probable it becomes that they are nothing but various expressions of one and the same power, which can be called (comparatively) their **fundamental power**.⁷⁰

Here we can see that, for Kant, the idea of a fundamental principle from which the various capacities of a substance are derived is one that initially suggests itself through a particular role that it can play in our attempts to unify the various appearances that we attribute to a substance. We are constrained to name natural powers after the regular effects through which we are aware of their existence, and if we were merely to attribute a power to the substance for each of its regular appearances, our representation of the substance would be the representation of an enduring thing that has a variety of powers. Logical maxims encourage us to represent variety

⁶⁹ Hume makes similar points about powers and laws, but he too seems to presuppose nature and the methods of *Naturbeschreibung* that he invokes in the *Enquiry Concerning Human Understanding*. This, among other things that I will not go into here, suggests to me that the naturalistic reading of Hume is closer to the truth than the skeptical reading.

⁷⁰ A 648-9/B 676-7

in nature in such a way that we not only have discursive representations of what is common to a variety of things (concepts), but can also move from one of these representations to others in principled ways (inferences). It is advantageous, from the standpoint of the use of our reason in inferences, for us to unify some, or all, of these powers under more basic powers, so that we can unify the cognition of their effects even further. If, e.g., imagination and consciousness can be treated as elements whose combination explains the acts that we attribute to the power of memory, the power to distinguish, and the power to understand, we can infer from the fact that some act, *a*, is an act of remembering, that *a* is an act involving imagination and consciousness. Similarly from the fact that *b* is an act of distinguishing, it follows that *b* is an act involving the imagination and consciousness, etc.

Logic alone cannot guarantee that there are fundamental powers that would provide, for the various empirically discovered powers of a substance, that form which is most advantageous for our reasoning. As we meet with success in unifying these powers, however, it comes to appear more and more probable that there are such powers. Kant goes on to claim, in the passage immediately following the above passage, that we proceed in the same way with the relatively fundamental powers that we accept as having been established with a high degree of probability. That is, we proceed in the same hypothetical way in attempting to unify these through appeal to an absolutely fundamental power. In proceeding in this fashion, we are not insisting that there is such a power, but our reason does require that we at least search for one on behalf of the requirements of systematic cognition.

These passages present what appears to be a fairly standard view of empirical method. Reflection on the particular cognition that is gained through sense experience is guided by logical principles in an attempt to arrive at more general concepts, principles, and laws under which our empirical concepts of the principles and laws of nature are unified. We formulate hypotheses concerning what general principles and laws might be necessary to unify these, and as we are able to account for more and more aspects of nature that previously seemed to require different

principles, or different sets of laws, according to one of these hypotheses, we achieve greater subjective conviction concerning the truth of the suggested hypothesis. We then proceed to reflect on what is now probable truth, rather than merely hypothetical conjecture, in the same fashion toward the end of even greater unity. Empirical natural science, according to the fairly standard eighteenth-century view I take Kant to be discussing here, differs in important ways from mathematical science. The certainty concerning the principles and the deductions of the latter are based on mere relations between ideas, while the very high probabilities of the latter are both based on, and explanatory of, real existence and matters of fact.⁷¹ Although Kant agrees, in principle, with the claim that we cannot have any non-empirical cognition concerning the powers that are active in nature (e.g., concerning how many there are, how they are related to one another, how they are determined to their regular effects), he is quite at odds with the positivistic and logical-empiricist views of scientific methodology that some British and French thinkers in the eighteenth-century seem to think follow unproblematically from the denial of particular forms of rationalism.⁷² We can see this, I believe, in the following passage:

But if one attends to the transcendental use of the understanding, it is evident that this idea of a fundamental power in general does not function merely as a problem for hypothetical use, but pretends to objective reality, so that the systematic unity of a substance's many powers is postulated and an apodictic principle of reason is erected. For even without our having tested the unanimity of the various powers of a substance, and even when we have failed to discover it after all tests, we still presuppose that there will be one to be found, and not only because of the unity of substance, as in the above-mentioned case, but also in cases where several, though to a certain degree similar, substances are met with, as in matter in general, reason presupposes the systematic unity of manifold powers, where particular natural laws stand under more general natural laws, and the parsimony of principles becomes not merely an economical rule of reason, but an inner law of nature.

In fact, it is not at all clear how a logical principle of rational unity of rules could come about, if a transcendental one were not presupposed, through which such a systematic unity is accepted a priori as depending on the objects themselves. For with what justification can reason

⁷¹ This distinction forms the basis for Buffon's claims about methodology in natural history. For more on his views, see Larson [1994], Lyon and Sloan [1981] and Sloan [forthcoming].

⁷² By this I mean that Kant does not accept the dichotomy that Hume and Buffon accept between analytic a priori judgments in logic and mathematics, which are certain but empty, and synthetic a posteriori judgments based on experience, which have content but are the result of probabilistic and inductive methods.

demand, in its logical use, to treat the manifoldness of powers that nature provides for our cognition as a merely hidden unity, and to derive these, as far as it can, from some fundamental power, if it were free for reason to admit that it was just as possible that all powers are of different kinds and that the systematic unity of its derivation does not accord with nature? In such a case, reason would proceed directly contrary to its purpose, in that it would set for itself an idea as its goal that entirely contradicted the arrangement of nature. One also cannot claim that reason has gleaned this unity according to principles of reason from the contingent constitution of nature. For the law of reason to seek it is necessary, since without it we have absolutely no reason, but without this we have no coherent use of the understanding, and lacking this we would have no sufficient characteristic mark of empirical truth. Accordingly, with respect to this last consideration, the systematic unity of nature must by all means be presupposed as objectively valid and necessary.⁷³

Here, we see Kant suggesting a transcendental justification for the use of the rational idea of a fundamental power in systematizing our empirical cognition. He begins by claiming that this idea appears not to be merely a problem for the hypothetical use of our reason; i.e., it is not merely the *result* of a task that we have set for ourselves, such as: ‘find for the given multiplicity of powers of a substance, the power that unifies them’. We seem to start with the presupposition that this fundamental power is there to be found and proceed in the hope that we can determine the thought of this power more precisely than it is determined when we start out. That is, we already have a nominal definition of a fundamental power involved in the formulation of the task, i.e., ‘the power that unifies the multiplicity of powers of a substance’. What we are seeking is really an answer to the questions, ‘which of the powers of the substance is fundamental?’, ‘how does the fundamental power unify the other powers?’, or ‘how is this power determined to its effects?’. The tasks that we hope will take us nearer to an answer to these questions cannot be the origin of the idea, because the idea is what guides us in these tasks.

Kant claims that before we even begin to search for the unity of particular empirically discovered powers, we assume that a fundamental power can be found. This undermines the psychologistic view that the origin of the idea of a fundamental power is the activity of unifying particular powers under more general ones, which leads at some point to the notion that, perhaps, these relatively fundamental powers can be further unified under an absolutely fundamental

⁷³ A 650-1/B 678-9

power. He also claims that after all attempts up to a certain point have failed, we continue to believe that this power is there to be found. This undermines the psychologistic view that the degree of our conviction grows in relation to past successes in ventures of this kind and is weakened by past failures. The origin of the idea itself cannot be the process of abstraction, in Kant's view, nor can the power the idea has over the mind be the result of habituation.

This idea is also not something that follows merely analytically from the concept of a substance, though Wolff appears to have thought it did, because it is not something that we think merely in the substance-accident relation. We also presuppose that the powers of various different kinds of material substance can be unified under more fundamental powers. The paradigm achievement recognized by empirically minded natural philosophers in the eighteenth-century, namely, Newtonian physics, provides the "more general natural laws" under which "particular natural laws" stand, through which "the parsimony of principles becomes not merely an economical rule of reason, but an inner law of nature". Here, Kant appears to be pointing to the fact that disputes between Newtonians and Leibnizeans during his time go on against the background of a common assumption that each party believes to have established objectively as a law; i.e., the *law of continuity*. Kant believes that this rational principle cannot be derived from the mathematical laws of corporeal phenomena nor can it be derived from the metaphysical laws of psychology. Its application can, however, be justified by the transcendental psychology of the *CPR*.

The *principle of continuity*, and correlates, such as the principle of least action 'nature takes the shortest course', and the principle of parsimony 'principles are not to be multiplied beyond necessity', are principles that both parties accept, and that neither side believes can be established as an "inner law of nature" by appeal to the considerations favored by the other. Leibnizeans take the phrase "inner laws of nature" to refer to laws governing series of changes in the internal determinations of substances, which are ontologically prior to the mathematically determinable phenomena of bodies. Newtonians take the phrase "inner laws of nature" to refer to

laws governing series of changes in the external relations between substances. The presuppositions of the empirical methodology made use of by eighteenth-century thinkers who align themselves in one way or another with Newton, however, are substantive ontological principles, which can no more be *justified* empirically, in Kant's view, than can the substantive principles made use of in the empirical methodology of thinkers who are more aligned with Leibniz.

The commitment to a fundamental power that unifies the other powers of a substance is a commitment to the existence of a principle that provides the ontological correlate for the methodological maxims that one takes to be authoritative for scientific activity in general. It does not become an empirically justified principle merely because one denies the existence of (or the need to appeal to) spiritual entities, and presupposes that this power belongs to a substance (or kind of substance) that accounts for all corporeal phenomena.⁷⁴ This idea, and the substantive commitments on which the methodological injunctions of the empiricist are based, is not a fact to be established by the sciences, in Kant's view. It is, rather, an a priori presupposition of the activity of the empirical sciences in making synthetic judgments concerning the unity of empirically given objects and the unity of nature. Accordingly, it requires a transcendental justification.

3.5: The Two-Fold Justification of the Principle of Continuity

Kant's justification for the principle of continuity comes in the form of an appeal to the conditions for a criterion of *empirical* truth. Kant believes it is important to distinguish between two different kinds of synthetic principles, both of which are necessary conditions for the possibility of empirical cognition, but each plays an importantly different role in securing this

⁷⁴ I have in mind here the views of LaMettrie and Diderot, who claim to derive all vital phenomena, included the power of judgment and the intellect, from a single sensible power of matter.

possibility. The principles of the understanding are rules that are necessary for thinking any object of the senses at all. They provide the grounds for synthetic a priori judgments concerning phenomena and, through this, a ground for particular empirical judgments that can be true or false. These actual empirical judgments involve, in an essential way, referring observable phenomena to something = x as the object whose phenomenal states are given in sensory experience. With respect to the relations between the phenomenal states of objects, the principle of continuity is a constitutive principle that follows as a correlate of the principles presented in the 'Analogies of Experience' and the 'Postulates of Empirical Thinking in General'.

The principle of reason is not concerned directly with judgments concerning the particular phenomenal states of empirical objects. It provides a rule for synthetic judgments concerning the grounds internal to the variety of objects = x in nature, which we think as the inner grounds of the enduring empirical characters of these objects. These characters are *presupposed*, and not *explained*, by the determinate empirical judgments concerning cause and effect that we make by reference to natural laws. Our procedure with the principle of reason is not one in which objects are constituted for our empirical cognition. Rather, it is one in which we investigate the constitution of these objects according to ideas, such as the idea of a fundamental power and the idea of a natural species, and attempt to unify our empirical cognition of the particular powers and species of natural beings. With respect to the relations between the powers of substances under the idea of a fundamental power and the relations between the members of a species under the idea of a causal nature, the principle of continuity is a regulative principle that reason projects as an *order of nature* that satisfies the requirements for the greatest possible extension of the use of our understanding in experience. We cannot know prior to the actual advance of this experience what, in particular, we will discover concerning the manifold of natural objects, but we require the principle of reason to guarantee us that whatever manifold of parts, elements, and laws we discover will be a *unified* manifold.

Continuity in the Analytic

A closer look at some passages concerning continuity in the ‘Transcendental Analytic’ will help provide the contrast with the version of the principle for which Kant is arguing in the ‘Appendix to the Transcendental Dialectic’. This is important not only for understanding the way Kant approaches these issues here, but also for appreciating what is new, and what is not, in his return to these issues in the *CTJ*. In the discussion of the *principle of generation* in the second analogy, Kant claims the following:

Now every alteration has a cause, which manifests its causality in the entire time during which the alteration proceeds. Thus the cause does not produce its alteration suddenly (all at once or in an instant), but rather in a time, so that as the time increases from the initial instant *a* until the completion of the alteration in *b*, the magnitude of the reality (*b-a*) is also generated through all the smaller degrees that are contained between the former and the latter. All alteration is, therefore, possible only through a continuous action of causality, which, to the extent that it is uniform, is called a moment. The alteration does not consist of these moments, but it is generated through them as their effect.

That is, now, the law of the continuity of all alteration, the ground of which is this: that neither time nor the appearance in time consists of parts that are the smallest, and that yet the state of the thing passes through all these parts, as elements, in its alteration to its second state.⁷⁵

Here the law of continuity expresses the rule that any change in state of a sensible object is the effect of some cause that is active through the entire duration of the change, such that between any two distinguishable points in this duration, there is a third point that could be distinguished at which the magnitude of reality of the effect is closer to that at each of these points than they are to each other. Let’s assume a case in which the effect in question is motion, the change in the quantity of motion is acceleration from 10 mph to 15 mph, and the duration of the change is 1 minute. The law of continuity will require that at the 30 second point, the quantity of motion *x* is between 10 mph and 15 mph, and that at the 45 second point the quantity of motion *y* is between *x* and 15 mph. The same can be said for any other distinguishable point

⁷⁵ A 208-9/B 253-4

within the minute that separates the initial quantity from the final quantity, or the time through which the alteration in the state of the object is generated.

Zeno style paradoxes can be avoided on this model because the moments through which the alteration is generated are not moments of time, but are moments of uniform causal activity. Neither the time through which the alteration occurs, nor the appearance (i.e., the effect in which there is an alteration, or the motion) consists of discrete parts or elements. When we introduce divisions into the duration of the alteration *in thought*, we are not dividing the time itself or the motion itself into the elements out of which it is generated; we are, rather, merely indicating the *distinguishable* points through which the state of the object passes in a continuous fashion. The law of continuity with respect to the alteration of the state, or the generation of an observable determination, of an empirical object can be justified a priori, in Kant's view, by reference to the conditions for the possibility of making determinate judgments concerning the objective temporal order of events. A more general version, which includes not only the succession of phenomenal states of objects in time, but also the co-existence of appearances in space, can also be justified by reference to the conditions for the possibility of experience, as we see in the following passage from the discussion of the third postulate in the section on the 'Postulates of Empirical Thinking in General':

The principle of continuity forbids all leaps (*in mundo non datur saltus*) in the series of appearances (of alterations), but also in the totality of all empirical intuitions in space all holes or clefts between two appearances (*non datur hiatus*); for one can express the proposition in this way: nothing can enter into experience that would prove a vacuum, or that would even admit it as a part of an empirical synthesis.⁷⁶

This indicates Kant's view that empty space is merely an a priori form of our empirical intuition and is not an object of empirical intuition, or an ontological condition for the empirical characters and the alterations in observable state of objects of experience.⁷⁷ This is a repudiation of one of the central strains within mechanical philosophy, which holds that phenomena such as

⁷⁶ A 228-9/B 281

⁷⁷ A 26/B 42

local motion and the varying density of matters of different kinds would be impossible without some empty space separating the atoms or corpuscles out of which compound bodies are generated.⁷⁸ Kant clearly states here not only that nothing in our experience could possibly demonstrate the existence of a vacuum, but also that nothing in our experience would even allow us to make empirical judgments that take empty space to be the ‘third thing’ that provides the ground of a real synthetic connection between objects.

Accordingly, the principle of continuity, in the form in which Kant accepts it, is an a priori condition that partially determines which of the range of potential suggestions concerning the particular laws governing the causes of particular kinds of phenomena can be taken as potential expressions of natural laws. If, for example, the expression of a law requires that bodies move through empty space, or that they undergo radical transformations from one state to another, without passing through all of the intermediate states separating these, then the law under discussion cannot be seriously considered as a natural law. The reason for this, in Kant’s view, is that the necessity that attaches to the formulation of a natural law requires a direct connection to the processes whereby the understanding makes use of the materials provided by the appearances in determining the states of objects. The understanding must be able to make use of the law to conclude that the observable state of an object is necessary, i.e., that this state follows with necessity from some prior observable state of the object in accordance with the proposed law, if it is to be accepted as a natural law.

If some proposed lawful generalization from experience involves connecting the observable states of bodies to *unobservable* states or *unobservable* bodies, then the conditions simply are not met for our empirical judgment that the observable states of a particular body are necessary. We could not begin with a description of the temporally prior states and derive the temporally posterior states from them according to this rule, because we cannot begin with a description of these unobservable states. Accordingly, even if it were actually the case that these

⁷⁸ Kant discusses this view in detail in the *Metaphysical Foundations of Natural Science* (4: 532-5)

states did follow in precisely the way the suggested law dictates that they would, the law dictating this is not a natural law.

Natural laws are not, in Kant's view, empirically discovered suggestions concerning how natural phenomena are derived from their super-sensible or intelligible grounds. They are, rather, rules according to which observable phenomena are necessitated by other observable phenomena in such a way that, if we were in possession of the rule and were aware of the temporally prior phenomenal state of an object, we would know what state will follow without having to observe it. If the succession of the states of the object according to this rule were not continuous, or if the subsequent observable state of the object were the result of the prior states of entities that are, in principle, unobservable, then the conditions for our applying this rule to a particular case would not be met. Thus, the proposed rule can be ruled out a priori as a law of natural causality.

Now there is no existence that could be cognized as necessary under the condition of other given appearances except the existence of effects from given causes according to laws of causality. Thus, it is not the existence of things (substances), but rather only the states of things that we can cognize as necessary, and moreover only from other states that are given in perception in accordance with empirical laws. From this it follows that the criterion of necessity lies solely in the law of possible experience that everything that happens is determined through its cause in the appearance. Hence we cognize only the necessity of effects in nature whose causes are given to us, and the characteristic mark of necessity in existence reaches no further than the field of possible experience, and even there is not valid concerning the existence of things, as substances, since these can never be viewed as empirical effects, or as something that happens and comes about. The necessity, therefore, concerns only the relations of appearances according to the dynamical law of causality, and the possibility that grounds itself on this, to conclude a priori from some given being (a cause) to another being (the effect). Everything that occurs is hypothetically necessary; that is a principle [*Grundsatz*] that subjects the alteration in the world to a law, i.e., to a rule of necessary existence, without which there would not be any nature at all. Hence the proposition "nothing occurs through a blind chance" (*in mundo non datur causus*) is a natural law a priori; likewise "no necessity in nature is blind, but is rather conditioned and, thus, intelligible necessity" (*non datur fatum*). Both are laws that are such that through them the play of alterations is subjected to a nature of things (as appearances) or, what is the same, to the unity of the understanding, in which alone they can belong to an experience, as the synthetic unity of appearances.⁷⁹

⁷⁹ A 227-8/B 279-80

Here we see Kant expressing very clearly the point made above about natural laws being the basis on which we are able to determine that some observable state of a substance is necessarily related to some other observable state of a substance. He introduces two more correlates of the principle of continuity, explaining their status as natural laws by reference to their role in stating the conditions under which alone appearances can be connected in such a way that they belong to experience. There are two important points here that point us to the transition from the principle of continuity as Kant discusses in the ‘Transcendental Analytic’ of the *CPR* to the principle as he discusses in the ‘Transcendental Dialectic’. First, Kant claims here, that through these laws, the alterations in the observable states of objects are “subjected to a nature of things (as appearances)”, which he equates with “the unity of the understanding”. He appears to be claiming that without these laws, the principles derived from the schematized versions of the categories would still be conditions for the possibility of experience, and would still provide us with a priori knowledge concerning any possible object of experience, but they could not lead us to any knowledge of nature. Not only do we require actual empirical intuitions as the determinable matter for empirical judgments, but we also require laws, derived from the principle of continuity, according to which the understanding thinks the object as a member of the observable *order of nature*. Without these laws, the empirical criteria for the determinate use of the categories of causality and necessity in thinking objects whose states are given in intuition would never be satisfied, and the “play of alterations” would never amount to alterations in the states of natural substances.

Second, Kant claims that we do not cognize the existence of things or of substances as necessary, whether in themselves or as necessary effects of other things. Substances are not things that happen, or things that come about, in the sense of being generated successively from prior states according to laws of nature. This is so, according to the above passage, even in the field of possible experience. Necessity applies only to the relations between the states of a substance, even if the substance under consideration is the enduring ground in the appearance of

these changing states. This means that the principle of continuity as it is discussed in the ‘Transcendental Analytic’ is applicable only to the alterable states of the entities that are members of the observable *order of nature*. Whatever the particular laws of nature turn out to be, they will not be laws that explain the possibility, existence, or unchanging empirical character of natural substances. Rather, they are laws whose use will presuppose *these things* as given, in order to derive the alterations in the observable states of such things from other observable states a priori. This point is central, I believe, to the ‘Antinomy of Teleological Judgment’, which arises when we neglect the importance of the difference between reflecting on the possibility of ‘the generation of material things and their forms’, according to the determinate rules provided by the understanding, and the maxim for reflecting on the possibility of ‘products of material nature’, according to a rule provided by the power of judgment. It is also central for grasping the particular role Kant assigns to reason in the ‘Appendix to the Transcendental Dialectic’, and the events that lead Kant to reformulate the view provided there in a separate *Critique of the Teleological Power of Judgment*.

Continuity in the Dialectic

Kant thinks of the principle of reason in terms of two contrasting maxims, of manifoldness and of unity, that represent the two-fold interest of our reason. These maxims are necessary for thinking the non-sensible grounds of unity in virtue of which there are natural substances with enduring empirical characters, the alterations of the states of which can be subjected to causal laws. It provides the grounds necessary for synthetic a posteriori cognitive judgments concerning the *order of nature*. These involve, in an essential way, referring natural phenomena to something = x that has an enduring empirical character that is shares with other phenomenal objects, in virtue of which these objects are subject to a common set of empirically discoverable laws. The understanding presupposes these in making determinate judgments

concerning natural causality, but cannot provide us with any insight concerning their grounds independently of the ideas of reason.

The schematized categories provide rules through which we legislate to the appearances, but they do not provide us with anything approaching inner laws of nature. The objects that we think through them a priori do not have a *nature*, or an inner principle of the connection of the manifold powers and capacities of a substance, and the projected totality of these objects of our a priori cognition is not *nature*. The schematized categories can provide us with a priori cognition of objects of the senses precisely because they do nothing more than allow us to anticipate the intuitive and discursive forms according to which we connect the matter of sensible intuition in determinate ways. This matter is something that is itself provided only empirically, and we have no way of determining how many different powers and capacities of how many different kinds of substance will be revealed to us through their effects on our sensibility. It is not simply the case that we have no way of determining this number *a priori*, if I understand Kant's view correctly. Rather, we have no way of determining this number *at all*. We cannot do this a priori, because the actual powers and capacities of substances can be known only empirically, and we cannot do this empirically, because no amount of experience could ever be sufficient to determine this.

The idea of nature is the idea of the sum total of the phenomenal effects of these powers and capacities, taken together with these powers and capacities themselves.⁸⁰ If we did not represent these powers and capacities as grouped together in systematic ways in the causal natures of the objects of experience, we could no more have empirical knowledge than we would if we could not intuit objects in space and time or use the categories to connect our sensible intuitions together to make judgments about these objects. That is, if there were no objects in our experience that had enduring empirical characters (e.g., if there were no *hot* and *dry* things), and no variations in these characters that were such as to make the objects discernible from one another in intuition and in thought (e.g., if everything were *hot* and *dry* and there were no *cold*

⁸⁰ A 418/B 446

and *wet* things), then there would be no differences in the ways in which we connected our sensible intuitions through the use of the categories, and we would have no *empirical* concepts.

If I could not distinguish the ship from the water, I would never get to the point of distinguishing between the subjective order of my impressions of the relations between them and the objective order of the events in which they are related. If I did not presuppose that the water has some nature that determines its capacities and that the materials out of which the ship is constructed have some nature that determines their capacities, I would never begin to wonder *how it comes to be* that the ship can stay afloat and move through water. If I did not think that despite the differences in the nature of water and the nature of wood, or iron, there is some commonality that allows objects of these different natures to interact, I would not begin to do natural philosophy. We have empirical concepts, in Kant's view, only on the assumption that there are similarities and differences in *existing things* that legitimate the practice of discursive reference to *things* through *their* characteristics. We can subject judgments such as 'water is cold and wet' or 'iron is heavier than wood' to empirical scrutiny only if it possible to find water in nature and to discern whether or not it *is* actually cold and wet, or if it is possible to find iron and wood and to weigh them.

Kant's view in the 'Appendix to the Transcendental Dialectic' is that if we did not have the principle of reason, which presupposes the existence of generic commonalities and specific differences between things in nature, and commands us to investigate nature through its maxims of manifoldness and diversity, we would not arrange the commonalities and differences in the observable features of empirical objects in the ways we actually do. If we did not do this however, we would not be able to reason about natural phenomena and count some phenomenon to have been explained when we have discovered the nature of the object in question *and* the natural laws according to which objects of that kind behave. The coherent use of our understanding depends on this use of reason, because the security of the immediate judgments we make, such as 'the fire burned the wood', or 'the water extinguished the fire', does not merely

depend on having empirical criteria for subsuming objects of intuition under empirical concepts such as fire, wood, and water. These concepts themselves must be related to each other, and to other concepts, in systematic ways such that it is neither obviously false (contradictory) to make these claims nor trivially true (analytic). That is, if we did not think of fire, wood, and water, in terms other than the mere criteria according to which we identify them, we would not know to take the judgment 'the fire burned the wood' to be one that is likelier to be true than the judgment 'the wood burned the water' or 'the water burned the fire', and, thus, to be a more promising provisional assessment of some actual state of affairs. We also would not think that anything other than actually seeing the event that is described in this way would entitle us to make any judgments concerning the possible, likely, or certain truth of the claim.

Without the kind of coherent use of the understanding that this system of empirical concepts makes possible, we would not know what synthetic judgments could be tested, and what would qualify as an empirical confirmation of some synthetic judgment about an actual state of affairs or about the actual cause or causes of some regularly observed phenomenon. Accordingly, Kant believes that the presupposition of the systematic unity of nature is a transcendental condition for the possibility of synthetic a posteriori cognition of the *order of nature*. It is importantly different from other transcendental conditions, however, in that it is not itself a priori knowledge concerning the objects of experience. By reference to the intuitions of space and time and the categories, we can have knowledge of the formal aspects under which these objects will have to appear to us and the formal laws to which these objects will have to conform in order to be parts of the synthetic unity of experience. The principle of continuity as it relates to the alterations in time and to the totality of empirical intuitions in space provides a priori constraints on what kinds of suggested rules can be taken to be laws of nature. The rational *principle of the continuity of nature*, however, is not a principle that directly concerns the necessary relations between the changing states of natural substances. It is, rather, a principle that concerns these relations indirectly through its focus on the unity of the manifold divisions in nature between the

discrete classes of entity that remain the same through, and that provide explanatory grounds for, these changing states.

All our reason can provide a priori concerning the actual unity and diversity of these material conditions for the possibility of systematic empirical cognition of nature are subjective maxims that it is necessary for us to follow, if we aim to have any empirical cognition that can qualify as scientific. Because of its relation to the empirical sciences, it has seemed to some that this principle is both *suggested* and *verified* by our experience. Because of the necessity with which reason demands that we make use of it, it seems to others that the principle is suggested by experience but that it can be determined to be objectively valid a priori. Kant himself seems to have been of this opinion in the *OPA*, in which he argues that the unity and harmony that we discover in nature is presupposed by the essential characteristics of bodies in space and that this provides a better basis on which to ground natural theological reflections than is the unity and harmony characteristic of plant and animal species, which is contingent with respect to bodies *as such*. Kant accepts there that Maupertuis has proven the principle of least action in his *Essay on Cosmology* (1751) and, thus, that the laws of motion have a necessary relation to “appropriateness, beauty, and harmony”.⁸¹ Kant believes these laws can be known to apply with necessity to all of the various different kinds of matter, because they follow from the conditions for the possibility of conceiving of the physical basis, or the real grounds of possibility, for the extension and impenetrability that provides the logical essence or empirical criterion for all bodies. Thus, although the existence of matter is something that is contingent in itself, and can be known to us only through experience, the most general laws that govern corporeal nature can be cognized a priori, or according to their antecedent material grounds, and we can know that the laws that govern particular kinds of matter will also of necessity be in accord with the principle of least action.

⁸¹ 2: 99

Kant believes that these facts about the *order of nature* are best understood by reference to the view of God as the all-sufficient material ground of the possibility and existence of the variously natured beings that we come across in nature. The view of the *CPR*, as it turns out, is not all that far removed from the view of the *OPA*, despite the fact that Kant has lost all confidence in our ability to have cognition of God's existence according to the a priori grounds of the necessity of this existence. The principle of continuity, together with the indeterminate schema provided by the same idea of God developed in the *OPA*, is what provides the ground for a merely formal or speculative teleological approach to the unified *order of nature*. The problem with dogmatic approaches to the *order of nature* is not that they make appeal to the *law of the continuity of nature*, or that they reflect on nature from the standpoint of theological interests or convictions. It is, rather, that they cannot explain how we *can*, and so merely insist that we *do*, have a priori certainty concerning how many powers and substances, or how many kinds of power and substance, are required to ground the *order of nature*.

The more promising direction to go with this principle, in Kant's view, is to claim that it is objectively valid a priori, but only in an indeterminate way and only with respect to our understanding of nature. The *unity* of nature that we think through the idea should not be confused with *numerical identity* and the manifold of distinct varieties of things in nature should not be assumed to be *beyond any number*, or infinite; i.e., the principle does not allow us to answer the questions 'how many substances exist in nature?', 'how many causal powers are active in nature?', or 'how many laws govern interactions in nature?' in any of the determinate ways that the mathematically minded rationalist and empiricist metaphysicians in the modern period have.⁸² This, I think, is one of the central things that Kant means in claiming that the principle is indeterminate, i.e., it is not prejudicial concerning what in particular *could* account for

⁸² This is the 'all or nothing' approach to reason that both Kant and Leibniz work to avoid, but that ends up becoming the legacy of idealism in Germany. (See Franks [2005]) The unity that is represented by reason in ideas is not something that ignores differences that are potentially relevant in other contexts, which the unity of concepts certainly does, nor is it a unity that requires homogeneity, as the unity of intuition does.

the unified manifold of various objects in nature, as a priori commitments to monism, materialism, spiritualism etc. so often appear to be. These are reductive approaches to unity that are understandable enough as hypotheses, but that appear to be largely contradicted by experience and, for the most part, unnecessary from the standpoint of a priori theoretical considerations. The appeal to ideas, as analogues of schema of sensibility, enables a view of unity that is indeterminate a priori with respect to the manifold of possible entities and relations that will be met with as *unified within* this nature. In this sense, it is similar to the unity represented by the understanding in a concept, which is indeterminate with respect to how many individuals can be subsumed under it. The idea, however, allows us to maintain the view that it is a single entity, or a truly unified manifold, in which these entities and relations are to be met with, rather than an aggregation of really distinct things that happen to agree in some respect or that are unified externally or artificially by a representation that abstracts from the real differences that distinguish between them.

Kant thinks that the genuinely interesting thing about the idea of the systematic unity of nature is that it clearly does present us with a set of logical principles for our hypothetical attempts to unify our empirical knowledge, but it is just as clear that it would be contrary to the end envisioned by the use of these principles, if the general and particular distinctions we make and the unities we posit through their use were merely artificial distinctions and conventionally accepted unities.⁸³ The *logical* use of reason in dividing, comparing, and seeking unity in nature seems to presuppose a transcendental principle, yet no object can ever be given in experience that would satisfy the conditions represented in the ideas of natural elements, of fundamental powers, and of natural species of plant and animal.⁸⁴

⁸³ A 651/B 679

⁸⁴ We will see in Chapter 4 that Kant believes the peculiarity of the idea of a *natural end* is that, although no object can be given that is adequate to the standard, empirical objects are given, i.e., members of species of plant and animal, that are subject to the standard, which appears to provide objective validity for the concept.

We cannot simply forsake these ideas, in Kant's view, because they provide the formal elements that enable us to develop a system of empirical concepts, but we also cannot provide the same kind of deduction for these ideas that we can provide for the a priori concepts of the understanding (the categories). We can, however, secure the objective reality of principles of reason, not as forms of judgment that determine the objects of our experience, but as forms of judgment for determining the matter that is provided by our empirical cognition of these objects. The ideas of reason can be justified as subjective principles that stem from our representation of the needs of the understanding with respect to experience.

Our understanding requires concepts in order to make judgments, and concepts are discursive representations of a manifold of things through characteristic marks that are common to these things. Accordingly, if there is too great a difference between things in nature for us to discover common characteristic marks, or if there is too little difference between things in nature for us to distinguish one thing from another in thought, then we will not be able to generate empirical concepts through which we can make judgments that determine the objective characters of and relations between sensible objects.⁸⁵ It is not any objective insight into how nature has to be *per se* that leads us to presuppose that if we keep looking we will find principles of unity for things that are given in nature as diverse, and that we will find further diversity amidst the things we take to be unified. Rather, it is the subjective needs of the empirical use of our understanding that leads us to presuppose that there *is* an objective *order of nature* that we can uncover through careful observation and through the formulating and testing of hypotheses.

This is the real source, according to Kant, of our a priori commitment to the principle of the continuity of nature, or to the principles of manifoldness, affinity, and unity. These principles do not concern the continuity of *natural change*, which actually provides a constitutive principle for the empirical use of the understanding.⁸⁶ Rather they are principles that concern the regular

⁸⁵ A 657/B 685

⁸⁶ For a discussion of the status of the principles in the *CPR*, see Watkins [2001]

arrangement of the *natural forms* that remain through, and provide grounds of explanation for, these continuous changes. For example, the hypothesis that between two given species of animal there is likely a third species whose members resemble the members of each of these species more closely than these members resemble each other, is not based on an objective principle that we can derive a priori from insight into the conditions for the possibility of a world in general. Nor is the hypothesis that some given object in nature is composed of the same kind of substance that other objects in nature are and that the differences between these objects can be reduced to different determinations of this one kind of substance.

These hypotheses are based on the acceptance of synthetic a priori principles, the universal form of which can appear to guarantee that when we fail to find what we are looking for (relevant differences between apparently similar things, or principles of unity for apparently distinct things) in nature, it must be merely some contingent feature of our understanding, or of the current state of our knowledge, that explains this failure. Kant's point in the 'Appendix to the Transcendental Dialectic' seems to me to be that it may only be because of contingent features of our understanding that we are constrained to look for these things in the first place, and to presuppose that the possibility of a natural world requires that they be given prior to our looking for them.

If we did not have the particular requirements of discursive cognition that suggest to us principles for *unifying* our empirical cognition, such as '*entities are not to be multiplied beyond necessity*' and '*varieties of entity are not to be diminished rashly*', it might not even occur to us to think that a world in which there are real gaps between natural species and a real multiplicity of fundamentally different kinds of thing in nature is somehow *less perfect* than one in which there is absolute continuity between forms, each of which is also distinguishable from every other by reference to some discursively specifiable characteristic. Kant appears to be agreeing with Leibniz that the latter world would be the best of all possible worlds as long as the criteria for the greatest extension of the *transcendental use* of our understanding were the criteria for the

perfection of a world. Although we have no compelling reason to identify these, no doubt, divergent criteria, we hardly have any reason to reject the use of these principles, since it has always been the *end* to be achieved by their use, and not any intellectual grasp of their necessity, that has led thinkers, like Leibniz, who are genuinely interested in investigating the *order of nature* to adopt them.

The actual utility of these principles, however, requires that they be adapted to the empirical use of our understanding. Thus, their actual use can appear to involve inconsistencies with the pure versions of these principles, or with other mutually limiting principles, on which one might focus in arguing dialectically against the view of someone who makes use to them. Recognizing the subjective source of the need to make use of these principles, Kant believes, should have the effect of mitigating the potential difficulties that arise if we take them to be objective principles. Near the end of the first section of the ‘Appendix to the Transcendental Dialectic’, Kant writes:

If merely regulative principles are considered to be constitutive, they can be antagonistic as objective principles; however, if one considers them merely as maxims, there is no real antagonism, but rather merely a varying interest of reason, which causes the parting of ways of thinking. Reason in fact has only a single interest and the conflict of its maxims is only a difference and mutual limitation of the methods for satisfying this interest.

This is how it comes about that the interest of manifoldness (according to the principle of specification) enjoys a better status with this sophisticated thinker, while the interest of unity (according to the principle of aggregation) does with that one. Each believes themselves to make a judgment from insight into the object, but actually grounds it solely in the greater or smaller attachment to one of the two rules, neither of which rests on any objective grounds, but rather on the interest of reason, and thus could be better referred to as maxims than as principles. When I see insightful men in conflict concerning the characteristic of human beings, of animals or plants, and even of bodies of the mineral realm, where some, for example, accept particular characters of peoples based on their descent or even definitive and hereditary differences in families, races, etc., others in contrast fix their minds on the claim that nature has set up exactly the same dispositions in these parts, and that all difference rests simply on external contingencies, I need only take into consideration the character of the object in order to grasp that it lies too deeply hidden for both for them to be able to speak from insight into the nature of the object. It is nothing other than the two-fold interest of reason, where each party takes to heart one interest or the other, or affects to do so, and thus the difference of maxims of natural manifoldness, or of natural unity, which allow themselves to be unified quite well, but as long as they are taken to be objective insights, they cause not only conflict, but also obstacles that delay the discovery of the

truth, until some means is found to unify the conflicting interest, and to satisfy reason in this regard.⁸⁷

Given what we have seen thus far, in this chapter and in previous chapters, I believe it is no stretch to interpret this last paragraph as a report of the disputes in which Kant himself is involved in the 1770s concerning the unity of the natural species of human beings and concerning more general issues in physical geography, anthropology, physiology and natural history. Kant's own view represents a serious effort to combine the commitment to unity with the respect for the phenomena of manifoldness that he refers to here. That is, he argues for the unity of the natural species through attributing to its members a common nature, in which there is an identical set of dispositions, the development of which is occasioned by environmental factors that variously hold back or require this development in individuals. He also accepts that there are particular characters of peoples, families, races, etc., that are more than merely constructs of our imagination or our systematizing spirit. These differences have grounds in the same generative power of the species that explains the unity of the species, the ability of its individual members to adapt themselves to the requirements of their environment, and the capacity of these individuals to produce viable offspring with others members of the same species.

The presumption of a common nature with an identical set of dispositions does not require the view that each individual is, at some point in their development, identical to every other individual at that point in their development, and that all differences are the result of external influences on their subsequent development, e.g., the imagination of the mother while the child is in the womb, or the effects of climate and culture on the developing child.⁸⁸ It can mean that the same causal nature is active in the generation and maintenance of each individual from other individuals, and that since these other individuals are already members of peoples,

⁸⁷ A 666-7/B 694-5

⁸⁸ In the eighteenth century there were a variety of suggestions concerning what could explain contingent resemblances between individuals. Maupertuis' work on the inheritance of contingent characteristics is likely to have had an effect on Kant's approach to these issues. For a discussion of his views, see Gasking [1967]

families, and races, the particular dispositions within the species that are already developed in these groups are passed along according to various empirically discoverable laws. Kant sees that there is good reason to occupy the ample theoretical space between the view that each individual is a causally isolated monad that develops according to a nature unique to itself and the view that all individuals of the same species are identical according to their inner grounds and all differences are due to external causes. His more general views on natural causality involve rejecting the pre-established harmony involved in the former view, and the latter appears to be less able to deal with the empirically given regularities involved in hereditary and environmental variation within interbreeding populations than is Kant's own.

Kant does not claim superior insight into the nature of the objects in question, so much as he possess a peculiar insight concerning the theoretical issues that one cannot avoid simply by declaring ones allegiance to an empiricist program in the sciences. It may seem more consistent with what we observe to claim that all individuals of the same species are identical to one another at some point in their development, because we can find no grounds for distinguishing between the contents of one egg and those of another immediately after they are laid. Alternatively, it may seem more consistent to claim that all individuals have their own unique nature because we can never find two adults of the species who agree in all observable characteristics. Presuming that we adopt this program in order to learn about how nature works, however, we likely would not stick with pure versions of either of these views for long. Differences emerge between seemingly identical individuals in seemingly identical environments in regular ways that cannot be ignored, and commonalities emerge and are maintained through generations that do enable us to some degree to identify familial and geographical affiliations of individuals within the species. The maxims of manifoldness and of unity are clearly, in Kant's view, subjective principles that all systematic investigations of nature are required to make use of, even if some of the individuals and groups involved in these practices are prone to emphasize or privilege one or the other. In his own view of natural species and of hereditary and environmental grounds of differentiation

between its members, Kant hopes to be unifying the conflicting interests in unity and in manifoldness in a way that satisfies our reason in this matter.

As we will see below, Kant is clearly unsuccessful in unifying conflicting parties to eighteenth-century disputes concerning natural species. He will find it necessary to return to these specific issues, and to clarify his own understanding of the proper use of ideas of reason in natural philosophy in response to Herder's work on the history of humans several times in the 1780s. In this relation, the passage immediately following the one quoted above is of central relevance.

The same is the case in relation to the acceptance or denial of the famous law of the **ladder of continuity** of creatures that was introduced by Leibniz and supported admirably by Bonnet, which is no more than a pursuit of the principle of affinity that is based on the interest of reason; for observation and insight into the constitution of nature certainly could not provide this as an objective assertion. The rungs of such a ladder as they are given to us in experience stand much too far apart from one another, and our putatively small differences are commonly, in nature itself, such broad gaps that on the basis of such observations (especially in a great manifold of things, where it must always be easy to find certain things that resemble and approach one another) absolutely nothing is to be counted as an intention of nature. Then again, the method of seeking order in nature according to such a principle, and the maxim to take such an order, although indeterminate where or to what extent, to be grounded in a nature in general is by all means a legitimate and admirable regulative principle, which, however, as such goes well beyond what experience or observation could match, without determining anything, but rather only sketching out the path to systematic unity.⁸⁹

Taken literally, the idea that there is a *ladder of continuity* in creatures, or a *great chain of beings*, entails that between any two natural forms there is a third natural form that resembles each of these more closely than they resemble each other. The version maintained by Leibniz is tied to his view concerning the perfection and intelligibility of the world. It involves the claim that no two finite beings are identical in all respects but differ solely in number, and that the differences between these beings are differences in their perfection or their degree of reality.⁹⁰ Thus, all finite beings can be arranged on a scale according to their degree of perfection. Because

⁸⁹ A 668/B 696

⁹⁰ AG 214

of considerations stemming from the principle of sufficient reason, there cannot be any assignable degree on this scale to which no existing thing corresponds. Accordingly, just as between any two numbers there is a third whose value is closer to each than theirs are to one another, between any two existing things, there is some third thing between them on the scale of perfection.

From the standpoint of the natural historian, this means that there are no wholly separate distinct orders, genera, or species in nature. What we are prone to take as breaks within the *order of nature* (such as between minerals and plants, and between each of these and animals) do not represent genuine differences in kind such that, e.g., any two minerals will resemble each other more closely than either resembles a plant.⁹¹ Instead of adopting the traditional distinctions between these three kingdoms and then arranging individuals or species within each according to how closely they resemble each other, one could, instead, arrange all individuals or all species in nature on a single scale according to resemblance relations. This is often done in the eighteenth- and nineteenth-centuries in such a way as to envision an ascending order of complexity (unity amidst diversity = perfection) from relatively simple natural forms in rocks and minerals, to more complex crystals, to relatively simple plant forms such as moss and grasses, through more complex plant forms to relatively simple animal forms, all the way up to the human being.

Although the idea is an essentially descriptive one that provides an outline for arranging the order of representation of natural variety in compendia of natural history, early views of species transformation tended to be based on historicizing the *great chain of beings* and envisioning the history of nature in terms of the generation of ever more complex forms from simpler forms. There is somewhat of a tension involved in taking this idea in both the descriptive and the historical senses, of course, because whatever principle guides the historical progression from less perfect forms to more perfect forms must be such that it works selectively in leaving some rocks, some minerals, some crystals, some mosses, some grasses, etc. behind as it moves on to the generation of more complex forms. Just as importantly, and this is one of the points Kant

⁹¹ For a discussion of the ‘Scale of Diversity’ in eighteenth-century natural history, see Larson [1994]

is making above, despite the fact that nature is arranged in such a way as to have provided us with the opportunity to form such hypotheses about the arrangement of individuals within species, species within genera, etc., the same nature also provides ample evidence that alternative hypotheses may be correct, as e.g., the view that minerals, plants and animals constitute really distinct realms.

That we can meet with some success in arranging natural forms on a continuum, Kant believes, is next to inevitable, given the sheer multitude of different things that are to be found in nature. There is no real reason to believe, however, that all natural forms can be arranged in this way, or that there really are no significant breaks or leaps between them. Moreover, if we are going to talk about what nature intends, i.e., if we are going to discuss providence, teleology, or natural perfection, then the continuity of natural forms does not seem to Kant to be the best basis upon which to do this. The idea of the causal self-sufficiency of the *order of nature*, or the unbroken chain of natural causes, is a better standard of perfection for the world than is either the comparative or the transformationist version the idea of the *great chain of beings*. The idea that the efficient-causal nexus of nature involves arrangements that serve as means for the achievement of ends, such as the arrangement of organs within animal bodies functioning to serve its ends,⁹² and the provisions within the species for individuals to adapt to and survive in various climates as is consistent with the end of the survival of the species, is the regulative idea on the basis of which teleological judgments ought to be made, in Kant's view. The principle of the continuity of nature is a regulative principle that provides us with the outlines of a system into which our empirical cognition of the variety of, and affinity between, natural forms can be placed. The purposiveness that we represent through this principle, however, is the agreement between nature and the requirements of our understanding. These, however, are not the requirements that Kant believes provide the basis for a genuinely teleological conception of nature.

⁹² A 688/B 716

3.6: Kant and Herder in the 1780s

In his reviews of the *Ideas*, Kant criticizes Herder primarily for the imaginative flights that are necessary to fill in the gaps in his hypostatization of the idea of a *great chain of beings*. Rather than using this idea, as a tool for seeking real efficient-causal connections and discovering empirical laws that can serve in the formation of well-grounded hypotheses concerning historical origins, Herder takes the injunction to seek unity in nature as warrant for forcing a particular conception of historical and ontological unity on nature. One aspect of this approach is Herder's adoption of the view of *epigenesis* provided by C. F. Wolff. Kant claims to be in agreement with Herder concerning the rejection of *pre-formed germs* in accounts of the generation of organized bodies, but only if these *germs* are understood as previously existing mechanical structures. If these *germs* are thought of simply as inexplicable self-imposed limits on the organizing activity of the organic force (*i.e.*, if they are conceived of dynamically rather than mechanically), then according to Kant one not only can, but must, make use of them in an epigenetic account of the generation of *individual* organized bodies from other organized bodies. These very limitations, however, preclude us from the kinds of claim about the ultimate origins of particular species of organized being, and about the historical transformation of matter through the various stages in the *great chain of beings* that Herder provides in his *Ideas*.

If we grant to a single organic force the capacity to generate each individual organic form in nature, from crystals all the way up to human beings, then we are left with no way of understanding *why* or *how* this force forms the particular being it does in any given case. One interesting feature of the unity amidst diversity observed in the organic realm, however, is that plants and animals reproduce the general form of the species generation after generation, always with slight variations in new individuals, and in such a way that some of these variations endure

through subsequent generations, while others do not.⁹³ In his review of Herder, Kant is not simply taking a former student to task for disagreeing with his own ideas. He is pointing out that Herder's speculations, suggestive and interesting as they may be, are of little or no *use* for sorting out and explaining the features of nature that are most relevant to the debate concerning the *generation* of organisms. If, as Kant also maintains, well-grounded *classifications* and scientifically respectable hypotheses concerning historical origins rely on the discovery and use of genuine causal connections, grounded in forces that generate effects in accordance with discoverable natural laws, then Herder's speculations are of no real use here either.

Kant suspects that this aspect of Herder's work can be explained by the fact that Herder's ambitions are not really scientific; *i.e.*, his real aim is to use the work of physiologists like Wolff to lend an air of credibility to his view that the death of the organic body is not the death of the individual. Herder sees this death, rather, as a transformation through which the soul that animates the human body in the physical world continues on as pure spirit. Herder's work does not appear to present any genuine challenges to Kant's views concerning natural history that Kant has not already addressed in the works of the 1760s and 1770s or in the *CPR*. The popularity of what Kant clearly does not take to be a philosophically respectable work in an important and growing area of natural philosophy, to which Kant has been contributing for thirty years, and to which it is known that Kant himself introduced Herder, however, provides an understandable motivation for Kant to reiterate and defend his own views in this review and in subsequent essays.⁹⁴ What is more, the use of claims about the permanent activity of forces as support for the spiritual nature and immortality of the soul represents a rejection of one of the central claims of

⁹³ This is one general line of criticism that von Haller advances against the epigenetic theories of both Buffon and C.F. Wolff. Kant's agreement with this criticism explains why he insists that there must be some kind of internally imposed limits on the formative force or drive, if this force is to be genuinely explanatory of the generation of a particular kind of organic structure. The criticism, as we will see below, applies with equal force to Herder's view, which depends centrally on the views of Buffon and Wolff.

⁹⁴ The dispute between Kant and Herder is not limited to theoretical issues, so in addition to the *Determination of the Concept of a Race* (1785), the essays *Idea for a Universal History from a Cosmopolitan Point of View* (1784), *Conjectural Beginning of Human History* (1786), and *What is Orientation in Thinking* (1786) are also relevant to this discussion.

the *CPR*, namely, that we cannot know the soul as a purely spiritual substance and use this knowledge as a basis for a theoretical demonstration of its immortality.⁹⁵

The request that he review the *Ideas* in a newly established literary journal, thus, provides Kant with a public platform in which to distinguish his own views from those of Herder and to argue for the superiority of the former.⁹⁶ He also takes the opportunity to assert the importance of internal restraints on the activity of certain powers or forces as necessary for rendering the products of this activity suitable for particular ends. In Herder's case it is the imagination that must be constrained through "logical exactness in the determination of concepts" and "careful distinguishing and testing of principles",⁹⁷ if his thinking is to be rendered suitable for scientific discourse. In the case of organized beings, the formative activity of the forces at work in generating the structures of the body must be constrained through *germs* and *predispositions* if the body is to be rendered suitable for the way of life characteristic of a particular species of organism. Thus, in the review Kant defends the version of the *germ theory* that he makes use of ten years earlier, in the essay 'On the Various Races of Humans', and for which he provides a general philosophical grounding more than ten years before that in the *OPA*.

As I have argued, this theory plays an essential role for Kant in providing an ontological grounding for Buffon's *viable offspring* criteria of membership in a physical or natural species, while rejecting Buffon's own account of how these offspring are produced. Kant's own *germ theory* allows him to maintain the view that a natural species of organism is a unified line of descent of interbreeding individuals, which is the view of species on which a proper natural history (*Naturgeschichte*) of organisms is grounded for Kant. The descriptive and comparative conception of a logical species, as a set of individuals sharing a common characteristic (or set of

⁹⁵ This is the basic claim of the section 'On the Paralogisms of Pure Reason'. For a comprehensive discussion of the arguments of this section, see Ameriks [1982, 2000].

⁹⁶ Kant was asked in July of 1784 to make some contributions to the newly established *Neue allgemeine Literaturzeitung*. His review of the first part of Herder's *Ideas* appeared in one of its first issues in January of 1785. For a discussion of Kant's several activities during this time and of the context of the debate with Herder, see Kuehn [2001].

⁹⁷ 8:45

observable properties), is used in what Kant calls natural description (*Naturbeschreibung*). The classifications formed on this basis can be used as starting points for discovering the particular forces and laws explanatory of the common possession of such a characteristic, but in and of themselves they are merely logical groupings.

Because Buffon's empiricism involves a notion of *physical truth* that is reducible to spatio-temporal series of observable states of bodies, he cannot move beyond mere description of regularities to causal explanation. Although his descriptive system of nature is not the same as the logical system of Linnaeus, it is not really any more of a natural classification than is the latter. Moreover, since Buffon denies any legitimate role for reason in investigating nature, he undermines the possibility of the very empirical knowledge of physical truth that he claims is the basis for a genuine natural history. Herder's views in the *Ideas* have the advantage that they do not rely on the account of generation offered by Buffon, but they have the disadvantage that they combine the transformism of Buffon with the equally problematic view of generation offered by C. F. Wolff.

If the idea of the *great chain of beings* that serves as the basis for transformism is used *problematically* as a tool for comparative anatomy, then Kant thinks it is a benefit for the sciences. If this idea, however, is taken as a *fact* about nature that is discovered through observation and that warrants positing a force that is capable of explaining this fact, then we are merely playing with *ideas*. The troubling irony of such a procedure is that it mimics the procedures of genuine science. It pretends to be grounded in observation and sober reflection, and claims to overcome the pernicious influence of *a priori* reasoning in areas that deal with substantive matters of fact. The actual procedure, however, involves a dogmatic interpretation of what it is that one observes and commitments concerning the forces and entities that are capable of explaining these 'facts' that can only be *a priori*, since they go beyond what experience could ever justify.

Just as we do not observe organic molecules aggregating and ordering themselves, or perfectly non-organized matter being transformed into organic structures, we also do not observe mere matter being transformed into crystals, crystals into plants, plants into animals, and lower animals into human beings. If we did observe such a thing, we might be justified in positing an organic force that unifies the series of changes that such individual things undergo. As it is, we observe similar processes in distinct kinds of things, speculate concerning the possibility that these similarities could be explained as the result of gradual transformations, without any knowledge concerning whether or not such transformations are even *really possible*, and then claim that we have to posit a force that renders necessary what we have merely *assumed* is actual. The forces and matter that serve as the first principles in the accounts of all of these thinkers are, in Kant's view, *invented* as causes that explain effects that we do not observe, but that these thinkers insist have to be the case. Try as they might to distance themselves from speculative metaphysics, each of them tries to explain what we do not observe in terms of processes that we cannot understand. Herder in particular is guilty of two illicit moves from Kant's perspective:

H1) The move from considering *logical* relations of resemblance between forms in nature, guided by the idea of a *great chain of beings*, to the positing of a *real* continuous progression of material beings through grades of complexity and perfection from the simplest forms of rocks to the most complex and perfect of visible, earthly forms; namely, the human form.

H2) The move from this view of the continuity of visible natural forms, to the claim that there is a similar continuity among invisible beings, that human beings represent the transition from material to spiritual beings, and that, accordingly, humans can expect to survive the destruction of their bodies.

These claims lead Herder to a highly speculative ‘natural history’ of organized beings that is more reminiscent of the metaphysics criticized in the *Dreams* essay than of the empirically grounded inquiry into the natural causes of unity and variety in nature that Kant himself sees as proper natural history. Further, the causal force behind Herder’s *great chain of beings* is a single organic force that exists independently of the matter it organizes, forms organic creatures, and then is active through the various organs of those creatures. It is on the basis of the varying manifestations of this single force through the various organs that are characteristic of differing levels of organization that creatures are grouped into various taxa; *i.e.*, into genus, species etc. Because the same force at work in organizing the matter is also responsible for carrying out the functions characteristic of its organs, there is no difference in kind between the generation, growth, and maintenance of organized beings. Accordingly, Herder rejects the need for any kind of *preformation* in explaining the generation of individual organized beings or the reproduction of parts of these beings.

In previous chapters, the position denying that the generation of an organic structure and its further growth and development are discrete processes has been referred to as *epigenesis*. This position is generally contrasted with a range of views that hold there to be a real difference between the processes involved in the formation of an organized structure and the processes involved in its unfolding and functioning and are, accordingly, referred to as *preformation*. Although, according to this characterization, Herder’s position should be called *epigenesis*, he himself rejects this title. Instead, he claims that the generation of organized beings is not an epigenetic process, but a *genetic* one. What Herder intends here is to underscore his disagreement with theories of *mechanical epigenesis*, like those offered by Maupertuis and Buffon. The generation of an organized being, in Herder’s view, does not involve simply the spatial rearrangement of previously existing material parts caused by the interplay of vitalistically conceived motive forces characterizing these discrete parts. Thinking of it as such involves thinking of the parts as ‘growing from without’ through a process of mechanical aggregation.

What actually occurs, in Herder's view, is that forces, which are ultimately independent of the organs through which they work in the visible world, form a previously formless mass *from within* into an organized structure that becomes the tool for the exercise of these forces in the visible world. If such forces do exist and are capable of working in this way, then mechanical versions of *epigenesis* (which provide a mechanistic account of the gradual emergence of organic structures in a previously undelineated mass) and both *pre-existence* and Haller-Bonnet *germ* theories of *preformation* (which claim that such structures only appear to emerge gradually, but are previously formed though not yet visible) are mistaken in their claims. Given Herder's agreement with the basic position of *epigenesis*; namely, that organic structures are actually generated successively in an apparently undelineated mass, it seems fair to count his theory as epigenetic, with the important qualification that his version is dynamic, or even vitalistic, rather than mechanical.

Herder's claims about the manner of operation of the vital force involved in the epigenetic generation of organisms elicits from Kant a response that proves informative for understanding Kant's own view. Specifically, Kant agrees with Herder's view that we should understand and explain the observed effects involved in the generation of organisms in terms of non-mechanical natural forces that work to organize matter, and that we cannot explain these as merely the effects of the size, shape, and motion of material parts. We should also treat the generation, functioning, and repair of damaged parts within an individual organic body as continuous processes grounded in the exercise of natural forces. Kant's own view requires two crucial restrictions, however.

The first is that, given the origin of our conception of these forces in empirical observations of organized beings, we must limit our claims concerning the efficacy of these non-mechanical organizing forces to the visible organic realm. We cannot claim that they are prior to and responsible for the original organization of matter, since we have no experience of their efficacy, save in bodies that are already organized and/or are produced by other bodies that are

already organized. The second is that, in order to meet the criteria involved for an explanatory ground of the phenomena we actually observe, these forces must work in such a way as to bring about particular kinds of organization; *i.e.*, a single organizing force alone cannot explain why in certain cases the result of the organizing activity is a horse, while in others it is a chicken, in others a fish etc.

It is in explaining the continuity of form within a particular type of organized being that Kant finds it necessary to make reference to a *generative force* specific to a species of organized being, and to the *germs* and *dispositions* that he discusses in the earlier essay on *Races*. In his review of Herder's work, we see Kant more clearly distinguishing his own version of the *germ theory* from mechanistic ways of conceiving of it. Kant clearly does not conceive of these *germs* and *dispositions* as previously formed structures, like buds awaiting a mechanical stimulus to unfold, but rather he conceives of them as self-imposed limitations on the organizing activity of the organic force. As I argue in Chapter II, I think the best interpretation of Kant's earlier essay on *Races* requires attributing this same view to him already in 1775. If I am right about this, then in the review of Herder's *Ideas* Kant is defending his earlier view and making it clear that despite the fact that 'no eye has ever seen such *germs*', there are scientifically respectable grounds for positing them.

A look at some passages from Kant's review provides us with a sense of the substantive disagreements between Kant and Herder. Just as importantly, however, it should also provide a sense of the substantive agreements between them that make calling attention to how they differ so important for Kant. Both of these aspects are informative for appreciating Kant's expression of his views on organisms and teleology between the first and third *Critique*. In the first two passages below and the beginning of the third, Kant summarizes Herder's use of the idea of a *great chain of beings*, and then the bulk of the third passage represents his criticism of this use. There are several points worth noting. Most generally, as noted above, Kant takes Herder's aim in this work to be a proof of the immortality of the human soul that bases itself on 1) the

apparently ascending order of natural forms from least perfect to most perfect, and 2) the permanence of force. Herder takes the human form to be the end, goal, or *schema of perfection* for natural forms, and other forms to be more perfect the more closely they approximate this form. Within nature, the *great chain of beings* is a continuous scale of complexity and of value, with the highest value assigned to human beings as the ends of nature.

The following passage from Kant's review of Herder's *Ideas* is largely Kant quoting from Herder in summarizing the latter's view. I reproduce it here because it is illustrative of several of the key points on which the two disagree. The particular approach Kant takes to the use of teleological principles within natural philosophy in the *CTJ* is an attempt to provide a more careful assessment of the actual role that teleology plays in the practices of physiologists and natural historians, and of the reasons for the need to posit a fundamental power of nature in accounting for the laws of organic phenomena, than Herder provides. Kant's perception that there is a need for him to do so, in defense both of his critical philosophy in general and of his particular views concerning physiology and natural history, stems from views such as this.

“From stones to crystals, from these to metals, from these to plants, from there to animals, finally to humans we saw the form of organization rise, and with it also the forces and drives of the creature become more diverse until all of them finally unify themselves in the form of the human, to the extent that this form can comprehend them....” “Through this series of beings we noticed a similarity of basic form, that progressively approximates the form of humans—and at the same time we saw the forces and drives approach him. – With every creature the length of life was also determined according to the end of nature, which is to be advanced. – The more organized a creature is, the more its structure is composed from the lower realms. The human is a compendium of the world: lime, earth, salt, gases, oil and water, forces of vegetation, of irritability, of sensation are organically unified in him. – Through this we are led to assume in addition an invisible realm of forces that stand in the same relations and have the same transformations, and an ascending series of invisible forces, just as there is in the visible realm of creation. – This is of the greatest importance for the immortality of the soul, and not for this alone, but for the continuation of all efficient and living forces in creation. Force cannot perish, though the implement can be destroyed. What is called into life by the universal animator, lives, what acts, acts eternally in its eternal connections.” These principles are not analyzed, “because here is not the place for that.” Meanwhile “we see in matter so many forces similar to spirit, that a complete antithesis and contradiction between these two certainly very different beings, of spirit and of matter, if not itself a contradiction, seems at least completely unproven.”

As we have seen above, Kant believes that the rational idea of natural continuity is intrinsically linked to the process of generating hypotheses concerning the powers combined in the natural substances whose regular mode of activity in nature we are aware of through its effects in experience. Experience of this regular activity means empirical cognition that particular observable states of substances follow other particular observable states according to a rule, which requires appeal to natural laws of continuity in the alteration of the observable states of sensible objects. There is, for Kant, an important difference between the law of continuity of *natural change* in the state of enduring substances with enduring empirical characters and the principle of the *great chain of beings*, which is a claim about the continuous progression in nature from one kind of substance to all other kinds of substance. Herder takes similarities between the observable forms of natural substances to be evidence of a historical progression of continuous changes in nature from one form to another. This, in itself, is a largely speculative hypothesis.

It is not a matter of making judgments concerning the necessity of observable states of substances as effects that follow from prior observable states according to particular natural laws. Nor is it a matter of forming and testing hypotheses concerning the relations between the natural powers of a substance that give rise to these particular laws according to the idea of a fundamental power. It appears, rather, to be a completely general hypothesis that is formed by taking the idea of continuity between the characters of natural substances, which is an ideal tool for descriptive classifications of the *order of nature*, as an actual *description* of the present state of affairs in nature, which then requires an explanation by reference to the continuity of natural change. The direction of this change is then thought to be from lesser states of perfection to greater states of perfection, which is understood, in general, as unity amidst diversity and, in the particular context of natural forms, as the human form. Accordingly, not only is the idea of the *great chain of beings* hypostatized as a description of the present state of nature, but the particular form of the human being is taken to be the end at which the historical progression of forms is aimed.

Herder then takes this historical progression in the order of natural forces, which again is a speculative hypothesis, to be the fact that provides evidence for a similar progression in forces whose effects are not observed in the natural world. Kant believes he has identified Herder's real interest, and that it has little to do with natural history in the sense of Buffon's universal and particular natural history or Kant's own work in natural history. Natural theology is Herder's real purpose in looking to the *order of nature*. This is understandable enough from Kant's perspective, but he believes that theological presuppositions in the practice of natural history render the results achieved entirely ineffective as natural theology. No real service is done, either to natural philosophy or to theology, by the view of a natural world that is merely a means to some other end, that is imperfect but improving, or that could not function in the way it does if not for the constant influence of supernatural powers.⁹⁸

The next passage is, once again, largely Kant quoting from Herder. Here we see an expression of the basic aspects of Herder's view of generation that Kant finds objectionable, for obvious reasons, and that will provide one of the significant targets of his treatment of organisms and teleology in the *CTJ*.

– “No eye has seen pre-formed germs. When one speaks of an epigenesis, one speaks improperly, as if the parts grew from without. It is formation (genesis), an effect of inner forces, for which nature has prepared a mass, which they form for themselves so that they can make themselves visible. It is not our rational soul that forms the body, but the finger of divinity, organic force.” Now it is said: “1. Force and organ are internally connected, but are not one and the same. 2. Every force acts in harmony with its organ, since it formed and assimilated itself to the same in order to reveal its being. 3. When the husk falls away, the force remains that previously existed, although in a lower state and likewise organic but nevertheless before the husk.” The author then says to the materialists: “Let it be that our soul is originally identical with all the forces of matter, of irritation, of motion, of life, and simply works at a higher level in a more developed, finer organization; has one then ever seen even a force of motion and of irritation perish, and are these lower forces one and the same with their organs?” It is maintained that the relation between these forces can be one only of progression. “The human race can be

⁹⁸ This is not a new point for Kant, who stresses throughout his writings that natural philosophy can be a propaedeutic to theology, only if it actually testifies to the perfection of the world. Otherwise, there is no way that one can infer to the perfection of its ground.

seen as the great confluence of lower organic forces, that are supposed to germinate in him to the formation of humanity.”⁹⁹

Here is part of Kant’s response:

What should one think about the hypothesis of invisible forces that effect the organization, and thus of the attempt to explain what one does not understand through that which one grasps even less? We can at least come to know the laws of organization through experience, although the causes remain unknown; concerning invisible forces even all experience is taken from us, and what can the philosopher then present for the justification of his pretext except the mere despair of finding the information in any knowledge of nature, and the decision to seek it in the fertile fields of the power of poetry? This remains, in fact very dogmatic, metaphysics, despite how much the author, as the fashion requires, disowns it.¹⁰⁰

By ‘invisible forces’, Kant appears to be referring to the realm of forces that Herder believes exist and act prior to organizing bodies. These forces are then active in nature though the bodies that they organize, and they continue to exist and act after the death of the organized body. Kant is committed to the view that all of our knowledge concerning forces is derived from our empirical cognition of the regular connection of effects in nature that follow from them. What the beings or substances that possess these forces may be in themselves is unknown to us, but through our knowledge of the laws grounded in the exercise of their forces, we can at least justify an indeterminate appeal to them as causes of given effects. When we take away the effects that we can experience, however, we take away the only thing that would allow any non-arbitrary appeal to them at all. The representation of a substance that is active through forces that have no observable effects is a merely empty concept for us. The fact that it does not contain a contradiction is irrelevant to the consideration of whether there could ever be any legitimate appeal to such a substance.¹⁰¹

If the ‘finger of divinity’ that forms organized bodies so that it can reveal itself is something that is active independent of any known or knowable laws, which it must be if it is

⁹⁹ 8:49-50

¹⁰⁰ 8: 54

¹⁰¹ A 222/B 269

active prior to the point at which it begins to have observable effects, then the appearance that we can at least have empirical cognition of the laws of organization must be false. The poetic determination of the unknown cause of organic generation as a spiritual substance undermines the possibility of the knowledge of generation that is possible for us. According to a relatively uncontroversial usage of the term, claiming to derive the observable changes in bodies directly from the activity of an unobservable ground is doing *metaphysics*, and dogmatic metaphysics at that. Thus, Kant appears to be wholly justified in calling attention to this and in claiming that his agreement with Herder that we would better served in physiology and natural history by not mixing in metaphysics is a good reason to reject Herder's view.

In addition to the topics discussed above, Kant's review indicates the belief that Herder has the order of thoughts concerning the hope for immortality backwards. Herder's approach not only undermines the idea of the unity of the natural world that provides the first principles of judgment for our theoretical use of reason, but it also undermines the idea of the unity of the moral world that provides the first principles of judgment for our practical use of reason. If we look to how nature actually treats non-human animals as a source of material for our analogies, we see that the individual is not the benefactor of nature's providence. It is the physical species that is preserved through change and that approximates the ideal of perfection, while the individual organic body is merely a relatively distinct member of the continuous spatio-temporal series of states unified by the *generative force* that is the essential form of the species.

The *great chain of beings* would not be a stepladder for the ascent of an individual from one level of perfection to the next highest, and then to the next highest, *etc.*, even if it did represent a fact about the order of nature. That is, if polyps are in fact 'crossovers' that undermine our idea that plants and animals are wholly distinct kingdoms, this does not mean that an individual plant is transformed into a polyp, and then into an animal. All it means is that the individual members of some physical species of organism have features at some stage in their development that are taken to be characteristic of plants and some features that are taken to be

characteristic of animals. This is a claim about the sufficiency of the *characteristics* used in making higher order classifications for forming discrete classes, and not about the capacity for individuals that are subsumed mediately under these class concepts to be transformed from one species, genus, or class to another. An individual's progression through the various stages of life, even in cases where the transformation seems to be as radical as that from a caterpillar to a butterfly, is a progression through the stages of life characteristic of an individual of a particular physical species. The only thing even remotely resembling individual immortality is the similarity in appearance that future generations of offspring may have to individuals of previous generations.

Along the path of analogies formed from natural philosophy alone, there is no ground for hope in individual immortality. There is also, according to Kant, no reason to think that the human form is the end towards which all other physical forms strive; *i.e.*, that it is somehow a schema for the perfect organization of a body that all other natural bodies approximate. Nor is there any reason to think that there is an invisible realm of forces, or a realm of forces in addition to those that relate substances to their effects in the sensible world. As Kant has maintained since the 1760s, the theory of spirits is neither *suggested by* nor is it any *use for* our knowledge of the workings of nature. The genuine source of ideas of the kind that Herder pretends to glean from non-human nature in the *Ideas* can only be our conception of ourselves as rational beings, and our thinking about the conditions for the realization of our ends as such, according to Kant.

Kant's own view of natural teleology, as we have seen, is based in the idea of provisions made by nature, and virtually preformed in the generative force that grounds the unity of a natural species of organism, which allow individuals of these species to develop particular characteristics that are suitable for surviving in the various different environments in which these species occur. Differences between individuals of the same species, and between groups of individuals of the same species, result, in Kant's view, from the interaction between these purposive pre-dispositions and environmental factors that function as selective mechanisms determining which

of a range of characteristics possible for members of the species will be exhibited by particular members. Over extended periods of time and through a number of successive generations, groups of interrelated lines that inhabit the same regions of the earth begin to exhibit somewhat fixed sets of characteristics, that distinguish their members in recognizable ways from the members of other groups of interrelated lines of descent within the same species.

Kant proceeds according the maxim that whatever characteristics are such that they are ‘taken up into the generative force’, or are passed on from generation to generation in sexually reproducing beings, are not mere effects of external circumstances on the (supposedly) identical original disposition of *each individual member* of the species, but are developments of originally purposive predispositions within the *nature of the species* that are occasioned by the environments in which individuals develop and become fixed within particular lines of descent over time. This means that the common possession by groups of individual members of the same natural species of a set of identifiable characteristics that is *contingent* from the standpoint of the species, but that also *endures* through successive generations, provides us with more information about the branch on the ‘family tree’ from which these individuals are likely to have come than it does about the specific regions on the earth in which they are likely to have developed. As a result, heredity, or causal factors *intrinsic* to the species, takes precedence over environment, or causal factors *external* to the species, in explaining the particular combination of characteristics exhibited by its individual members, though it does so in a way that maintains a necessary reliance on these external factors.

These particular combinations of characteristics are *contingent*, from the standpoint of the general concepts under which these individuals are subsumed, but they are also presumed to be *necessitated*, according to natural laws that govern the generation and functioning of organic bodies with particular natures in particular environments. What is more, they are also generally *purposive*, both materially and formally. Materially, these characteristics are in accordance with the needs of the individual as defined by reference to a standard provided by the natural end of

the preservation of the species in various environments. Formally, these characteristics accord with *our* cognitive need to orient ourselves towards the manifold of empirically discovered natural forms and empirical laws of nature through the use of the principle of ‘unity amidst diversity without detriment to variety’. Further, they allow us to do so through causal hypotheses concerning the real grounds of this particular kind of systematic unity, rather than by appeal merely to comparative and logical classes, or by appeal to external, artificial, or accidental variations on identical themes.

By attending to these considerations and to the passages provided immediately below, we can begin to see why the controversy with Herder leads Kant to the subsequent recapitulation of the theory of generation offered in the essay ‘On the Various Races of Humans’ (1775) in the essay ‘Determination of the Concept of a Race of Humans’ (1785), and why the criticism of this essay leveled by Förster would lead Kant to compose an essay clarifying his own procedure in appealing to teleological principles in the essay ‘On the Use of Teleological Principles in Philosophy’ (1788). This sequence of events appears to me to provide much of the context without which the text of the *CTJ* remains largely obscure, and Kant’s most interesting contributions to the life sciences remain largely unnoticed. The following passage is from Kant’s review of the second part of Herder’s *Ideas*:

The division of the human species into races is not congenial to our author, primarily that division that grounds itself in hereditary color, presumably because the concept of a race is not yet clearly defined for him.

In the third part of Book VII, he calls the cause of the climactic difference of humans a genetic force. The reviewer understands the authors intentions with this expression as follows: He wants to reject the system of evolution, on the one hand, and also the mere mechanical influence of external causes, on the other, as unsuitable grounds of explication. He then assumes a life-principle, which modifies itself internally according to the difference in external circumstances in a way that is suitable for them. In this, the reviewer follows completely, except with the proviso that, if the internally organizing cause were limited through its nature to a certain number and degree of differences in the formation of its creature (after the arrangement of which it would no longer be free to build according to another type in changed circumstances), one could certainly call these natural determinations of formative nature *germs* or *original dispositions*, without thereby thinking of germs as originally implanted and simply occasionally unfolding machines

and buds, but as simply limitations that cannot be further explained on a self-forming capacity that we can just as little explain or make graspable.¹⁰²

Here is the statement of Kant's view concerning the *virtual* preformation of characteristics in the *generative power* that he thinks observation of the specific kinds of regularities in organic nature require us to posit. The key difference between Kant and Herder involves how we are to understand the phrase 'modifies itself internally according to the difference in external circumstances in a way that is suitable for them'. Herder's model appears to be one in which the life-principle spontaneously modifies the particular body in order to suit *it* to a particular environment, by representing the environment in which the body is to live and acting on the matter of the body. This action occurs independently both of any 'mechanical influence of external causes' and of any internal constraints on the exercise of this power. If this is the case, from Kant's perspective then the effects of this activity, which are clearly supposed to be in material nature, are effects that follow from a power that is not of a material nature, and they follow in *accordance with* circumstances in material nature, but they are not subject to any laws of material nature.

Organized bodies are, thus, not only products of artifice, but they are products of a kind of artifice with which we are not at all familiar. We are familiar, through the inner sense, with the effects in nature of beings that are of a thinking nature (souls), and with the effects of the powers we attribute to such beings to bring about changes in the state of an organized body (voluntary motion), to have their own state changed by externally generated changes in the state of this body (sensory awareness), and to use this body as a tool for manipulating other bodies in their environment (artificial/technical intervention). We do not, however, have any kind of experience whatsoever of beings that are wholly independent of material nature (spirit), let alone of beings of this kind that also have the power to form matter. It is not clear that we could ever have anything even resembling empirical warrant for claiming that the phenomena of organic generation and of

¹⁰² 8: 62-3

purposive variation within species are explained in this way. There are clearly other sources from which one might derive these ideas, and other purposes one might think are served by their use, but their connection to physiology and natural history is more than merely tenuous, it would seem.

A different interpretation of the phrase ‘modifies itself internally according to the difference in external circumstances in a way that is suitable for them’ can be given by thinking of the *generative power* as active, in *connection* with other natural forces, according to internal limits on the variations in form that it can produce in the matter of the bodies to which it is attributed. The effects of this activity are a mutual fit between organism and environment, which is a relation that we judge to be:

- 1) *Good*, by reference to the idea of the self-preservation of the species of which the organism is a member as a natural end,
- 2) *Actual*, because of the efficient-causal interaction between the generative power in each of the parent organisms that contribute to the ‘mixed matter’ from which the individual organized body is generated and the natural powers of other bodies in the environment,
- 3) *Possible*, by reference to the idea of purposive predispositions within the causal nature of the species and the mechanical influence of external causes that selects between these in such a way that the contingent characteristics that are conducive to the survival of individuals in various climates are produced and passed on from generation to generation according to natural laws.

Kant does not claim that we can have any insight into the inner real grounds of the possibility that we represent in 3), but he does think that it at least admits of an analogy with causal powers with which we are familiar and that we know to be active in nature. The analogy with our own artificial interventions in the *order of nature*, not primarily with machines that we construct for particular purposes, but with the *artificial selection* through which we produce hybrid plants and breeds of dog that exhibit characteristics we deem to be desirable provides us with an, albeit somewhat distant, analogy with the powers through which nature works. This also, incidentally, provides us with an opportunity to formulate and test hypotheses concerning

the natural powers and natural laws to which these processes are subject, from which we can develop theories concerning the causal bases for and the causal histories of species of plant and animal. The theory Kant develops on the basis of his understanding of the descriptive and experimental approaches to physiology and natural history involves a commitment to realism concerning the natural species, as an entity in nature that consists of causally active members (plants and animals), that themselves consist of causally active members (systems of organs), both of which are lost and replaced regularly while the species endures. This forms the context for the following passage, also from Kant's review of the second part of Herder's *Ideas*:

A second proposition to be defended would be this. On page 212 it says: "If someone were to say that not the individual man, but the kind is brought up [*erzogen*], he would be speaking incomprehensibly to me, since kind and species are only general concepts except in so far as they exist in individual beings. – As if I were to speak of animalness, of stoneness, of metalness in general and outfit them with the grandest of attributes, which however contradict each other in singular individuals! – along this path of Averroist philosophy our philosophy of history shall not stroll." Of course, whoever says 'no single horse has horns, but the species horse is horned' would be uttering an absurdity. For, in this case, species means no more than the characteristic mark in which all individuals must agree with each other. If, however, the human species means the entirety of an unending (indeterminable) series of generations (as this sense is quite common), and it is assumed that this series continuously approaches the line of its determination [*Bestimmung*], which runs alongside it, it is not a contradiction to say that in all its parts, the series is asymptotic to this line and yet, in the whole, it meets it, in other words, that no member of all of the generations of mankind fully achieves its determination, but that only the species does. The mathematician can provide elucidation here; the philosopher would say that the determination of mankind in the whole is unending progress, and the completion of this progress is a mere idea, though in all respects a useful one, of the end towards which we must direct our efforts in accord with the intentions of providence.¹⁰³

In this passage, Kant addresses one of the central points of contention between himself and Herder concerning the natural history of human beings and the proper way in which to conceive of natural, political, and moral progress towards our ends. Here is not the place to go into the details of this particular dispute, which are directly relevant to the development of Kant's practical philosophy in the 1780s, and are also significant for the overall argument of the *CTJ*.¹⁰⁴

¹⁰³ 8: 65-6

¹⁰⁴ The discussion of a natural end, an end of nature, the final end of nature, etc., in the *CTJ* directly concerns the dispute between Kant and Herder concerning the particular sense in which one can say that

Most interesting for my purpose are the general points about natural species that this passage makes. First, there is the distinction between a *species concept*, as a representation of a characteristic mark in which all members of a logical class of things agree, and a *natural species* as an unending or indeterminable series of generations. The former, for Kant, is something that occurs within a scholastic system of concepts that is suited to being an aid for memory, whereas the latter exists in nature. Our representation of the natural species is an idea, which no individual member of the series can, in principle, instantiate adequately. Nonetheless, it provides us with a standard for making judgments about the members of this series.

In this particular case, Kant has in mind judgments concerning the end that nature has in store for the species, how nature in general and our human nature conspire towards this end, and how we must use our freedom in order to realize the social and political conditions most conducive to the flourishing of the human species in nature.¹⁰⁵ The last consideration provides a significant distinction between the practical and theoretical approaches to natural history for Kant, but the general model for considering the natural history of a species is the same for the human species as it is for other natural species. It merely happens to be the case for Kant, as it was for Rousseau,¹⁰⁶ that one of the capacities virtually pre-formed in the human species is the capacity for rational self-determination, in virtue of which we can and must take responsibility for following and instituting laws of freedom to which we are also subject. In this one particular our species is importantly different from other species in nature, but the model of natural teleology that Kant uses as a guide for investigations in natural history appears to be essentially the same.

human beings have a privileged status in nature. Although there are some very interesting issues raised there, I will not go into them in the present work.

¹⁰⁵ This is the topic of the essay *Idea for a Universal History from a Cosmopolitan Point of View* (1784).

¹⁰⁶ The capacity for self-perfection is part of the ‘mechanism’ through which natural man is forced to leave the state of nature, according to the view of the *Discourse on the Origins of Inequality*.

The ‘Averroist’¹⁰⁷ aspect of Kant’s view of natural species and of the use of teleological considerations in natural history has escaped the notice of many interpreters of the *CTJ*, as has the specific view concerning organic generation that Kant begins to develop in the 1760s. Defending these views involves him in a series of public disputes concerning fundamental issues in natural history in the 1780s. I believe it also provides the motivation for Kant to provide a transcendental critique of the teleological power of judgment in the *CTJ*, in which Kant defends a substantive view concerning the model of organic causation necessary for transforming plant and animal physiology and natural history into explanatory disciplines.

The conditions that Kant believes must be placed on any acceptable epigenetic account of generation reflect once again Kant’s concern to provide a coherent conception of a physical species as a single line of descent, and to distinguish this conception of a species from the purely logical one that is used in arranging natural objects together under titles according to outward similarities. The same considerations concerning a physical conception of the species, and the need to invoke the theory of germs in accounting for the continuity of form within a species of sometimes widely varying individuals dominate the essay ‘Determination of the Concept of a Race of Humans’. In this essay, Kant continues to defend the monogenetic theory of human origins against polygenetic views by claiming that the former provides better explanations *both* of the ability of humans of different races to have fertile offspring together *and* of the fact that the traits of these offspring are mixtures of the traits characteristic of the races from which the parents stem. He relies on his dynamically conceived germ theory to support this monogenetic theory and to ground the physical conception of a species that is relevant to natural historical questions.

¹⁰⁷ Averroes is a medieval Islamic commentator who interprets Aristotle as denying individual immortality to the rational soul in humans. Herder appears to be accusing Kant of the same in this context, i.e., he is saying that the species cannot be infinite (immortal), if each individual is finite (mortal). Kant can, and as we see in previous passages does, claim that he was under the impression that the discussion was one concerning natural history, and that as far as experience goes, nature does not seem to be concerned with what we think of as individual members of what appears as a continuous series of generations in the life of the species.

These germs are thought to be part of the nature of the species or the physical counterpart of the logically conceived essence; i.e., they are inner grounds of the common characteristics to which we appeal in forming class concepts, but they are also grounds of features of individual members of these classes that are contingent from the standpoint of these general concepts, yet are common enough as to lead us to form concepts of *varieties* and *races*. In coordination with external grounds in the environment, these germs are responsible for the development of traits that are conducive to survival in the particular environment in which the individual develops. The apparent ‘fit’ between organized beings and the areas of the world that they inhabit is a relation that is thought of as purposive, in the sense of being in harmony with or in accord with the ends of the organized being. The efficient causes of this ‘fit’, however, are natural, in the sense that the fit arises from the interaction between the organized being (*qua* individual with a determinate nature) and the environment. Explaining this fit naturally, according to Kant, requires that we think of the original organization of the relevant species as intentionally aimed at producing this fit and as involving germs that give rise to appropriate characteristics in the appropriate environment.

The conception of a natural history of organized beings that Kant lays out in this essay, together with the conception of a species as a single line of descent and the conception of germs as inner grounds of the development of purposive characteristics, comes under attack by an advocate of the polygenetic theory of human origins, Georg Föster. In two papers published in the *Teutsche Merkur* for 1786, Föster disputes Kant’s distinction between *Naturgeschichte* and *Naturbeschreibung*, and especially the emphasis that Kant places on the former. According to Föster, if natural history is concerned with classifying beings according to lines of generation and descent, then it is a science that is fit only for gods and not for men.

In an effort to defend both his distinction between *Naturgeschichte* and *Naturbeschreibung* and his account of the generation and maintenance of order in the organic realm, Kant composes the essay ‘On the Use of Teleological Principles in Philosophy’. In this

essay, we get Kant's clearest statement of the link between organisms and teleology prior to the third *Critique*. The basic claim in defense of judging the possibility of organisms teleologically is that not doing so would require us to invent a fundamental force or power that blindly organizes matter in purposive ways. According to Kant, however, inventing fundamental forces provides a license for reason to explain whatever it wants in whatever way it sees fit. Thus, in order for us to couch our explanations in terms of natural powers that experience requires us to posit, and whose action we can conceive of as at least roughly analogous to that of powers that we already know are active in nature, we have to think the cause that provides the ground of systematic unity for species of organized beings as active through intellect and will.

Although he does not mention them by name in this context, Kant is almost certainly referring to attempts like those of Herder and Wolff to explain organic generation by appeal to an organic force, or an essential force, respectively. These are fundamental forces that are claimed to operate in ways very different from the ways in which any other forces known to us operate. Wolff's essential force is claimed to work without intention and without tools, i.e., in the absence of any physical structure or mechanism through which it is active, and to be alone sufficient to explain the generation of purposive organic structures in a previously unformed mass of matter. Herder's organic force is similar except that it appears to be a life force that fashions the machine-like structure of organs in order to suit matter for use as a tool for its expression in nature. Kant's main criticism of these views is not that the forces posited operate in ways different from other forces with which we are familiar. The notion of a fundamental force is one that carries with it the notion of this kind of activity. The main criticism is that they are invoked as explanations of effects that we cannot be sure actually occur in nature.

Kant ends this essay with what is perhaps the clearest expression of the basic outlines of his position on organisms and teleology prior to the *CTJ*. The first of the following passages provides an outline of what I take to be the central claims of the 'Dialectic of the Teleological Power of Judgment' and the first few §§ of the 'Doctrine of Method of the Teleological Power of

Judgment'. The second passage provides the basic nominal definition of an organized being from which Kant proceeds in the 'Analytic of the Teleological Power of Judgment', discusses the important constraints on our license to posit fundamental forces, and then suggests what Kant believes to be the only fruitful way of *thinking for ourselves* the kind of activity involved in the real ground that accounts for the natural phenomena of organization:

The very same principle "everything in natural science must be explained naturally" at the same time points to the boundaries of the principle. For one arrives at its outer boundary when one makes use of the last among the grounds of explanation that can be secured through experience. Where these grounds leave off and one must start to appeal to fabricated powers of matter according to laws that admit of no confirmation, one is already beyond natural science, even if one continues to refer to natural things as causes, while attributing to them powers whose existence cannot be proven in any way, and the very possibility of which is difficult to make conformable to reason. Since the concept of an organized being already carries with it that it is a matter in which everything stands to each other as end and means, which can be thought of only as a system of final causes, and thus only the teleological mode of explanation, and in no way the physical-mechanical mode, remains available at least for human reason: physics cannot ask about the ultimate origin of all organization. The answer to this question, if it is at all approachable for us, would obviously lie outside of natural science in metaphysics. For my part, I derive all organization from organic beings (through generation) and later forms (of these kinds of natural thing) from original predispositions according to laws of gradual development (the likes of which are often met with in the transplanting of plants), which were to be met with in the organization of their line. Determining how this line itself came to be is a task that lies beyond the bounds of any physics that is possible for humans, in which bounds I believed it necessary to constrain myself.¹⁰⁸

Now, the concept of an organized being is this: that it is a material being, which is possible only through the mutual relation of everything that is contained in it as means and end (every anatomist as physiologist actually begins with this concept). A fundamental force, through which an organization would be effected, must accordingly be thought as a cause working according to ends, and in such a way that this end must be laid at the ground of the possibility of the effect. We cognize a force of this kind according to its determining ground in experience, however, only in ourselves, namely, in our understanding and will, as a cause of the possibility of certain products that are completely directed towards ends, namely, works of art. Understanding and will are fundamental powers, of which the latter, to the extent that it is determined by the former, is a capacity to bring something forth in accordance with an idea, which is called an end. Independently of all experience, however, we should not fabricate a new fundamental power, the likes of which those would be that work purposively in a being, but without having their determining ground in an idea. Thus, the concept of a capacity of a being to work purposively from itself, but without any end and intention that lay in it or its cause—as a special fundamental power, of which experience gives no example—is completely fabricated and empty, that is, without the least guarantee that an object could correspond to it. So, whether the cause of

¹⁰⁸ 8: 178-9

organized beings be met with in the world or outside of it, we must either refrain from all determination of its cause, or think for ourselves an intelligent being; not as if we (as the blessed Mendelssohn believes with others) had insight into the impossibility of such an effect from another cause: but because we would have to invent a fundamental power in order to lay at its ground another cause that excludes final causes, to which reason has no right, since it would then be no trouble to explain everything that and how it wants to.¹⁰⁹

In the first of these passages, we see Kant distinguishing between the questions to which we can legitimately expect an answer from natural philosophy and those that require an appeal to metaphysics. Questions concerning the natural laws according to which plant and animal bodies are generated from other plant and animal bodies can be answered from the standpoint of natural philosophy, provided we make the appropriate assumptions concerning the empirical character of the natural beings we are investigating. Our natural philosophical investigations come to an end when we have exhausted the tools that experience provides us for explanations. Our experience leads us to consider organized beings as systems of means and ends and it does not provide us with any tools for deriving purposive systems from anything more fundamental. It also does not, however, provide us with any reason to believe that such purposive systems cannot be generated from other purposive systems according to natural laws. Thus, although we cannot provide a physico-mechanical explanation of the ultimate origin of organized beings from some other kind of being, we can explain the generation of organized bodies from other organized bodies.

The commitment to a real natural distinction between organized beings and other kinds of being in nature requires and warrants an appeal to a fundamental power that, unlike those appealed to by Wolff and Herder, is conceived of in terms of its regularly observable effects in nature and according to an analogy with a power that we are certain is active in nature; i.e., our own understanding and will. Kant's position is really pretty interesting here. The claim is not that the cause responsible for the purposiveness of organized beings is one active through understanding and will. The claim is, rather, that if we take into account the peculiar character of

¹⁰⁹ 8: 180-2

organized beings, as systems of means and ends, we would have to *invent* a fundamental power in order to think the fundamental power responsible for organized beings independently of the analogy with our own understanding and will. The general ban within the natural sciences on appealing to any powers that are not revealed to us through their effects in experience leads, in Kant's view, to the necessity of thinking the fundamental powers responsible for plant and animal generation as if they were aimed at this generation through an idea.

We cannot be certain that powers that effect means-ends relations between material parts, like those we observe in organized bodies, *without* being determined to their effects through ideas are even possible. We might be able to argue that there is no contradiction in the conception of such a power, but natural philosophy needs more than that in order to rely on some suggested power as a tool for explanation. There are any number of non-contradictory concepts that are not legitimate scientific principles. We can argue that there are other fundamental powers of nature that we do not need to think of as active according to ideas, but that would miss the point, because we are interested in the fundamental powers that generate means-ends relations between material parts within physical systems. If we are interested in providing causal explanations of the generation and functioning of organized bodies that do not refer to occult powers, in Kant's view, we are required to think of the powers responsible for the possibility of organized beings as active according to ideas. This claim, together with the claim that inherent to the very concept of a natural end is the limitation of its status to that of a regulative principle for the reflecting power of judgment, will provide the basis on which Kant argues in defense of his own original views concerning the physiological basis for a natural history of species of plant and animal in the *CTJ*.

Chapter IV: Organisms and Teleology in the *Critique of the Power of Judgment*

Introduction

In previous chapters, I have drawn attention to the importance of the project in natural history that Kant commits himself to from his earliest writings onward for understanding the particular way in which he approaches the study of organisms and the use of teleology in natural philosophy. The project of transforming natural history from a primarily descriptive enterprise into one that investigates the natural laws according to which unity and diversity are generated and maintained is one of Kant's earliest interests, and it is one that remains central to his thinking through both his pre-Critical and Critical periods. In the 1760s and 1770s, Kant develops his own interesting positions within eighteenth-century debates concerning the precise way in which to reconcile the broadly mechanistic approach to cosmology and general physics that dominates the modern period with phenomena, such as those of organic generation and functioning, to which the methods of mechanistic science are recognized to be ill-suited. By rejecting fairly common presuppositions concerning the ontology of material nature, Kant is able to develop a theory of organic generation that avoids many of the difficulties encountered by the germ-theory of preformationism and the mechanical theories of epigenesis that are prevalent in the middle of the eighteenth century.

His own theory remains generally preformationist, though it is the natural species, rather than the individual plant or animal body, that is presupposed by the process of generation. The causal nature of the species is active through each of its potentially inter-breeding members in generating, maintaining, and restoring the unity of each of these organic systems as required by the self-preservation of the species. Self-preservation provides the natural *telos* of the species and our use of teleological judgments in natural scientific investigations of organisms is primarily a

matter of taking the nature of the species to involve a set of predispositions for the initial development and the subsequent inheritance of characteristics that render individual members of its various inter-breeding populations better suited to the requirements of self-preservation in the particular geographical areas in which these populations are found. These groups exhibit characteristics that are *contingent* from the standpoint of the essence of the species, they contribute to the *perfection* of the species, and they are generated in *lawful* laws that depend both on hereditary and environmental factors.

Kant's particular causal view of natural species and the general view of natural history with which it is internally connected involve a use of ideas of reason in making judgments concerning nature that is considered questionable by some of his contemporaries. There is no doubt that the controversies concerning natural history in which he is involved in the 1780s provide the central motivation for Kant to compose a *Critique of the Teleological Power of Judgment*, and it is fairly clear to me that the text of that work is an elaboration and defense of the strategy for investigating the organic world that Kant develops in the 1760s and 1770s, and grounds in a very general way in the 'Appendix to the Transcendental Dialectic'. In the final section of the previous chapter, we saw that both general methodology in natural history and particulars concerning the theory of organic generation are central points of dispute between Kant and Herder. We also saw that two of the central issues Kant addresses in the essay *On the Use of Teleological Principles in Philosophy* are the distinction between *Naturgeschichte* and *Naturbeschreibung* and the warrant for positing a specific kind of fundamental power of nature to account for organic phenomena. In this chapter, I will show the importance that addressing both of these issues has for Kant's conception of the *CJ* in general, and for the argument of the *CTJ* in particular. Seen in the context of his effort to develop and defend a unified approach to physiological and natural historical explanations of contingent order in nature, Kant's *CTJ* is not merely an historically and philosophically interesting reflection on the peculiarities of biological explanation. It also presents a generally plausible plan for securing the explanatory autonomy of

the life sciences without undermining a commitment to the unity and self-sufficiency under natural causal laws of the natural world, whose various parts and connections are investigated in general physics, in physiology, and in natural history.

As we will see, the specific role Kant assigns to the teleological power of judgment emerges out of some interesting changes to the approach he takes to the *law of the continuity of nature* in the *CPR*. This law becomes the central principle of the autonomously reflecting power of judgment, which appears to take over one of the roles that Kant assigns to reason in the first part of the ‘Appendix to the Transcendental Dialectic’. That is, the presupposition that nature specifies itself into the form of a system, the outlines of which we can reproduce through the empirical concepts that are required for a coherent use of the understanding (i.e., concepts of genera, species, varieties etc., of natural object), becomes the *principle of the purposiveness of nature for our cognition*. This is the principle according to which we make aesthetic judgments of reflection, which are based on a subjective feeling of pleasure that accompanies the same interaction of our cognitive faculties that leads to the development of empirical concepts. It is also the principle of teleological judgments, which are cognitive judgments that take some of these empirical concepts and reflect on the natural powers responsible for their objects according to a standard provided by our idea of a system of means and ends.

In the second part of the ‘Appendix to the Transcendental Dialectic’, Kant discusses teleology only as a method for judging objects according to a principle of “the highest formal unity”. This method provides a supplement to our investigation of the efficient causal nexus of nature through an appeal to final causes, as if these were the intentions of a highest intellect. Although he claims, at the beginning of his discussion of ideas in the *CPR*, that “a plant, an animal, the regular arrangement of the world’s structure (and thus presumably also the entire order of nature) show clearly that they are possible only through ideas”¹, the focus in the ‘Transcendental Dialectic’ of the *CPR* is on the role of the pure transcendental ideas (God, the

¹ A 317-8/B 374

world, the soul) as the a priori *formal* contribution made by reason to our theoretical cognition of the *order of nature*. We reflect on natural arrangements according to the law of the continuity of nature *as if* the whole of nature were the result of the intentions of a highest intellect, without pretending to derive anything in nature from the presumed determining grounds of such an intellect. There, as in the *OPA*, the legitimacy and utility of appeals to a supernatural ground of the perfect *order of nature* comes through their role in allowing us to take observable cases of unity and harmony as following from the essences of the natural beings under consideration in accordance with natural laws.

In the *CTJ*, Kant focuses on the empirically based distinction between objective purposiveness that is merely formal, such as that displayed by the “regular arrangement of the world’s structure (and thus presumably also the entire order of nature)”, and objective purposiveness that is material, such as that displayed by plant and animal bodies. Although judgments concerning both of these bring reason’s idea of an end into play, it is only the latter that require us to judge their possibility in relation to a natural end. Accordingly it is only our experience of the objective features of plant and animal bodies that justifies our appeal to a fundamental power of nature that is genuinely different from the powers of nature that are responsible for mechanically aggregated bodies, which are conducive to our end of systematic cognition, and the powers of nature that are responsible for systems that do not themselves have the character of ends. Thus, in the *CTJ*, we see a view that more obviously involves the distinction that Kant makes in the *OPA* between the *necessary order of nature* and the *contingent order of nature*.

This does not appear to me to be the result of any substantive changes to his view concerning organisms and natural teleology, however. The *CPR* is a work primarily concerned with our a priori cognition of nature according to what follows with necessity from the formal conditions for the possibility of experience. The *CJ*, in contrast, is a work primarily concerned with the principle that we make of use in judging the contingently given matter of our actual

experience. If I am right, the substantive aspects of his natural philosophy that allow for the general reconciliation of mechanism and teleology found in the *OPA*, and that provide the background against which he develops the view of a natural species of organism presented in the 1775 essay *On the Various Races of Humans*, have not changed significantly since the early 1760s. What has changed a great deal between then and the 1790 publication of the *CJ* is the transcendental theory of experience that provides the basis for Kant's particular approach to questions of justification.

The argument of the *CTJ* is intended to establish that, although 'organized' is a *contingent* determination relative to the essence of *body*, it is a *necessary* determination relative to *plant* and *animal bodies*. These observable cases of unity and harmony in nature apparently cannot be thought to follow from the essences of natural bodies according to natural laws, and thus *seem* to require that we accept one or another unacceptable hypothesis concerning the causal origins of purposive arrangements in nature. The appearance that leads to this seeming need to adopt one of these alternatives can be avoided, however, if we resist the common tendency to think of the essences of natural bodies in two related ways, namely, 1) as descriptions of the absolute character of some independently existing things-in-themselves, and 2) as unified by reference to a genus of existing things that becomes divided up into species such as 'mineral', 'plant', and 'animal'. The result of these tendencies is to think of 'extension' and 'impenetrability' as the ontological basis of whatever other, more specific, characteristics are referred to in the class concepts that we use to identify natural bodies as individual members of general kinds.

Kant seems to be wholly correct in maintaining that we have every empirical ground to deny, and only suspect theoretical grounds to insist, that plant and animal bodies are generated and maintained merely through the aggregation of extended and impenetrable units of matter. If we choose, nonetheless, to maintain that the matter of bodies is a self-subsisting entity that is characterized by extension and impenetrability, then the particular forms that characterize plant

and animal bodies would have to be due either to principles that exist entirely outside of nature, or to some other immanent principles that act on this matter. The latter option is the one that anyone interested in natural philosophy would take, but it does not actually help save the unity of nature, since this supposedly immanent principle would have to be a power that is able to penetrate the essentially impenetrable matter of bodies in forming them *from within* in ways that suit them to being functional members of the systems in which they are found. Including plant and animal bodies in the causal *order of nature* requires both attributing to nature a fundamental formative power that grounds the essential organization of plant and animal bodies (Analytic) and denying that the particular plant and animal bodies, and the matter of which they are constituted, are independently existing entities (Dialectic). Transcendental Idealism allows us to conceive the possibility of what experience reveals to us is actual, but our reflection on experience towards the end of unifying empirical laws can often lead us to believe is impossible.

The tendency to think of the essences of natural bodies according to 1) above results, in Kant's view, from an amphiboly in the concepts of reflection that leads us to take the matter-form combination represented in a priori judgments concerning bodies to be one in which 'extension' and 'impenetrability' are essential components unified by an essential form. The tendency to think of these essences in terms of 2) above results from taking the *law of the continuity of nature* to require that all natural substances are merely various modifications of the essentially identical matter of bodies. Taken in this way, the perfectly sound maxim of judgment that the understanding provides for the reflective power of judgment becomes unsound in light of the phenomena of organic generation and maintenance. That is, this maxim requires that we reflect on the generation of material things and their forms, i.e., on *alterations* in the observable state of the matter of bodies, from the standpoint of the presupposition that this process is possible according to the most general laws of mechanics. If the physical interpretation of these mathematical laws requires that all alteration in the observable state of a body be a change in location of the observable parts of the body (relative to one another, relative to other bodies, or

relative to absolute space) that is caused by the moving force of some body external to the parts undergoing the change, then we cannot do in the particular case of plant and animal bodies what is required by our reflecting power of judgment.

This would mean, however, that plant and animal bodies provide us with a demonstration that turns the maxim for reflection provided by the autonomous power of judgment into an objective principle of nature. That is, it would not simply be the case that some products of material nature cannot be judged according to the standards of mechanism provided by the sensibly conditioned human understanding. Rather, it would have to be the case that the principle grounding the possibility of these products could not possibly be one that exists or is active within the *order of nature*. The kind of causality *from within* that is required of whatever cause is responsible for forming plant and animal bodies is inconsistent with natural change being exclusively the *externally caused* changes in location of the parts of bodies. Accordingly, the *de facto* mechanical inexplicability *for us* of the possibility of organized bodies is taken as the necessary mechanical inexplicability *per se* of purposive arrangements in nature. This *per se* mechanical inexplicability is taken to warrant the objective principle that the generation of some material things is not possible according to merely mechanical laws.

The question then becomes ‘what is it that must be assumed *in addition to* mechanical laws in order to account for the objective and material purposiveness of nature that is demonstrated by the existence of plant and animal bodies?’ Epicurus offers us *the swerve* that interrupts the regular motions of atoms, which leads to the development of complex and purposive bodies within the mechanically explicable *order of nature*. Spinoza denies that there are *products* of material nature, which is a merely passive *natura naturata* that results necessarily from the infinite extension of the active *natura naturans*, and claims that the relation of all corporeal beings to one another through their mutual inherence in the divine substance secures the purposive relations between members of the mechanically explicable *order of nature*. In opposition to these views, the hylozoist and the theist argue that there is a need for intentional

activity in addition to mechanical laws in order to account for the purposive unity of existing bodies in nature. The hylozoist claims that that relation to ends of plant and animal bodies is due to the principle of life that inheres in nature in general (world soul), or in the matter of these bodies, and animates the mechanically explicable *order of nature*. The theist appeals to an original being outside of nature that grounds the possibility both of the mechanically explicable *order of nature* and of the relation in which this order stands to the ends of organized beings.

The presupposition that the principle required to supplement the mechanically explicable *order of nature* must act either *unintentionally* or *intentionally* leads to the four positions mentioned above. The being that provides the ontological ground of the purposiveness of nature has to be, according to its matter, either *material* substance or *immaterial* substance, and, according to its form, either *blind* and *dead*, or *intending* and *living*. Epicurus' dead matter must swerve without any cause, and so there is an inexplicable leap that is supposed to play a role in the explanation. Spinoza's dead God cannot provide anything more than ontological unity, which need not have *any* reference to ends, and mathematical explicability, which is accordance with ends that are purely formal (i.e., ideas of geometrical figures). Hylozoism is forced either to attribute life to matter or to merely posit a world soul or other kinds of soul. The former conflicts with the essential inertia that is presupposed by the mechanically explicable *order of nature*, and the latter presupposes the very attribute of bodies that it is called on to explain, namely, their objective material purposiveness or their harmony with the ends of natural beings that are not merely material. Theism, not surprisingly, is the view that Kant believes is the most promising; however, he believes that the only condition under which the choice between these mutually exhaustive alternatives would be required of us is not, in fact, met. That is, we cannot know that the phrase 'the principle required to supplement the mechanically explicable *order of nature*' has an objective referent.

The most we are entitled to assert is a condition on the subjective principles, or maxims, that are required by our reflection on the *order of nature* towards the end of systematizing the

manifold of empirically discovered natural laws in accordance with which material things and their forms are generated. In Kant's view, we need to appeal to a *technic of nature* that unifies those aspects of the unified *order of nature* that we *can* understand according to laws of efficient causality with those aspects of nature that we *cannot* understand according to laws of efficient causality. Despite what many commentators are prone to assert, the former class *includes* the specific processes through which one organized *body* is generated from another organized *body* of the same species, which is something that occurs according to empirically discovered laws that we can use as rules for determining that some posterior state of a natural substance follows with necessity from some prior state.

The substance to which these alterations in phenomenal state are referred, however, is not the individual plant or animal body *per se*. It is, rather, the organized being that is the supersensible ground of unity for the particular parts of this body, for the particular parts of the other bodies that we identify as bodies of the same kind, and for the totality of whatever particular bodies *could be* judged to be members of the same cosmological series of potentially interbreeding beings. The natural species is the substance that we reflectively consider in this relation, and the causal nature of the species is the synthetic unity of powers that we think under the idea of the fundamental power of this substance. This is the idea of a natural end that serves as the standard for our judgments concerning the objective harmony between the matter of actually existing bodies and some being that can be thought only as an end; i.e., for our judgments concerning the objective material purposiveness of plant and animal bodies. These bodies are in harmony with the end of self-preservation that we attribute to the natural species because they are generated and maintained by the very activities that constitute this self-preservation. The natural history of the species, in the sense of *Naturgeschichte*, is the dynamical process through which this end is achieved by means of the very beings that are undergoing the changes in state that we observe as the generation and maintenance of organic form in matter.

In this way, Kant believes we can reflectively consider the internal connection between efficient and final causes that is required by a genuinely natural view of teleology, and that is largely undermined by the modern tendency to identify final causes with the intentions of some intelligent being. Doing this allows us to maintain the explanatory *priority* of the final cause over the efficient cause, in the *ontological* sense in which the causal nature of a being grounds its phenomenal character and the regular effects of this character in nature, while also maintaining explanatory exclusivity in *epistemological* contexts for the efficient-causal mechanisms through which alterations in the observable states of natural substances are generated. Kant's transcendental idealist solution to the difficulties concerning organic generation and natural classification that concern eighteenth-century thinkers appears to me to provide a coherent position concerning the causal self-sufficiency of the *order of nature*, which cannot be reduced to materialism, justified naturalistically, or used as a basis for either naturalism or supernaturalism in ethics. It has not been obvious to interpreters that this is Kant's aim or that the *CTJ* succeeds in providing a coherent position on organisms and teleology. I believe this is due, in part, to the general lack of any serious attention to the particular issues that confront the physiologist and the natural historian in Kant's day, and/or to the particular solution Kant favors in addressing these issues from the 1760s onward. In the following chapter, I aim to provide support for the general view of the *CTJ* I have sketched above.

In the two introductions to the *CJ*, Kant provides a general discussion of the principle that he believes provides the basis both for *Naturbeschreibung* and for the transition from the descriptive classes found in the logical system of nature to the systems that are found in nature and that provide the objects for a genuine *Naturgeschichte*. This discussion will be the focus of the section that immediately follows (4.1). In the text of the *CTJ*, Kant distinguishes between the subjective purposiveness of natural objects from the standpoint of our cognitive capacities (which is the topic of the *CAJ*), and the objective purposiveness that we judge reflectively through appeal to standards provided both by the understanding and by reason. In the first §§ of the *Analytic*,

Kant sorts through some distinctions between the various kinds of objective accordance with ends that are exhibited by natural objects, and that lead to teleological judgments of various kinds, before turning to an explicit discussion of organized beings as the sole basis on which a genuinely natural teleology can be founded.² Much of the discussion in recent literature has taken it for granted that Kant either wants to, or needs to, provide an argument for the mechanical inexplicability of organic generation and functioning in order to motivate his claims about teleology. I am convinced that a good deal of this literature interprets Kant's aims and methods in a fairly unfortunate way. Kant's view, as we might expect on the basis of the previous chapters of this work, is that despite the fact that we *can* and *do* understand the lawful generation and functioning of plant and animal bodies in a generally mechanistic way, mechanism *alone* cannot explain to us the essential relation in which these bodies stand to one another through their relation to a third thing, namely, the relation of 'being in harmony with' or 'being in accord with' the rational idea of an end.

Following the section on the natural historical background of the *CTJ*, I will begin my interpretation of the text itself by addressing the issue of mechanical inexplicability (4.2). I will provide reasons to believe that Kant is actually defending the legitimacy of generally mechanistic approaches to organic phenomena, which he believes are (intentionally or unintentionally) undermined by approaches to the epigenetic generation of plant and animal bodies like those that we have seen from C.F. Wolff and Herder. I will then make some suggestions concerning the connection that Kant sees between understanding the generation of something according to the *mechanism of nature* and being able to produce it in artificial contexts in a way analogous to the way in which nature does. By reflecting on the views Kant develops concerning the differences between races and varieties of a natural species, I suggest that Kant believes we can produce

² McLaughlin [1989] seems to think that Kant is attempting to derive the concept of an organized being as a natural end purely from concepts. In light of his similar discussions in the *OPA*, and his insistence here and elsewhere that he is simply taking the concept of an organized being as it is used by physiologists, however, this seems to be an unlikely interpretation. My own interpretation of what he is doing in the *Analytic* will be clear from what follows.

these in a way analogous to the way in which nature does and, thus, we can understand their production according to the *mechanism of nature*.

This process presupposes, however, already existing species of inter-breeding individuals *into which* we are introducing divisions and, thus, this process itself cannot provide an explanation of the existence of these species. The natural species is what I take to be the referent of Kant's use of the terms *organized being*, *natural end* and *inner end of nature*, and it is the possibility of these species that we cannot understand by appeal to the *mechanism of nature*. The ideas of species are the standards to which we subject individual plant and animal bodies in our teleological judgments, and which we are also constrained to represent as the real inner grounds of the possibility, existence, and mutual connection of these bodies within a natural system. Recognizing this, I believe, allows us to make sense of Kant's approach in the central §§ of the 'Analytic of Teleological Judgment', to which I will turn following the discussion of the *mechanism of nature* (4.3). I see these §§ as a process in which Kant begins with an unproblematic nominal definition of a *natural end* and expounds on this by appeal to phenomena that all parties to the debates in which he is involved agree stand in need of explanation (§ 64). He then argues that providing an explanation of these phenomena, on the basis of a physical interpretation of the logical essence of a *natural end* as *an organized and self-organizing being*, requires appeal to a fundamental power of nature, the operation of which we cannot understand except according to an analogy with our own practical reason (§ 65). He then presents this as providing a rational justification for the use of the principle of teleology, "*an organized product of nature is that in which everything is reciprocally both an end and also a means*", as a maxim for judgment that is occasioned by our experience of organized beings, and that is actually accepted as unproblematic by physiologists, for whom it is the functional equivalent of a first principle (§ 66).

As natural philosophers, physiologists have no difficulty interpreting this maxim in a way that is consistent with the general principles of physical investigations, which remain constitutive

for their practices. As political philosophers, moralists, speculative natural historians, or metaphysicians, however, these same thinkers, or others who make use of their work, involve themselves in an entirely different set of issues. Lack of sufficient care in keeping these issues distinct from one another threatens to undermine the coherence of natural philosophy and poses a threat to the self-reliance of our power of judgment. This is the topic of the ‘Dialectic of Teleological Judgment’, which I will discuss in the section following the discussion of the Analytic (4.4). The Dialectic consists of the presentation of an ‘Antinomy of Teleological Judgment’ (§ 70), a preparation for its solution (§ 71), a discussion of the four approaches discussed above to determining what is required as a supplement to the *mechanism of nature* for explaining the purposiveness of nature (§§ 72-3), and an argument that transcendental idealism allows us to reconcile the use of mechanistic and teleological principles in making judgments concerning the possibility of the same objects (§§ 74-8).

Until recently, the general line of interpretation concerning the Antinomy was that the key to its solution is the distinction between regulative and constitutive principles.³ More recent interpretations have pointed out the difficulties involved in squaring this with the text and have suggested that there is a real conflict between the regulative principles that Kant originally presents as the thesis and antithesis of the Antinomy. In my discussion of the Dialectic, I will argue that the key to resolving the merely apparent conflict presented in the Antinomy is a distinction within *regulative* principles that is generally neglected by interpreters. Kant does not adhere to a strict alignment between *regulative* principles and the *reflecting* power of judgment, on the one hand, and *constitutive* principles and the determining power of judgment, on the other.⁴ The maxims of the thesis and antithesis are both *regulative* principles, but the thesis is a

³ For a discussion of this approach to the Antinomy, see McLaughlin [1989]

⁴ Makkreel [1991] draws attention to the fact that the principles of the reflecting power of judgment are constitutive with respect to aesthetic judgments of reflection. It appears to me that reflecting power of judgment can also take a principle that is constitutive for scientific practice, such as the principle of mechanical causality, and use it for reflecting on the unification of empirical laws that are given as contingent.

maxim for reflection that is required by the conditions for the empirical use of the understanding, whereas the antithesis is a maxim for reflection that is provided by the autonomous power of judgment for the use of our reason in relation to nature. The empirical use of the understanding is what provides us with empirical cognition of the manifold of natural laws, and through the maxim of the thesis we attempt to unify these laws analytically by seeing them as tokens of the same general type, i.e., as particular mechanical laws that are related to one another in a *necessary order of nature*. Through the maxim of the antithesis, we attempt to unify these and other particular laws synthetically through their relation to ends, i.e., as laws that are related to one another as means to ends within a *contingent order of nature*.

If a particular event in nature were to violate the conditions of the empirical use of the understanding, we could not consistently claim that it was a natural event. However, if we are unable to unify two natural laws according to the maxim provided by the understanding, and so we are constrained to think the unity of these laws in terms of ends, there is no contradiction here. We cannot even be certain that the principle of their unification is not found within the *mechanism of nature*, let alone make any determinations concerning where the principle of this unification is actually found. When reflecting on empirical laws according to the maxim of the thesis, we are doing so in order to make a judgment concerning the laws that govern the *alteration* of observable states in bodies; i.e., ‘the generation of material things and their forms’. When reflecting on empirical laws according to the maxim of the antithesis, we are doing so in order to make a judgment concerning the laws that govern the *existence* of the natural substances to which we attribute these states; i.e., ‘products of material nature’.

Plant and animal bodies are not exempt from the mechanical laws of nature that govern them *qua* bodies, nor are they entirely recalcitrant to generally mechanistic explanations, but the *unity* of the various empirically discovered, efficient-causal laws to which their functioning is subject cannot be grasped by us except as a unity of efficient-causal means to the ends of the species to which these bodies belong. Judgments concerning the possibility of these products

have to be understood as subject to standards that are significantly different from judgments concerning the possibility of the processes through which the observable forms of plant and animal bodies are generated in matter. This is a difference that Kant maintains in the *CPR* in arguing that judgments of necessity are legitimate only concerning the observable states of substances and not concerning these substances themselves. This difference is collapsed, however, by transcendental realism concerning these bodies, which Kant believes provides another indirect argument for the necessity of adopting transcendental idealism.

The final sections of the *CTJ* are a ‘Transcendental Doctrine of Method for the Teleological Power of Judgment’, in which Kant discusses the benefits of the transcendental idealist approach to natural teleology for the central problems of physiology and natural history (§§ 79-82), and for the transition from natural philosophy to practical philosophy (§§ 83-4) and from there to theology (§§85-91). Although in many ways this transition project is the most important part of the *CTJ* from Kant’s perspective, I will limit my discussion to the issues directly related to natural philosophy (4.5). I will show that these first sections of the Doctrine of Method provide Kant’s mature expression of the basic view, for which he has been arguing since the 1763 *OPA*, concerning the most promising direction for transforming natural history into a study of the real causal connections in nature that explain the generation and maintenance of real unity and real diversity in the organic realm.

4.1: Natural History and the *Critique of the Power of Judgment*

In the first introduction that Kant composed for the *CJ*, he introduces the claim that despite the fact it has no concepts or principles through which it legislates to *objects*, the power of judgment is the source of a concept or a rule that it prescribes to *itself* for its activity of reflecting on natural objects. This reflection is aimed at discovering general empirical concepts and general empirical laws under which the particular concepts and laws generated and discovered through

experience can be subsumed. The rules guiding this reflection cannot be the same rules as those guiding the understanding a priori, if they are to be used in unifying the empirical cognition of nature that is provided by the understanding, nor can they be rules derived from experience, if they are to be genuinely legislative for this activity. Accordingly, Kant believes that the power of judgment serves itself as a rule in presupposing that the objects of nature lend themselves to being judged according to a system of empirical concepts, or that our empirical cognition of nature can be cognition of a system of nature.

The systematic aspect of our experience that is guaranteed by the principles of the understanding leaves it entirely indeterminate whether or not, e.g., the effects of any two causes will be rendered necessary by the *same* rule, or any two natural substances will be instances of the *same* kind of natural substance. The particular kinds of substance, power, and causal law that are to be found in nature cannot be cognized by us a priori. The principles of the understanding merely provide general rules for seeking these and general criteria for judging particular cases, they do not provide us with outlines of the system into which we can fit our cognition of these particular cases. It is the responsibility of the power of judgment to provide this outline through the concept of “nature as art” or the concept of the *technic of nature*. Looked at in the context of Kant’s ongoing interest in the artificial systems of nature that serve the ends of *Naturbeschreibung* and the system of natural classification that is the ideal goal of a completed *Naturgeschichte*, it is clear that Kant intends to introduce the principle of the power of judgment as a way of clarifying and defending his own position on the importance of both distinguishing between these and relating them to one another. Kant formulates this principle in the First Introduction to the *CJ* in the following way:

The principle that belongs to the power of judgment alone [*Das eigentümliche Prinzip der Urteilskraft*] is thus: *nature specifies its general laws into empirical laws according to the form of a system for the sake of the power of judgment.*⁵

⁵ 20: 216

In a footnote to the sentence immediately preceding this characterization of the principle, Kant claims the following:

Could Linnaeus have even hoped to provide a system of nature, had he had to worry that, when he found a stone he called granite, it may have been distinct according to its intrinsic character from every other that appears just like it, and thus that he could hope to meet only with individual things, equally isolated for the understanding, but never a class of things that could be brought under concepts of genus and species?⁶

This is a clear indication of the importance of the issues of classification discussed in previous chapters for Kant's view in the *CJ*. It is interesting, however, that Kant is clear in this context that the standard we presuppose nature will meet in our empirical investigations is one provided by a concept of the reflecting power of our judgment, and not by reason. According to the 'Appendix to the Transcendental Dialectic' of the *CPR*, it is reason that 'prepares the field for the understanding' through providing a transcendental principle of continuity, or the *law of continuity in nature*, that requires us to seek unity under principles without losing sight of the diversity of the individuals that constitute these unified manifolds. This could seem to be an important shift in Kant's views that requires us to seek an explanation in terms of a reformulation of certain aspects of his system. It could, alternatively, be understood as a largely terminological distinction that Kant has decided upon as a way of expressing more clearly a position he already holds in the *CPR*. I am prone to think that he has seen good reason to distinguish more clearly between the indeterminate transcendental principle of the continuity of natural forms, and the subsequent discussion of the use of ideas of reason for providing something analogous to sensible schemata that render the principle applicable to nature.⁷ The former principle, as Kant says, is

⁶ 20: 216, note

⁷ The final §§ of the 'Doctrine of Method of Teleological Judgment' discuss physico-theology and ethico-theology. There, Kant maintains the general view he puts forth in the *OPA* and the *CPR* that natural philosophy can be only a propaedeutic to theology, and not its basis, and it can do this only if it finds arrangements in nature that are produced naturally and that also harmonize or accord with ends. As we

what prepares the field for the understanding, while the latter clearly involves an intentionally adopted plan for ordering empirical knowledge in the even more systematic fashion that is required to turn experience into empirical science. As I understand the discussion of the ‘Appendix’ Kant is arguing that despite the appearance that logical systems of nature are artificial constructs that result from principles we consciously adopt due to our desire to investigate further into nature, or our hypothetical use of reason, to believe this is really this case is to misunderstand the order of priority between part and whole with respect to our cognition. In Kant’s view, it is only because we already assume that an objective *order of nature* exists, that we are capable of, first, understanding particular aspects of nature and, then, proceeding from there in the hope that we will be able to understand the systematic connections between these parts in the whole. As he claims there:

Were it the case that among the appearances that present themselves to us there were such great diversity, I do not mean to say of form (for in that respect they may be similar to one another), but of content, i.e., according to the manifold of existing beings, that even the sharpest possible human understanding could not render the least resemblance between them apparent through comparison of the one with the other (a situation that certainly allows itself to be thought) the logical law of genera absolutely would not come about, and there would not even be a concept of species, or any general concepts at all, in fact, no understanding would come about, since it has to do entirely with such concepts.⁸

This strikes me as the same line of thinking Kant presents in the *CJ* for justifying the use of an a priori principle of judgment that presupposes that nature is in harmony with our own cognitive ends. Only now, instead of attributing this principle, which renders the coherent empirical use of the understanding possible, specifically to *reason*, he attributes it to the *power of judgment*. The real difference that leads to this shift is that now Kant assigns a particular role to the power of

have seen, Kant finds that Herder’s use of natural philosophy as the basis for theology is unstable because there is nothing natural about the force he appeals to as a power to produce organized bodies that harmonize with ends, and because the use he makes of the principle of continuity is dogmatic. Kant’s insistence that the idea of a *natural end* (objective material purposiveness) provides the basis for all theoretical or natural teleology, and that *practical reason* is required to move from this propaedeutic to theology proper, are important elements of his response to Herder.

⁸ A 653-4/B 681-2

judgment with respect to our feeling of pleasure and displeasure, which is the sensible capacity between the cognitive faculty and the faculty of desire. In deciding to use the terms understanding, judgment, and reason in a slightly modified fashion from that in which they are used in the *CPR*, Kant is reflecting his further recognition that the intellect provides principles for uses other than theoretical knowledge of what exists in nature.

That is, principles of reason are constitutive with respect to freedom, and the principle of judgment is constitutive with respect to aesthetic judgments of reflection. The ideas of reason remain regulative in the context of systematic knowledge of nature, but Kant is interested in discussing cases where their use is occasioned by particular objects that are not merely parts of the system of nature, but are also themselves systems, whether in external form (e.g., crystal formations and the forms of flowers) or also in inner structure (i.e., plants and animals). The power of judgment is now discussed as the source of the law of continuity in nature that Kant discusses in the *CPR*, and the principle of judgment becomes a regulative principle for cognitive judgments concerning the particular *order of nature*:

All those formulae that are brandished: nature takes the shortest path—*she does nothing in vain—she makes no leaps in the manifold of forms* (continuum formarum)—*she is rich in species but also economical in genera*, etc. are nothing other than the same transcendental expression of the power of judgment in establishing for itself a principle for experience as a system and hence for its own needs. Neither the understanding nor reason can ground such a natural law a priori. For we can certainly have insight that nature in its merely formal laws (through which it is an object of experience in general) directs itself according to our understanding, but with respect to particular laws, their manifoldness and dissimilarity, nature is free from all limits of our legislative cognitive capacity, and it is merely a presupposition of the power of judgment, on behalf of its own use in ascending from the empirical-particular in each case to the more general but still empirical, in order to unify empirical laws, which grounds that principle.⁹¹⁰

⁹ 20: 210-1

¹⁰ Kant makes a similar point in the second introduction (Cf. 5: 182), though he now includes under the law of continuity provided by the power of judgment that nature “makes no leaps, either in the *sequence of its changes* or in the juxtaposition of specifically different forms” (emphasis mine). This comes in a section entitled “The principle of the formal purposiveness of nature is a transcendental principle of the power of judgment”, so it appears that Kant may have changed his view slightly on this point between the first and second introductions. I am prone to think the change is more terminological than substantive, since in the second introduction he is discussing transcendental principles of the power of judgment in general, and not specifically the principle of the reflecting power of judgment.

It seems clear to me that Kant means to be maintaining the distinction between the continuity of alterations in the states of substances in time and of the intuition of objects in space, which are formal laws of experience that he presents in the *Analytic of the CPR*, and the logical and transcendental versions of the law of continuity of forms or of natural substances, which is a presupposition concerning the material of experience that he presents in the *Dialectic*. Instead of talking about the latter in terms of reason legislating to the understanding for the purposes of systematic empirical cognition, Kant now sees the law of continuity as a matter of the power of judgment legislating to itself for these purposes. This provides Kant with a way of distinguishing more clearly between the *heautonomy* of the power of judgment when it reflects on nature towards the end of subsuming particular laws under more general laws in the way that is most conducive to the empirical use of the understanding (i.e., when it aims to subsume particular laws under mechanical natural laws) and the *autonomy* of the power of judgment when it reflects on these same laws in a way that is conducive to the empirical use of reason (i.e., when it aims to relate them to one another in a teleologically ordered system).

The presupposition that nature forms a system that is conducive to the use of our power of judgment, or the principle of the *technic of nature*, is prior to the decision of whether the particular forms and laws that are related to one another in this *technic* are such that we will be able to understand their unity by appeal to mechanical laws alone, or whether our cognition of the unity of these forms and laws will require our use of ideas of reason. This artificial view of nature is clearly the basis of the classificatory scheme involved in *Naturbeschreibung*, of which Linnaeus' *Systema Naturae* is the classic example. Despite the artificiality of this system, most naturalists in the eighteenth-century agree that it represents an achievement for natural history that nearly parallels Newton's achievement in physics. This system of empirical concepts, however, is merely the beginning of the use of our understanding in discovering the real principles of unity in nature. The real disputes among natural historians in the eighteenth century

concern whether, and if so how, this *Naturbeschreibung* can be used to discover these real principles.

Although Kant disagrees with Buffon in several important respects, these two are unified in rejecting the view that a natural classification will differ only in degree from the artificial system provided by Linneaus. Most other natural historians in Germany, including J. F. Blumenbach, see a natural classification as a more detailed description of the characters of plant and animal species, rather than as a classification that is based on causal laws or lines of descent. Although Blumenbach too rejects the particular version of the *great chain of beings* favored by French physiologists and by Herder, he sees the perfection of nature to consist in the fit between the way in which organisms are outfitted and the environments in which they make their living. This is closer to Kant's view of the teleological *order of nature*, but because Blumenbach does not provide any causal account of this fit, his view remains entirely descriptive. Kant's own view of teleology involves, in an *essential* way, that it is a method for judging the relation between causal principles and the regularly observed effects of these principles. Although, as Kant will claim in the 'Doctrine of Method' of the *CTJ*, "no one has done more for the proof of the theory of epigenesis"¹¹, both in establishing the fundamental power of nature responsible for organic phenomena and in avoiding the views of thinkers such as C. F. Wolff and Herder, Blumenbach's natural history remains a descriptive cataloguing of nature's variety.

The options in Germany at the time for a causal natural history, as far as I have been able to surmise at this point, are Herder's vital transformism and the theory of natural species, involving descent with modification within naturally determined limits, that we have seen Kant developing. Herder's view appears to be largely a temporalized version of the teleologically ordered *great chain of beings*, which puts itself forth as a causal natural history. To the extent that it is a causal account, however, there is nothing genuinely natural about the principles driving it and the laws that govern these. To the extent that it is a natural account, then, it is really a

¹¹ 5: 424

description of the temporal order in which natural forms are presumed to have followed one another in arriving at the present state of the natural world.

Kant believes that teleological considerations should come into natural history only *after* we have an understanding not only of the particular forms that exist in nature, but also of the particular natural laws according to which these forms are generated and maintained. It is this empirical cognition that licenses the initial appeal to particular natural powers and the *subsequent* attempt to unify these under some fundamental natural power. *Naturbeschreibung* does provide an important first step in the attempt towards *Naturgeschichte*, but there is also real work to be done between them. We cannot simply hypostatize the reflectively presupposed and empirically discovered *technic of nature* and then posit whatever fundamental power we think would be sufficient to transform matter through all the various links in the great chain. In the second introduction to the CJ, Kant claims the following:

The transcendental principle [*Grundsatz*] to represent to oneself a purposiveness of nature in the form of a thing, in subjective relation to our cognitive capacity, as a principle [*Prinzip*] for judging the thing leaves it entirely indeterminate, where and in which cases I have to render a judgment as one that concerns a product [*eines Produktes*] in accordance with a principle [*Prinzip*] of purposiveness, and not, rather, merely according to universal laws of nature, and leaves it to the aesthetic power of judgment to make out, through taste, the suitability of the product (its form) to our cognitive capacity (to the extent that it decides, not through agreement with concepts, but through feeling). By comparison, the teleologically employed power of judgment provides the conditions in a determinate way, under which something (e.g., an organized body) is to be judged according to the idea of an end of nature; however, it cannot provide a principle [*Grundsatz*] from the concept of nature, as object of experience, for the warrant to attribute to nature a relation to ends a priori, or even to accept the same in an indeterminate way from actual experience with such products. The reason for this is that many particular experiences must be undertaken and considered under the unity of a principle [*Prinzips*] in order to so much as be able to cognize through experience the objective purposiveness of a certain thing.¹²

Teleological judgments, in Kant's view, cannot be made simply on the basis of the felt purposiveness of some arrangement in nature, nor can they be made prior to the investigation of the natural causes that are responsible for some apparently harmonious systematic arrangement,

¹² 5: 194

of a thing or of several things, in nature. The concept of a natural end and, thus, a natural history that makes appeal to this concept, must be grounded in the explanatory practices of natural philosophy. These practices clearly go beyond what the senses actually deliver, and what the understanding can actually comprehend, but they cannot do so in a way that leaves the requirements of the understanding entirely unheeded. Thus, in Kant's mind, a natural history of plants and animals requires a reflective use of ideas in teleological judgments, or a use of ideas of natural species as principles for unifying, and *not* for replacing, the laws of nature that we discover through the methods of mechanistic science.

Aesthetic judgments of reflection can be made on the basis of a feeling that is occasioned by reflection on some object that is actually produced by merely mechanical laws, because we are not at all concerned with causal considerations in this kind of reflection. Teleological judgments can also be made concerning objects that are produced in accordance with mechanical laws, because they are judgments that concern the principle of unity for the laws that are required to produce some thing. In introducing the distinction between aesthetic judgments of reflection and teleological judgments in the first introduction, Kant claims:

... [I]f empirical concepts and empirical laws are already given in accordance with the mechanism of nature and the power of judgment compares such a concept of the understanding with reason and its principle of the possibility of a system, when this form is met with in the object, the purposiveness is then judged to be *objective*, and the thing is called a *natural end*, whereas before things were judged only as indeterminately purposive *natural forms*. The judgment concerning the objective purposiveness of nature is called *teleological*. It is a *cognitive judgment*, but it belongs only to the reflecting and not the determining power of judgment. For in general the technic of nature, whether it is merely *formal* or *real*, is only a relation of things to our power of judgment, in which alone the idea of a purposiveness of nature can be met with, and which is attributed to nature merely in relation to our power of judgment.¹³

Kant's argument in defense of his own views concerning the proper use of teleological judgments in natural philosophy in general and natural history in particular involves showing that the concept of a *natural end*, as he makes us of it, not only does not violate the generally accepted

¹³ 20: 221, emphasis in text.

principles of natural scientific explanation, but it positively requires the use of these principles. The way in which this concept is used by Herder and other vitalists, in contrast, undermines these principles. The practicing physiologist or natural historian should, accordingly, find more in Kant's view that will further their aims than in Herder's. Kant respects that the real relations between particular natural objects are causal relations that require investigation through the methods of observation and experiment and explanation by appeal to the natural mechanisms through which even the most purposive of arrangements are brought about in nature.

The relation between these objects and the power of judgment that discovers real systematic connections within and between them, however, is a different matter. The idea with which these connections within the object are in accordance is clearly an idea in our minds. It is a mere sophistry to conclude from this that these connections themselves are only in our minds, however, presuming that we discovered these connections and the particular laws that govern them prior to asking about the relations these have to ends. It makes all the difference in the world, from Kant's perspective, whether we *presuppose* on the basis of the external form or the inner structure of some thing that it cannot be produced in accordance with mechanical laws, or whether we *conclude* from our empirical cognition of some thing and the laws to which it is subject that we cannot understand the unity of these laws without referring them to an *actual state* that we think through the idea of an end. The former is a presumptuous claim about the powers of nature that we have no right to make a priori, and that is open to all sorts of counter-examples. The latter is a tool that furthers our pursuit of understanding the systematic connection of natural laws that is required for the plant and animal bodies that we observe in nature to *live*, and for the natural species of which we take these bodies to be members to *preserve themselves* in nature.

The idea that these laws are connected *in order to* make these phenomena possible is one that is located in our thought, but the real grounds of the possibility of these phenomena are located in the same place where the real connections through which they are actually achieved are located, namely, in the *order of nature*. This appears to me to be the most fundamental, and the

most interesting, aspect of Kant's thinking in natural history from the 1750s onward. It is the basis for his view concerning the natural generation and functioning of organic bodies and concerning the perfection of the *order of nature* in which this takes place. The extent of Kant's commitment to this view, however, is not generally appreciated by contemporary interpreters of Kant's work; nor was it appreciated by Kant's own contemporaries. Accordingly, in the following section, I will address the fairly prevalent, and textually justifiable, tendency in the literature to see Kant addressing a serious problem presented for natural philosophy by the mechanical inexplicability of organisms.

I believe it is right to see him doing this, but that it is a mistake to take Kant to be providing an argument that organisms are mechanically inexplicable natural products, and because of this, we need to introduce the idea of a natural end into our scientific practices. It is more correct, I think, to see him as beginning with the consensus view at the time that no currently available theory of the generation of plants and animals is a *merely* mechanistic theory. He then tries to determine what more is required to account for organic phenomena according to a consideration of *these phenomena* and of the principles that practitioners of the natural sciences find themselves appealing to, rather than by direct appeal to whatever might provide the most support for our political, theological, or metaphysical convictions. Reading him in this way, I believe, provides us with an interpretation that is better able to make sense of the text of the *CTJ* itself, and of its relation to Kant's other systematic works and occasional essays in the pre-Critical and the Critical periods.

4.2: Mechanical Inexplicability and the Causal Unity of Nature

One common interpretation of Kant's view in the *CTJ* is that he appeals to organisms in the *Analytic* as examples of natural bodies that defy our attempts at mechanical explanation.¹⁴ The logic of Kant's view, according to this interpretation involves, first, arguing that organisms are mechanically inexplicable, then, claiming that we are justified in making teleological judgments concerning organisms because otherwise we could not understand them, and finally, arguing that this is merely a feature of our cognition and that we cannot conclude anything about the ultimate cause of organisms through the use of the merely regulative principle of teleology. This might be an understandable move if Kant were primarily concerned with the attempt to argue from empirical considerations for the view required by his practical philosophy.¹⁵ If organized beings are beings within nature that are not subject to mechanical laws, then the obstacle that mechanical determinism presents for our conception of *ourselves* as not subject to these laws, in at least some of our actions, would seem to be taken care of. Taking Kant's aim in this way, however, leads to extreme difficulties in providing coherent interpretations both of the *CTJ* itself, and of its relation to Kant's other works.¹⁶ On the face of it, however, it is a claim for which one can appear to find textual support, in both the *Analytic* and the *Dialectic* of the *CTJ*. In this section, I will begin by looking at some passages that appear to support this general interpretation, comparing these with other passages that are very difficult to reconcile with the view of Kant's strategy outlined above, and suggesting an alternative way of approaching Kant's claims about mechanism in the *CTJ*. I will then consider the connection that Kant draws between mechanistic explanation and artificial production, in light of his views concerning differences between populations of individual members of the same natural species; i.e., races and varieties.

¹⁴ Ginsborg [2001], Guyer [2001], McLaughlin [1989], Düsing [1968]

¹⁵ This is the view of Guyer [2001]

¹⁶ Guyer recognizes this, but instead of taking it as evidence that there are problems with his interpretation, he takes it as evidence that there are problems with Kant's view.

This discussion will provide further support for my claim that the referent of the terms *natural end*, *organized being*, and *inner end of nature* is not, as many commentators suppose, the individual plant or animal body, which is *subject* to the particular natural laws that we discover empirically, but is rather, the natural species of plant or animal, which is the *ground* of these particular natural laws.

Blind Natural Mechanism and the Mechanism of Nature

One does not need to look any further than Kant's statement of the principle for judgments concerning the internal purposiveness of organized beings, in § 66 of the *Analytic*, to support the claim that Kant believes organisms are mechanically inexplicable:

An organized product of nature is that in which everything is an end and reciprocally also a means. Nothing in it is in vain, without end, or to be ascribed to a blind natural mechanism.¹⁷

If we look just a little bit further to the formulation of the 'Antinomy of Teleological Judgment' in the *Dialectic*, we see Kant pointing to an apparent inconsistency between the following maxims for judgment:

The first maxim is the Thesis: All generation of material things and their forms must be judged as possible according to merely mechanical laws.

The second maxim is the Antithesis: Some products of material nature cannot be judged as possible according to merely mechanical laws (judging them requires an entirely different law of causality, namely that of final causes).¹⁸

This makes it appear that the *Analytic* of the *CTJ* is supposed to establish the (objective or subjective) inexplicability of organisms from the standpoint of mechanical laws of nature, and the *Dialectic* is supposed to resolve the tension this creates for our prior commitment to

¹⁷ 5: 376, emphasis in text.

¹⁸ 5: 387

mechanical explanations of natural events. If we are looking for a catchy way to express the view, Kant provides us with one further on in the *Dialectic*, by claiming:

It is entirely certain that we will never even become adequately acquainted with organized beings and their inner possibility according to merely mechanical principles of nature, much less be able to explain them; and so certain in fact, that it can be asserted brazenly: it is absurd for humans to so much as adopt the project, or to hope, that at some future time a Newton could still arise, who will make comprehensible even the generation of a blade of grass according to natural laws that no intention has ordered; rather, humans must be absolutely denied this insight.¹⁹

This straightforward claim concerning the impossibility of a ‘Newton of the blade of grass’ appears to be all the evidence one would need to establish that Kant is committed to the view that organisms are mechanically inexplicable. If one looks a little more closely at the text of the *CTJ*, however, it is possible to find passages supporting the contention that one should at least be somewhat careful to specify precisely what it means to say that, for Kant, organisms are mechanically inexplicable.²⁰ For instance, in § 71 ‘Preparation for the solution of the above antinomy’, Kant claims:

We cannot in any way demonstrate the impossibility of the generation of organized natural products through the mere mechanism of nature, since we can have no insight into the endless manifold of particular natural laws from [prior insight into] their first inner grounds. These laws are contingent for us, because we cognize them only empirically and, thus, we absolutely cannot arrive at the inner, thoroughgoing sufficient principle of the possibility of a nature (which lies in the supersensible).
... However, it is [...] undoubtedly certain that with respect to our cognitive capacity the mere mechanism of nature can deliver no ground of explanation for the generation of organized beings.²¹

From this passage, it appears that Kant is making a somewhat weaker claim than he could otherwise be interpreted to be making. He is claiming that there are features of the way in which we come to have knowledge of natural laws, namely, empirically, or through experience of events that occur according to these laws, that render these laws contingent *for us*. We cannot know

¹⁹ 5: 400

²⁰ Ginsborg [2001] and [2004] are admirable attempts to do just that. Although I cannot agree with several of her conclusions, chief among which is her claim that Kant’s Newtonianism keeps him from a commitment to causal natures in the Aristotelian sense, I have learned a great deal from her work.

²¹ 5: 388-9

whether these laws are actually derived from the ‘first inner grounds’ of ‘the mere mechanism of nature’ or whether the inner grounds of the laws of organic generation are really different from these. What we can know, however, is that starting from the principles to which *we* appeal in order to explain events according to ‘the mere mechanism of nature’ we cannot *also* explain the generation of organized beings.

If this is an accurate presentation of Kant’s view, then we might think that certain modifiers he uses in making what could appear to be stronger claims, such as ‘*blind* natural mechanism’ and ‘*merely* mechanical laws’, are relevant for understanding Kant’s view in the *CTJ*. If we also take into consideration that none of the various theories of organic generation prevalent during Kant’s time holds that this is a process *we can* explain by reference to *blind* natural mechanism or *merely* mechanical laws, we might be prone to think that Kant is not taking on the burden of proof in establishing that organisms are mechanically *inexplicable*. The burden may be, rather, to establish that, despite the generally recognized shortcomings of certain kinds of mechanistic approach to organic phenomena, there is still something to be gained by our approaching these phenomena with an eye towards understanding the efficient-causal mechanisms through which the ‘first inner grounds’ of the laws of organic generation achieve their effects in material nature. It may be that we have difficulty finding a good argument for the claim that organisms *are* mechanically inexplicable, or even for the claim that they defy all *our* attempts at mechanical explanation in the *CTJ*, because Kant *does not* actually believe we can know that the former claim is true, and because he *does* believe we can know the latter claim is false.

It seems relatively clear from the above passage that Kant does not think we can have the positive knowledge concerning ultimate ontological principles, or the first inner grounds, of the empirical laws of organic generation that would be required for us to maintain the claim that they are *not* products of the mechanism of nature. What is more, claims like the following one from § 80, ‘On the necessary subordination of the principle of mechanism under the teleological

principle in the explanation of a thing as a natural end', seem to make it fairly clear that Kant does not believe that organisms defy all our attempts at generally mechanical explanations:

The **authorization to search for** a merely mechanical mode of explanation for all natural products is in itself entirely unrestricted; but the **capacity to make due** with this alone is, according to the constitution of our understanding insofar as it is concerned with things as natural ends, not only very restricted, but it also has clear boundaries; namely, it is such that according to a principle of the power of judgment nothing can be accomplished in the explanation of natural ends by the understanding alone, hence the judgment of such products must in each case be subordinated at the same time to a teleological principle.

Because of this it is reasonable, even profitable, to inquire into the natural mechanism for the sake of an explanation of natural products as far as this can be done plausibly, and not to give up this attempt because it may be impossible **in itself** to coincide with the purposiveness of nature along this path, but rather only because it is impossible **for us** as humans; since for this an intuition would be required that is other than sensible, as would be determinate cognition of the intelligible substrate of nature, from which a ground could be given for so much as the mechanism of appearances according to particular laws, which entirely surpasses our capacity.

Thus, in order that the naturalist not be at a complete loss, he must always lay at the basis of his judgment of things whose concept as a natural end is grounded beyond any doubt (organized beings), some original organization which itself uses that mechanism, in order to bring forth other organized forms, or to develop its organized forms into new shapes (which must, however, always follow from and in accordance with that end).²²

Here, Kant appears to be claiming straightforwardly that organisms do not defy all our attempts at mechanical explanation, even though they do, *in principle*, defy all attempts at explanations that make use of the mechanical mode of explanation *alone* (i.e., *blind* mechanism or *mere* mechanism). That is, the reference to the principle of the power of judgment makes it appear that this power is authoritative in commanding that the understanding be restricted when it comes to explanations of natural ends. The authority of the understanding with respect to cognition of the determinate states of objects of experience and particular events in nature is limited in this case, and the understanding must follow the lead of the teleological principle that is provided by the reflecting power of judgment. Kant does not present this as a case in which, having failed to explain some state of affairs in nature mechanistically, we then try to make some sense of things by appeal to teleological considerations. It seems, rather, that Kant is claiming

²² 5: 417-8

that we attempt to explain what we can about natural products through the mechanical mode of explanation, knowing in advance that these methods cannot provide explanations of the relation to ends that we think with respect to them.

We can make progress towards explaining the features of objects that we judge to be natural ends through inquiring into the mechanisms through which these natural products function, even if we can know that we will never have the kind of insight into the intelligible substrate of nature that would allow us to derive ‘so much as the *mechanism of appearances* according to particular laws’ from its inner grounds. This seems to me to be a statement concerning the partial similarity between the appearances of organized products of nature and those of other particular kinds of body in nature, and of the distinction between the *mechanism of appearances* and the *mechanism of nature*. We never derive the determinate spatio-temporal order of phenomena (*mechanism of appearances*) from some prior insight into the inner grounds of natural products, regardless of whether or not these grounds are located among the efficient-causal powers of nature that are determined to their effects blindly, or in the absence of any representation of these effects as goods (*mechanism of nature*). Rather, we attempt to determine what this phenomenal order is by appeal to the thought of *some* inner ground of the determinate states and capacities for change in the body, which, together with the inner grounds of the same in other bodies, is responsible for generating series of appearances in particular, law-governed, ways. In the counterfactual state of affairs in which we *could* intuit these inner grounds directly, we *would* be able to understand how the *mechanism of appearances* of inorganic bodies in nature follows from the *mechanism of nature*. In the same counterfactual state of affairs, we *might* also be able to understand how the appearances of plant and animal bodies are both grounded in the *mechanism of nature* and suited to serve the ends that we represent them as serving.

Failing this insight, we are forced to presuppose the existence and activity of an organized being that is active through the *mechanism of nature* in generating other organized forms, and in modifying already existing organized forms into new shapes. Kant appears to be

claiming that although we cannot *derive* the *possibility* of organisms a priori from our cognition of anything else in nature, there is another kind of explanation of organisms that we can provide, and this explanation involves appeal to natural mechanisms and to already existing organized bodies; namely, we can provide an explanation of the generation of organized bodies, and of modifications in their observable state, by reference to an original organization that makes use of efficient-causal powers in bringing these bodies forth. Our power of judgment prohibits us, in principle, from “attributing anything in an organized being to a *blind* natural mechanism”, but it appears that Kant treats this as a largely definitional point concerning our thought of ‘what an organism is’. It looks quite a bit like he is claiming that there is nothing preventing us from thinking of organized beings as active in nature through efficient-causal mechanisms, or from investigating and *explaining* the generation and maintenance of organic forms along the path of physico-mechanical natural philosophy.

The principle on which we base the use of our power of judgment in reflecting on the possibility that beings of this kind should exist in nature, however, prohibits us from being able to reduce the *purposiveness* of these natural mechanisms to the effect of blind mechanical causes. Kant does not claim that we can understand *how* it is *possible* for organized beings to be active in guiding the mechanism of nature in this way, but he is clearly committed to the view that they actually do this. What is more, as becomes clear in § 81 ‘On the association of mechanism with the teleological principle in the explanation of a natural end as a natural product’, he believes that it is conditionally necessary for them to do this:

Just as according to the previous paragraph the mechanism of nature alone cannot suffice for conceiving of the possibility of an organized being, but rather (at least according to the constitution of our cognitive faculty) it must be originally subordinated to an intentionally active cause: the merely teleological ground is just as little sufficient for considering and judging the organized being as a product of nature, if the mechanism of nature is not associated with the organized being as if it were the tool for an intentionally active cause, to whose ends nature is also subordinated in its mechanical laws.

...The principle: Everything that we take to belong to this nature (*phaenomenon*) and to be a product of it must also be thought as connected with it according to mechanical laws, remains

nonetheless in force, since without this type of causality organized beings, as ends of nature, would not be natural products.²³

Here we see a claim with which we are familiar from other contexts, and to which we will return below; namely, the claim that if organized beings are to be counted as natural products, we must consider them as standing in real, causal relations to other objects in nature and, thus, as in some way subject to mechanical laws. Kant's claims here about the subordination of the mechanical laws of nature to the ends of organized beings, and about the connection of these beings to nature in accordance with mechanical laws, appear very similar to the view of the *OPA* concerning the *contingent order of nature* and its connection with the *necessary order of nature* within a single efficient-causal nexus that is *also* directed at meeting the needs of plant and animal bodies. In this passage, it seems very clear that Kant is thinking of organized *bodies* in terms of machine-like structures of parts that, as bodies, must be subject to mechanical laws. If they were not, we could not count organized *beings* among the natural causes of events in nature, and they could not interact with other beings in nature according to natural laws. These mechanical laws must themselves be subordinated, at least as far as our *judgments* concerning them go, to a cause that is active in a way that we reflectively consider according to an analogy with our own intellectual will, or a practical reason. If they were not, organized *beings* would not have the character of natural *ends*, in relation to the idea of which natural bodies could be judged teleologically; including both the particular organized *bodies* that we think of as having an *internal* connection to one another through their internal connection to this organized *being*, and other organic and inorganic bodies that we represent as having merely external connections to the organized being.

There are several points from the last two passages that seem to me especially noteworthy. The first point is that Kant distinguishes between the *mechanism of nature*, through which we conceive organized beings to be active in nature, and these organized beings

²³ 5: 421-2

themselves. The idea of an organized being involves that of an ‘original organization’ that makes use of the *mechanism of nature* as if it were a tool for achieving its ends, and the particular laws governing the *mechanism of appearances* are thought to follow from these inner grounds of organized bodies. Among these particular laws are laws according to which natural mechanisms are used for generating other organized forms and for developing new shapes in already existing organized bodies. The second point is that Kant insists that this model, involving an active organized being and mechanisms through which the activity of this being takes place, provides ‘the basis of judgment’ for the naturalist, who would otherwise be at a loss in investigating ‘things whose concept as a natural end is grounded beyond any doubt (organized beings)’.

Kant’s claim in this context that the applicability of the concept of a natural end to existing things is grounded beyond any doubt (*unbezweifelt gegründet*), and his discussion of the need to associate mechanism with teleology if we are going to be able to explain things according to the *order of nature*, seem clearly to be ways of distinguishing his own view concerning organic generation and functioning, and the prospects for causally explanatory theories of physiology and of natural history, from the views of C. F. Wolff and Herder. Kant sees himself as offering an hypothesis, concerning the real grounds in nature for particular material forms and particular laws of corporeal nature, that begins with the phenomena that all concerned parties are interested in understanding; i.e., the generation of organic forms of particular kinds and the various, apparently purposive, modifications of the general form common to the kind in particular individuals. He proceeds in full awareness that the apparent contingency of these forms and laws and the necessity of offering and testing hypotheses are essential aspects of our empirical cognition, which is an endeavor to understand nature *as* it is given to us in sense experience *through* appeal to concepts and ideas that we generate and formulate for this purpose.²⁴

²⁴ The recognition that we cannot derive all divisions in nature a priori and that the divisions we do envision a priori are not gleaned from nature, but result from the needs of our own reason, however, is not itself an argument for the view that there are no divisions in nature. Just because I do not know precisely where the joints will be prior to making an incision in an animal body, it does not follow that in cutting

Kant's commitment to the claim that we cannot have any insight into the inner grounds of organized beings, or of any other natural beings for that matter, does not entail a commitment to the claim that we cannot have any cognition of these grounds. It merely means that they are cognized *as* causes in relation to given effects and not as they are in themselves, or according to the inner constitution that provides both the *sufficient ground* for the range of capacities that we attribute to a natural being and the *necessary ground* for all of the various determinations and changes that belong to its actual state. If our empirical cognition of particular natural forms and natural laws requires reasoning from sensible effects to the supersensible grounds of these effects, and attempting to unify diverse effects by appeal to common grounds, then it is extremely important that we be certain about these *effects* before offering hypotheses concerning the real grounds that explain them and that unify them with other natural phenomena.²⁵ If we offer hypotheses for explaining phenomena in the absence of any general agreement concerning these phenomena, or concerning 'what happens in nature', we will not actually resolve any disputes amongst practitioners of a discipline and encourage them to work together towards their common ends.

This appears to be precisely what happens in mid-eighteenth-century disputes concerning organic generation. One side claims that 'what happens in nature' *has* to be the unfolding of a previously existing organic structure, because nature *cannot* have a genuinely formative power that results in *contingent unities aimed at perfection (preformationism)*. The other side claims that 'what happens in nature' *has* to be the rearrangement of previously existing material parts, because *all* natural generation of complex bodies occurs in this way (*physico-mechanical epigenesis*). In the latter part of the eighteenth century there is general agreement that nature must have some kind of genuinely formative power, but disagreements remain concerning the

away the other tissues I am not discovering joints that were already there. The same can be said in general for our investigation of nature in an attempt to discover its 'joints', or the real grounds of unity, diversity, and variety in nature.

²⁵ This is the point referred to in the section on 'Discipline of Pure Reason' in the previous chapter's discussion of Wolff's view.

claim that this power is *sufficient* to explain the generation of plant and animal bodies from previously unformed matter (C. F. Wolff), and the claim that this power is also *sufficient* to explain the spontaneous adaptation of individuals of the same species to different environments (Herder). If Kant is correct, neither C. F. Wolff nor Herder can hope to make any of the real progress that is needed in this area because they both provide purely speculative theories, i.e. theories that posit forces or powers as real grounds for effects that we cannot be certain are even really possible.

There is no general agreement that organisms *are* generated out of masses of matter entirely lacking in organic form, so C. F. Wolff's explanation of the natural capacity to generate organic form by appeal to an *essential force* that is active in material nature without the need for any mechanical structures for its activity is largely speculative. There is also no agreement that organisms *do* spontaneously adapt themselves to the environments in which they are to live, so Herder's explanation of the natural capacity for spontaneous self-adaptation by appeal to the same *genetic force* that explains the natural capacity to generate organic form spontaneously is also largely speculative. In the *CTJ*, Kant is clearly arguing *against* views of this kind and *for* the claim that organized bodies are in fact explicable by us in ways that do not violate basic commitments of physico-mechanical natural philosophy. He is also appealing for support to the fact that the empirical concept from which *he* begins in doing so, i.e., the concept of an organized being, is one about which there is no serious doubt concerning its applicability to natural objects.

The possibility of explaining the generation and functioning of these bodies physico-mechanically does, in Kant's view, require that we make a basic assumption; i.e., that organized beings exist and that they are active in nature through natural mechanisms. This, however, is a claim that no one seriously interested in these matters actually doubts. The generation of naturalists that includes Herder and Blumenbach, just as much as the generation before them that includes C. F. Wolff, von Haller, Bonnet, La Mettrie, Buffon, and Maupertuis, and the generation before them that includes Boerhaave and Stahl, all agree that organized beings are active in nature

through natural mechanisms. They also agree that the process of generation in plant bodies depends on seeds, that the process of generation in animal bodies *appears as* the successive delineation of a previously un-delineated mass of matter without any external cause acting on the matter, and that there is an *appearance* of fit between the structures of plant and animal bodies and the environments in which they are generated, nourished, and grow.

These are the phenomena that physiologists in the modern period prior to Boerhaave and Stahl (Harvey being the most notable among them) are content to deal with purely *descriptively*, because they seem to defy all attempts at *mechanical explanation*. These are the same phenomena that Boerhaave and Stahl believe could be *explained* by reference to natural causes, which subsequent generations of physiologists and natural historians accept as key for gaining legitimacy for their disciplines in the eyes of scientific communities. Although Kant is critical of particular theories that are offered as ways of turning physiology into an explanatory science, he clearly has views concerning more and less promising ways of doing so, and he clearly develops a view that he believes is able to combine the most promising achievements in physiology and natural history during his time with his own achievements in transcendental philosophy and in the metaphysics of nature.

We have seen his criticisms of *individual preformationism* as a theory holding that although the ultimate origin of each plant and animal body is supernatural, God creates organic machines that unfold like clock-work (in roughly the same way that Newton's universe functions after having been created, imbued with force, and turned over to mechanical laws). We have also seen his criticisms of particular views of *physico-mechanical epigenesis* that hold that organic molecules are molded internally and/or that they actually possess powers similar to those that Newton believes are super-added to matter, which explain the ability of the molecules to organize themselves into organic forms that both resemble and differ from the parent organisms from which they come.

Kant's own view concerning the most promising theory is a view that can be called *teleological-mechanical epigenesis*. This view involves the denial of claims concerning what can be thought of as *physico-mechanical* and *atomistic reductionism*:

1) The same intrinsic natural powers that we posit as responsible for the essential characteristics of matter can be understood by us to also give rise to natural species of interbreeding plant and animal bodies (*physico-mechanical reductionism*).

2) There are ultimate parts of bodies whose existence and monadic determinations, as things in themselves, are ontologically and temporally prior to the contingent capacities they have and the contingent relations in which they stand as members of compound and complex bodies (*atomistic reductionism*).

Like von Haller, Kant accepts that it is necessary for us to appeal to *some* mechanical structures through which vital powers are active in nature, but unlike von Haller he does not believe that the purposiveness of these mechanical structures requires that they exist as *actually* pre-formed germs, or *primordia* of eventual organs, within the extended mass of the embryo. The determinable order of co-existing and successive *appearances* of one and the same body (*mechanism of appearances*), in Kant's view, is not the same thing as the mechanism through which the phenomenal states of this body are produced (*mechanism of nature*). The individual body is not thought as the sum total of its phenomenal parts together with the phenomenal states of these parts, just as nature is not thought as the sum total of the phenomenal states of bodies. Rather, the individual body is the substrate to which these parts are referred as *its* parts and to which these states are referred as *its* states, which we think through an idea as the real ground of the unity of these parts and states. Nature is the totality of these inter-related real grounds taken together with the spatio-temporally ordered series of phenomena that are referred to it as its state, which we think through an idea as an individual.

Talk about the mechanical generation of organized bodies and about the mechanisms responsible for this generation can be ambiguous, according to this view. If we consider the

mechanism of appearances, or the order of co-existing and successive phenomenal states of one and the same body, there is no serious doubt that the generation of organized bodies, and of the observable system of purposive mechanisms through which they function, is a mechanically determinable process. The doubt concerns whether the existence of organized bodies is *made possible* by the existence of natural powers that are determined to their regular effects in nature independently of any representation of these effects. The temporal order in which these structures become visible to an observer cannot, in principle, be decisive here. That is, the question being posed does not concern the order *amongst* the appearances (which come first, which come next, etc.). We take it at the outset that, first, the embryo *appears* to lack any determinate internal structures, later, it *appears* to have rudimentary structures, and still later, it *appears* to be a functioning system of organic structures. These facts have already been determined prior to our investigation (in ways that Kant believes require principles that make objective cognition of ‘what happens in nature’ possible).

The real question concerning organic generation is one about the real grounds (in nature or beyond) that are responsible for the phenomena being given to us in *that* order, rather than in *some other* order, or not at all. Accordingly, Kant believes we have to distinguish carefully between the *machine-like* bodily structures that are *part* of this order, or the actual body parts that appear or would appear if we dissected the body and/or put parts of it under the microscope, and the *efficient-causal mechanisms* that we think as real grounds of this order, or the synthetic relations between the fundamental powers of nature that ground the series of phenomena in which these machine-like structures appear as members. If we have cause to, and/or *cannot but* reflect on the fundamental powers of nature according to an analogy with the combination of our own cognitive and volitional faculties, there is nothing wrong with this, in Kant’s view. It becomes a problem, however, if we take the results of this reflection to be a principled claim that determines the concept ‘the inner grounds of plant and animal generation’ through the predicate ‘are active spontaneously’.

Doing this takes these grounds out of the efficient-causal *mechanism of nature* through which bodies are generated naturally. As causes of effects that are given to us through the outer sense, we are constrained to think of the inner grounds of plant and animal bodies as parts of a unified system of real grounds in *material nature*. We cannot do this, however, if we assign to these grounds a mode of activity that is free from external determination by other natural forces; i.e., if we think of them as actually spontaneous. The tricky issue is that these grounds are supposed to be explanatory of series of phenomena that include *sensible mechanisms* that we *cannot* understand without considering them as directed at phenomenal states that we represent by appeal to ideas of systems of means and ends. That is, these machine-like structures have to be *just so*, if they are going to play the role in the survival of the plant or animal they are assumed to play. Because of this, we cannot think of the production of these sensible mechanisms in bodies as a result of the *blind* mechanism of natural powers that are wholly indifferent to the states of the bodies they ground.²⁶ Thus, we have to think of the fundamental natural powers that ground the broadly mechanical functioning of observable plant and animal bodies as grounds in material nature that produce the machine-like structure of organs in these bodies *just so* and *directs* them towards the production of particular events and arrangements that are necessary for the continued existence of these bodies according to natural laws.

The *vital-epigenetic* views of C. F. Wolff and Herder are in tension with Kant's own largely because they render considerations of mechanisms at the level of the real grounds of the purposive forms of bodies irrelevant or impossible. Apparently neglecting the distinction between the phenomenal order of appearances and the real grounds of this order, they take the phenomenal order to be the thing-in-itself that is as it appears to be because there is a natural power that makes it so. The appearance *that* organized bodies are generated successively from

²⁶ The directedness of the fundamental powers we posit in accounting for the phenomena of organized beings seems to me to be clearly relevant to the issue of why we have to think them in terms of ideas and cannot think them in the same way we think moving forces, which are grounds of rest just as much as of motion, and do not actually strive to bring about a particular state of the body.

undifferentiated masses of matter becomes the appearance *of* organized bodies being generated in this way. The appearance *that* organisms have the capacity to adapt themselves spontaneously to their environments becomes the appearance *of* organisms that adapt themselves spontaneously. It is the thing-in-itself that appears, is described in terms of the spatio-temporal order in which it appears, and is supposed to be explained by an intrinsic natural power to generate organic form independent of any mechanism through which it is active in nature. That is, these powers operate not only independently of the *physical organs* of the body, which are produced by them in matter, but also independently of *other powers in nature* with which they could be thought to work in unison in grounding particular phenomena and the particular natural laws of these phenomena.

From Kant's perspective, these theories reject the *mechanism of nature* in the *metaphysical sense* of natural powers of bodies as real, efficient-causal, grounds necessary for events in material nature, even if they accept some role for mechanism in the *physical sense* of machine-like structures and motive forces being relevant to the explanation of the particular characteristics and activities of complex bodies. This means that they can really be only one of two things, from Kant's perspective. Either they are speculative metaphysics that passes itself off as empirical natural philosophy, or they are merely descriptive enterprises that pretend to be causally explanatory by referring to the analytic claim that the power that is necessary and sufficient to account for events as they describe them brings these events about. In either case, the project of transforming the largely descriptive enterprises of plant and animal physiology and natural history into scientific explanations of natural phenomena cannot be furthered by the acceptance of these projects. Again, this appears to be largely because 1) the concepts of the effects in nature for which they offer causal powers as explanations are not actually 'grounded beyond any doubt', 2) they refuse to 'inquire into the natural mechanism for the sake of an explanation of natural products as far as this can be done plausibly', and 3) they decide instead 'to give up this attempt because it may be impossible **in itself** to coincide with the purposiveness of nature along this way'.

If I am right that Kant is interested in arguing against the view of *vital-epigenesis* offered by C. F. Wolff and the view of the spontaneous generation and adaptation of organic form offered by Herder, which seems quite likely given the context in which Kant decides to compose the *CTJ*, then we *should* be concerned to find an argument in *support* of the applicability of generally mechanical modes of explanation to the phenomena of organic generation. The burden of proof is not on Kant to establish that there are features of organisms that we cannot explain by reference to *blind* mechanism or *merely* mechanical laws. Rather, it is to demonstrate the superiority of his view concerning how we ought to deal with this generally recognized fact. Kant's aim, as I see it, is to show that his own appeal to a natural power as the real ground for the essential characteristics of organisms provides a legitimately preferable alternative to those offered by C. F. Wolff, Herder, and even Blumenbach. The central reasons he believes this, I think, are that he starts with the phenomena that everyone agrees stand in need of explanation and provides something like a 'deduction from these phenomena' that establishes the existence of a physical power of nature, which allows us to think a real ground of unity for the characteristics appealed to in the empirical concept of an organized being (Analytic). He then attempts to clarify the distinction between the analogy with our own wills, which we make use of at the level of metaphysical reflection on the inner grounds of the possibility of unifying this power with other natural powers, on the one hand, and the requirements of our understanding for following up on any proposed natural scientific explanation, on the other (Dialectic). Finally, in the above passage and others, he aims to provide a sense of how his own model of what I am calling *teleological-mechanical epigenesis*, which he calls both *epigenesis* and *generic preformation*, allows him to provide a more coherent methodological approach to the *order of nature* than can be provided by these other views (Doctrine of Method).

Artificial Production and Products of Nature

If this is so, why is the discussion in the literature so often concerned with Kant's attempt to argue for mechanical inexplicability in this context? It seems to me that this interpretation suggests itself largely due to the common tendency to think of Kant as beginning from the standpoint of the project of a purely mechanistic science and then realizing that there are limits to the extension of this project to organic forms. A different interpretation suggests itself, I believe, if we think of Kant as beginning with the idea of material nature, and then asking how we can make judgments concerning natural bodies through the idea of a system of means and ends without violating our prior commitment to the production and functioning of bodies being something that is explicable in terms of the general mechanism of the efficient causal powers that we attribute to beings in material nature. This may seem like a subtle difference, but it is one that I believe Kant maintains throughout his writings on natural philosophy, and that has considerable results for our understanding and evaluation of Kant's view in the *CTJ*.

If we locate the *CTJ* within the context of natural history, *and* we understand Kant's insistence on treating nature as a causally self-sufficient system prior to thinking about possible connections between this system and our moral vocation, or between the possibility of the system as a whole and theological issues, I think we will be prone to put the emphasis on *natural* in thinking about Kant's claims about *natural ends*. If we tend to think that practical philosophy is really Kant's concern, here and elsewhere, we might be more tempted to put the emphasis on *ends* in thinking about these same claims. The price of doing the latter, however, is not only the attribution to Kant of views whose internal consistency is suspect and whose relation to his other views is tenuous, but also the neglect of materials that can help us understand the *CTJ* in a way that is more consistent both with his theoretical philosophy and with his practical philosophy. In the rest of this section, I will begin by looking at some additional passages that have led interpreters to see Kant as arguing that organisms are not mechanically explicable. I will then

suggest that these passages have been misinterpreted in a way that leads to inconsistencies with views that Kant clearly holds, and that they should be reinterpreted in light of these views.

One of the central passages in the *Analytic* that leads interpreters to see Kant as maintaining the view that organisms are mechanically inexplicable comes from § 64, ‘On the unique character of things as natural ends’. This section begins with the following claim:

In order to have insight that a thing would be possible *only as an end*, i.e., in order to be required to seek the causality of its inception not in the mechanism of nature, but in a cause whose capacity to act is determined through concepts, it is required that its form would not be possible according to merely natural laws, i.e., those that can be cognized by us through the mere understanding applied to objects of the senses; but rather that even the empirical cognition of this form, according to its cause and effect, presupposes concepts of reason. Since reason must also cognize the necessity of every form of a natural product, if it is to so much as have insight into the conditions that are connected with its production, but it also cannot accept this necessity in the case of the given form, the **contingency** of its form with respect to all empirical laws of nature is itself a ground for reason to treat the causality of this form as if it were, precisely because of this, possible only through reason. However, this causality, is then the capacity to act according to ends (a will), and the object, which is represented to be possible only through such a capacity, would be represented as possible *only as an end*.²⁷

If we take Kant to be referring specifically to the observable forms of particular plant and animal bodies here, and to be claiming that we are forced to think they are possible *only as ends* because they are not explicable by reference to merely natural laws, then we will be prone to think 1) that Kant believes that the functioning of plant and animal bodies through which these observable forms are generated and maintained is mechanically inexplicable and 2) that it is the contingency with respect to mechanical laws exhibited by these forms that provides us with reason to maintain that we must judge them in terms of teleological standards. Further evidence for this kind of reading can be found in § 68, ‘On the principle of teleology as an inner principle of natural science’. In explaining why teleology is not generally considered a part of theoretical natural science, but is relegated to the status of a *propaedeutic* to theology, Kant claims:

²⁷ 5: 369-70. Italics are my own emphasis; bold is in the text. I have diverged slightly from Guyer’s translation.

This happens in order to secure the study of nature according to its mechanism to things that we can subject to our observation and experiment in such a way that we could produce them ourselves like nature does, at least according to similar laws; for one has complete insight only into those things that one can make and bring about according to concepts. Organization, however, as internal end of nature, infinitely surpasses all capacity for a similar production through art: and with respect to external natural arrangements that are taken to be in accordance with ends (e.g., wind, rain, and the like), physics considers the mechanism of these things, but their connection to ends, to the extent that this should be a condition that belongs necessarily to their cause, it simply cannot bring forth, since the necessity of this nexus is one that entirely concerns the way in which our concepts are joined and not the nature of things.²⁸

This passage seems to indicate that the organization within plant and animal bodies is something that we cannot understand or explain according to the mechanism of nature, because we cannot produce such beings artificially in a way that resembles the way in which nature produces them. Coming, as this passage does, at the end of the *Analytic*, it then seems natural to see the *Dialectic* as offering an explanation of why our understanding, which is tied to mechanical reductionism as the only genuinely scientific approach to natural phenomena, has such difficulty with the phenomena involved in the generation and functioning of particular plant and animal bodies.²⁹ As tempting as this general line may be, there are several reasons to believe that it cannot be Kant's considered view.

First, in § 64, shortly after the passage quoted above, Kant claims "... [o]ne tree produces another tree according to a known law of nature". This indicates clearly that he believes that plant bodies *are* subject to natural laws. Accordingly, it cannot be the case that Kant believes they *are not* subject to such laws, or that we cannot have empirical cognition of these laws. Thus, it also cannot be that this contingency with respect to empirical laws combines with the demands of our reason in requiring us to view plant and animal bodies *as if* they were products of a will. As has been suggested above and will be seen more clearly below, the relevant contingency is not actually the contingency of particular plant or animal bodies with respect to particular empirical laws. It is, rather, the contingency of the *empirical laws* involved in organic functioning with

²⁸ 5: 383

²⁹ This is the way that McLaughlin [1989] takes this passage and the ensuing discussion in the *Dialectic*.

respect to *each other* and to the *most general laws* of material nature that requires us to think of the system of laws to which these bodies are subject in terms of the dictates of a rational will.

Second, Kant clearly believes that we can, and in fact do, produce individual plant and animal bodies artificially, in a way that resembles the way in which nature produces them. Through growing seeds of the same plant in various artificial environments, we can “have insight into the conditions that are connected with” the production of varieties. These are forms exhibiting characteristics that are contingent with respect to the species of which they are members, yet we can understand the laws according to which such contingent forms are produced.³⁰ Through cross breeding plants and animals with different empirical characters, we can also “have insight into the conditions that are connected with” the production of hybrids. Through selectively breeding plants and animals with particular characteristics we can also have insight into how breeds or races might come about naturally. These are lines of descent within a natural species that involve inheritable differences between individuals that are contingent in relation *both* to the essence of the natural species of which these individuals are members *and* even to the general class of members of this same line of descent. Despite this contingency, Kant believes we *can* have empirical cognition of laws of heredity and of laws connecting the development of hereditary dispositions with environmental factors that trigger them. He also believes that we can produce varieties, hybrids and breeds artificially according to the same, or at least similar, natural laws according to which they are produced naturally.

Kant’s arguments in his work on natural historical issues in the 1770s and 1780s are based on the results of investigations into the generation and maintenance of observable forms that are contingent in a variety of respects that are being done in the eighteenth century by thinkers such as Maupertuis.³¹ We know that *some* varieties of plant and *some* breeds of animal

³⁰ Maupertuis’ work on heredity through crossbreeding plants and animals is clearly important in this respect. In arguing for the difference between a race and a variety in the *Determination of the Concept of a Race of Humans*, Kant refers to the, in principle, testability of his own criterion for a race.

³¹ See Gasking [1967]

are *de facto* partial results of “a capacity to act in accordance with ends (a will)” because we produce them *artificially*, sometimes with the express intention of gaining insight into the laws according to which such things are produced *naturally*. This seems to be a perfect example of investigating nature according to its mechanism, or designing experiments that help us to understand the efficient-causal laws according to which events occur in regular ways, even in cases where we *also* take products of the mechanism of nature to be the kinds of thing that admit of, or require, being judged in terms of ends.

Varieties of plants and particular breeds of hunting dog are certainly useful for the nourishment of humans, and it may be precisely because of this that we originally come to be interested in understanding the natural mechanisms through which these things are produced. Not only does it appear to be false to attribute to Kant the view that we are unable to understand the mechanical production of *these* things, but it also appears to be false to attribute to him the view that the contingency of *these* forms requires that we think of them as products of intentional causality. Some varieties and breeds certainly are produced intentionally through our artificial intervention; however, it is because we already judge them in relation to *our ends* and we already think of them as being *produced naturally*, that we are interested in subjecting them “to our observation and experiment in such a way that we could produce them ourselves like nature does, at least according to similar laws”.

Commentators who call our attention to these passages are clearly onto something, however, since they do point us in a direction that may be helpful for understanding how Kant can claim that organization is something that surpasses our capacity for artificial imitation, while also holding that we can, and do, subject plant and animal bodies to observation and experiment and we do bring about new varieties and breeds in a way similar to the way that nature does this. Recall that, in the above-quoted passages from the ‘Doctrine of Method of Teleological Judgment’, Kant distinguishes between the organized being and the mechanism that it makes use of in generating new organic forms. The subsequent discussion concerning organic generation

there indicates that Kant is in fact recapitulating the general theory concerning the physiological basis of natural history we have seen him develop in previous chapters. What this is likely to indicate, I believe, is that the referent of the term *organized being* should be taken to be the natural species of which individual plant and animal bodies are parts or members. The *mechanism* that this organized being makes use of, in a way analogous to the way that a craftsman makes use of tools, is not the particular machine-like structures that are found within the extension of these bodies. It is, rather, the various natural powers that serve as the essential components that are unified by the essential form in the causal nature of the species. These are the ‘tools’ with which the formative power is associated and to the laws of which power the laws of mechanism are subordinated. Kant’s view, I believe, is that we should reflect on the possibility of organized beings according to the idea that they are active in nature through this mechanism of efficient-causal powers that generates the particular organic forms that we come across in our experience in ‘individual’ plant and animal bodies.

The intrinsic orientation towards, or accordance with, ends that we attribute to organized beings is not merely a feature of the individual systems within systems of bodily parts within *this* particular plant body or within *this* particular animal body. Remember that for Kant, the particular bodies we experience are not individually existing things-in-themselves, nor do they consist of a multiplicity of individually existing things that could just as easily have existed in some other set of relations. Rather, the particular bodies of our experience are phenomenal effects that we take to be grounded in the causal powers of some substance, of whose existence and characteristics we can be made aware only through its effects in nature. Considered as the substance whose natural causal powers ground the phenomenal determinations and changes of phenomenal state of an entire system of inter-breeding plant or animal bodies, the *organized being* exists outside of the sum total of spatio-temporal series of phenomena it grounds. These particular bodies bear an internal relation to one another, in virtue of the internal relation in which they stand to this *organized being*. Each of these bodies can be judged by reference to a rational

idea of this *organized being*, as both the *efficient cause* of, and the *natural end* served by, the generation and functioning of *these* bodies.

Going back to the claim at the end of the *Analytic*, concerning organization infinitely surpassing our capacity to understand it through imitation, I believe Kant has something like the following in mind. We can produce individual varieties of a given species under artificial conditions, we can produce hybrids through cross-breeding different varieties of a given species or individuals of different natural species, and we can produce breeds or races through artificially selecting individuals of a species that exhibit desired characteristics. All of these artificial methods, however, presuppose something we cannot produce artificially, namely, a natural species of interbreeding plants or animals. All of our observation and experimentation is aimed at understanding the various ways in which members of natural species are generated and function, including the ways in which they interact with their environments, and the ways in which these environments ‘select’ which from among the range of capacities that are virtually pre-formed in the nature of the species will be developed.

Our *artificial selection* can imitate *natural selection*, but our artifice cannot do anything more than realize states that are already really possible for beings of these kinds. The inner grounds of the range of capacities we attribute to a natural species of plant or animal, i.e., to an organized being, is something into which we cannot have any insight. We can understand and explain *particular cases* of the generation and functioning of individual bodies by reference to these inner grounds, given that we already have knowledge of these grounds through experience of their effects. We cannot, however, understand the *possibility* of these grounds and, thus, of the capacities and characteristics we refer to them even *relatively a priori*, or by appeal to some existing thing other than organized beings that is ontologically basic in relation to the powers of organized beings.

In this sense it is clearly right to maintain that Kant denies the mechanical explicability of organized beings in relation to our cognitive capacities. It is just as central a point in Kant’s

general approach to organisms and teleology, however, that this denial does not actually conflict with the indefinite extension of our knowledge concerning the natural mechanisms through which the possibilities we represent as contained in the causal natures of these species come to be actualized. Starting with the principles for investigating material nature outlined in the *MFNS* alone, it is impossible for us to grasp what is unique about plant and animal bodies compared to all other kinds of body we come across in nature.³² Like the empirical concept of matter, once we have the concept of an organized being through experience, we can fix a set of necessary and sufficient conditions for identifying individuals that fall under that concept. We can even posit a fundamental natural power as an existing real ground of these essential characteristics, should they differ sufficiently from those of other kinds of bodies. We cannot however know how it is possible that there be such a natural power, any more than we can know how it is possible that there be natural powers of attraction and repulsion. We can know that such powers exist only through observation of their regular effects in nature, and we can attribute to these powers only what is required by the conditions for the possibility of our empirical cognition of these effects. This kind of approach to the justification of teleological judgments is what we might expect on the basis of the central points Kant makes in the essay on teleology that he publishes in 1788. If we look at the structure of the ‘Analytic of Teleological Judgment’, moreover, I believe this is just what we will find.

4.3: The *Formative Power* of Nature and Natural Organization

At the beginning of § 66 ‘On the principle for judging the internal purposiveness in organized beings’, Kant provides the following characterization of the principle on which he takes natural teleology to be based:

³² The *MFNS* provides principles for the general doctrine of body, from which the differences between specific kinds of bodies cannot be derived.

This principle, along with its definition, states: **An organized product of nature is that in which everything is an end and reciprocally also a means.** Nothing in it is in vain, without end, or to be ascribed to a blind mechanism of nature.³³

While it may seem that Kant is simply stipulating this principle, and that it does not actually provide any tools for his argument concerning the peculiar status of organized beings, he clearly does not take himself to be doing so. This is a generalized expression of the same principle that he claims, in the *CPR*, “one can boldly, and with the approval of all who understand such matters, assert” in medical physiology, namely, “everything in an animal has its use and good purpose”.³⁴ What Kant does with this principle in the *CTJ*, which he does not do in the *CPR*, is attempt to derive it from what he now takes to be its two sources, namely, the empirical observation that provides the occasion for its use and the a priori principle that legitimates its claim to universality, which cannot be derived from experience. In the *CPR*, the introduction of a teleological maxim is discussed in relation to the role of the pure transcendental ideal of God as a schema for the empirical use of reason in representing indirectly the systematic connection of all series of events in the world. This is a deistic conception of God, as an all-sufficient intellectual ground of the possibility, existence, and connection of objects in the world, and purposive unity is discussed as the “highest formal unity, which is based in rational concepts alone”.³⁵ Although in the *CTJ*, Kant is clear that the genuine basis for the principle of teleology is an idea of reason, his view of teleology is now focused on the *intrinsic* and *material* purposiveness of organized beings, rather than on the purposiveness for our cognition of merely formal relations between natural objects. Kant exploits analogies he sees between the production of organized physical bodies and the production of organized bodies of knowledge in the *CPR*, but he does not emphasize the

³³ 5: 376

³⁴ A 688/B 716

³⁵ A 686/B 715

particular role played by our experience of the former, which he now takes to provide “for natural science the ground for a teleology” that “otherwise would absolutely not be legitimate”.³⁶

With the assignment of the principle of the formal purposiveness of nature to the power of judgment in the *CJ*, Kant emphasizes the differences between the power of judgment as subject to aesthetic or sensible conditions (both in further determining given concepts and in reflecting on given objects) and the same power of judgment as freed from these conditions, yet also requiring some conditions for its legitimate employment. The sensibly conditioned power of judgment involves the aesthetic reflection that issues forth in judgments of taste. This kind of reflection is *necessary for* (though it is not *aimed solely at*) generating the system of empirical concepts that provides us with a coherent use of the understanding in making determinate empirical judgments. The same power of judgment, as guided by ideas of reason that are constitutive only for our practical self-legislation, is required for us to provide physical interpretations of particular classes of body that we define logically by reference to peculiar causal capacities. This distinction provides Kant with a clearer division between the transcendental principle that we discover through reflection ‘to have been operative’ in the generation of our concepts of logical genera and species of natural body, on the one hand, and the principles that are occasioned by observations that are consciously directed at systematic knowledge of nature, on the other.³⁷ The importance of the specific way in which he does this in the *CTJ* is something that will emerge through taking a look at the central sections that provide Kant with the materials for the derivation and definition of the principle of the teleological power of judgment.

³⁶ 5: 376

³⁷ Kant discusses both of these in the ‘Appendix to the Transcendental Dialectic’ of the *CPR*. The former is the topic of the section ‘On the regulative use of the ideas of pure reason’, and the latter is the topic of the section ‘On the final intention of the natural dialectic of human reason’.

§ 64 ‘On the unique character of things as natural ends’

The discussion in § 64 of the *CTJ*, ‘On the unique character of things as natural ends’, does not take the characterization of ‘something that is possible *only as an end*’ (quoted above) as foundational with respect to the characterization of a *natural end*. Instead, Kant signals that this is the wrong way to go by providing an example of something that we judge to be possible only through human artifice, namely, a regular hexagon drawn in the sand. The conclusion *vestigium hominis video* is the one we draw, correctly, from things in nature that meet the criteria discussed at the beginning of that section. Of course, at the same time, Kant believes that in cases like this one, ‘artificial’ is a merely relative determination, since the will of the human being is also taken to be a natural cause that works through the *mechanism of nature*, broadly understood, in bringing about effects in nature.³⁸ The efficient-causal mechanisms through which this will is expressed are located in the inner grounds of the organization of the human body, however, so the consideration of organized beings as natural ends is preliminary *both* to the pursuit of our theoretical interest in understanding the *order of nature* in its own right *and* to the pursuit of our practical interest in the *order of nature* in relation to our own intentionally formulated ends.³⁹

I take it that Kant begins referring to plants and animals, viewed as products of nature rather than as products of artifice, only later, when he claims:

In order to judge something that one cognizes as a natural product nevertheless to be *also an end*, thus to be a **natural end**, assuming that there is not a contradiction somewhere in this, more is certainly required. I would say preliminarily: a thing exists as a natural end if it is cause and effect of itself (although in a two-fold sense). For here there is a causality of a sort that cannot be combined with the mere concept of a nature, without subordinating this causality to an end, even though as such it can certainly be thought without contradiction, but it cannot be grasped. We

³⁸ 5: 172

³⁹ As we will see below, Kant believes that we do not conceive of organized bodies in nature according to an analogy with our own technical-practical pursuits (mechanical arts and sciences, fine art, culture, civil society) in nature, but rather we conceive these pursuits according to the standard provided by organization in nature.

will clarify the determination of this idea of a natural end through an example to begin with, before we analyze it fully.⁴⁰

It seems clear to me that Kant intends to distinguish between something that is possible *only as an end*, i.e., a product of intentional activity or artifice, and something that is a natural product, yet is *also* something that we have to judge by appeal to the idea of an *end*. What is required for the judgment that something is a natural end is that the natural phenomena that require us to think of the form of some body as contingent in some way, also require us to think of this form as necessitated in accordance with empirical laws that govern the activity of the natural beings themselves to which these phenomena are referred as states. The hexagon in the sand remains artificial, even though it is produced by naturally occurring causes, because the cause responsible for the regularity of its contingent form is a cause external to, or independent of, the sand in which this form is generated. In order for the lawfully generated changes of the state of a being that endures through these changes to be a case requiring the idea of a natural end, the cause whose activity is responsible for these changes must be, in some sense, identical or internal to the enduring thing to which these changes are attributed. Furthermore, as the examples Kant provides will indicate, the cause must be responsible for generating changes in bodies that, because they produce *states* to which we do not think the body is indifferent, we retrospectively consider to be the ends that direct the causality of this cause.

The examples Kant provides to elucidate this idea are, generally speaking, what we might expect on the basis of his previous discussions of organic generation and of natural species, with the exception that he makes reference to plants rather than to animals. Kant treats the phenomena of generation, nutrition, and reproduction in plant bodies as examples of processes in which the same thing, considered in different respects, is both *cause* of the production of some determinate state of affairs and *product* of the enduring activity of this same cause. He focuses on the

⁴⁰ 5: 370-71 Italics represent my emphasis; bold is in text. Again I have departed slightly from Guyer's translation.

capacities peculiar to organized bodies (nutrition, growth, reproduction) that are generally recognized capacities to produce states towards which bodies that are potentially in them are not indifferent. These are capacities, moreover, that have generally been attributed either to the body itself (by moderns) or to the vegetative part of the soul (by scholastics).

These capacities are not under the control of the intellect or the will of beings that possess intellectual and/or sensible capacities for cognition and desire. They are present in beings to which we are not accustomed to attribute these higher and lower capacities, but to which we do attribute a kind of natural striving for self-preservation (whether or not we choose to call this *life*). That is, they are present in bodies as common and as negligible in the *order of nature* as blades of grass. Yet, they are also present in other plants that exhibit more complex and beautiful forms, and in all sorts of animals, no matter where on the scale of complexity, beauty, and perfection these forms are located. They are even present in what some take to be the crowning achievement of nature, i.e., the human animal. There are several things that Kant appears to be doing in focusing on nutrition, growth, and reproduction in a species of plant as examples of the unique character of things that we are forced to think of in terms of natural ends. One of these is to locate the fundamental issues for physiology and natural history in a realm where appeals to powers of representation and desire are obviously analogical rather than literal. Another is to focus on capacities that, at least traditionally, have marked a significant distinction between the plant and animal kingdoms, on one side, and minerals, rocks, crystals and other admittedly complex and beautiful natural forms, on the other.⁴¹

⁴¹ This would seem to serve the purpose of pointing to the fact that we *do* observe liquids turning into solids, and we do observe particular organisms that place into question the precise distinction between plant life and animal life. We do not, however, observe liquids that are not products of plants or animals turning into animated organized structures, and we do not observe particular minerals that place into question the precise distinction between inert, inorganic and living, organic bodies. Comparisons between the observable forms of bodies of one kind during one stage of their natural development (e.g., the viscous fluid *in chicken eggs* that turns into a chick) and bodies of another kind entirely (e.g., the viscous fluid that *is mercury* that turns into a tree of Diana) can be illuminating for discovering general laws of nature, but they do not provide a great deal of evidence for suggestive claims that these two bodies are *really* of the same natural kind. Unless, that is, what it is to be a member of a kind is to exhibit an observable form similar to that of other members of the kind. Statements such as ‘material nature transforms itself from a

Perhaps most importantly, Kant treats nutrition, growth, and reproduction as different stages of the same continuous process. It is a process through which a specific organic form is generated *by* bodies that already have this form *in* bodies that previously lack this form. At the same time, it is also a process through which the form of the species is preserved by being generated anew, with variations, over time. This is a clear difference between Kant's view and other forms of *preformationism*, including von Haller's germ theory, which are all vulnerable to the criticism that they posit untenable distinctions between the *creation* of the parts of the organic body and the *subsequent* unfolding of visible organic structures. If nutrition and growth require a capacity to organize materials that are taken in from without and to incorporate these into the structure of the body, then it is not clear why generation and reproduction should be processes in

fluid state into forms as different, complex, and purposive as chickens and trees-of-Diana' are true, but they can also be highly misleading. When combined with statements such as 'supposedly distinct natural forms approach one another through degrees', it is easy to see how one might hit on the idea that the static *order of nature*, with its fixed divisions and gaps, can be traced back to an original state, in which there were no divisions, from which all of the apparently different, complex, and purposive forms of nature have been successively generated. This would explain why it is that the forms we observe today resemble each other in striking ways, and why it is that they 'arrange themselves' in orders of complexity. Of course, if one's standards of rigor for such claims are closer to Kant's than to Herder's, one might insist that we don't actually see mercury turn into a chicken, and we don't actually see a tree of Diana forming in a chicken egg. Accordingly, we might think that it is *more* relevant to understanding what it is that is in the chicken egg to indicate that it was produced by a chicken and that it later turned into a chick, than to indicate that it is a viscous fluid. While the latter is correct, it is misleading to classify bodies according to observable form, and then, when they undergo regular changes that the bodies that produced them (and the bodies that produced them, etc.) also underwent, to call this a *transformation*. It is clearly a change in observable form, but it is only if we decide that observable form is all that is relevant to classification, or is all that the body is, that this regular change becomes the transformation of one kind of thing into an entirely different kind of thing. We might also be sympathetic to the claim that the term 'approach' has a very different meaning when we are considering the temporal stages in which something gets closer to something else, e.g., the stages through which the materials in the chicken egg approach the fully-formed chick, than it does when we are considering the similarities between distinct things that are given at the same time, e.g., the form of a crystal approaches the form of a plant, which approaches the form of an animal. Herder seems to Kant to exploit ambiguities of these kinds in providing his natural history, and Kant can be seen as pointing to what has generally been a fairly clear distinction between bodies that have capacities to grow, be nourished, and reproduce, and bodies that do not have these capacities.

In addition, if nature really does go through stages in which it approaches more and more perfect forms, and plant life is merely a stage on the way to animal life, the highest expression of which is human life, two obvious facts may not be so easy to explain. First, the fact that less perfect forms still exist and are so abundant is not so easy to square with the idea that the human form is the pinnacle of the transformative history of nature. Second, the fact that animal life and human life still depend on 'plant life' not only externally, for nutrition (or for aesthetic purposes), but also internally, for the functions that cannot be understood so neatly in terms of a machine fashioned by a spirit in order to get around in this world for the time being. Whatever else the human being may be, we know at least that it is also a species of organized natural beings that grow, are nourished, and reproduce at least some of the parts that are lost or injured.

which the powers of nature are entrusted only to unfold previously formed structures or *primordia* of future structures.⁴² Even *individual preformationists* would not want to accept that nutrition and growth are merely processes of unfolding. Drawing a distinction between these processes and generation and reproduction in any principled way, however, seems to be rather difficult. These appear to be good reasons, based on generally accepted maxims of natural philosophy, such as the principle of continuity, for preferring an epigenetic account of the generation of individual organized bodies.

Bringing together the capacities of nutrition, growth, and reproduction, as instances of the production or generation of organic form makes it possible to maintain the continuity of change in material nature and to venture a hypothesis concerning a power that is fundamental with respect to the capacities that are taken to be essential in identifying individual bodies in nature as living. Kant's examples also locate the activity of this power in the natural species that is active through individual bodies in producing the parts that are *their* members and, what amounts to the same thing, producing the parts that are *its* members. That is, it is new individuals with the form common to the species that are generated. This appears to be a good reason, also based in generally accepted maxims of natural philosophy, for admitting that the continuous changes in individual organized bodies occur within natural limits that one could think of as pre-formed.

Accordingly, the discussion of organized beings as 'cause and effect of themselves', seems to be designed as an appeal to generally recognized basic features of *what it is to be* an organized being that are uncontroversial, but that also lead to the controversy between epigenetic and preformationist views of organic generation. This sets the stage for Kant's own claims concerning a fundamental natural power. This power is posited as the causality responsible for effects in nature that everyone agrees do actually occur. It is a power that we can think of as active in a way analogous to other powers with which we are familiar. Finally, it is a power that interacts with other powers in nature in such a way that the processes through which the

⁴² Kant pushes this issue in § 81 in criticizing the *theory of preformation*.

apparently purposive fit between organism and environment comes about are subject to natural laws that are grounded in the efficient causal powers of natural substances. These three criteria for the introduction of a fundamental power are all part of Kant's normative, though clearly not idiosyncratic, view of the conditions for genuinely scientific hypotheses; namely, the effects must be certain, we must be able to think the power according to an analogy with the active powers of which we are aware in inner sense, and the power must be part of the efficient-causal nexus of nature.

The general outline of the example Kant provides is as follows:

I. Taken as members of a natural species, one tree generates another tree that is of the same species. The species is both *generating* and *being generated* through the process in which a tree produces a seed, the seed is sustained until the circumstances necessary for its development come about, and a new tree grows from this seed. Thus, as a *species*, the tree is cause and effect of itself.

II. Taken as an individual, the tree grows through appropriating materials through its roots, reforming these materials, and introducing them as new members into the pre-existing functional structure of the tree. The functioning of the tree, through the exercise of the capacities for nutrition and growth at T^1 , is responsible for the continuous functioning in the intervening stages between T^1 and T^2 , and thus for the effect reached at T^2 . This effect is the same tree, only larger, so as an individual, the tree is cause and effect of itself.

III. Taken in terms of its individual parts, the activity of the tree is responsible for the production of leaves, these leaves are responsible for sustaining the tree prior to the time at which they die and fall to the ground, and this sustenance ultimately allows the tree to produce a new set of

leaves the following spring. The part-whole relation within the individual plant body, is one in which the parts are both causes and effects of the functioning of the whole.

In all of these cases, the existence and characteristics of the thing we consider as the effect of some natural causal process (the tree) is also something that we consider to be made possible only by, or that has a necessary ground in, the very same activity that characterizes this thing (the activity of the tree). Kant takes the discussion in § 64 of the various ways in which trees provide empirical examples for the concept of a natural end to establish the characteristics that are thought in this empirical concept merely in an ‘inauthentic and indeterminate’ way. The discussion in § 65 ‘Things as natural ends are organized beings’ provides the further analysis of the idea of a natural end that is suggested by these examples. That is, it provides a derivation of the character of a natural end, or something that ‘is related to itself mutually as cause and effect’, from a determinate concept.

§ 65 ‘Things as natural ends are organized beings’

The determinate concept from which Kant derives the character of things as natural ends, as it turns out, is not the concept of our technical-practical capacity for artifice, which is evidenced by things such as hexagons in the sand. Taking *this* to be the determinate concept on which we base our analogous thought of the causality responsible for organized beings is what leads to the scientific dead-ends of *individual preformationism* and *vital epigenesis* in Kant’s view. Whether the production of these forms occurs at some indefinitely removed time in the past, or whether it occurs successively through the moments of time in which we observe it, is irrelevant to the determination of the role of nature in producing these beings. If the cause of organic generation stands to the regularity exhibited by plant and animal bodies as the cause of the generation of hexagons in the sand stands to the regularity exhibited by this geometrical

figure, then the former process is actually no more explicable according to laws of *material nature* than is the latter.

Intentionally active causes, whether outside of nature entirely (*individual preformation*) or outside of material nature (*vital epigenesis*), would make the observable organic forms of plant and animal bodies products of artifice. This *would* explain why we are unable to understand the ultimate origin, or the inner possibility, of plants and animals by appeal to the most general laws of material nature. It would also, however, make it absolutely impossible to understand these processes according to particular laws of *material nature*, since the laws actually governing their production would be laws of *thinking nature*. If, along this path, we were also to try to explain the possibility that our wills, or other powers of thinking beings, could be active in nature, we would be moving in a very small circle.⁴³ Accordingly, both for the sake of our theoretical commitment to the causal unity of the *order of nature*, and for the sake of our reflection on the possibility of our wills grounding effects in the natural world, Kant believes it is important to overcome the watch-maker/watch analogy.

Of course, this is not a new idea for Kant. As we have seen, it is one that provides the basis of his rejection of the *preformationist* account of the order of the cosmos provided by Newton, and of the *individual preformationist* approaches to organic generation taken by earlier modern thinkers who want to assign some role to the methods of mechanistic science for treating vital phenomena within plant and animal physiology. The same general considerations, however, are equally applicable to the new wave of vitalists. These thinkers adopt the same watch-maker/watch analogy, but the creator is assumed to be active in nature and is called an *essential force* or a *genetic force* that acts spontaneously in producing organic form in matter that is wholly indifferent to this form. § 65 of the *CTJ* is the central section of the *Analytic* for appreciating

⁴³ If our hope were to derive individual immortality as well, we would also be positing what would appear to be an entirely unnecessary process through which a spirit, which is capable of acting independently of matter in forming the body, animates the body so as to reveal itself in nature, and then sheds the body. That such a thing is possible is utterly unknowable, and that it should be necessary, as a good, seems fairly difficult to grasp.

Kant's response to *individual preformationism*, the *germ-theory*, and *vitalistic epigenesis* and, thus for understanding his remarks directly concerning these theories in the Doctrine of Method. Here, Kant argues that the fundamental power of nature that our empirical cognition of the particular laws of organic functioning entitles us to posit is one that *ought* to be conceived on analogy with our will as *practical reason*, rather than on analogy with our technical-practical production of artifacts.

The idea through which we think a natural end should not be the idea of a complex machine that is set up by some rational being in order to produce something that serves the ends of this or other rational beings. It should, rather, be the concept of the inner natural perfection of the being that is both active cause and beneficiary of the processes through which organic forms are generated. In Kant's view, we ought to conceive of the natural causality involved in the generation of plant and animal bodies as the causality of 'natural ends in themselves' (*an sich Naturzwecks*), on analogy with the causality of practical reason in virtue of which we consider the humanity in us as an end in itself. This provides us with an analogy that serves to guide not only our empirical investigations of nature, but also our reflection on the 'highest ground' of organized beings. Kant is careful to add, however, that this latter reflection is not one that is aimed at deriving anything concerning the *order of nature* from some supernatural ground. It is aimed, rather, at the extension of the same practical reason that serves us as the ground for the analogy according to which we think the *self-propagating formative power of nature*.⁴⁴

The further analysis that Kant provides in § 65 of the special character of bodies that we judge in terms of natural ends comes in two paragraphs that parallel the two quoted above from § 64. That is, the first provides a characterization of what *would be* involved *were* these beings products of artifice (or possible *only as ends*), and the second provides a characterization of what *must be* involved *if* they are to be taken as natural products (or possible *also as ends*). Together,

⁴⁴ 5: 375

they provide two empirical criteria for the use of the idea of a natural end in judging particular objects in nature:

For something to be a natural end it is required, first, that the parts (according to their existence and the form) are possible only through their relation to the whole. For the thing is itself an end. Accordingly, it is dealt with under a concept or an idea that must determine a priori everything that should be contained in it. To the extent, however, that a thing is thought as possible *only in this way*, it is merely a work of art, i.e., the product of a rational cause that is distinct from the matter (the parts), whose causality (in furnishing and combining the parts) is determined through its idea of a whole that is thereby *made possible* (and thus not through external nature).

However, should a thing as a natural product yet contain *in itself and its inner possibility* a relation to ends, i.e., *be possible only as a natural end* and without the causality of rational beings outside of it, it would be required, second, that the parts of the same combine themselves into the unity of a whole through being individually the mutual cause and effect of their form. For in this way alone is it possible, that conversely (mutually) the idea of the whole could in return determine the form and the connection of the parts: not as cause – for then it would be a product of art --, but as ground of cognition for the one that makes judgments concerning the systematic unity of the form and connection of the entire manifold that is contained in the given matter.⁴⁵

Here we see the same contrast between the criteria for something that is possible *only as an end*, and is thus a product of artifice, and something that is a natural product, but must *also* be considered according to the idea of an end. In the former case, the idea of the product in a cause that is capable of having ideas, and of acting in such a way as to impose form on other things, is what *makes* the product *possible*. The product is produced from without by a rational cause that fashions previously existing materials into the form that is required by the idea. This idea serves as the antecedently determining ground of the contingent form of the parts and of their contingent connection in the whole and, *as such*, also serves as the antecedently determining ground of the possibility of the product. It is not merely the contingent *existence* of the product that is brought about according to an idea, in this case, but the idea is itself the ground of the very *possibility* of this product. This case is analogous to the case of the hexagon in the sand. The regular form of the hexagon is made possible in general through our a priori construction of the concept of a

⁴⁵ 5: 373 Emphasis mine.

plane figure with six sides of identical length. The imperfect approximation of this form in sand is made actual by 1) the intuitive representation of this possible form, 2) the discursive steps for its construction that are derived from this representation, 3) the representation of some good that is to come about through its production, 4) the nature of the sand and of the stick, in virtue of which the former is capable of passively receiving the form generated in it by the latter.⁴⁶

In the latter case of a *natural end*, the existence of the product in nature is what enables us to form not a merely sensible representation of the product, or even a concept of what this product has in common with other actual or possible products of material nature, but a rational idea of the product. This is an idea of the inner grounds of *possibility* for a unified manifold of bodily parts, which manifold of parts is given to us as actual only partially and only through our sensory experience. It is only because these parts are given in our experience as being mutually related to one another as cause and effect, with respect to both their *existence* and their *form*, that we are able to make use of an idea in *determining* the form of the whole and the connection of the parts within the whole. This determining is *not* a matter of bringing the form and the connection of the parts into existence, as when we draw the sides of a hexagon in such a way that they meet one another at the angles required by our concept; nor is it a matter even of generating empirical cognition of these formed parts, as individuals that resemble other real and possible individuals in nature. Rather, this determining is a matter of generating empirical cognition of the real relations in which the parts of a naturally functioning whole are found. We do this through judging those parts and relations that *are* actually given to us *as also* existing in relation to parts that *are not* actually given to us, within a unified system that is the *sufficient* ground for the possibility of the connection within a whole of individual parts, which we experience as individually and mutually *necessary* conditions for this connection.

⁴⁶ This is not intended to be an exhaustive list. It is, rather, an indication of the four most relevant aspects of the technical-practical mode of production in the present context.

In other words, I take it that the determining that is made possible through this idea is the determination that an existing and already formed plant or animal body is a member of a particular natural species of plant or animal. This species is considered, in one relation, as the *ontological ground* that is responsible for the possibility, production, and maintenance of the system of organs that is *this* particular plant or animal body. In another relation, the species is considered as the *sum total* of the individual plant or animal bodies that are generated and maintained through the functioning of these systems of organs. By appeal to the former standpoint, we are able to maintain the unity of the species, over time and in space, through all the several variations that occur on account of internal (hereditary) and external (environmental) conditions. By appeal to the latter standpoint, we are able to investigate the functioning of natural machine-like structures within particular bodies, through which individual systems of organs are generated and maintained, and we are able to gain empirical knowledge of the natural laws according to which the efficient causal powers responsible for the existence and functioning of these machine-like structures are related to the mechanism of nature outside of these bodies.

Individual members of these species *can be* brought about in artificial circumstances, and new breeds can be generated through artificial selection according to an idea that determines the characteristics that a being ought to have, e.g., an idea of what is needed for a successful hunt. This kind of artificial selection, however, occurs *within* a naturally existing species, and in fact the product was already made possible by nature, before it was made actual by artificial intervention. That is, the possibility of this combination was already grounded in the nature of the species, prior to our decision that this particular combination of characteristics would suit the animal to our ends. Because of this, even when the combination is *actually* brought about through artificial methods, the result is not really an artificial product. The inner possibility of this product is given through the causal nature of the species in question (and not through some rational cause external to it) and it is produced according to laws similar to those according to which nature functions without our intervention. The organization that we are constrained to

think as an inner end of nature, and that we are not able to reproduce through artificial mechanisms, is the organized being *qua* species of plant or animal. This is what Kant has in mind as the *natural end in itself* that we represent according to an analogy with the *end in itself* that is both the object of our rational acts of willing and the ground of our capacity to will in accordance with reason; i.e., the humanity in us.

Kant appears to be arguing here for the same general view concerning plant and animal bodies we see him developing in the 1760s and 1770s, though he has been forced to clarify the view itself, and his analogical appeal to a will in reflecting on the real possibility of plant and animal species, by the controversy with Herder and the ensuing criticism from Förster. In claiming that organized beings have a capacity to produce genuinely new members of their kind, Kant is merely appealing to the phenomena that everyone interested in a physiological explanation of organic generation begins with. His determination of the idea of a natural end by appeal to the empirical concept of an organized being expresses his commitment to the view that Buffon's law is really an analytic statement concerning what is meant by the term 'natural species of organism'. In §§ 63-4, Kant is providing examples that are useful for the *Namenerklärung* of the term 'natural end'. These examples should lead the reader to the recognition that the class of things in nature that we judge by reference to the idea of a 'natural end' are all either a) individual objects to which the term 'organized being' is also applicable, or b) objects that stand in real relations to such objects. The practice of making teleological judgments concerning objects in b) is one that depends on taking objects in a) as the ends in relation to which these relations are judged to be harmonious. Thus, the practice of making reference to natural ends depends on taking the beings that we refer to through the concept 'organized being' as the class of things in nature that we judge, independent of their relations to beings of other kinds, in terms of the idea of a 'natural end'.

§ 65 then argues that distinguishing between *natural* ends and *artificial* ends, which we all do in practice, requires taking the term 'organized' in a particular way when we think about

the real possibility of organized beings. That is, 'organization' is a contingent predicate with respect to the a priori determination of the concept of a body. Taking organized beings to be natural ends, however, requires that we take them to be natural products, and that we judge them by reference to ends with which they are not merely externally related. If the cause responsible for this contingent determination of bodies is thought to be some being entirely distinct from the one in which it is generated, the organization of the organized bodies that we come across in experience will be represented as a product of artifice in each case. In order to maintain that the forms of plant and animal bodies are generated naturally, to maintain the distinction between natural ends and artificial ends, and to think that the empirically discovered laws of generation are natural laws, we have to take natural ends to be both *organized* and *self-organizing beings*.

Accordingly, the very idea of a natural end requires us to define the concept of an organized being in such a way that 'organized' is actually an essential determination of *this* class of bodies. Plant and animal bodies, according to Kant's view, are not bodies that become organized only subsequent to their being bodies and, in becoming organized, take on the observable form in virtue of which they *are* plant or animal bodies. The observable form of a plant or animal body is, rather, merely the empirical criterion for *our* power of judgment in identifying bodies as members of natural species. These bodies are already members of particular species of plant or animal prior to showing the outward signs of being organized, and prior to exhibiting the peculiar form of organization that is common to members of their particular species. In Kant's view, theories of organic generation that posit mere matter and an *essential force* or a *genetic force* that organizes these bodies and makes them members of particular species of plant or animal, make it impossible to distinguish in any principled way between natural and artificial determinations of bodies. These views rest on what Kant believes to be a natural enough mistake in the use of our power of judgment.

Empirical concepts of what is essential to some class of bodies are *not* concepts of the necessary and sufficient conditions for the bodies themselves that are members of our classes.

They are, rather, empirical criteria that we generate for our own use in determining that some already existing body is a member of a particular class of bodies. For example, the empirical concept of an oak allows us to *identify* some existing thing as an oak, but it does not allow us to *exclude* all things that *do not* exhibit this characteristic from the class of oaks. If we take the empirical criteria for our determinate judgments of the form 'x is an oak' to be the ontological conditions that have to be met by any x in order for this judgment to be true, we are committing a fallacy of transcendental subreption. That is, we are treating the subjective grounds under which we can be certain that our judgments are true as objective grounds for the truth of these judgments.⁴⁷ Assume, for instance, that we make the judgment 'acorns are not oaks' because of our reliance on criteria such as the shape of a tree's leaves for the purposes of identification. Arguments could be made that our judgment is true, since acorns are not yet oaks, even though they are produced by oaks and, given the right conditions, would become oaks. Perhaps equally compelling arguments could be made that our judgment is false, since the outward form of the leaves, and whatever other characteristics we build into our logically defined classes, are actually irrelevant to the question of whether or not something is an oak. In support of the latter view, we could maintain that whatever is produced naturally by an oak is, for that very reason, a member of the oak species, whether it is a relatively self-subsistent thing, like an acorn that could one day grow into an oak, or whether it is a leaf that will die if it is separated from the body that generated it.

We might think that there need be no real dispute between these different ways of conceiving of what it is to be an oak, while also thinking that we should avoid mistakes that rest on conflating two, very different, standards for judgment. For instance, if we decide, in accordance with the first standard, that acorns are not oaks, we should not then turn around and claim that in order to become an oak, the acorn must undergo some radical transformation that

⁴⁷ This is legitimate when the objects we are considering are phenomena, but even then, only with respect to the most general characterization of the possibility of an object of sense experience

really amounts to transubstantiation. The transition from a seed to a mature oak, like the transition from an embryo to a mature animal, will seem to be a radical transformation only if we begin with a logical conception of species and then claim that some being that previously had one particular nature came to have another particular nature. This kind of transformation cannot be conceived as a natural process, if we take 'natural' to indicate that there is a ground for the change in the nature of the being that undergoes it. This nature is, in the first instance, conceived as a logical essence or a *conditio sine qua non* of membership in a class, meaning that the acorn and the oak have entirely different natures. If the one is to be generated out of the other (i.e., if the acorn is to become an oak, or the oak is to produce acorns) there must be some third thing that is capable of bringing about this change. It can still be considered natural, on this view, if the third thing we posit is some power of nature to bring about these radical transformations.

Theories of radical transformism seem to arise from this kind of subreptic fallacy, which appears to be fairly common among empiricists who take the view that the bodies of our experience exist, with the same features we observe them to have, independently of the particular modes in which beings like us experience them. If it turns out that our empirical criteria for identifying bodies are not, at the same time, the ontological grounds of their membership in species, then we might be able to treat processes through which an oak is generated out of an acorn, and more acorns are produced by this oak, as natural processes that are part of the life-cycle of the same enduring thing. If the views of thinkers such as Herder do actually depend on this kind of confusion, and this confusion can be avoided if we think about the very different roles played by the empirical concept of the essence of bodies of a particular kind, and the rational idea of the causal nature of a species of natural bodies, then there are good reasons to reject the radical transformist approach and to accept Kant's alternative. What is more, if Herder's own view cannot account for our ability to make distinctions that even he takes for granted in his theory, then there is good reason to reject this view, even if we are not yet convinced that Kant's alternative is a viable one.

If Kant is right that our ability to distinguish between the natural determinations of organized bodies and the artificial determinations of these same bodies requires us to think of plant and animal bodies as products of the activity of organized and self-organizing beings, then he appears to have a good, critical, refutation of the views of Herder and other supporters of the theory of vital-epigenesis. Kant need not argue on dogmatic grounds, or by appeal to what has to be the case in order for organisms to be possible, which he claims we cannot do. He can argue, rather, by appeal to what has to be the case if the cognition of plant and animal bodies that Herder and others claim we have is to be possible. In arguing against Kant, these thinkers deny the reality of distinctions within nature that Kant maintains, such as the real distinction between different races of human being. If all differences in human beings are really externally caused variations on the form common to all humans, then all of these differences are artificial, and so are the distinctions that Kant makes by appeal to them.

Supposing this is a possibility, we might be tempted to wonder what characteristics are truly natural for human beings, or what would all human beings look like, if not for these artificial differences. Presumably, no particular human being can provide an example. That is, if we are to approach the issue in a principled fashion and one that is consistent with our claims about original identity, we will have to believe either that all existing human bodies are subject to the effects of external circumstances, or that no existing human bodies are subject to these effects. We obviously cannot maintain the latter and still claim that all differences between human bodies are merely artificial. If we maintain the former, however, then it is impossible for us to be certain that any given feature of a particular human body is a natural feature, rather than an artificial one. For any observable feature we might take to be natural (e.g., the possession of two legs, or of two eyes, or an upright posture) it seems to be possible in principle to find a human body that lacks that feature. We are free to maintain that this lack is a result of artificial circumstances, but then we would have to presuppose the very distinction we are pretending to ground, namely, the distinction between the features natural to humans and those that result from the influence of

external causes. We are also free to maintain that whatever lacks these features is not a human being, but then we would have to claim that accidents (e.g., the loss of a leg, or an eye) and other developments (e.g., aging) are capable of transforming a human being into another kind of being entirely. For the sake of consistency we could point to the claim that the generation of a human body out of an embryo involves the same kind of radical transformation, but it is not clear that this is really any help, since it relies on the already questionable view that the generation of such bodies is an instance of this kind of transformation.

If Herder cannot make the distinction between natural and artificial characteristics in any principled way in *particular cases*, then even if his view were consistent or true, i.e., if it were logically possible or actually the case that Kant is wrong about the natural differences between members of the same species, there would be no way for us to know this and no way for us to depend on judgments that take this claim as their principle. What is more, if the claim that there *are* no such differences is taken to follow from the claim that there *cannot be* any such differences, and the latter claim is taken to follow from the view that all beings of the same kind are identical with respect to their essence, then it might be instructive to appeal to the difference between the essence of some thing and the causal nature that explains the possession of the features taken to be essential to the thing. What is clearly contingent from the standpoint of the essence of some kind and, thus, tempts us to seek an external cause for its presence in individuals of the same kind, might well be an attribute that has sufficient grounds for its *possibility* with respect to some individual member of a natural species in the nature of the species, and necessary grounds for its *actual presence* in particular members in the mechanism of nature outside of the individual.

The Self-Propagating Formative Power of Nature

If these considerations are, in fact, central to Kant's strategy in moving from the idea of a natural end to the example of the various ways in which a tree is cause and effect of itself, and then from there to the concept of an organized and self-organizing being, then we would expect that this discussion would be followed by two things. First, there would be an appeal to a natural power, other than Wolff's *essential force* or Herder's *genetic force*, that provides the real ground of the capacity that serves us as an empirical criterion for identifying particular objects in nature as organized beings and, thus, as subject to the standard for judgment provided by the idea of a natural end. Second, there would be a discussion of the analogy with our own powers according to which we should conceive of the relation between this natural power and its regularly observable effects in nature, which will distinguish the kind of teleological view of nature that he espouses from that made use of by other thinkers. That is, we should expect that Kant will offer a view concerning the real ground of the capacity to produce viable offspring, as he does in the 1775 essay "On the various races of humans". This would turn a merely analytic or logical conception of what it is to be a member of a natural species of plant or animal into a representation of the real ground of unity for particular individuals of the same species, and the real grounds of differentiation between species. We should also expect that Kant would defend his conception of this real ground according to an analogy with our will, as he does in the 1788 essay 'On the use of teleological principles in philosophy'. It seems to me that this is precisely what he does in § 65 following the discussion of the empirical criteria for determining that some existing product of nature is an organized and self-organizing being.

After discussing the shortcomings of the analogy between organisms and man-made machines, Kant claims:

An organized being is thus not merely a machine, for a machine has solely **motive** force. It possesses in itself, rather, a **formative** force, and even one that is such that it imparts it to

materials that do not have it (organizes them). Accordingly, it is a self-propagating formative force that cannot be explained through the capacity for motion (the mechanism) alone.

One says far too little concerning nature and its capacity in organized products, when one calls this capacity an **analogue of art**. For then one represents the artist (a rational being) outside of nature. It is far more the case that nature is in itself, and in every species of its organized products, self-organizing, certainly in accordance with some exemplars in the whole, but also with suitable variations that are required by self-preservation according to circumstances. One perhaps comes closer to this inexplicable characteristic when one calls it an **analogue of life**...⁴⁸

Here Kant is offering his view concerning the real ground of unity for the various capacities by reference to which we determine the empirical thought of some existing body through the idea of a *natural end*. That is, the capacities for nutrition, growth, and reproduction lead us to the claim that some particular body is not merely passively organized from without, but that it stands in an internal relation to a self-organizing natural species. These capacities are unified in our thought by referring them, as effects, to the activity of a self-propagating formative power of nature. Kant believes that the power an organized being has to organize the bodies that are its members cannot be explained by the machine-like structure of parts that are involved in its capacity for specific kinds of motion. An organized body is not a machine that is externally directed by rational beings towards the ends of rational beings, even if there certainly are cases in which these bodies *are also* useful towards the intentionally formulated ends of such beings, and cases in which these bodies *can be* produced by artificial methods in such a way that they are rendered more useful towards these ends.

In the *MFNS*, Kant provides the following characterization of a machine, and of the general difference between mechanical natural philosophy and the physico-mechanical, or dynamical approach, that he favors:

A body (or corpuscle), whose motive force depends on its figure, is called a *machine*. The mode of explanation of the specific difference of matters through the character and composition of their smallest parts, as machines, is the *mechanical natural philosophy*; however, that which derives the specific differences of matter from matters, not as machines, *i.e.*, mere tools of external

⁴⁸ 5: 374 Emphasis in text.

motive forces, but from their own original motive forces of attraction and repulsion, can be called the *dynamical natural philosophy*.⁴⁹

Now, the above quote concerning organized beings could be taken to leave it an open question whether or not Kant believes that the formative power of nature, whose effects we observe in the vital capacities of plant and animal bodies, can be derived from the original motive forces of attraction and repulsion referred to in this passage. It is clear that he does not think it can be derived from the figure of these bodies, or from a supposedly original capacity for motion, but he could still think that it is somehow derivative of the original forces of attraction and repulsion. Other passages from the *MFNS*, where Kant discusses the chemical actions of bodies in distinction from their mechanical actions, could be taken to suggest that something like this may be what he has in mind. Keep in mind the following two facts in looking at these passages: 1) The kind of generation of animal bodies that provides the locus of dispute in eighteenth-century physiology is what we now call sexual reproduction, but which Kant refers to as ‘mixed generation’⁵⁰, 2) The central difficulty for explanatory approaches to this kind of generation is that the matter in which the organic form becomes apparent over time appears, at first, to be entirely continuous, i.e., lacking in any distinct, articulated parts, and in the case of chicken embryos the change appears to take place in isolation from any external causal influence.

The action of moved bodies [*bewegter Körper*] on one another through the communication of their motion is called *mechanical*; that, however, of matters insofar as they mutually change the bonds between their parts through their own forces also at rest, is called *chemical*. This chemical influx is called *solution* [*Auflösung*] to the extent that *it has the separation of the parts of a matter as effect* (the mechanical separation, e.g., through a wedge that is driven through the parts of a matter is, thus, entirely different from the chemical, since the wedge does not work through its own force): but that which has as its effect the isolation of two matters dissolved through one another is called analysis [*Scheidung*]. That solution of specifically different matters through one another, in which no part of the one is met with that would not be unified with a part of the other, specifically different, matter in the same proportion as that of the whole, is the *absolute solution*, and can also be called *chemical penetration*.⁵¹

⁴⁹ 4:532

⁵⁰ 8: 163

⁵¹ 4:530

Even supposing that the art of chemistry [*die Kunst*] does not have any chemical dissolving forces [*chemische Auflösungskräfte*] of the kind that have the power to effect a complete dissolution, nature could still perhaps demonstrate such forces in its vegetative and animal operations, and through these, perhaps, generate matters that, although they are mixed, still no art could analyze the [mixed] matters back out [from this mixture]. This chemical penetration could also be met with even in cases where one of the matters is not literally separated and dissolved by the other, as perhaps the caloric [*Wärmestoff*] penetrates the body, since if it were simply distributed in the empty spaces between bodies, the solid substance itself would remain cold, because it could not take in anything from the spaces.⁵²

We might be tempted to think that Kant's references here to chemical action and to vegetative and animal operations would be precisely the kinds of thing he believes is happening in cases such as generation, nutrition, growth, and reproduction. Observation of the embryo in the earliest stages of development reveals no distinct parts in the matter, which could be due to the chemical penetration of the matters provided by the male and the female. We cannot analyze these matters out of the solution, but it does not follow that they are not mixed. Generation could be a process in which the chemical action of the forces of these matters at rest has the effect of the continuous alteration of the state of the body both prior to and following the point in time at which we determine that there are visible structures in the embryo. Subsequent acts of nutrition require taking in external materials through the internal mechanisms of the body, but this is not a matter of mechanical separation. It involves, rather, dissolving the bonds within the matters ingested and introducing a new structure into these materials that suit them to their role in the previously existing structure of the plant or animal body.

The view that the natural powers of a body can work internally on the state of another body is contrary to the mechanical philosophy. If this is what actually occurs in nature, however, then the mechanical philosophy is contrary to nature. The dynamical view of physical influx that Kant maintains throughout his mature writings maintains that such action is, in fact, a necessary condition of the most general aspects of the order of natural phenomena. This view, accordingly, provides a basis from which Kant can maintain the possibility that the above account of what

⁵² 4:531-32

occurs in generation and nutrition is correct. Kant can avoid the preformationist tendency to rely on unobservable structures in matter as causes of observable effects, which would violate the conditions for the empirical use of the understanding, while also avoiding both the vital atomism involved in the views of Maupertuis and Buffon, and the appeals by C. F. Wolff and Herder to essentially spontaneous principles of form that do not sufficiently take into account the regularly observed limits of the exercise of the formative power of nature.

In one of the examples appealed to in § 64 of the *CTJ*, namely, the example of the growth of a tree as an instance of the tree generating itself as an individual, Kant does refer to the “analysis (*Scheidung*) and new composition (*Zusammensetzung*)” of materials that the tree takes in from without. He also refers there to the inadequacy of our artificial methods (*Kunst*) to perform tasks that cannot, merely for that reason, be denied to nature. The passage in § 64 of the *CTJ* refers to our inability to restore or reproduce the plant from the elements we analyze out of it, rather than our inability to dissolve mixed matters into the elements out of which they are composed, but Kant does attribute a capacity for both analysis and formation (*Scheidungs- und Bildungsvermögen*) to the tree.⁵³

As chemical capacities, these would not be *mechanical* in the narrow sense of the term, which would involve a reliance on the view that the various matters (liquids and solids) within the plant or animal body are mixtures of atoms or corpuscles and empty space, and that the various changes in these bodies are results of the communication of motion from one of these corpuscles to another. We have seen, in the discussion of the *CPR*, that Kant does not believe that purported laws governing the alteration of states in phenomenal substances that require appeal to empty space are legitimate contenders for natural laws. It could be that Kant maintains the possibility of unifying the formative power of nature and the motive capacities common to all bodies by reference to their common derivation from original attractive and repulsive forces, which are active both in motion (*mechanically*) and at rest (*chemically*). It may be that Kant thinks of the

⁵³ 5: 371

liquid matter found, e.g., in the egg of a chicken as something approaching an *absolute solution* or a *perfect penetration* of matters of specifically different kinds, which explains why we are unable to distinguish anything resembling a structure in the earliest stages of generation. Our inability to analyze these matters out of the solution in which they are found does not mean that there are no chemical processes taking place, through the action of the attractive and repulsive forces of originally different kinds of matter, that could explain the gradual emergence of structures within what appears to be a continuous mass of matter.

The formative power of nature that Kant refers to in § 65 of the *CTJ* may be the chemical power to analyze and dissolve matters of different kinds. If this were the case, then it might make sense to say that although the generation of organized bodies is not explicable solely through the principles generally made use of in mechanical natural philosophy (matter and motion), it is still something that takes place according to natural laws that govern the efficient-causal interaction of natural powers, so it is still part of the *mechanism of nature*. This view is consistent, however, with the claim that, despite the actual status of this formative power *vis a vis* other powers that we take to be physically fundamental, we cannot understand the connection between the observable effects in matter and the fundamental natural powers responsible for them without making use of the idea that these effects are ‘aimed at’ naturally by these powers. That is, an understanding of the chemistry of nutrition, growth, and reproduction, alone may not really be enough *for us* to comprehend just what it is that is going on in these chemical processes.

Without the idea that nourishment is a good for plants and animals, or that growth is a good for plants and animals, we might not have any real understanding of what we are observing and what bears explaining when we investigate the functioning of plant and animal bodies. More importantly, without the existence of actual plants and animals that are nourished, grow, reproduce lost parts, repair injured parts, and generate other individuals of the same species, we would not understand that such beings are possible a priori, i.e., merely from cognition of various kinds of matter and of the general principles of chemical solution and analysis. If all this is so,

we would still have to treat the *self-propagating formative power of nature* as a physically fundamental power that acts in such a way that we conceive of its effects as having been directed towards the end of generating and maintaining individuals of the species and, thereby, preserving the species.

Kant conceives of this end, as the above passage from § 65 indicates, as ‘self-preservation according to circumstances’. The striving for ‘self-preservation’ that we appeal to as a teleological ground of unity for the various capacities within an organized body is something that Kant believes renders the formative power of nature more suitable for being conceived according to an analogy with life than according to an analogy with the artificial production of machines. Immediately following the above quoted passage from § 65, Kant claims:

... [B]ut [with the analogy of life] one must either attribute to matter as mere matter a characteristic (Hylozoism) that contradicts its essence, or associate it with a principle (a soul) that is of a different kind, but that stands in community with matter. In the latter case, however, if the product is supposed to be a natural product, one must either have already presupposed organized matter as the tool for this soul, which does not make organized matter the least bit more comprehensible, or one must make the soul the artist of this construction, which takes the product out of (corporeal) nature.⁵⁴

The essential attribute of matter as matter that is contradicted by hylozoism is, of course, inertia. When Kant discusses the concept of matter, and its essential inertia, in the *MFNS*, inertia is treated simply as ‘lifelessness’.⁵⁵ It is not a striving to maintain or preserve a state of motion or of rest, as if one or the other of these was the natural state for bodies. Thus, to the extent that the formative power of nature responsible for the organization that we treat as essential to plant and animal bodies is thought of as *striving to preserve* species of organized products, it is thought of according to an analogy with the powers of the soul. As object of the inner sense, however, the

⁵⁴ 5: 374-5

⁵⁵ 4: 544

soul is of a different kind from bodies, which are objects of the outer sense.⁵⁶ We are aware of the community of these in our own case, but this community is no more explicable *for us* than is the organization of matter that we might be tempted to explain by reference to it. If we refer to the soul as a self-subsisting entity independent of this community, moreover, we are appealing to the idea of a spirit, whose action in itself and on the body it serves to animate are not things we can appeal to in rendering something like organic form in matter more comprehensible.⁵⁷

Thus, Kant believes we are forced to accept the formative power responsible for organized matter as a physically fundamental power, if we want to avoid contradiction, *either* with the inertia that we represent as essential to matter as such *or* with the commitment to the idea of organized beings as natural, rather than artificial, products. It would seem that a commitment to the generally accepted standards of natural scientific investigation would tell against both *hylozoism* and the appeal to a spiritual *Werkmeister* of the organized body. The proper conclusion to draw from these considerations, according to Kant, is that:

To speak precisely, the organization of nature has nothing analogous with any causality that we know.* Beauty of nature can legitimately be called an analogue of art, since it is attributed to objects only in relation to our reflection on their outer intuition, and thus only because of their superficial form. Inner natural perfection, however, such as is possessed by those things that are possible only as natural ends and because of this are called organized beings, is not thinkable or explicable according to any analogy with any physical, i.e., natural, capacity that is known to us, and, since we ourselves belong to nature in the broadest understanding, not even through a precisely adapted analogy with human artifice.⁵⁸

In this passage, Kant is clearly claiming that the *self-propagating formative power of nature* that we are constrained to posit as the real ground of the essential characteristics of organized plant and animal bodies is, from our perspective, a physically fundamental power. We can know what particular powers nature has only through experience of their phenomenal effects,

⁵⁶ This is the basis for the distinction between the doctrine of body (material nature) and the doctrine of the soul (thinking nature) in the foreword to the *MFNS*. 4: 467

⁵⁷ This appears to be the same line of thinking Kant expresses in the *Dreams* essay.

⁵⁸ 5: 375

and the phenomena associated with plant and animal bodies (nutrition, growth, reproduction) are such that we are constrained to think of these bodies in terms of a manifold of capacities that are unified through being directed at the self-preservation of the species. The analogy with human artifice is inappropriate here because, although there is an orientation towards ends in both cases, the relationship between the ‘artificer’, the ‘tools’, and the ‘product’ in the case of an organized body is an *internal* relation. The organized being is active through the ‘mechanism’ of efficient causal forces that constitute *its nature* in producing the individual members of the species that we experience as individual plant and animal bodies, and as individual parts of these plant and animal bodies.

The analogy with human artifice is, strictly speaking, fairly presumptuous. Think about a regular hexagon in the sand, which is a product of human artifice. Its form is contingent with respect to the sand in which it is produced, but this form is also in accordance with a rational idea of *just how* the six sides have to be situated with respect to each other in order to, e.g., construct the six-sided figure that has the largest area. It is true for Kant that our intellectual capacities are of a different nature than are the capacities of the sand, the neighboring sea, the wind, other animals, etc. To the extent that we are capable of drawing in the sand, however, these capacities are considered as mutually related grounds of natural phenomena, and so *our* causality is *natural* causality. The analogy with artifice is based, however, on the thought that nature lacks the capacity to produce arrangements that accord with our representations of *just how* something has to be, if it is to be conducive to some end. The analogy is, thus, coherent only if we take our capacity to produce changes in the states of the bodies around us that accord with our representations to be a non-natural capacity. We have no grounds for doing this from the theoretical standpoint, however, if Kant is right that we are aware of our own capacities only through their effects on our empirical consciousness, and that these effects can in principle be related to other effects according to laws of nature.

What is more, this analogy would require an extension to *all* the arrangements in nature that accord with some one of our representations of *just how* things have to be, if they are to be conducive to some end. Rather than our basing the thought of the formative power of nature on an analogy with our own technical-practical production of states of affairs that we take to be good, and positing an architect outside of nature as the intentionally active cause of purposive forms, Kant thinks it is more informative if we think about the relation in the other direction. That is, it is more correct to say that we base our own technical-practical, or artificial, production of effects in nature on an imperfect analogy with the formative power of nature. This power is responsible for bringing about arrangements naturally in ways that we attempt to imitate through our art, not only in the case of varieties and races of plants and animals, but also in the case of political arrangements. In a footnote to the above-quoted passage from § 65, in which Kant claims that the formative power of nature is not strictly analogous to any other powers with which we are familiar, Kant adds:

*) Conversely, light can be shed on a particular connection, which is actually met with more in the idea than in actuality, through an analogy with natural ends referred to in the literal sense. The word ‘organization’ has frequently been well used for the institution of magistrates, etc., and even of the entire political body, in the case of a newly undertaken complete reconstruction of a large people into a state. For every member should certainly not be merely a means, but at the same time also an end, and, in that it contributes to the possibility of the whole, should be re-determined with respect to its place and function through the idea of the whole.⁵⁹

As in his essays on politics, Kant is here claiming that the idea of organization guiding the attempt to institute a political order that is conducive to the development and expression of our autonomy is one that is based on the idea of the intrinsic natural perfection of organized beings.⁶⁰ In this case, the perfection aimed at is the maximal development of our natural capacities as human beings, which involves our assuming the responsibility for achieving this end on our own. In order to do this, we have to reflect on the course of human history as we know

⁵⁹ 5: 376 note

⁶⁰ This is the view of the *Idea for a Universal History*.

about it thus far, project an idea of where this history *could be* headed, and compare this with an idea of where it *should be* headed. This involves us in a significantly different orientation towards natural history than does a purely theoretical approach to understanding and explaining the *order of nature*, but in both cases the self-propagating formative power of nature, in virtue of which organized beings have a capacity to generate and maintain individual members of natural species of plant and animal, must be treated by us as a physically fundamental power. We cannot think or explain this power on analogy with any other *natural* power with which we are acquainted.

As far as physiology and natural history are concerned, our appeal to the principle of teleological judgment leaves it open whether or not the physically fundamental power whose effects in nature provide us with the occasion for adopting it can actually be derived from some more fundamental power, or whether or not it is ultimately directed to its effects through ideas of these effects as goods. We do not require answers to these questions in order to investigate nature, to the extent that we can, according to its mechanism. Nor would an answer to these questions change anything about how we go about investigating the mechanical production and functioning of parts that, since they are parts of plant or animal bodies, also have to be thought by us, in relation to the organized wholes of which they are parts, as organs. In the ‘Analytic of Teleological Judgment’ Kant is attempting to derive the principle according to which teleological judgments are actually made within natural philosophy, from actual experience of particular forms and laws in nature and the rational principles we are required to make use of in thinking the causality responsible for these forms and laws as *natural* causality.

The analogy that we appeal to as a guide for our investigations of organized beings, and as an aid for contemplating ‘their highest grounds’, is not a causality that we think as *subject* to the same *natural* laws to which particular bodies in nature are subject. Rather, the basis for this analogical conception is a causality that we think as subject to laws of *freedom*, whose activity gives rise to objects that are subject to natural laws. These are not mere guidelines that tell us how

to realize some end that is already represented from elsewhere as possible and as a good. Actions that are determined in this way are merely technical-practical actions that take their principle from without (in this case from nature outside of us).⁶¹ Laws of freedom command action, not for the sake of some determinate state that is produced through this action, but because the action is something we must perform as beings with the power to confer the status of a good on objects through our willing.⁶² Interestingly enough, Kant appears to be maintaining that it is only when we consider the causality exercised by *organized beings* on analogy with our practical reason as legislative a priori to freedom, rather than on analogy with our technical-practical production of artifacts in nature, that we are able to provide a causal model of the generation and functioning of *organized bodies* that is a genuinely natural model.

Kant does not actually disagree with C. F. Wolff and Herder, Maupertuis and Buffon, or *individual preformationists* concerning the need to relate organized beings in thought to some kind of spontaneous cause. He merely thinks that the goal of providing a natural model of organic causation is undermined, rather than furthered, if we make determinate judgments concerning the natural powers involved in organic generation based on the *animated-machine* model of organisms or on the *sensible desire* model of organisms. Both of these models involve positing something external to the organized body as the end at which the structure of the body is aimed and, thus, as the basis for teleological judgments concerning this body. On the first model, these are the ends of the soul that animates the body, and the dispute can be carried out over whether it is the individual soul, a world soul, or a completely transcendent spirit, that is the one representing these ends and/or benefiting from their achievement. On the second model, something outside of the body is thought to be represented by the body as a good, and the standard for our judgment is one that concerns the efficiency or expediency with which bodies

⁶¹ This is the way in which happiness functions if we subordinate our will to some object outside of it that we represent to be the end that confers value on its willing.

⁶² This is how the idea of the good will is supposed to legislate as an activity that has its end in itself and not in some product outside of it.

organized in particular ways are able to obtain the objects of their desire. The only way to maintain an objective connection between the ontological grounds that determine the causality responsible for the production of the body and our representation of the ends that are served by the organization of the body, on these models, is to claim that these causal grounds are determined to their effects according to representations of ends.

Kant believes that, if instead of making determinate claims about the spontaneous principles responsible for the generation and functioning of purposively organized bodies, we begin with the experience that leads us to think of them in these terms, we might be less prone to make claims about them that threaten to undermine the empirical cognition of nature from which we begin in our reflective attempts to think the natural grounds of the bodies that are given to us in experience. By starting with external relations that we judge to be purposive and asking about the character that something has to have in order to be the kind of thing that could stand in relations of this kind, Kant draws attention initially away from the kinds of *causes* that are capable of producing purposive arrangements, and towards the kinds of things for which it is possible for arrangements to be purposive.⁶³ This draws attention to the foundational role of organized beings with respect to claims about naturally purposive relations, i.e., they are the kinds of thing in nature whose existence is capable of conferring the value of ‘in accordance with ends’ on natural relations and, the value of ‘means’ on natural bodies that stand in relation to them.

If we start with the phenomena that lead us to treat these bodies in a way that is different from the way we treat other bodies in nature, rather than with claims concerning the kinds of cause that could ground these phenomena, we will say that they appear to be ‘causes and effects of themselves’, or they appear to be generated from other individuals of the same kind, and they appear to generate their parts through the same functioning that the parts generated in this way

⁶³ That is, the consideration that a will would be *sufficient* to produce some arrangement is not as important as the consideration of what it is about the arrangement that would make us think that a will that does nothing in vain would be *necessary*. If there is nothing in the arrangement that has the character of an end, then there is no need to attribute the character of a means to anything else in the arrangement, and a will that brought it about would be doing something in vain.

make possible. If these phenomena are taken to provide conditions that have to be met by any causal hypotheses, instead of being taken as *mere appearances* that lead us to think something that cannot actually be the case, then we will be committed to the view that the causality responsible for the individual bodies that we judge to be ‘causes and effects of themselves’ has to be a kind of natural causality. That is, the effects are natural phenomena, so the causes will have to be natural entities. The effects that we represent *as if* they were represented by the cause, as goods that determine it to action, will be the generation and functioning of organized bodies. This generation and functioning, however, is not something distinct from the cause that that we represent at aiming its activity at this end. The activity, rather, has its end in itself, and not in some external product of the activity.

The only way we can represent this kind of self-determining activity is on analogy with the spontaneity we attribute to our wills, as *practical reason* and not as individual acts of volition. The latter are externally stimulated and externally directed according to circumstances, while the former is the enduring, self-directed activity that provides the conditions for the possibility, existence, and lawful co-ordination of the latter in a coherent whole. The result of this activity *in us* is a system of *laws of freedom* that are authoritative with respect to individual actions that can diverge from these laws, and the effects of which can be judged to be better or worse by appeal to how closely they accord with the effects that one would expect from actions that are determined solely by these laws. By making an analogous use of this idea, we can think of the results of the activity of the formative power of nature in particular species of organized being as systems of *natural laws* that are authoritative with respect to individual bodies that can also diverge from these laws, and the effects of which can be judged to be better or worse by appeal to how closely they accord with the effects that one would expect from actions that are determined solely by these laws. In this way, we can think of the causal nature of species of plant and animal body as the ground of particular laws to which these observable bodies are subject, but which are not

without exception, due to the obstacles to proper development that can be provided by external factors.⁶⁴

The particular bodies that result from the activity of this causal nature can be judged according to a standard that is provided by the idea of how bodies of this kind *might* develop if they did so in circumstances that were maximally conducive to the development of the capacities necessary for the self-preservation of the species. This provides a merely indeterminate standard for judging particular members of the species because we cannot determine, a priori or through experience, precisely what these circumstances would be, or what the resulting products would look like. We can, however, use the general idea of a nature to reflect on the possibility that there should be such a wide range of diverse characteristics exhibited by plants and animals of the same natural species, which appear to be *both* brought out by differences in environment *and* suited to the needs for survival in these different environments. This is the general idea I take Kant to be expressing near the end of the central § 65 of the *CTJ*, when he claims:

The concept of a thing as a natural end in itself [*an sich Naturzwecks*] is thus not a constitutive concept of the understanding or of reason, but it can, however, be a regulative concept for the reflecting power of judgment, according to a distant analogy with our causality according to ends in general for guiding our investigations of objects of this kind and for contemplating their highest ground; the latter certainly not for the sake of cognition of nature or of the ultimate ground of nature, but rather for the sake of the same practical capacity for reason in us, on analogy with which we consider the cause of that purposiveness.⁶⁵

This, I believe, provides Kant with a much more interesting view of natural teleology than is generally recognized to be the case, and a much more scientifically promising approach to dealing with the internal complexity of organized bodies and the external relations between individual organisms and their environments than that of his contemporaries. C. F. Wolff's *essential force* is a spontaneous principle of form that serves as a sufficient ground for the

⁶⁴ What is proper will be thought of relative to what is regularly the case and what suits the individual to playing its role in the self-preservation of the species. It will be a regulative idea, without which we would not be able to determine that there must have been some external cause that we can look for in order to try to understand how the particular effect was generated.

⁶⁵ 5: 375

development of the individual and, as such, cannot allow for any genuine influence from without on the resulting structure of the individual plant or animal body. Herder's *genetic force* is a spontaneous principle that modifies the body, now this way, now that way, according to circumstances and, as such, does not present a constant against which the effects of particular environmental factors can be measured. What is more, as grounds of particular effects, the spontaneity of these forces means that they are not in dynamical interaction with the forces that ground the laws of bodily phenomena more generally, and they are not subject to any laws of material nature. Although they are offered as causal hypotheses, the most we can achieve by appeal to them appears to be a description of the order in which events in nature occur, accompanied by the claim that these events follow necessarily from the action of these forces.

Blumenbach's *formative drive*, or *Bildungstrieb*, is not subject to these same worries, insofar as it is thought to work in conjunction with other forces under the direction of an original organization.⁶⁶ His view concerning the perfect *order of nature*, however, is still one that takes the standard of judgment concerning organized bodies to be provided by the external relation between the structures of individual bodies and the particular environments in which their needs are met. Although it is causal relations that Blumenbach is describing, his teleology remains descriptive, as does his classification of natural species. Blumenbach's physiological investigations lead him to a view of the fundamental power of nature responsible for organic generation that is far closer to Kant's than are those of C. F. Wolff and Herder. His work appears, from Kant's perspective, to be a sign of significant progress in the attempt to turn plant and animal physiology into an explanatory, rather than a merely descriptive, enterprise. Blumenbach's concentration on the observable features of individual organisms and the observable relations between organisms and their environment, however, do not provide the extension of these tools that would be required by the project of doing the same for natural history. In this respect, Kant appears to be on his own in providing alternatives to the kind of

⁶⁶ 5: 424

transformist projects envisioned by Buffon, La Mettrie, and Herder. All of these figures envision a kind of teleological history that attributes a natural striving for perfection to a hylozoistically conceived matter.

The Use of Teleological Judgments in Natural Philosophy

Kant's own natural teleology, as we have seen, breaks with this hylozoist view and offers the idea of the self-preservation of relatively autonomous species of individuals that reproduce their kind, with variations due to both hereditary and environmental factors, as the basis for teleological judgments concerning the natural causes of unity amidst diversity in the plant and animal kingdoms. The argument of the 'Analytic of Teleological Judgment' is aimed at establishing the need to appeal to a self-propagating formative power of nature, that we conceive through an analogy with our own self-determining capacity for practical reasoning, as the physical basis of the capacities essential to organized beings, and to derive the principle on which natural teleology is based from the idea of a natural end to which we are led by observation of the effects of this formative power. The argument of the 'Dialectic of Teleological Judgment', to which we will turn shortly, is aimed at establishing that we *can* do what the Analytic argues that we *need* to do by addressing the apparent tension that arises for our power of judgment from the adoption of different maxims for its reflection. There, Kant argues that dogmatic approaches to explaining the purposiveness of nature, or dogmatic answers to the question 'what is required in addition to the *mechanism of nature* in order to explain the purposive unity of organisms?' fail. He argues that the peculiarities of our cognition explain the natural illusion that the causal unity of nature requires a single set of laws derived from a single principle, and that transcendental realism concerning the matter of bodies is inconsistent with empirical realism concerning the generation and functioning of organized beings.

In one way or another, all of the issues addressed in the Dialectic have to do with the threat to the coherence of natural philosophy that is posed by the kind of amphiboly in the concepts of reflection and the kind of one-sided approach to the unity of the *order of nature* that Kant already addresses in the appendices to the main divisions within transcendental logic in the *CPR*. The particular laws of nature that we combine in the *technic of nature* are apparently heterogeneous. One general way to see objects in material nature as conducive to the requirements of our cognition, or as subjectively purposive, is to think of the laws governing their effects as related to one another in a *necessary order of nature* under mechanical laws. Another general way, which is required by our experience of species of plant and animal, is to think of the laws governing the phenomenal effects of objects in material nature as related to one another in a *contingent order of nature*, through the mutual subordination of these laws to a common end. The *contingency* of purposive relations in nature poses a problem for the attempt on the part of the metaphysician to unify these apparently heterogeneous laws within a system ordered according to some principle from which these laws can be thought to follow with necessity.

Whether the characteristic activities of bodies in nature are ultimately the result of blind necessity (Epicureanism), purely intellectual necessity (Spinozism), purely voluntaristic necessity (hylozoism), or the necessity of a perfectly rational will (theism), however, contingency has to be involved at some point in our account. The attempt to derive contingency from a principle of necessity leads our metaphysical reflections into apparently inextricable difficulties. Kant believes these difficulties *have to be* solved because of a natural confusion to which our power of judgment is prone, and that they *can be* solved by appeal to the peculiarities of our own cognitive capacity that require us to rely on judgments of modality in reflection on natural objects and on the *order of nature*. An intellectual power of cognition that did not share these peculiarities might be able to intuit the *order of nature* as a whole, including all the individual forms and laws that we judge to be *contingent* in some relations while also presupposing that they are *necessary* in other relations, without discriminating what is possible from what is also actual, and what is

actual from what is also necessary. The collapsing of these modal categories would not eliminate those states that we think of as natural goods or natural ends, e.g., the self-preservation of the species. It would merely take away the subjective aspect of our cognition that leads us to judge the arrangement of natural laws as *purposive*, or to judge the laws through which states such as these are achieved in nature as requiring a *contingent* unification through their relation to an *idea* of these states *as* goods or ends.

It is interesting that Kant believes the use of teleological principles in making judgments concerning nature becomes contentious, and leads to an Antinomy, only within the context of dialectic, where we leave the empirical use of the understanding behind and attempt to make judgments concerning the ultimate objective principle of unity for the system of empirical concepts or empirical laws that we project for the purposes of our reflection. When we reflect on nature in accordance with the requirements of the empirical use of the understanding, mechanistic and teleological approaches are not in tension with one another. In § 66 of the *Analytic*, ‘On the principle for judging the intrinsic purposiveness in organized beings’, Kant presents the following general description of the methodological commitments that govern the practice of physiologists:

It is common knowledge that the dissectors of plants and animals accept the maxim ‘nothing in such a creature is in vain’ as unavoidably necessary in order to investigate their structure and to be able to have insight into the reasons why and to what end such parts, why such a position and connection of parts, and exactly this inner form were given to them. It is also common knowledge that they heed this maxim just as much as the principle [*Grundsatz*] of the universal doctrine of nature ‘nothing happens by chance’. In fact, they can no more renounce this teleological principle [*Grundsatz*] than they can the universal physical one, since, just as without the latter no experience would remain, without the former principle [*Grundsatzes*] no guide would remain for the observation of a kind of natural thing that we have once thought teleologically under the concept of a natural end.⁶⁷

The shift from the *Analytic* to the *Dialectic* involves moving from something akin to a deduction of the fundamental formative power of nature from the phenomena of organized beings, and the derivation of the principle of teleology for reflections that are aimed at

⁶⁷ 5: 376

discovering the particular laws according to which we can make determinate judgments about these objects, to reflections that are aimed at discovering the single principle from which the systematic unity of all natural laws in a single system is derived. The physiologist *as such* does not get involved in dialectics, because he or she is adept at making use of these maxims in particular investigations without feeling compelled to explain how the combination of general physical principles and the teleological principle is possible with respect to the same objects. As a natural philosopher, the physiologist has every incentive to remember, and no incentive to forget, that the idea of the end, with which the particular natural laws that govern the functioning of an organized body are in harmony, is the idea of a system of means and ends in the thinking of the investigator.

As Kant treats the issue in § 66, once we are led to refer a particular object to “a supersensible ground of determination beyond the blind mechanism of nature”, we are constrained to think about the object exclusively in terms of the unity provided by this idea. Otherwise we would have a “mixture of heterogeneous principles” and no “secure rule for judging”. At the same time, however, the unity provided by this idea is the unity of a guided mechanism of nature, in which the *mechanism* remains every bit as important as the *guidance*, and *nature* is both ordered and ordering. Kant seems to think that the above-quoted maxims (‘nothing in such a creature is in vain’ and ‘nothing happens by chance’) are not heterogeneous in the case of physiological judgments concerning organisms because both are taken in a natural teleological sense. It is understood that the efficient cause of the change, which guarantees that it does not happen by chance, is *internal* to the being undergoing the change, in which nothing is in vain. Natural change in physiology is a dynamic natural process. It is *not* the merely mathematical synthesis of homogeneous elements in a formal system that provides the model of exactness for general physics. The general physical principle ‘nothing happens by chance’ can be taken in this relation as the rough equivalent of the claim that no *change* is without purpose or the result of a blind natural mechanism. Similarly, ‘nothing in such a creature is in vain’ is taken as

the rough equivalent of the claim that no *part* or *capacity* is without purpose or the result of a blind natural mechanism. Things that we might *otherwise* claim can be explained purely mechanistically will now be considered in their relations to the other members of a system of means and ends, or organs and the causes and effects of their functioning as such:

It may very well be that, e.g., in an animal body some parts could be grasped as concretions according to merely mechanical laws (as hides or membranes, bones, hair). Regardless, the cause that furnishes the matter suitable for this, modifies it just so, forms it and delivers it to the place where it belongs, must always be judged teleologically, so that everything in the body must be considered to be organized, and everything [that this cause produces] is also in turn an organ in a certain relation to the thing itself.⁶⁸

From here, it is fairly easy to see how physiological reflection becomes naturally extended beyond the intrinsic purposiveness of organized beings to take into consideration the purposive relations in which other beings in nature stand to these beings. Even if, considered in isolation, the existence and regular changes in these other beings does not require us to unify the particular empirical laws to which they are subject by reference to ideas of ends, the real causal relations in which they stand to other beings that do require this implicates them as well in the system of purposive relations in nature. As a result, we come to see the entire system of nature as a teleologically ordered system, and we ask about the possible ends that could be served by arrangements in nature that would not normally require us to think of nature as aiming at ends. Kant thinks there is no tension that arises here between teleological reflection and determinate claims about the mechanisms through which natural causes are active. The mechanisms through which change occurs are thought, in a general and somewhat indeterminate way, as subordinated to the ends these changes further, while our understanding of how these ends are furthered is made possible by our investigation of these mechanisms.

As long as the states that we reflect on through our ideas of ends are observable states of natural bodies, and the powers that are active in and through the mechanical arrangements of

⁶⁸ 5: 377

parts in these bodies are considered to be natural powers, there is no antinomy in the self-legislation of judgment. Natural teleology does not take intentional language (i.e., talk of wisdom, efficiency, foresight, beneficence) to involve the introduction of a “particular ground of causality” into physics, in Kant’s view. It takes these terms to refer to a “type of causality of nature according to an analogy with our own in the technical use of reason”.⁶⁹⁷⁰ Thus, although we think of the entire *order of nature* as analogous to an organized being, we need not think of the principle of organization in *this* being as a soul that works in accordance with (*either* rational *or* sensible) representations of the good, and that provides the animating form for the matter of the world (*either* from within *or* from without). This is no more necessary for thinking the *order of nature* as a whole than it is for thinking the order of a natural species of interbreeding plants or animals.

Empirical reflection on the order in material nature can be done in terms of the idea of a *self-propagating formative power of nature (bildende Kraft)*, which is between body and soul, according to an analogy with the *formative power* of our own cognitive capacity (*Bildungsvermögen*), which is between sensibility and understanding. This provides the analogy with our own technical use of reason, where we proceed according to a previously given schema of an object in producing this object according to a plan. The utility of this analogy need not be argued for, since it’s near ubiquity is what gives rise to the view of organisms as either divinely

⁶⁹ 5: 383

⁷⁰ This last claim may appear to be in tension with the interpretation I provide for the claims Kant makes in § 65 concerning the analogy with our practical reason, and the insufficiency of the analogy with human artifice, for judging organized beings. It should be remembered, however, that in that section, Kant is addressing the *intrinsic* purposiveness of organized bodies, which is something that he discusses in terms of a *natural end in itself*. This is the inner ground in virtue of which external connections can legitimately be thought of as means-ends connections. In § 68, he is concerned with the particular natural laws that we investigate in physics, and not the inner ground of the relation of these natural laws to ends. The particular laws according to which organized bodies are generated and function, and the laws that govern the relations between these bodies and other bodies in nature can be investigated according to an analogy with the *technical* use of our reason, it would seem, because we already conceive of the inner grounds of these bodies, or organized beings, according to an analogy with our *practical reason*. This provides the representation of the *natural ends* according to which the mechanism of nature outside of them can be also be considered, analogously to the technical use of reason, as a system of *means* that is ordered with wisdom, efficiency, beneficence, etc.

created or naturally produced machines. The aptness of the analogy to our machines, however, is also clearly questionable, as is obvious from the preformationist tendency to take divinely engineered machines to differ to an incomprehensible degree from machines that we make, and the tendency in vital-mechanical epigenetic accounts to attempt to explain how one machine is capable of actually producing other machines.

If we are tied to the kind of reflection that is suited to the transcendental use of the understanding, while also taking the bodies of our experience to be objects for this use, our claims about ultimate principles of unity will tend in the preformationist direction. If we are tied to the kind of reflection that is suited to the empirical use of the understanding, we will tend towards epigenetic accounts of generation. However, if we take the bodies that are the proper objects of this use to be things-in-themselves, then we will be prone to accept the kind of theory that Maupertuis and Buffon offer in terms of vital molecules with appetites and aversions. If we reflect on these bodies from the standpoint of transcendental idealism concerning the bodies of experience, we can be empirical realists concerning these bodies and the laws of their generation (epigenesis) and be transcendental realists concerning the natural species (preformation), without confusing the ontological principles that we think as conditions for nature with the ontological principles that we think as conditions for freedom.

This non-empirical reflection, which is the topic of the Dialectic, involves a somewhat complicated analogy. That is, the power of judgment, which is between the understanding and reason, is legislative for the feeling of pleasure and displeasure, which is between the cognitive faculty and the faculty of desire. In aesthetic judgments of reflection, the mere form of a natural object, as represented by the imagination, occasions a harmonious activity of the higher and lower cognitive capacity, which is felt by the *subject* as pleasant, and which encourages the *subject* to maintain itself in this activity. In teleological judgments, the empirical cognition of the matter-form combination in natural objects, as represented by the sensibly conditioned understanding, occasions a harmonious activity within the higher cognitive capacity, which leads to the

representation of the *object* as having an inner sense of pleasure and displeasure, which encourages the *object* to maintain itself in its activity. This is the analogy with the imagination that allows us to conceive of the formative power responsible for the essential features of organized beings.

Moving from here, our non-empirical reflection is concerned with the unity within such objects between the formative power and the natural powers that give rise to the phenomenal extension and impenetrability of the body and, should it be present, the powers that ground the capacity for sensible cognition and voluntary motion of the animal. That is, we are constrained to follow out the analogy that has this formative power somehow *between* the body and the soul. Here we are beyond the limits of physics. We cannot derive the empirical character in virtue of which these bodies interact causally with other bodies in nature from their empirically discovered powers, nor can we derive these powers and their unity from some more fundamental ground. We can, however, reflect on the synthetic unity of the grounds revealed by the synthetic unity of their effects in these bodies, in the same way we reflect on the synthetic unity of the grounds of our states of cognition, feeling, and desire revealed through the synthetic unity of these states in our apperception, namely, according to the idea of the fundamental power of a substance. We are not *explaining* the unity of the capacities of the organized being when we conceive of them as grounded in a substance that we take to be a natural end in itself, because this is a merely problematic conception that we adopt for the sake of the coherence of our empirical cognition. We are, however, providing a model for reflection according to which we can unify the principles that we make use of in natural scientific explanations in a way that preserves a commitment to there being a unified *order of nature* that provides the real object of the communal activity of the cosmologist, the general physicist, the physiologist, the chemist, the anatomist, and the natural historian of human and non-human natural species.⁷¹

⁷¹ This appears to be what the *principle of the purposiveness of nature for our cognition* entails.

4.4: The Dialectic of Teleological Judgment and the *Order of Nature*

The problems with teleological judgment, in Kant's view, really begin only when we move beyond the natural scientific investigation of the *order of nature* and attempt to provide substantive answers to certain questions that our cognition of organized beings leads us to pose. Traditionally, metaphysicians have not rested content with the model of teleological reflection as a complementary method of investigation into natural laws of causality. They have merely presupposed the need to do this, and the legitimacy of doing this, and have concerned themselves with providing a determinate answer to the question of whether the causes responsible for naturally purposive connections are determined to their effects intentionally or unintentionally. The antinomy that appears to threaten the self-legislation of judgment arises in the process of reflecting on the manifold of particular laws of nature, which have been discovered through this combined method, in an attempt to locate a single objective principle from which all of these laws stem.⁷²

The critical metaphysician, from Kant's perspective, does not proceed directly to the question about the objective principle from which these laws stem, but starts with questions concerning the subjective sources of the perceived need to locate this objective principle. The insight gained is that there may not need to be an objective principle of unity for the contingently related laws of nature, because the contingency of the relations between these laws may be an artifact of the way in which we discover and unify the laws of nature. It may not seem that we have gained much through this recognition, but Kant believes that considering it from the perspective of what we stand to lose if we do not proceed in this way, namely, the secure use of human reason both in cognition and in practical matters, we will appreciate the positive value of this limitation concerning the speculative use of principles of reflection.

⁷² 5: 386

In the following section, I will provide an interpretation of the apparent antinomy of judgment and the role of transcendental idealism in providing the solution to this antinomy. According to this interpretation, the appearance of an inconsistency stems, not directly from a confusion between regulative and constitutive principles, but from the related tendency to forget the very different sources of the maxims combined in the principle that we make use for reflecting on particular laws towards the end of cognizing the unified *order of nature*. Although the maxim discussed as the thesis is derived from a rule that is constitutive for the determining power of judgment in providing physico-mechanical explanations of events in material nature, it is merely regulative for our reflection on the particular, empirically discovered laws of material nature that we make use of in providing such explanations. In its reflective capacity, the power of judgment is self-legislating and we need not restrict ourselves exclusively to the maxim of mechanism, which maintains its objective but indeterminate a priori validity for judging events in nature, due to our interest in the use of the determining power of judgment in genuinely physical explanations.

The idea of the unification of empirical laws in a system is a requirement for the coherence of our empirical cognition, and we cannot provide this unity solely by subsuming particular laws under the universal laws that stem from the conditions for a mathematically exact science of corporeal phenomena. It would, thus, be a mistake to deny the use of other principles for reflecting on the laws involved in the possibility of products of material nature. If our unified empirical cognition of the laws governing the regular appearances of organized beings (whether natural species of plant and animal or, by extension, the entire *order of nature*) leads us to attribute the possibility of organized beings, as an effect, to the causality of an architectonic understanding, however, the power of judgment is no longer self-determining in its reflection. It has merely replaced the legislation of the understanding with the legislation of reason and has entirely subverted its task of representing the “unity according to empirical laws of the thorough-

going lawfulness of nature”.⁷³ The laws in accordance with which effects follow from the causality of an architectonic understanding are neither empirical laws nor laws of nature.

Actually attributing the unity of natural laws to the activity of such an understanding is not a case of supplementing the view of the *mechanism of nature* according to the requirements of a more comprehensive view of the *order of nature*. It is, rather, a case of replacing the *order of nature* with an order of effects following from causality through freedom. This serves to undermine the physical-mechanical mode of natural explanation that one is seeking merely to supplement. We fare no better, in Kant’s view, if we attempt to provide some other determinate explanation of what is required in addition to the mechanical laws of nature in order to account for the *lawfulness of the contingent*. If we take the regulative principle of the autonomously reflecting power of judgment to be a regulative principle for the determining power of judgment under the legislation of reason, we will be led to the appearance that the maxim presented as the thesis and the maxim presented as the antithesis cannot be unified within a coherent strategy for reflection on the unity of nature. That is, we would be forced into the view that we are required to make the same distinction between the *mechanism of nature* and *supernatural grounds* of events in nature that is required for the sake of thinking free causes and unconditioned necessity in the ‘Antinomy of Pure Reason’. Non-empirical reflection on *supersensible* natural grounds should not be identified with non-empirical reflection on the *supernatural* grounds of nature, however, if we aim to secure the unity of nature and the coherence of our empirical cognition through this reflection.

The natural tendency to conflate these, in Kant’s view, is due largely to transcendental realist assumptions concerning the bodies of our experience. If plant and animal bodies, the bodies on which they rely for nourishment, soil, rivers, rocks, the moon, the sun, etc., *were* things in themselves, then the empirical laws governing their regular alterations and their regular relations within a causal community *would* require unification through a cause that acts according

⁷³ 5: 386

to ideas.⁷⁴ The presupposition that guides our investigation of nature is a commitment to the view that *nature* divides *itself* into a system that is conducive to our cognition, but the assumption of transcendental realism concerning the bodies of our experience leads to empirical idealism concerning these bodies and their connections in nature. Because this result completely undermines the presupposition on which empirical research is based, transcendental idealism is the only theory capable of saving the natural scientific commitment to a genuinely causal *order of nature*.

The lesson of the Dialectic, as I see it, is that even in cases where products of material nature (natural species of interbreeding plant and animal bodies, geographical ecosystems, the solar system) force us to make judgments concerning their possibility that involve reference to ideas of the architectonic connection of individuals in a system, we are still required to judge the possibility of alterations in their observable states (i.e., the continuous generation of the form characteristic of these systems) according to particular natural laws that are necessarily connected with other natural laws in the *mechanism of nature*. What we are unable to do, in Kant's mind, is judge the generation of an *organized being* as something that is possible in terms of the mere *mechanism of nature*. This would provide an actual conflict with the maxim for judgment provided by the determining power of judgment, however, *only if* the generation of an organized being were a case of the generation of an observable form in a material thing; e.g., if the individual plant and animal *bodies* we observe, dissect, and cross-breed were things-in-themselves that meet reason's criteria for organized *beings*, or if geographical and cosmological sub-systems were things-in-themselves that meet these criteria. An organized being, however, is

⁷⁴ That is, the unification of these independently existing things in a species, which we think through ideas, would either be grounded ontologically in an archetypal idea or it would have no ontological ground. In the former case, the unity we represent would be actual and not merely imagined, but in either case it would be grounded in ideas. The reality versus the unreality of the ideal connection, however, does not change the fact that the principle of the connection is not a natural principle.

a natural system, which is a manifold of material things taken together with a unifying ground, that we think in indeterminate terms as the “inner ground of nature that is unknown to us”.⁷⁵

Whether plant and animal *species* are generated according to mechanical laws or according to some other kinds of law is not something that we can determine, because, if Kant is right, the possibility of a species is not the possibility of some alteration in the observable state of a phenomenal substance. As Kant maintains in the essay on teleology preceding the *CTJ*, and as he has maintained since the *OPA*, natural philosophy leaves off prior to the point of explaining the ultimate origins of organization in nature. It is guided, however, by reflectively considering the a priori grounds of the possibility of a species of interbreeding plant or animal bodies as the object of an idea in an architectonic understanding. As he develops his view between 1763 and 1781, Kant becomes less convinced of our theoretical capacity to determine that the existence of plant and animal bodies does in fact presuppose a divine intellect, and less convinced that the presupposition of an original created pair of members of the species is warranted or necessary for our physiological and natural historical investigations. He maintains in the *CPR* that the structures of plant and animal bodies show clear signs of origin in an architectonic idea of the species, though it is clear that his own way of cashing out this kind of language is in terms of the maximal extension of our research into the efficient causes of their generation and functioning.

Between 1781 and 1790, we see Kant growing less assertive about this point as well. He still maintains, as he has throughout, that natural teleology requires taking the purposiveness of natural arrangements to have natural grounds, and reflecting on the unity of these natural grounds by reference to the idea of an architectonic understanding. It appears to be the case, however, that his work in practical philosophy and the disputes in which he is involved concerning natural history in the 1780s leads him to place an even greater emphasis than he had in the *CPR* on distinguishing natural teleological reflection on nature from practically oriented uses of reason for reflecting on nature. The former is aimed at unifying laws in a way that is demanded by our

⁷⁵ 5: 388

theoretical interests, including the interest in a natural history of species of plant and animal. This kind of natural history traces the development of populations within these species backward in time according to empirically discovered laws concerning their functioning and concerning hereditary and environmental sources of variation from a common general form. Practically oriented natural history, in contrast, involves looking at the history of the human species, attempting to discern the general trajectory of this history, and making normative claims concerning what nature appears to have intended for the species and what we ought to do, but may not be physically necessitated to do, once we assume responsibility for our own future.

Herder's natural history appears to Kant to involve an uneasy combination of these that runs them together and undermines the aims of both. Initial conditions and laws of progression are parts of a dogmatic approach to explanation, whether we assume that it is reason or experience that provides us with the relevant first principles for the deduction, and whether we claim that is an atemporal or a temporal progression that we are deriving from these principles. This is possible for us in practical contexts, because we are responsible for prescribing laws a priori to ourselves for the determination of our wills. In theoretical contexts, however, we have to work backwards from regular effects to the laws of the series of these effects, and from regular relations between these series to the principles of their connection. Even once we have discovered these laws and principles, we cannot *derive* the states of natural beings or the alterations in the states of these beings from these laws and principles alone. The most we can do is derive our cognition of the states of natural beings from cognition of their other states, in connection with the states and alterations of the other natural beings with which they exist in a causal community, according to natural laws. It is an unfortunate *non sequitur*, from Kant's perspective, that takes the need to invoke teleological judgments in the context of attempting to unify the theoretical cognition of nature that we gain in this way, as license for a transition to the practical through the view of the progressive transformation of nature through various stages of perfection.

Much of the literature on the *CTJ* has, I believe, taken insufficient notice of the important distinction for Kant between issues of ultimate origins, which are *always* beyond the realm of scientific inquiry and which are a primary source of his disagreement with the epigenetic view of organization provided by Herder, and issues of the temporal generation and maintenance of various orderly manifolds of specifically different kinds of system in material nature, which are *never* beyond the realm of scientific inquiry for Kant. This literature has also tended to focus narrowly on individual plant and animal bodies as if these were the organized beings that Kant has in mind throughout, in the *Analytic* and the *Dialectic*. The transition from the *Analytic* to the *Dialectic* in the *CTJ* is every bit as important as this same transition in the *CPR*, though one generally finds less attention paid to this difference in the secondary literature on the *CTJ*. The aesthetic and logical principles for judgments concerning objects of sensibility do not lead to dialectical disputes in themselves, in Kant's view, because their actual use is subject to common standards of observation and testing. When we move beyond direct consideration of these objects and attempt to establish determinate claims concerning their supersensible grounds through these same principles, however, the matter is entirely different. The two-fold interest of reason in seeking unified cognition of nature leads to the adoption of mutually conditioning maxims of reflection on these supersensible grounds, leading to the situation in which one 'sophisticated reasoner' is more tied to one of these, while another is more tied to the other. In the debate, each side glosses over the equal necessity for our cognition of the other maxim, and both sides ignore the source of these maxims, and of their dispute, in the subjective features of our own particular ways of gaining access to the inner principles of nature.

What follows will provide a detailed discussion of the main points I have made here, beginning with an initial discussion of the 'Antinomy of Teleological Judgment' in light of the specific issues concerning organic generation that lead seventeenth and eighteenth-century thinkers to questions about the mechanical explicability of organic generation. The discussion of the Antinomy will continue through my subsequent discussions of the dogmatic approaches to

explaining the purposive *order of nature*, and of the transcendental idealist resolution of the antinomy that Kant believes clears the way for his own use of teleological principles in the view of natural species that provides the basis for his project in natural history. That will prepare the way for a concluding section on the position concerning organisms and teleology that Kant provides in the first §§ of the ‘Doctrine of Method of the Teleological Power of Judgment’.

Overview of the Conflict and its Resolution

The Antinomy that Kant discusses in the Dialectic results from the use that we make of guiding principles in the attempt to unify the manifold of particular laws of nature that we discover through experience. When we are concerned with determining particular objects of experience to be in particular states or with determining that a particular object is a member of some general class of naturally occurring object, our judgments are made in accordance with rules that are provided by the understanding in the form of a priori principles and empirical concepts. When our interest is in proceeding from cognition of particular laws to the unification of these laws under more general empirical laws, however, the power of judgment serves itself as a principle for its reflection. In doing this, it makes use of two different subjective principles, or maxims, between which there is an apparent tension.⁷⁶

Each of these is a maxim for thinking the unity of what would otherwise be represented as a merely contingent aggregate; i.e., a manifold of particular empirical laws, or a manifold of higher level empirical laws that serve to unify particular empirical laws. The difference in the source of these maxims, however, leads to an apparent difference in the kind of unified system of natural laws under which we judge natural events and natural objects to be possible. The tension between the system of efficient causal laws projected for the sake of the understanding and the system of final causes projected on behalf of our reason is merely apparent, in Kant’s view,

⁷⁶ 5: 387

because the latter is not a distinct, complementary, and potentially opposed set of laws. It is, rather, an entirely different set of regular relations in which we are constrained to represent particular laws of efficient causality in order to see these laws as governing particular aspects of a unified system of nature.⁷⁷

If we ignore the peculiar status of the two-fold principle of the autonomously reflecting power of judgment and take the maxim of teleology to be a merely *complementary* principle for explaining aspects of nature that we cannot understand and explain according to the *mechanism of nature*, we render our reflection on natural laws incoherent. The same result follows from the attempt to do entirely without the principle of teleology and the attempt to derive the efficient-causal nexus of nature from natural or supernatural beings whose actions are determined to their effects through representations of these effects as ends.⁷⁸ These are all common enough, and understandable enough, responses to our perception that there are *necessary* connections between *contingently related* elements (parts of matter, substances, natural powers, natural laws) within unified systems in nature and a unified system of nature. The attempt to explain the *lawfulness of the contingent* in nature, or the purposiveness of connections in nature, presupposes that necessity and contingency actually attach to objects and relations in nature and, thus, that there is some objective principle in virtue of which it is both necessary and correct for us to represent them in this way.⁷⁹

If Kant's transcendental idealism is correct, however, the possibility and necessity of objects of experience is really no more than a relation of our representations of them to our

⁷⁷ McLaughlin [1989] takes the view that teleology is a matter of complementing mechanistic investigations, as if it bridges a gap that we are then able to close when we provide a mechanical explanation. To me it seems closer to what Kant is arguing in the *CTJ* to think that once we judge something to have the character of a natural end, our investigation of the mechanisms through which its regular states are produced will be guided by the reflective principle of a guided mechanism. No matter how far our explanations go, we will never explain away the character that leads us to think of these mechanisms in this other relation.

⁷⁸ 5: 389-95

⁷⁹ 5: 401-4

cognitive capacity.⁸⁰ Considered as they may be in-themselves, or as objects of a cognitive capacity that differs in kind, and not merely in degree, from our own, it may be that possibility and contingency have no real status in nature. Recognizing this will not relieve us of the need to represent potentially counter-factual physical possibilities, or of the need to think about the principles of connection for apparently contingently related elements within natural systems in terms of ideas, but it should relieve us of the natural dialectic arising from the worry that there may be some objective inconsistency in combining mechanistic and teleological laws within a unified system of empirical cognition of nature.

The maxim presented as the thesis is a maxim derived from the determining power of judgment, and requires that our reflection be directed at subsuming particular laws of nature under more general laws in the way that is best suited to the understanding. Although we cannot actually derive these particular laws a priori from the universal laws of motion, the maxim of the thesis states that we must think of these laws *as if* they had been arrived at through nature's specifying its mechanical laws into a system of laws that are related to one another in necessary ways in the *mechanism of nature*. This, I take it, is the Critical analogue of the pre-Critical view of the *necessary order of nature*. It is the order that would be most conducive to the extension of the empirical use of our understanding even concerning those objects in nature whose unity is something we cannot understand by appeal to mechanism alone.

The maxim that is presented as the antithesis is a principle that the power of judgment is constrained to adopt through experience of particular systematic connections in nature, and its use is not restricted to reflection on observable events towards the end of connecting these events in the ways that would be required by the determining power of judgment, namely, according to the intuitive criteria for the application of the categories to particular objects of experience. It is valid, however, only with respect to the use of our reason in seeking the fundamental principles of

⁸⁰ This is the same point made concerning the principles derived from the modal categories in the 'Postulates of Empirical Thinking In General' of the *CPR*.

unity for those objects of experience that we discover to be subject to a variety of particular empirical laws, e.g., it is valid for reflecting on the various empirically discovered powers of a natural substance according to the idea of a fundamental power.

The preparation for the solution of the antinomy involves recognizing that the autonomously reflecting power of judgment is free to take the idea of an architectonic understanding as its principle for reflecting on the grounds of the necessary connection that we presuppose must exist between particular laws of nature. We cognize these laws merely contingently, through observation of their effects.⁸¹ These laws themselves appear to be contingent, because we cannot derive them a priori from the universal laws of material nature, and, for this same reason, their connection in a system also appears to be contingent. Despite this, we presuppose that these laws are necessary, and that the relations between them are also necessary, because the coherence of our empirical knowledge of nature requires the “unity of a thoroughgoing lawfulness according to empirical laws”.⁸² That is, Kant does not believe that the subjective unity of our experience, which is guaranteed a priori by the formal conditions for the possibility of experience, is sufficient for coherent empirical knowledge of nature.⁸³ This requires a unity of empirical concepts and laws according to an objective principle, even if it is one that we can represent only indirectly due to the subjective limitations on our cognition.

Because the cognition under consideration is empirical cognition of the laws of material nature, the obvious choice for guiding our reflection on the systematic connection of particular laws is the set of universal laws that are derived from the a priori determination of the empirical concept of matter in the *MFNS*. Being maximally general, these laws cannot alone provide us with explanations of the generation of features that distinguish particular kinds of body from one another, which is one of the reasons that a transcendental principle of the purposiveness of nature

⁸¹ 5: 388

⁸² 5: 386

⁸³ 5: 183-4

for our cognition is required as a presupposition for empirical science.⁸⁴ It would be a misunderstanding of the relation between universal and particular natural laws, however, to think that whatever cannot be derived a priori from these universal laws also cannot be subsumed under the general principle provided by them. That is, the universality and a priori validity of these laws is not best understood by thinking of them as being laws that govern an existing thing called ‘matter *as such*’, which is determinate only in being the maximum of indeterminacy, or in its not yet having been distinguished into particular kinds of matter.

Both the mechanical laws and the material things and their forms that are referred to in the maxim of the thesis are, according to Kant’s considered view, grounded in the dynamical powers of something = x that provides their real grounds. The derivation of the empirical character of bodies in general from their real grounds, however, is not the object of general physics, nor is the derivation of particular kinds of body from their real grounds the object of other areas of natural philosophy. Natural philosophy is concerned, rather, with the derivation of states of enduring phenomenal substances from previous states according to the empirically discovered laws governing the effects of the exercise of these dynamical powers. The universality and a priori validity of mechanical laws with respect to our empirical cognition of events in material nature is not a guarantee that these laws are sufficient to ground the possibility of these events. The universality of these laws is, rather, something that attaches to them as limiting conditions on the empirical discovery of particular laws governing the motion of objects in material nature. Independent of their application to the natural world, which is a being we think through an idea of reason, these laws are merely mathematical formulae.⁸⁵

The teleological mode of explaining the unity of natural laws is occasioned by empirical observations of plant and animal bodies, but the transcendental ground of legitimation for its use is its relation to the coherence of our empirical cognition, as a necessary subjective condition for

⁸⁴ 5: 185-6

⁸⁵ 4: 469

the possibility of the representation of a coherent *order of nature*. It is a natural illusion, based on the empirical cognition of objects that can be subsumed under the idea of a system of means and ends, to think that we can determine anything directly about objects through the idea of an intelligent cause of the world.⁸⁶ If we could do this, the power of judgment would not maintain its status as self-legislative in its reflection. Instead, it would simply be the determining power of judgment under the legislation of reason, which would lead to the same conflict with the legislation of the understanding that Kant addresses and resolves in the section on the ‘Antinomy of Pure Reason’ in the *CPR*.⁸⁷ The causes of the cosmological series whose members are plant and animal bodies have to be *natural* causes, if the principle of the purposiveness of nature for our cognition is to serve as a maxim for reflection on the unity of particular laws in a single coherent *order of nature*. Positing causes outside of the *mechanism of nature* would actually undermine the project that we are sometimes led to think requires us to do just that.

There is no genuine contradiction in maintaining that the grounds of unity for particular empirical laws must be sought in products of material nature that we are constrained to judge in terms of final causes (e.g., in species of plant and animal), while also maintaining that we are constrained by the requirements of the empirical use of our understanding to reflect on the particular empirical laws that govern events in material nature *as if* each could be ultimately derived from a principle of the *mechanism of nature*. If the generation of the observable form characteristic of a particular species in a body that previously lacks this form *were* the production of a plant or animal from unformed matter, then we *would be* unable to conceive of the objective but indeterminate universal validity of the maxim of mechanism. This generation would not be a case of continuous alteration through which a new observable determination is produced in the same enduring substance. This would not only violate a necessary condition for some change to be possible according to *mechanical* laws, however. It would be a change that violated the

⁸⁶ 5: 405

⁸⁷ 5: 387

conditions for the possibility of our cognition that it occurred according to any *natural* law. The production of form in an unformed mass of matter is the creation of a new thing that did not exist prior to the change (plant or animal body), and the annihilation of the old thing that did exist prior to the change (unformed matter).

In this, Kant agrees with Herder. He merely disputes the view that we have any good reason to maintain that this occurs *in nature*. In the case of the generation of particular forms of organization in bodies that previously lack *these particular* forms, these bodies are always observed to have *some other particular* form prior to their transformation. The ‘finger of divinity’ is an interesting metaphor, and it can seem to be quite a pious expression of reverence, but as a principle of natural historical explanation, it is neither *required* by our observation and testing nor is it *helpful* for our formulating of testable hypotheses.

Similarly, if the parts of matter *were* independently existing things-in-themselves, and the only principle of unity for compound bodies *were* the unity of spatial contiguity, then the purposive unity characteristic of organized beings would, in Kant’s view, have to violate the laws of mechanics. That is, the contingent relation to our ideas of ends would have to be grounded in some feature of the aggregated object that resulted either from pure chance (swerve) or from the vital strivings of the parts of the compound body. Just as in Herder’s case, however, the same feature in virtue of which these entities violate the laws of mechanics, are features in virtue of which we are unable to count them as subject to any laws of nature. Both of these alternatives to Kant’s own epigenetic theory are offered as ways of explaining the genuine production of organic forms in nature according to natural laws that avoid the break with the principle of continuity in nature that preformationist theories require. Both are theories, however, that derive the observable forms of these bodies from unobservable material and formal principles according to laws that, for this very reason in Kant’s view, cannot be laws that govern the continuous alteration of states in enduring phenomenal substances.

No defensible form of the law of continuity requires, or even allows, that there be continuity between the *observable* effects of the activity of natural substances and the, in principle, *unobservable* grounds of these effects. Dogmatic metaphysicians, such as Leibniz and Christian Wolff, might make use of this assumption in developing intellectual systems of nature, but French Newtonians and Germans such as Herder are self-proclaimed enemies of this metaphysical approach to natural order, who pride themselves on being led by nature and on deducing principles from the phenomena. This is the context in which Kant sees the need to provide a transcendental critique of the teleological power of judgment, which makes use of two very different kinds of continuity in its reflection on natural laws. One is concerned with the continuous changes in the observable states of phenomenal substances, while the other is concerned with the arrangement of natural forms in continuous ways within and between logically represented classes of natural substance. Kant's own position concerning the attempt to provide physical interpretations of these logical classes requires that we avoid the kind of confusion he sees in Herder's thinking, which Kant believes results from taking the continuity of natural change as the necessary causal ground of the kind of continuity of natural forms that rules out real breaks between classes and natural differences between members of the same class. His discussion of this issue in the 'Appendix to the Transcendental Dialectic' of the *CPR* appears to have fallen on deaf ears, and the importance of these distinctions in stemming the growing tide of vital pantheism in Germany clearly warrants a reformulation of the position provided there.

According to transcendental idealism, the matter of bodies is merely the substantial in the appearance. It requires something = x that is the supersensible substrate to which we attribute the dynamical powers that we discover through their regular effects and that we think as the inner grounds of the essential features of bodies. Accordingly, we can conceive of the formative power of nature, which we posit as the ground of the unified capacities that serve as essential identifying characteristics of *organized and self-organizing beings*, as specified in relation to the essential components of the causal nature of a particular species of body. As a species of *body*, this causal

nature will have to be thought to include the fundamental attractive and repulsive forces that ground the mechanical and chemical actions of individual bodies. As a species of *inter-breeding organized body*, this causal nature will have to be thought as also including the generative power that explains the capacity by reference to which its individual members are identified as members of this particular species.⁸⁸ As efficient causal powers that we are forced to posit on the basis of undeniable features of natural bodies, there is nothing hypothetical about the elements that we think as the material grounds of the possibility of the species. The hypothesis comes in when we think a fundamental power as the form that is able to unify these elements in the organized being, in part, by making use of the powers responsible for the mechanical and chemical capacities of bodies in assuming a particular observable form and in maintaining this form through time.⁸⁹

The contingent connection between powers of different kinds in an organized and self-organizing natural being, the regular generation of contingent characteristics in individual members of the species, and the law-governed connections between essentially different kinds of body in nature all involve the representation of the *lawfulness of the contingent*, which Kant takes to be the general criterion for judgments of purposiveness (i.e., in aesthetic, natural teleological, and practical contexts). We are both able to, and constrained to, think this combination of essential contingency and natural necessity because of the particular relation between our sensibility and our understanding. Because the material element of our thinking is provided by sensible intuitions of manifolds within individuals, and the forms through which we determine these elements in judgments are discursive representations of an indeterminate manifold of individuals, there is indeterminacy going in both directions in our empirical thinking.

⁸⁸ That is, the generative power is the real ground for the viable offspring criterion of species membership (*Naturgeschichte*) and of the observable characteristic according to which they are identified (*Naturbeschreibung*)

⁸⁹ The unification of the teleological and the mechanical maxims is achieved by thinking the mechanical laws as subordinated to the end of the organized being, which means that they are tools involved in the self-preservation of species, and through investigating the mechanisms through which the end is achieved, we are also investigating the end. 5: 410-11

The individual can always be discovered to exhibit some feature that is indeterminate, or contingent, with respect to the general class of which it is a member.⁹⁰ If this feature is, nonetheless, taken to be the necessary effect of some cause, then it is represented as a lawfully generated contingency. The concept can always be thought to subsume more individuals under it than have been identified as of yet. When we come across some individual and we are not sure whether it is, e.g., a variety of oak, our determining that it is an oak presents a case in which an individual that was previously represented as contingent with respect to the determination ‘is an oak’ is subsumed under a particular empirical law for identifying oaks.

The whole, from the standpoint of the understanding, does not exist until all the parts are in place. Accordingly, the whole can be thought to be a result of contingent form that is placed on the sum total of its parts. If these parts come to be connected into the form of a whole in accordance with some law, then we have another case of the lawfulness of the contingent. The parts, from the standpoint of sensibility, cannot exist except in relation to the whole. Accordingly, the parts can be thought to be contingent with respect to the whole. If parts are necessitated by being introduced as divisions within the extension of some whole in accordance with a law, then we have yet another case of the lawfulness of the contingent.

Both the logical relation of universal-particular and the real relation of whole-part are essential to the empirical use of our understanding, which, because it is a sensibly conditioned understanding, always leads us to judgments concerning the lawfulness of the contingent, or judgments of purposiveness. When we move beyond empirically based reflections to think the principles of unity for those manifolds that we unify empirically in terms of purposiveness (i.e., individual plant and animal bodies), we find that the understanding by itself cannot conceive of a species as a whole that exists prior to and conditions its parts in the way that the sensibly conditioned understanding can conceive of space as an abstract and formal whole that is the condition for all particular spaces and for the bodies that occupy space. Matter must precede

⁹⁰ 5: 406

form according to the concepts of pure understanding, so the form of the whole cannot be thought except in relation to the parts that serve as the ground of this form.

The concepts of the characteristics that are common to an indeterminate number of individual plant or animal bodies in nature is not the matter of our representation of a natural species, with the form being the way in which these characteristics are connected in the individual. These are the matter and form of the logical conception of a species of thing in general, which is a *concept* that occurs within a *system of empirical concepts*. If we want to conceive a species as a real, unified multiplicity of natural bodies, or as something that exists in nature and is active in nature through each of its individual members, the understanding alone is not equal to the task. The matter for this representation is provided by the idea of “unbounded reality” as the “matter of all possibility”, and “limitation (negation) as that form through which one thing is distinguished from another in accordance with transcendental concepts”.⁹¹ This is something that is accomplished only through a regulative employment of reason’s pure transcendental ideal (*ens realissimum*) in thinking the a priori possibility of the things themselves (substances with fundamental causal powers) and the system of their relations within nature, that we are led to think on the basis of experience as the real grounds of lawfully generated series of effects within observable bodies. Thus, the ideas of reason through which *we* represent the possibility of systematic connections in general, are thought as *representations* of a whole in an archetypal intellect that precede the possibility, existence, and connection of these parts in a real whole of natural beings.

This provides something analogous to an intuitive schema, which provides the form of a whole prior to the material parts that exist in relation to one another in this whole. Only, instead of these material parts being intuitions in space and time, they are particular empirical laws that govern the enduring states and alterations of state in the objects of whose existence and characteristics we are aware through these intuitions. Thinking the unity of these laws in a

⁹¹ A 267/B 322

system can no more be done by beginning with particular laws and adding more particular laws to these than generating a plant or animal body can be done by starting with individual parts and putting them together. In both cases, we have to represent the whole as the ground of the possibility, existence and connection of its parts. The generation of an animal body as a temporal process through which distinct structures are introduced into the spatial extension of some already existing *material* whole provides the sensible analogue for the rational idea of an internal connection between parts that appear to be of entirely different natures (liquid, solid, bone, flesh, blood, etc.) yet have a common sensible-material ground (the embryo). This is extended to the relations between animal bodies that exist at different times, in different places, and with different characteristics in the representation of an object that involves individuals that appear to some to require a commitment to entirely different natures (races) yet can be thought to have a common non-sensible-material ground (the species).

Because we proceed from empirically given manifolds of individuals that agree in some sensible respects, but are not identical, the connection between them is given, first, as contingent. Under the principle of the purposiveness of nature for our cognition, we are led to expect that that there is some empirical concept, discursive procedure, or law for identifying members of classes, that applies equally to all members of some possible set of non-identical individuals in nature. Each of these will have features that are contingent from the standpoint of their common characteristic, but they will all be subject to a law of identification that leaves these out of account. Once we have formed provisional classes along these lines, we will ask about the physical bases for these common characteristics, under the presupposition that we have been identifying individuals that are really related all along, but we have been doing so independently of any cognition concerning the natural laws *in accordance with which* these relations come about and the natural mechanisms *through which* these law-governed regularities are generated and maintained. We discover the laws according to which heredity functions and the laws according to which environmental factors influence development and functioning prior to discovering the

particular mechanisms through which natural forces are active in generating these regularities. Accordingly, these laws appear to be contingent from the standpoint of other laws, such as those involved in pumping the blood through the body, bringing in air, taking in nutrition, etc., where we already understand the mechanisms through which their regular effects are produced.

In representing the unity of the physical system under the various laws to which the functioning of the system is subject, we cannot simply represent the spatial relation of all the physical mechanisms through which the individual states of the body are produced. This is the case for two reasons. First, we come to discover these mechanisms only subsequent to our cognition of lawful regularities, so we have to represent the unity of the system initially in terms of the overall state produced by the confluence of these lawfully generated states (organization), rather than in terms of the real grounds of these states and their connections in the whole (mechanism). Second, we represent the spatial mechanisms through which the states of individual bodies are generated as products of the activity of the body prior to the time at which it is characterized by these spatial mechanisms, so the mechanisms involved in generating this organization cannot be identical to the spatial mechanisms involved in generating other states of the body, such as its states of motion. The regress in prior spatial mechanisms that generate these, and prior spatial mechanisms that generate those, etc. will never provide anything like the unity of the physical system that we were looking to understand. The only way we can represent this unity, given the contingent way in which we come to have cognition of empirical laws and natural mechanisms is through an idea of the system as an individual composed of a real synthetic unity of individuals that are mutually determining both with respect to each others states and with respect to the overall state of the whole.

Such a system cannot be an object for our intuition, for which the character, number and relation of the parts emerges only through successively analyzing the whole. It also cannot be an object for our understanding, for which the character of the whole emerges only through the successive addition of part to part. If it is actually produced through an idea of reason, however,

then the unity of the system of empirical laws is an artificial unity. Accordingly, we cannot represent the purposive unity of nature as natural unity by any direct means. What we can do, however, is realize that the idea of the archetypal intellect, which we were initially tempted to *posit* as the cause necessary to explain the lawfulness of the contingent, actually relieves us of the need to posit any special principle to explain this feature of nature.

We can think an understanding that is different in kind from ours and that thinks intuitively the real grounds of the connections in nature that we think discursively. Rather than proceeding from contingently given effects to cognition of the principle in accordance with which these effects and their relations are necessary, and then subsuming other similar effects under the same principle, this intuitive intellect would grasp the manifold of individuals through the real ground of their synthetic unity. The *necessary order of nature*, for such an intellect, would not require the analytic unity of laws that we attempt to *bring about* in our cognition through seeing each as having been derived from the most general laws of material nature. It could grasp the necessary unity of the *order of nature* originally, without dividing this order up into its necessary and contingent parts. In the very act of thinking the *technic of nature* as grounded in an intellect that guarantees the systematic unity of nature, or that grounds the lawfulness of the contingent and its connection to the *mechanism of nature*, we should be able to recognize that we do not actually need to posit the existence of this intellect. The mere thought of it allows us to view our reliance on modal judgments as one that is due to the fact that our understanding is *not* an archetypal intellect.

Accordingly, it ought to convince us that the phrase ‘the objective principle grounding the intrinsic purposiveness of nature’, or the phrase ‘the objective ground of explanation for the character of things as natural ends’ need not actually have any referent. The objective characteristics of the beings that we judge in terms of ideas certainly have some ground, and it is this ground that we are interested in investigating in natural philosophy. The principle that is responsible for these characteristics being judged to have the character of natural ends, however,

is a combination of whatever the real grounds of these objective characteristics are and the subjective principle of the *technic of nature* that prompts us to view these objects as being in accordance with our own cognitive ends. If it is unproblematic, as Kant believes everyone actually agrees that it is, to investigate the former according to the idea of the latter, that is really the end of the discussion as far as it concerns theoretical cognition of the a priori grounds of the purposiveness of nature.

Everything else is a matter of employing the methods that are within our power to the actual investigation of natural phenomena, such as organized bodies, and the preservation of the species. Judging these to be the natural ends of the exercise of natural powers and of the existence of the particular mechanisms through which these powers are active in nature does not really involve us in any difficulty. Once we recognize and as long as we respect the important difference between doing this and positing powers that are active through no mechanisms and are responsible for no known effects in nature, we need not worry about anyone who criticizes our methods. If we do not do this, however, then we are likely to continue to involve ourselves in disputes concerning which of two equally necessary maxims for empirical science deserves pride of place.

The Antinomy of Judgment: Issues of Interpretation

Like the dialectical disputes between natural historians who favor the principle of unity and those who favor the principle of manifoldness addressed in the *CPR*, the dialectic addressed in the *CTJ* arises on the basis of the apparent incompatibility between two maxims that Kant believes really represent the mutually furthering and mutually limiting aspects of a two-fold interest in nature. This time, it is the interest of judgment in the principle of its reflection on the *order of nature* as a whole. One aspect of this interest is in securing an efficient-causal nexus that renders natural order an object for our understanding. By itself, however, an efficient-causal

nexus lacks the architectonic connection that is required for a unified *order of nature*. This is why the reflecting power of judgment is constrained to make use of ideas of reason. Otherwise, we could not represent nature as a single enduring object *in which* an indeterminate multiplicity of causally interacting substances is responsible for the enduring and changing phenomenal states of natural bodies.

After presenting the maxims whose apparent incompatibility is responsible for the dialectic that leads the power of judgment astray in the principle of its reflection, Kant refers to both as regulative principles for investigation. He then considers what would happen if they were turned into principles that are constitutive of the possibility of objects. There are several well-noted issues of interpretation that stem primarily from 1) the resemblance between the maxim of the thesis and the ‘principle of generation’ of the Second Analogy, 2) the presentation of both the original thesis-antithesis pair and the pair that results from converting each to a constitutive principle, and 3) the concluding remark in §71 claiming that all appearance of an antinomy stems from the confusion between principles for the reflecting power of judgment and for the determining power of judgment. In order both to address these issues and to call attention to yet another that has received less notice in the literature, I will reproduce both sets of thesis-antithesis pairs.

The **first maxim** of the power of judgment is the thesis: All generation of material things and their forms must be judged as possible according to merely mechanical laws.

The **second maxim** is the **antithesis**: Some products of material cannot be judged as possible according to merely mechanical laws (judgment concerning them requires an entirely different law of causality, namely the law of final causes).

If one converted these regulative principles for investigation into principles constitutive of the possibility of objects themselves, they would read:

Thesis: All generation of material things is possible according to merely mechanical laws.

Antithesis: Some generation of the same is not possible according to merely mechanical laws.⁹²

⁹² 5: 387

It has become the consensus view in the literature that the first maxim (thesis) is not identical to the principle argued for in the Second Analogy, which states that the generation of a new determination in a sensible object takes place in accordance with a law of causality.⁹³ Since this principle does not specify what kind of causal law will be involved in any particular change, the first maxim is more specific than the ‘principle of generation’ or the ‘principle of succession according to the law of the connection of cause and effect’. This consideration provides evidence against the, once popular, view that Kant has reconsidered the constitutive status of the principle of causality by 1790, and has altered the view of the *CPR* in dramatic ways.

It has also become generally recognized, in a way that it was not previously, that the solution to the Antinomy is not merely a matter of avoiding the conversion of the first thesis-antithesis pair into its constitutive counterpart. That is, the appearance of an antinomy does not arise only when we take mechanism and teleology to be principles that are constitutive for objects. If Kant were claiming that the second pair are the principles between which there is an apparent conflict, his own subsequent claim that this would be a conflict in the legislation of reason, and not in the legislation of the power of judgment, would make the presentation of an ‘Antinomy of the Power of Judgment’ fairly arbitrary. The bulk of the Dialectic would also be superfluous, because the task of resolving the conflict would have been completed even prior to § 71, which is entitled ‘Preparation for the Solution of the Above Antinomy’. What is more, the subsequent discussion of dogmatic approaches to purposiveness, and the discussion of the peculiarities of our cognition, would play no part in overcoming the difficulties presented for judgment by the simultaneous adoption of maxims of mechanism and of teleology. For all of these reasons, it seems to be a better interpretive strategy to locate the apparent conflict between the regulative principles for reflection and then try to relate the various issues addressed in the

⁹³See McLaughlin [1989]

remaining §§ of the Dialectic to the task of clarifying how we can understand them in a way that they are consistent.

Against the background of my general agreement with these points, I would like to call attention to two issues. The first is that it should be noted that the resolution of the Antinomy *has to be* a both/and resolution, but it *cannot be* a two worlds resolution. Like the resolutions provided for the conflicts that arise from the dynamical cosmological ideas in the ‘Antinomy of Pure Reason’, the ‘Antinomy of Judgment’ requires a resolution that secures the use of both maxims. Unlike these, however, it cannot rest on claiming that both can be valid *only if* we refer one to objects in nature and the other to objects that exist in an entirely different connection. The objects on which the power of judgment is reflecting are particular empirical laws. If the maxims cannot be combined consistently in judging the possibility of a unified system of nature according to particular empirical laws, then the power of judgment cannot proceed from both of these maxims in its reflection. The *technic of nature* that the autonomously reflecting power of judgment provides itself as a principle would have to be abandoned for cognitive judgments. That would mean that we have to give up the hope of achieving systematic empirical cognition.

The second issue concerns the precise relation between the maxim of mechanism and the laws of mechanics that Kant treats in the *MFNS*.⁹⁴ The issue in the Dialectic of the *CTJ* is clearly the unification of particular laws of specifically material nature, and the laws of mechanics are constitutive of the possibility of turning our empirical doctrine of body into a natural science.⁹⁵ Accordingly, the recognition that the maxim of the thesis is not identical to the causal principle of the Second Analogy still leaves us with a question concerning the claim that a principle that is constitutive of natural science is a merely regulative principle in this context. Here it appears to me to be important to note that the status of dynamical principles such as this one is dependent, for Kant, on the context in which they are made use of.

⁹⁴ Watkins [forthcoming] notes that this issue has not yet received sufficient attention.

⁹⁵ 4: 468-9

The general causal principle is constitutive of the possibility of experience and its objects, because of its status as an a priori rule for combining sensible intuitions in the empirical thought of an object that can be given in a possible sense experience. The laws of mechanics are constitutive of scientific cognition of bodies, because of their role in the a priori construction of the empirical concept of matter, which is required for the determinate application of mathematics to objects of the outer sense. In claiming that the principle “All generation of material things is possible according to merely mechanical laws” is *not* constitutive of the possibility of objects themselves, Kant appears to be doing two things. One of these is distinguishing the subjective or formal principles required *by us* for scientific cognition of bodies from the objective or material conditions for the possibility of bodies. The former can be specified a priori, assuming we have the empirical concept of matter, while the latter cannot. This is so, for Kant, “because we cannot have any determining principle a priori for the possibility of things according to merely empirical laws of nature.”⁹⁶

Accordingly, our method in empirical science has to be one in which we proceed from the particular laws that we discover in experience to the attempt to unify these laws according to the idea of a system that is provided by the a priori construction of the empirical concept of matter. To the extent that we are successful in this, we have provided the component necessary for turning an empirical doctrine of nature into a natural scientific discipline. If we are not yet successful, or we cannot ever be successful, in doing this for a particular discipline, it does not follow that we cannot have systematic empirical cognition of the objects of this discipline according to empirical laws. It merely means that we do not have the kind of cognition that qualifies as *science*, i.e., a priori cognition from first principles. It also means that the unity of the system of empirical laws involved in this discipline, and by extension, the unity of what we now call the empirical sciences, will have to be secured by reference to the idea of the *technic of nature*.

⁹⁶ 5: 387

The other thing that Kant appears to me to be doing in calling attention to the claim that the principle of mechanical causality is not constitutive of the possibility of objects themselves is reminding us that the material grounds of the possibility of ‘material things and their forms’ are not atoms or corpuscles and empty space. They are, in Kant’s view, causal powers that we ‘locate’ in the “inner ground of nature”, which is not an object for the determining power of judgment. If by the phrase *mechanism of nature* we mean to refer to supersensible principles like these (i.e., atoms and void), which are presupposed as the grounds of visible bodies and particular empirical laws, then we can be fairly certain that the unity of nature would require appeal to *supernatural* principles. If, however, by *mechanism of nature* we mean something more like an efficient-causal nexus of natural substances, then it might appear more plausible that these substances could contain dynamical grounds both for the set of connections that we explain in physico-mechanical terms and for the connection we think between this set of connections (and, potentially, other sets of connections) and some state or states of natural objects that we represent through the idea of an end (e.g., the preservation of the state of functioning in an organized body, or the self-preservation of a natural species).

This is how I understand the following claim, which comes in § 70 just after the claim that the maxim of mechanism does not contain a contradiction:⁹⁷

...[I]f I say I must judge all events in material nature, and thus also all forms as products of material nature, with respect to their possibility, according to merely mechanical laws, I am not saying they are possible according to these laws alone (to the exclusion of every other kind of causality); rather it is supposed to indicate only that I should always reflect on these according to the principle of the mere mechanism of nature, and follow this principle as far as I can, for, without taking this principle as the basis of investigation, there cannot be any authentic cognition of nature. Now, this provides no obstacle for the second maxim on the occasions that provide

⁹⁷ McLaughlin [1989] notes that the sentence in which Kant makes this claim concerning a lack of contradiction is translated by Guyer in such a way that it appears that Kant is claiming there is no contradiction between the maxims of the antinomy. His linguistic point seems to me to be correct, but it is also true to say that there is no contradiction between these maxims, even if it takes some transcendental reflection to come to see the point. Kant clearly would not be claiming that the maxim is not self-contradictory, so it appears to me that he is claiming that it does not actually conflict with the phenomena of organic generation discussed in the *Analytic*.

reason for it, namely, with some natural forms (and from their instigation even the entirety of nature) to experience and to reflect on these according to a principle that is entirely different from explanation according to the mechanism of nature, namely, according to the principle of final causes.⁹⁸

In continuing this thought, Kant adds that reflection according to the idea of a final cause does not negate the first maxim. Rather, it encourages us to follow out mechanical connections as far as we can, while also keeping in mind that through following these we will never discover “the least ground for that which constitutes the specific character of a natural end”⁹⁹, although we are likely to gain cognition of other natural laws.

There does not seem to be anything genuinely controversial in claiming that experience and reflection that are conducted according to the idea of a final cause is different from explanation according to the mechanism of nature. Nor does it seem to be terribly problematic, in Kant’s context or in ours, to suggest that the former is a preliminary step towards the latter. That Kant at least does not believe it is problematic is quite evident from his claim, at the beginning of § 72, that “no one has ever doubted it”.¹⁰⁰ Of course, the claim that some thinkers have taken exception to is that by following out mechanical connections we will never discover what constitutes the specific character of a natural end. If we take this claim to mean we will never understand the difference between organized bodies and other kinds of body through the methods of physical science, we may not be likely to agree with Kant here.

The chances for agreement may be slightly better if we take him to be referring to the inner natural grounds of the possibility, existence, and connection within a whole of a manifold of interbreeding plant or animal bodies, which are organized “according to an exemplar in the whole, but also with appropriate variations that are required by self-preservation according to circumstances”.¹⁰¹ His claim is not that we cannot have empirical cognition of the laws according

⁹⁸ 5: 387

⁹⁹ 5: 387

¹⁰⁰ 5: 389

¹⁰¹ 5: 374

to which bodies that are members of these species undergo changes in their phenomenal states by investigating them according to the idea of a mechanism of nature. He is claiming, however, that we do not genuinely grasp what it is that is occurring through these changes unless we also thinking about them in the context of *what* the thing is that is undergoing them and *how* it is related to other things of the same kind. A maximally complete mechanical explanation of the ‘springs and principles’ within a plant or animal body would answer any number of questions concerning the processes of nutrition, growth, reproduction, etc. Of course, it would do so only if we asked these questions, and asking them appears to presuppose that we are thinking of states towards which the functioning of the body aims naturally as proximate ends that are merely modally distinct from the ultimate end of self-preservation. This, I think, represents a genuinely interesting philosophical position that is just as relevant in contemporary contexts as it is in Kant’s own.

If we look in a bit more detail at the specifics of this issue as it presents itself in Kant’s time, and we ask about what is thought to pose such a difficulty for reflecting on the possibility of the ‘generation of material things and their forms’ according to merely mechanical laws, I think several interesting features of what Kant is doing in the *CTJ* become clearer. This is what I propose to do in the remainder of this sub-section, before turning to Kant’s discussion of the problems with dogmatic approaches to explaining the specific character of things as natural ends.

The main specifications that the ‘second law of mechanics’ in the *MFNS* adds to the principle of the Second Analogy are 1) that the object undergoing the change is a *body* and 2) that the change is brought about by an *external* cause. That is, the second law of mechanics is the law of inertia, which states:

All change in matter has an external cause. (Every body endures in its state of rest or motion, in the same direction and with the same velocity, unless it is forced to leave this state through an external cause.)¹⁰²

¹⁰² 4: 543

The discussion of the ‘Dialectic of Teleological Judgment’ concerns our reflection on material nature towards the end of unifying particular empirical laws, and the maxim of the thesis is concerned with judgments concerning the possibility of ‘material things and their forms’. Accordingly, whatever other phenomena might also appear to require that we appeal to laws that conflict with the maxim of the thesis, we can be certain that changes in matter that cannot be attributed to an external cause would be violations of the law of inertia.

It should be noted that it is precisely such phenomena that lead Harvey and other seventeenth-century physiologists to deny that we can provide anything more than a description of the changes undergone by the fetus in animal generation.¹⁰³ It is also what leads eighteenth-century physiologists to theories of preformationism, mechanical epigenesis, and vital theories of epigenesis in an attempt to provide explanations of these phenomena that comply with the standards of modern science. The real issue, as Kant sees it, appears to be whether or not we can admit laws of material nature that involve natural powers to form bodies from within, while still maintaining the view that we have explained some natural phenomenon only when we have specified the mechanism through which it is produced. In the *MFNS*, Kant goes on, in the remark that follows the above statement of the second law of mechanics, to claim:

The inertia of matter is and means nothing other than its *lifelessness* as material in itself. *Life* means the capacity of a *substance* to act from an inner principle, of a *finite substance* to determine itself to change, and of a *material substance* to determine itself to motion or rest, as a change of its state. Now we know of no inner principle of a substance to change its state other than *desire*, and in general no inner activity other than *thinking*, with that which depends on thought, the *feeling* of pleasure and displeasure and *appetite* or willing. However, these grounds of determination do not at all belong to the representation of the outer sense and thus, not to the determinations of matter as matter. Thus, all matter is as such *lifeless*. This, and nothing more, is stated by the law of inertia. If we seek the cause of some change in matter in life, we must immediately seek it in another substance that is distinct from matter although certainly compounded with it.¹⁰⁴

¹⁰³ For a discussion of Harvey’s role in setting the tone for modern investigations into generation, see Gasking [1967]

¹⁰⁴ 4: 544 All italics in text.

The interesting point that this passage raises, when considered in relation to the discussion of the ‘Analytic of Teleological Judgment’, concerns the *analogy* that Kant refers to there between the self-propagating *formative power* of material nature and the capacity of a substance to *act* from an inner principle, or life. In that context, he reiterates the commitment to the inertia of matter as such, and claims that attributing the organization of bodies to a principle of life would either violate this commitment or require appeal to a non-material principle. In the latter case, which is the only one he is willing to countenance, we still cannot provide a natural explanation of how bodies come to have the empirical determination ‘organized’. That is, if we treat the body as the tool through which life is expressed in nature, we either presuppose the organization that renders bodies suitable for this expression, or we attribute the cause of organization to an immaterial principle that fashions the body in such a way that renders it suitable to its purposes. Kant has argued against the hylozoistic views of Buffon, Maupertuis, and others who attribute life-like capacities to the fundamental material molecules of organic bodies, since the 1760s. He has also spent a good deal of time in the 1780s arguing against Herder’s view that a genetic force (that seems at first to function hylozoistically, and then purely spiritualistically) is responsible for fashioning the organized body into the vehicle of the immaterial spirit in this life.

Kant’s own view since the 1760s has been that 1) if the principle responsible for organization in matter is life, we cannot understand the generation of organisms according to laws of material nature, and 2) if the principle responsible for the organization of matter is a natural capacity of plant and animal bodies, we cannot derive this capacity from some capacity that is more fundamental or that is shared by all bodies. In the *MFNS*, we see him claiming that the law of inertia does not entail that bodies cannot be animated, or that there cannot be any place for principles of life in *nature*, but only that matter *as such* is characterized by lifelessness. Thoughts, feelings and appetites *can* be considered *natural* causes of change in the state of motion or rest of a body, but only if we think the matter of the body as compounded with a

substance distinct from matter and as providing the mechanism through which the phenomena of life are produced in nature.

In the Analytic of the *CTJ*, we see Kant offering the claim that the capacity of a body to undergo changes of state that are attributed to internal grounds must be a *natural* capacity of bodies, in order for some living thing to be a *natural* cause of the motions of these bodies. This capacity is also one that cannot be explained by reference to the capacity for *externally* imposed motion, since it is a capacity to be formed from *within*. Nor can it be explained by the actual actions of the soul on matter (for the reasons alluded to above, namely, the soul as spiritual architect takes the cause of this capacity out of nature, and the soul as inner principle of life in an organism already presupposes matter that has this capacity). Thus, if organized bodies are to be generated and function according to natural laws, nature must have a formative power that renders these bodies suitable to being moved from within, or animated, by a principle that stands in community with them. According to Kant, it is a self-propagating formative force that explains the capacity of nature “to be self-organizing in itself and in every species of its organized products, certainly according to some kind of exemplar in the whole, but also with suitable variations that are required by self-preservation according to circumstances”¹⁰⁵

Once the natural capacity to be organized has been isolated in our thinking from *both* the mechanically explicable capacity to be moved from without *and* the sensitive capacities of the soul, the productive capacity of nature that stems from the formative force can be appealed to as the third thing that mediates the connection between the natural objects of the outer sense (bodies) and the natural object of the inner sense (the soul). Because we do not have a third sense that would allow us to experience the interaction between them, we can only think this mediation through referring the motive capacity of bodies, the formative capacity of organic bodies, and the sensitive capacity of our soul to a supersensible substrate. This we would think as a *living finite substance* that is the common ground from which the series of co-existing and successive

¹⁰⁵ 5: 374

phenomenal states of the body-soul combination are derived (ontologically) despite our subjective inability to derive them (explanatorily) from this ground.¹⁰⁶

According to the above considerations, the only natural phenomena that would contradict the law of inertia would be phenomena involving a material substance changing its own state of motion or rest. If the effects of the formative power are not changes in the state of motion or rest of a material substance, but are chemical changes in the inner states of bodies that are caused by the forces of matter at rest, then these effects are not in violation of the law of inertia. Kant claims that thought and desire, feeling and appetite, are not “grounds of determination that belong to the representation of the outer sense”, and so they cannot be “determinations of matter as matter”. There is nothing preventing him, however, from claiming that some of these are determinations of the inner states of objects that we do represent through the outer sense, namely, when we represent matter as organized.

If the matter of plant and animal bodies is organized from within, this organization enables bodies to be animated, and the principle animating the body is sought in some other substance that is compounded with the matter of the body, then the expression of plant and animal life in nature can be rendered consistent with the essential inertia of matter. This does not mean that we can understand the specific character of a natural end according to merely mechanical laws, but it does mean that expressions of life in nature and the essential inertia of matter can, in principle, be unified within a single systematic view of the *order of nature*. Because this is clearly one of the central issues that lead to dialectical disputes concerning natural mechanism and teleology in the eighteenth century, it would appear to be relevant to Kant’s argument for the coherence of the maxims made use of by the reflecting power of judgment.

¹⁰⁶The Averroism that Herder sees in Kant’s theoretical views is the claim that this *living finite substance* is not the individual spirit that is contingently connected to a particular body for a time, but is the humanity in us, the self-preservation of which provides the natural standard for teleological judgments concerning the individual.

Dogmatic Approaches to Natural Ends

In the Dialectic, Kant attempts to defend the coherence of one of his most enduring commitments, namely, that we have to investigate *all* events and arrangements in nature according to the mechanisms through which they are produced, if we want to have any understanding of them in terms of the *order of nature*. Doing this in cases where we *cannot think* of what it is that is distinctive of a class of nature's products, or what it is that is accomplished through these mechanisms, without thinking of the *possibility* of these products by reference to laws of perfection is an issue that Kant addresses in the *OPA*, the *CPR*, and the *CTJ*. In the *OPA*, Kant still believes that an a priori demonstration of the existence of God is possible, though even there the discussion of the perfection of nature does not involve *deriving* anything from the idea of God. The idea of God plays the same basic role in cosmology and natural history there that it does in the *CPR*, namely, it provides us with the idea of a single ground of the absolute possibility, existence, and systematic connection between the natural powers that ground bodies and that give rise to the laws to which these bodies are subject.

In the *CPR*, Kant claims that the purely ontological idea of God becomes a regulative principle for investigating the *order of nature* by serving as an indeterminate schema for the *law of continuity of natural forms*. By invoking the idea of a highest intelligence, we open up a teleological way of viewing connections in nature that does not interfere with our investigation of nature's mechanism, and that satisfies our reason in providing unity according to ends where we might not ordinarily expect it. It is important to Kant that both of these be involved, since the two-fold interest of theoretical reason in *manifoldness* and *unity* cannot be satisfied if we refer everything in nature directly to a single intelligent cause. Teleology, in Kant's view, cannot play any role whatsoever in natural science if it is entirely independent of the investigation of the natural mechanisms through which natural ends are served, and it cannot play any role in the metaphysics of nature unless we think a systematic connection between the natural powers that

produce purposive arrangements in nature and the natural powers that ground the blind mechanical workings of nature.

In the Appendix to the Dialectic of the *CPR*, Kant points to the two-fold interest of reason that leads to the appearance of a real conflict between those who emphasize *unity*, and deny real distinctions between individual forms in nature, and those who emphasize *manifoldness*, and posit the reality of such distinctions. The ‘Antinomy of Judgment’ in the *CTJ* strikes me as a similar treatment of the appearance of a real conflict between those who emphasize *mechanism*, and deny that natural ends are intentional, and those who emphasize *teleology*, and posit intentional causes that work according to ideas of ends. If we “take into consideration the condition of the object”, we will “grasp that it lies too deeply hidden” for us to “speak from insight into the nature of the object”.¹⁰⁷ The proponents of the two sides of the debate are not arguing about whether or not nature works in accordance with ends, or whether or not it is useful or subjectively necessary to think about nature in this way:

No one has yet doubted the correctness of the principle [*Grundsatz*] that certain things of nature (organized beings) and their possibility must be judged in accordance with concepts of final causes, even if one wishes only for a guide in order to get to know their condition through observation, without moving to the level of investigation concerning their ultimate origin. The question can thus be only whether this principle [*Grundsatz*] is merely subjectively valid, i.e., is merely a maxim for our power of judgment, or whether it is an objective principle of nature, according to which another kind of causality, aside from her mechanism (according merely to laws of motion) is attributed to nature, namely, that of final causes [*Endursache*], under which those (motive powers) would stand as merely intermediate causes [*Mittelursache*].¹⁰⁸

The dispute that Kant addresses is one between those thinkers who claim that the *purposiveness* apparent in nature requires explanation in terms of intentionally active causes (living matter or a living God) and those who claim that the *apparent* purposiveness in nature is actually explained by unintentional causality (dead matter or a dead God). The common mistake that Kant believes leads to disputes between supporters of hylozoism, theism, Epicureanism, and Spinozism is to

¹⁰⁷ A 667/B 695

¹⁰⁸ 5: 389-90

treat the concept of natural purposiveness, or the *technic of nature*, dogmatically as a concept that we can further determine through synthetic judgments.

This concept is based on the idea of nature as art, which involves us in thinking of nature as subject to a kind of causality that we can represent only through reason. Instead of first determining why it might be the case that we are forced to think about nature in this way, and then reflecting on the status of the principle that we make use of in doing so, the common tendency is to proceed directly to the question of whether the causality that explains the *technic of nature* is one that works intentionally or unintentionally. This gives rise to the distinction between idealism and realism concerning natural ends. Those who support idealism concerning natural ends *deny* that the productive capacity responsible for natural objects is active through representations. They then claim that the purposive forms of objects in nature result either from natural causality according to laws of motion plus an anomalous swerve (Epicurus) or from the metaphysical ground, or substance, in which the *mechanism of nature* inheres (Spinoza). Those who support realism concerning natural ends *assert* that the productive capacity responsible for natural objects is active through representations. They then claim that the purposive forms of natural objects result from either living or animated matter (hylozoism) or from the understanding of an originally living being (theism).

The two sets of exclusive disjuncts (intentional or unintentional, physical or hyperphysical) seem to exhaust the possibilities for further determining the concept of the causality responsible for natural purposiveness, so it appears that one of these views has to be right, and the others have to be wrong. The appearance that this is the case, in Kant's view, arises from the misconception that the subject concept 'natural end' is one that can be further determined through these predicates. In order to do this, we would have to be certain that this concept actually refers to objects through some real predicate, which is something that the experience leading us to adopt the idea of a natural end cannot provide. Our experience of organized bodies requires us to adopt this idea as a principle for the reflecting power of judgment,

but the representation of a natural end is an idea, or a representation of a kind of unconditioned completeness or perfection that can never be given in experience.

We can provide criteria for thinking empirically given objects under this idea, but in doing so, Kant does not believe we are determining anything concerning these objects. The point of the Analytic is to determine the *idea* of a natural end so as to make it useful for reflecting on particular objects in nature. This involves fixing on *organized beings* as the sole objects in nature that require us to reflect on the inner grounds of their possibility according to this idea, and arguing for the necessity of positing a self-propagating formative power of nature as the real ground of the essential characteristics that distinguish *organized bodies* from other kinds of body in nature. We do think the relation between this power and its regular effects in nature according to an analogy with our own causality according to ends, but that is merely a result of the way in which we are constrained to represent the inner grounds of objects that we cognize sensibly, and that we represent in terms of the systematic features peculiar to plant and animal bodies. Because the concept of a natural end is a merely problematic concept, we cannot provide a determinate explanation of natural purposiveness, or of the *technic of nature*.

The basic problem here, in Kant's view, seems to be that a determinate explanation of the *technic of nature* would require us to show how some contingent thing or some contingent relation between things is a necessary result of something whose existence is necessary. In addressing the distinction between taking the concept of a natural end as a constitutive concept for the determining power of judgment and taking it as a regulative concept for the reflecting power of judgment, Kant claims:

That it is not [constitutive] is clear from the fact that, as the concept of a **natural product** it contains natural necessity and, at the same time, as an end, it contains a contingency of the form of the object (in relation to mere laws of nature) in one and the same thing; accordingly, if there is not to be a contradiction in this, in order for it to be judged according to another kind of causality than that of natural mechanism in discerning its possibility, there must be a ground for the possibility of the thing in nature, and also a ground for the possibility of this nature itself and its connection to something that is not empirically cognizable nature (supersensible), and thus is not

at all cognizable for us. Thus, since the concept of a thing as a natural end oversteps the bounds **of the determining power of judgment** when it is considered through reason (though it may be immanent for the reflecting power of judgment with respect to objects of experience), ...the objective reality of this concept cannot be secured for determining judgments...¹⁰⁹

As an idea, the concept of a natural end cannot be *abstracted from* experience. It is *occasioned by* our experience of organized beings, and its use in reflecting on the inner grounds of possibility for these beings is legitimate, because these beings are objects of experience that are subject to known laws that are contingent from the standpoint of our cognition of the most general laws of material nature. The principle of the reflective power of judgment is a presupposition concerning the purposiveness of nature for our cognition, so reflecting on the possible grounds of unification for empirically given laws according to a rational idea of a system of laws unified by reference to a common end (namely, our own) presents no problem. In order to secure the use of this concept for the determining power of judgment, however, Kant believes we would have to have prior assurance that we are actually thinking of some existing thing through this concept.

According to the rules of the determining power of judgment, however, whatever observable form is exhibited by a body at a particular time must follow necessarily from the previous states of that body, and those of the other bodies with which it interacts, in accordance with a causal rule. Accordingly, this form cannot also be judged to be contingent in the same relation. Conceiving of some form that is produced in nature as contingent in some way or another requires referring the series in which the *observable* forms of bodies give way to one another to the supersensible substrate of nature, which we cannot cognize in any determinate fashion, and thinking of a contingent combination of powers that together ground the laws according to which these observable forms are produced in regular ways.

The conception of the supersensible grounds of the various powers and capacities that are responsible for the necessary order of events in nature, however, is something that exceeds the

¹⁰⁹ 5: 396-7

bounds of our determining power of judgment (whether under the guidance of the understanding or of reason). Accordingly, if we ask, for example, whether the inner grounds of the capacity for nutrition and growth in an oak are aimed at the preservation of the oak intentionally or unintentionally, we cannot answer this question in any straightforward way. Either answer we give would presuppose that these capacities *are* aimed at this state as a good, or that the existence of the oak *is* the natural end of the exercise of these capacities. If we merely adopt the idea that the oak is a natural end for the sake of unifying our thought of its various capacities, however, we will not, and need not, be able to answer this question.

The purpose of Kant's discussion of dogmatic approaches to the *technic of nature* in the Dialectic is to provide an example of the state of affairs that arises from committing the natural mistake that he believes is responsible for the appearance of an antinomy between maxims for our power of judgment. As he claims at the end of § 71 'Preparation for the resolution of the above antinomy':

All appearance of an antinomy between the maxims of the genuine physical (mechanical) and the teleological (technical) mode of explanation is based on the fact that one mistakes a principle of the reflecting power of judgment for one of the determining, and the autonomy of the one (which is valid merely subjectively for our use of reason with respect to empirical laws) for the heteronomy of the other, which must direct itself according to the (universal or particular) laws that are provided by the understanding.¹¹⁰

The common assumption made by all four of these approaches to the *technic of nature* is that the concept of the *technic of nature*, or of the *purposive mechanism of nature*, itself provides us with a principle for the determining power of judgment. Thus, whatever the source of the necessity and the contingency, there *is* a necessary connection between what happens with necessity in nature and what is for the best, or what ought to happen, which allows us to make

¹¹⁰ 5: 389

inferences from the former to the latter.¹¹¹ Each of these views takes the perfection of the *order of nature* as a given and seeks to determine the representation of the causality responsible for this order through the predicates ‘intentional/unintentional’ and ‘physical/hyperphysical’. In each case, however, nothing but what is for the best can come about in nature.

Kant, of course, does not believe that this perfect *order of nature* is something that is given to us, except indeterminately in the idea that serves us as a principle for reflecting on the parts of nature that are given to us. Accordingly not only can we not posit the cause of this order absolutely, but we cannot even posit this order itself except as the ideal end of our attempt to unify our empirical cognition of nature. In taking the principle of the *purposive natural mechanism* to be constitutive for the determining power of judgment, we neglect the autonomy of our reflecting power of judgment, which cannot take direction *from* the understanding while attempting to secure the unity *of* the understanding. Taking this direction would leave us unable to think the supersensible grounds by appeal to which we conceive the possibility of a harmonious, lawful connection between the natural powers that ground the merely mechanical capacities of bodies and the merely mechanical laws of nature, on the one hand, and the formative powers of nature and the natural laws of organic generation and functioning, on the other. The way to avoid this consequence, as I have already outlined above, is to accept core claims of transcendental idealism, namely, the distinction in the contributions made to our cognition by sensibility and by the intellect, and the distinction between the bodies of our experience and the things-in-themselves that we represent as the supersensible grounds of these bodies.

¹¹¹ It should not be surprising that this assumption is what Kant takes to be the source of the dialectical disputes concerning teleological judgment, give that one of the central aims of the *CJ* is to establish that the principle of the purposiveness of nature is a transcendental principle of the power of judgment.

Transcendental Idealism as a Solution to the Antinomy of Judgment

In what appears to me to be the central section of the Dialectic, § 77 ‘On the peculiarity of the human understanding through which the concept of a natural end becomes possible for us’, Kant provides a characterization of how the idea of a natural end differs from the ideas whose legitimacy is secured through the resolution of the ‘Antinomy of Pure Reason’ in the *CPR*. After discussing the transcendental ideal of absolutely necessary being and the practical ideal of morally necessary action, both as representations of conditions that are absolutely unconditioned relative to cosmological series (§ 76), Kant proceeds to compare the idea of a natural end to these ideas (§§ 76-7). In these other cases, the modalities that we attribute to the objects are predicates that attach only to the thought of the relation in which these conditions stand to other things, namely, the relation of an absolutely unconditioned ground of being to the being of contingent beings, and the relation of an absolutely unconditioned causality to physically or naturally contingent actions.

The moral law is expressed as a command concerning what *ought* to happen only because our sensibly conditioned faculty of desire makes it possible that what *would* happen in an intelligible world governed by rational laws *could* fail to happen in the sensible world. The idea of an intelligible world in which moral actions would follow because they are good, without the need for such commands, and the idea of freedom as the principle of form for such an intelligible world, are entirely transcendent ideas and do not provide us with any rules for determining any object. They do, however, serve as principles that regulate our conduct in the sensible world, and they do so with the same validity (even if not with the same efficacy) as they would if they were genuinely objective principles.¹¹²

The same, or nearly the same, is the case with the idea of a natural end, in Kant’s view. If our faculty of cognition were not sensibly determined, it may be that we would never posit a

¹¹² 5: 404

difference between the *mechanism of nature* and the relation of natural arrangements to ends, because there would be no contingent fit between particular natural laws and the universal laws under which these laws are subsumed. Because we cannot derive what is particular about particular laws of material nature a priori, we represent these particular laws and their systematic connection as contingent. The objects themselves that are subject to these laws are not genuinely contingent, they are merely subject to a multiplicity of particular natural laws whose connection, amongst themselves and to universal laws, we represent as contingent because we are unable to derive these particular laws and their connection a priori from their real grounds. The concept of a natural end does not serve to determine any object, but it is a necessary principle for regulating our inquiry into natural objects, and its validity for us is the same as it would be if it were an objective principle.¹¹³

In § 77, Kant claims that, like other ideas, the idea of a natural end is a representation to which no empirical object can be adequate. There is an important difference between it and these other ideas, however, which is the source of the confusion concerning its objective validity:

With the concept of a natural end, the case is the same as concerns the cause of the possibility of such a predicate, which can lie only in an idea; however, the effect that accords with it (the product itself) is actually given in nature, and the concept of a causality of nature, as a being that acts according to ends, seems to make the idea of a natural end into a constitutive principle of nature. In this it is distinct from all other ideas.

This distinction, however, consists in the fact that the idea thought is not a rational principle for the understanding, but for the power of judgment, and thus it is a rational principle solely for the application of an understanding in general to possible objects of experience; and, indeed, there the judgment cannot be determining, but merely reflecting, and thus the object can be given in experience, but cannot at all be **judged determinately** (let alone completely adequately) in accordance with the idea, rather it can only be reflected upon.

What is at issue is therefore a special character of **our** (human) understanding with regard to the power of judgment in its reflection upon things in nature. But if that is the case, the idea of a possible understanding other than the human understanding must be its basis (as in the Critique of Pure Reason we had to have another possible intuition in mind if we were to take ours to be of a particular kind, namely, one for which objects count only as appearances). Thus, one can say, certain natural products must be considered by us, according to their possibility, to be generated intentionally as ends, without requiring that there is really a particular cause that has the representation of an end as its determining ground, and thus, without denying that another

¹¹³ 5: 404

(higher) understanding than the human understanding could locate the ground of the possibility of these products as well in the mechanism of nature, i.e., in a causal connection for which an understanding is not taken to be the only possible cause.¹¹⁴

In this passage, we see that there are two peculiarities involved in our use of teleological judgments concerning natural objects. The first is that they concern objects that are actually given in experience as subject to natural laws that are, themselves, thought to be grounded in a cause that acts through the representation of an end. Unlike judgments that we might be tempted to make concerning purely transcendent beings, like God and freedom, these judgments are empirically justified by the observation of actual effects in nature that we take to be possible only through intentional causality. This creates the particular illusion that the Dialectic is aimed at revealing, namely, the illusion that the idea of a natural end, and with it, the idea of the purposive *mechanism of nature*, is a constitutive principle for the determining power of judgment.

The second peculiarity stems from the constitution of our understanding and what I take Kant to be claiming is the inherent limitation on our use of this concept that is involved in our thought of the concept itself. In claiming that it is not a rational principle for the understanding, as the ideas of God and the soul are claimed to be in the *CPR*, but is a rational principle for the power of judgment and, thus, “for the application of an understanding in general to possible objects of experience”, Kant appears to be claiming that idea of a natural end is already the idea of a standard for judging things that we cannot judge in accordance with the limitations of our understanding. Whatever actually *is* judged, or whatever we have grounds for believing *can be* judged, in accordance with these limits simply does not have the special character that leads us to the idea of a natural end. If something cannot at all be thought in terms of laws of nature, we judge it as an end, but not as a natural end. If we already can, or believe that there is a good chance that we can, explain something in terms of the mere *mechanism of nature*, we judge it as a natural object, but not a natural end. The status of a natural end is reserved for those objects that

¹¹⁴ 5: 405

we have every reason to assume are natural objects, and no reason to assume that we can explain adequately in accordance with our own sensibly conditioned understanding.

If that is right, however, then the concept of a natural end already contains within the logic of its use the presupposition that some *other kind* of understanding *could* explain the possibility of the object without any appeal to intentional causality. Again, whatever we thought *did not* meet this indeterminate standard, we would simply take to be a product of artifice, without bothering to treat it as a product of artifice that was brought about through natural causal means. Kant need not argue for the legitimacy of appealing to some other kind of understanding in this context, because anyone who would take exception to his claim would have to be arguing that this principle has *more* than a merely regulative status, as it would be rather difficult to find anyone in the history of philosophy or the history of science arguing that it has *less* than this status. The idea that the human understanding does not grasp the inner nature of things and, thus, that we cannot take the way we think about them to be decisive for judgments concerning what is and what is not possible in nature is, perhaps, as close to a universally recognized principle among philosophers at the time as one can find.

If one genuinely considers this in relation to one's own thinking, and not merely in relation to that of one's opponent, it should mean that the conceptual space we leave open for reflecting on the difference between how we are constrained to judge things and how they may be independently of any relation to these constraints cannot be occupied in any determinate fashion. Claiming that it is beyond our power to determine *how* something happens, but that it is within our power to determine *that* it happens is legitimate in cases where what we are referring to is some observable natural phenomenon, such as the generation of organic structure within an apparently continuous mass of matter. When we go beyond such phenomena and make claims such as 'it is beyond our power to determine *how*, but these structures *must* already be present in the matter undergoing the change', or 'these structures *must* be introduced into the matter of the body by an *essential force*', or 'they *must* be caused by powers of a spiritual nature', it is not clear

how we can make any sense of why any of these things *must* be the case, or of what entitles us to the claim.

If these are uses of this modal verb that indicate objective uncertainty coupled with subjective conviction, then it would appear that they are made according to a standard that serves as a regulative principle for reflection in cases such as this. This reflection will take the *law of continuity of nature*, the idea of the perfect *order of nature*, or of the *purposiveness of nature for our cognition*, as a standard in making judgments concerning the character that things *would be* revealed to have *if we had* an understanding that was constituted differently. To think that these principles can be used to determine what these objects are actually like independent of the limitations that apply to our human understanding, how they are active, or how they are generated, appears to be a matter of mistaking a principle that is subjectively valid for us for one that is objectively valid of objects. It is a particularly egregious mistake, in this case, given that the validity of the principle *for us* under particular conditions of reflection is assumed precisely *because* we lack objectively valid principles for determining the characteristics of these objects. It is also a particularly understandable one, given that the particular objects from which we start in this reflection are actually given in nature, as subject to particular natural laws, and we are *required* to reflect on these laws in this way, if we are to maintain that they are unified with other particular natural laws in a unified *order of nature*.

In the same § in which Kant provides the above considerations concerning the subjective sources for the confusion that the idea of a natural end can cause, he also appeals to another of the central aspects of transcendental idealism. His claim is that it *would be* impossible for any understanding, and not just for the human understanding, to represent the mechanical generation of an organized body *if we were* justified in treating material beings as things-in-themselves. The problems he sees arising in this context are not those resulting from Leibniz's *intellectualizing the appearances* and conceiving of the natural world according to standards of the transcendental use of the understanding. They are those resulting from Newtonians who *sensibilize* the objects of any

possible understanding in general and make things-in-themselves subject to conditions of space.

We can see in the following that Kant believes these thinkers begin with the criteria of the pure understanding for making judgments concerning the possibility of some object, namely, the parts are the determinable matter that must be given prior to the form. If we, at the same time, think of this possible object as a complex body that is subject to the conditions of the sensibly conditioned human understanding, then the parts will be simpler bodies that exist temporally prior to the whole. The form that is thought to result from their capacity to arrange *themselves* would not lead to the idea that the resulting whole has any relation to a natural end. The only way in which we *could* think of a whole of this nature as subject to a standard such as this would then be if we thought of the principle of form as following from an idea of their connection in the productive cause of this connection.

The case so far is the same as it would be for someone who does not share the commitments of the Newtonian, namely, we are thinking the possibility of the particular form of the body being generated according to natural laws from the standpoint of an intentional ground of unity for these laws. The crucial difference between the Newtonian and someone like Kant is that Kant can also conceive of an understanding for which the idea of this intentional ground would not be necessary and, thus, he can consistently maintain his commitment to the view that despite our need to think of this connection in terms of the *technic of nature*, it really has its grounds in the *mechanism of nature*. The Newtonian, however, has started from the presupposition that he or she is representing the parts under the same conditions that any other kind of understanding would, or as they are in themselves, so there is no room to then maintain that some other kind of understanding actually could understand the generation of such a body according to the *mechanism of nature*:

When we consider a whole of matter according to its form as a product of the parts and their powers and capacities to combine themselves (including other materials that these parts add to one another), we represent to ourselves a mechanical mode of generation of the same.

However, no concept arises in this way of a whole as an end, whose inner possibility positively presupposes the idea of a whole, on which even the character and mode of activity of the parts depends, as we must represent an organized body to ourselves. It does not follow from this, however, as has just been shown, that the mechanical generation of such a body is impossible; for that would say as much as: it is impossible **for every understanding** (i.e., contradictory) to represent to itself such a unity in the connection of the manifold, without the idea of this unity also being the generative cause of this unity, i.e., without intentional production. Nevertheless this would in fact follow, if we were justified in taking material beings as things in themselves. For then the unity that constitutes the ground of the possibility of natural formations would be solely the unity of space, which is, however, not a real ground of acts of generation, but is rather only the formal condition of these acts; although it has a similarity with the real ground that we seek in that, in it no part can be determined except in relation to the whole (the representation of which thus lies at the ground of the possibility of the parts).¹¹⁵

If space is represented as a condition of bodies as things-in-themselves, then there is no other *natural* principle of form that could be appealed to in explaining the systematic relations of the parts of a complex and functional whole, in which the character of each of the parts, taken individually, depends on the character of the whole in which it is related to each of the other parts. If we really are representing the possibility of complex bodies according to the antecedent real grounds of their possible generation when we think them as dependent on temporally prior individual parts in space, then it is objectively impossible for the specific kind of complexity that we represent in organized bodies to be generated through the *mechanism of nature*. If the parts exist with a specific character prior to their connection in the whole, and their connection in the whole is merely a matter of taking on a new set of relational determinations in space, then the character of the parts cannot also depend on their relation in the whole. Thus, if we start with the reality of organized bodies, and this particular set of presuppositions concerning the real grounds of the possible generation of complex bodies in general, there is no way for any understanding to represent the former as having followed from the latter according to laws that are not guided by any intention.

¹¹⁵ 5: 408-9

From Kant's perspective, this is an unacceptable result following from an unnecessary set of presuppositions that are suggested by the empirical use of our understanding; but that we need not think have any application to objects independently of their relations to this capacity of ours:

It is at least possible, however, to consider the material world as mere appearance and to think something as a thing in itself (that is not appearance) as substrate, and to lay at its ground a corresponding intellectual intuition (even if it not ours). In this way there would be a, certainly for us unmistakably, supersensible real ground for nature, to which we ourselves belong, in which we would thus consider that which is necessary in nature, as object of the senses, according to mechanical laws, while at the same time considering the harmony and unity of particular laws and of forms in accordance with them in nature, which we must judge to be contingent with respect to mechanical laws, as an object of reason (indeed the whole of nature as a system) according to teleological laws, and nature would be judged according to two kinds of principles, without the mechanical mode of explanation being excluded by the teleological, as if they contradicted one another.¹¹⁶

The objective conflict between the maxims of mechanism and teleology only arises, if Kant is right here, because transcendental realist assumptions concerning the bodies of our experience require realist commitments to a principle of the purposive connections within organized bodies. The mechanical mode of explanation becomes positively excluded in such cases because internal transformations are required to prepare already existing entities to be fit into the antecedent plan of the whole and then these entities require guidance to arrive at their proper location within the whole. Instead of replacing Buffon's internal moulds and vital powers of organic molecules with an essential force or an organic force that is merely posited as the sufficient ground for the mechanically inexplicable epigenetic development of organic structures, Kant believes we should reject the realist commitment to the matter of bodies that make these seem like the only alternatives for an epigenetic account of generation.

Transcendental idealism concerning the matter of bodies allows us to conceive of the *mechanism of nature* as the efficient-causal interaction between the natural powers of substances, which are the *unmistakably supersensible* real grounds of nature. The principle of unity for the

¹¹⁶ 5: 409

organized body, according to this view, is not space, which is a condition that applies to object only insofar as they are *sensible*. It is, rather, the exercise of the natural powers of the substance, whose phenomenal effects are the body and its enduring empirical character, which includes its capacities to undergo changes of various kinds. We can presuppose that *all* of the appearances of bodies, as objects of the senses, are rendered necessary in accordance with efficient-causal laws, while also maintaining that the various products of nature whose phenomenal states are explicable in this way are subject to a variety of particular empirical laws, between which there is a seemingly contingent unity that we judge, in accordance with an idea of reason, to be purposive (*lawfulness of the contingent or contingent unity aimed at perfection*).

There would be no contradiction between the physico-mechanical mode of explanation and the teleological mode of explanation, because we would not take it that these make use of different sets of laws, some of which apply to bodies *as such*, others of which apply to bodies *as organized*. Instead, both of these modes of explanation would appeal to efficient causal powers and the laws of phenomena that are grounded in their exercise. Particular bodies would be thought of as subject to these laws because the phenomenal characters of these bodies and the range of possible alterations in their observable states are grounded in this exercise of efficient-causal powers. The salient difference would concern whether in a particular case the fundamental natural powers that we attribute to efficient causes also require us to think of the states that are their regular effects as ends that unify a system of articulated and interrelated functioning parts through which these states are generated and maintained. If this is the case, we reflect on the possibility and the mechanical functioning of the parts according to the idea that these parts are naturally subordinated to the ends of the whole, without pretending to be able to explain precisely how the *mechanism of nature* is related to these ends.

As Kant goes on to claim in § 78, ‘On the Unification of the Principle of the Universal Mechanism of Nature with the Teleological Principle in the Technic of Nature’:

For where ends are thought as grounds of the possibility of certain things, there one must also adopt means, the efficient-causal laws of which **in themselves** do not require anything that presupposes an end, and thus can be mechanical and yet be a subordinate cause of intentional actions. From this a great and even universal connection of mechanical laws with teleological laws in natural acts of generation can be thought even in organic products of nature, but even more so when we, prompted by the endless multitude of organic products, adopt the intentional in the connection of natural causes according to particular laws now also (at least through an allowable hypothesis) as a **universal principle** of the reflecting power of judgment for the whole of nature (the world), without confusing the principles for judging mechanical laws and teleological laws and putting one in the place of the other; since in a teleological judgment the matter, even when the form that it assumes is judged possible only according to intentions, can according to its nature be subordinated in conformity with mechanical laws as a means to that represented end: likewise, since the ground of this unifiability lies in that which is neither the one nor the other (neither mechanism nor connection according to ends), but is rather the supersensible substrate of nature, of which we cognize nothing, the two modes of representation of the possibility of such objects are not to be dissolved [*nicht zusammenzuschmelzen sind*] for our (human) reason, rather we can judge them in no other way than as grounded in a highest understanding according to the connection of final causes, through which nothing is taken away from the teleological mode of explanation.¹¹⁷

Here we see Kant claiming that the matter for our teleological judgments can be provided by the mechanical laws of nature, which we do not represent as themselves having any necessary relation to ends. We think of an intentionally active cause as subordinating these laws, as means, to the production of its ends, on analogy with our own technical production of artifacts. Because we do this from the perspective of the transcendental idealist distinction between the sensible mechanism of nature and the sensible principle of the use of mechanical laws according to ends (i.e., the principle of our own technical production), on the one hand, and the supersensible ground of the existence and connection of these, on the other, we can reflectively consider this supersensible ground as a unified object for some other understanding.

This means that that we can conceive of the possibility of a unified *order of nature* in which organized beings are related to one another and to other kinds of natural substance in ways that are analogous to that in which the members of natural species of plant and animal bodies are related to one another, and the ways in which the physical parts of individual plant and animal bodies are related to one another, namely, as relatively autonomous entities that have a common

¹¹⁷ 5: 414

origin and that mutually interact in ways that serve the end of preserving the *order of nature*. We can do this without replacing mechanical laws with teleological laws, or *vice versa*, without confusing the two, or dissolving the distinction between the two, and without assigning one set of laws to one realm (within or beyond nature) and the other set to another realm entirely. That is the *mechanism of nature* need not be conceived of as purposive merely in relation to the ends of rational beings that inhabit a *realm of grace*. It can be judged to be in accordance with standards that are provided by our ideas of various natural species of plants and animals.

In this way, we can maintain the compatibility of mechanistic and teleological standards for judgment concerning objects and arrangements in a single *realm of nature* and avoid the kind of two-standpoints, or two-worlds, solution to the antinomy that threatens to undermine the causal unity of nature. This is ultimately what is required if we are to make a legitimate use of teleological principles in natural philosophy, according to Kant. Doing this would be impossible, if we did not make the transcendental idealist distinction between the contributions to our cognition made by sensibility and by the intellect, and the correlated distinction between the bodies of our experience and the supersensible real grounds of these bodies. Accordingly, Kant believes that transcendental idealism is required for us to maintain the coherence of the idea of the unified *order of nature* that is presupposed by the physiologist and the natural historian.

4.5: The Methodology of Natural Teleology (Conclusion)

Kant gathers the elements from the discussion found in the introductions to the *CJ*, and in the Analytic and the Dialectic of the *CTJ* to provide yet another defense of his own use of teleological considerations in natural philosophy in the ‘Transcendental Doctrine of Method of the Teleological Power of Judgment’. These §§ have received relatively little attention, even compared to the rest of the *CTJ*, in the literature. Some of the attention they have received from historians of ideas has been, understandably enough, aimed at assessing the relevance of Kant’s

thinking to later developments in the life sciences. Notable discussions on this topic have been written from the perspective that Herder's view represents the truly interesting and progressive view of natural history that breaks free of the old paradigm, to which Kant clings, and prepares the way for the development of biology as an autonomous discipline in the nineteenth-century.¹¹⁸

Kant's claims about the transformism of Herder's view are seen as the expression of a commitment to the fixity of species, which is taken to mean that Herder plays a more important role in preparing the way for truly historical and evolutionary approaches to life than does Kant.

Without pretending to decide this issue here, I should note that it does seem to me that there are other considerations that are at least as relevant, if not more relevant, to the development of biology than the degree to which one countenances transformism. The view of the perfection of nature that Kant finds objectionable in Herder and in French physiologists and *philosophes*, who materialize and historicize the *great chain of beings*, appears to be somewhat far removed from the views involved in nineteenth- and twentieth-century approaches to natural species. Kant's own view of descent with limited hereditary and geographical modification within natural species of inter-breeding plants and animals appears to resemble far more closely the natural historical view of species that will yield important results in the nineteenth century. Herder's approach, in which comparative anatomy plays a more central role than does physiology, will have other proponents among the nineteenth-century *Naturphilosophen*. Like Herder, these thinkers are attracted by the romantic view of vital pantheism, which Kant finds objectionable from the standpoint of reason and unmotivated from the standpoint of the observation and testing that constitute our experience of the organic realm.

It is not that Kant cannot see the beauty in nature, or be moved to judgments of the sublime by the contemplation of nature. He is, however, unwilling to grant that the imagination and its grasp of sensible forms leads us to objective insights concerning nature that completely surpass what we are able to grasp conceptually, subject to observation and experiment, and unify

¹¹⁸ Zammito [2003] Lovejoy [1959]

in accordance with rational standards. He does believe that our intuition of individual organic forms in nature provides far more material for reflection than we can capture and communicate in our discursive forms of judgment, and that it often inspires feelings that are not merely expressions of how we as individual subjects are affected, which reveal to us our place within a kind of community with other beings who share a common purpose. Kant's Averroism, however, leads him to see this community in terms of a *sensus communis* shared by the members of a natural species of organism, which is outfitted by nature with a set of predispositions that are developed naturally in such a way that individual members of the species in various geographical, cultural, and political environments are suited to the common ends of the species in nature.

The emphasis in recent Kant studies on practical philosophy as the motivation for central aspects of Kant's transcendental idealism tends to obscure the significance Kant believes his position has for grounding his substantive commitments concerning the natural world and the place of human beings in the natural world. These include the organic basis of our presence in nature as a material condition for the possibility of our cognition of a spatio-temporal system of mathematically explicable corporeal phenomena. They also include the organic development in the individual and the species of the 'germs' of autonomy that lead us to think of ourselves and others as subject to laws of action that apply unconditionally to all rational beings, i.e., regardless of whether or not their development proceeds according to the same natural laws, or takes place within the same families, the same races, or the same geographical, cultural, and political contexts as our own. Even if there are good reasons for distinguishing natural philosophical considerations (anthropology) from purely practical considerations (metaphysics of morals) it is not clear that there are any good reasons for ignoring the best available evidence from the natural sciences in making claims concerning the fundamental equality of human beings. It is only if we tend to ignore the importance of this distinction that we will tend to think that hereditary natural differences between individual members of the same species legitimate practices of assigning differences in moral status to these individuals.

Herder's view is one that does not appear to distinguish carefully between the kinds of perfection that are recognized in the Leibnizean tradition, namely, metaphysical perfection, or ontological completeness and self-sufficiency, physical perfection, or the pleasure of sentient beings, and moral perfection, or the freedom of rational beings under laws of an intelligible realm of grace. The standard he appears to adopt is Baumgarten's aesthetic standard of beauty as the sensible representation of perfection, which can be defined in terms of unity amidst diversity.¹¹⁹ The human form is paradigmatic because it is the maximum of unity of form amidst the diversity of elements that are found in nature, and other natural forms arrange themselves on a scale of perfection that approximates this form. Despite the influence of this kind of thinking in early theories of evolution in the late eighteenth- and the nineteenth-century, it is far more closely tied to traditionally dogmatic approaches to theistic metaphysics and anthropocentric approaches to natural philosophy than are Kant's own views concerning organisms and teleology in natural philosophy. Later generations of biologists will be forced to clarify the distinction between their own views and those of Herder and the *Naturphilosophen* in an effort to formulate a coherent research program for natural historical investigations within a unified science of living forms. It appears to me that they will do so in ways that are not entirely unlike the way Kant does this, in service of the same ends, in the 1780s and in the *CTJ*.

In this final section, I will draw attention to some passages in the 'Doctrine of Method' of the *CTJ* that point to the relative continuity of Kant's particular position concerning organisms and teleology from the 1760s up to 1790. Despite significant changes between 1763 and 1781 concerning his general view of metaphysics, and the interesting developments in the 1780s that lead him to publish a second and a third *Critique*, the project in natural history that Kant develops in combination with his lecture courses on physical geography and anthropology remains largely the same. It is not simply that these views do not change significantly during the nearly thirty

¹¹⁹ Makkreel [1996] provides a discussion of the role of Baumgarten's aesthetic theory in eighteenth-century German and its relation to the development of the hermeneutic tradition.

years that separate the *OPA* and the *CTJ* that is interesting, however. The view itself, and its potential impact on the state of the life sciences in Germany at the end of the eighteenth century, is what makes this continuity worth noting. If I am right, the view of generation that Kant publishes in the 1775 essay on race provides an original synthesis of ideas from the three most important contributors to the life sciences in the eighteenth-century, namely, Linneaus, Buffon, and von Haller.

Kant defends Linneaus' *System of Nature* against its most notorious opponent, Buffon, while granting to Buffon the significance of the distinction between *Naturgeschichte* and *Naturbeschreibung* on which his criticisms are based. He adopts Buffon's law for making empirical determinations concerning membership in a physical species, while deflating Buffon's claims to have actually provided a physical interpretation of the logical species concept. The species interpreted physically as an historical line of descent lacks any real unity if we make use of Buffon's phenomenistic methodology and his vital-mechanical explanation of the generation of individual members of the species. Accordingly, Kant adopts a modified version of von Haller's germ theory of preformation to account for the continuity of the general form of the species through successive generations in which regular variations between individuals 'fit' these individuals to their environments. Kant rejects those aspects of the germ theory, however, that render it unable to explain these regular variations and this fit in any way other than purely teleologically. Von Haller adopts a mechanical-teleological view, but his mechanisms are pre-formed bodily machines through which vital forces are expressed. We can descriptively take note of hereditary regularities and environmental correlations, but the productive causes of these cannot be located in the mixing of the generative materials and in the causal influences of the environment on the development of the individual.

Kant develops a view of dynamically pre-formed capacities within the *generative force* or power natural to the species that grounds the unity of the species, explains the ability of its members to reproduce sexually and to pass on predispositions to their offspring, and allows a

genuine role to be played by the environment in selecting which of these capacities and predispositions particular individuals will develop over the course of their lives. Kant is not in a position, nor does he claim to be in one, to *explain* these processes by reference to the mechanisms of reproduction, heredity, and adaptation. Those who, like Buffon and von Haller, claim to be in this position, however, meet with considerable difficulties in accounting for whole ranges of phenomena in anything more than an *ad hoc* fashion that is required by the advance of research and the dialectical contexts in which the results of this research are put forth. What Kant provides is an explanatory model for investigations into the natural mechanisms through which law-governed phenomena are generated. Instead of beginning with a particular mathematical or metaphysical interpretation of what the principles of mechanical explanation are, he begins with a general causal model that involves a commitment to the idea of the efficient-causal *mechanism of nature* and a respect for the requirement that what we seek to explain ought to be the natural phenomena that are commonly agreed to stand in need of explanation.

Commentators that have taken note of Kant's view in the 1755 essay on race have, I believe mistakenly, seen Kant as primarily a follower. He is believed to have followed von Haller in accepting the germ theory and to have followed Buffon in accepting the distinction between *Naturgeschichte* and *Naturbeschreibung* and the *viable offspring* criterion for species membership. This is not entirely false, but it is only partially true, and it provides the basis for seeing Kant following other trends in the 1780s. The epigenetic view of C. F. Wolff and the dispute with Herder is supposed to have led Kant to reject the germ theory and then to follow Blumenbach's views on the formative drive (*nisus formativus*, *Bildungstrieb*) in the late 1780s and in the *CTJ*. If by follow, we mean take note of and reflect critically upon, then it is clearly right to claim that Kant follows these trends with interest. He is also clearly more favorably disposed towards Blumenbach's views than he is towards those of C. F. Wolff and Herder. Thus, if we start with the idea that Kant must be taking his views in physiology from elsewhere, and ask about whose views gain prominence at what point in time and how closely related to these Kant's

subsequent claims are, we will be very likely to think that Blumenbach's work has a significant impact on Kant's own. If we consider the following facts, however, we might be prone to consider the relation between Kant and Blumenbach in a slightly different light.

Blumenbach publishes his thoughts on the formative drive in 1781, six years after Kant publishes his views on the generative force. Kant's views are expressed in an essay on anthropology, in which he argues for the unity of the human species amidst the diversity of characters that are exhibited by its various races. This essay appears at the same time that Blumenbach is completing his work '*On the Natural Varieties of the Human Species*', which he submits as his doctoral dissertation in medicine at Göttingen in 1775. Whether Blumenbach is actually influenced by Kant, who is older and already somewhat well-established, and who has been lecturing on physical geography for a number of years by then, or whether there are commonalities due to other factors, such as their mutual admiration for von Haller's work, is unclear. What is clear, I believe, is that Kant's published comments concerning Blumenbach in the 1780s and in the *CTJ* reflect the general agreement between the view Kant develops in the 1760s and 1770s and the view Blumenbach publishes in the 1780s. It is also clear, I believe, that Kant also has his own original view of the epigenetic generation of individual organic bodies, and his criticisms of the epigenetic views of C. F. Wolff and Herder, already in place prior to the publication of Herder's *Ideas*.

In the revised 1789 version of his 'On the Formative Drive', Blumenbach claims the following:

...[I]n the previously raw, unformed generative material of organized bodies, after this material is ready and reaches the place of its determination, there arises a particular drive, active over the course of its life, initially to take on its determinate figure, then to maintain it for life, and if this figure becomes mutilated, if possible to fill it out again.
...[It] thus belongs to the vital forces, but is as clearly distinguished from the other types of vital force of organized bodies (contractibility, irritability, sensibility, etc.) as it is from the universal physical forces of bodies in general; it appears to be the first, most important force for all

generation, nutrition, and reproduction, and which, in order to distinguish it from the other vital forces, can be called the **formative drive** (*Bildungstrieb, nisus formativus*).¹²⁰

It is clear that the *self-propagating formative power* that Kant believes provides the natural ground for the essential capacities of *organized and self-organizing beings* is conceived of in terms similar to Blumenbach's formative drive. Both distinguish between the vital powers that von Haller and other mechanical physiologists invoke for explaining the actions of the muscles and the nerves, and for explaining an organisms ability to orient itself towards its environment (contractibility, irritability, sensibility), on the one hand, and the force that is responsible for generation, nutrition, and reproduction, on the other. This seems to be one of the reasons that Kant takes his example in the *Analytic* from these processes in plants, which do not have the muscles, nerves, and external sense organs that are involved in the animal capacity for voluntary motion. As a result, we are drawn to the obviously analogical status of the comparison between our intellectually and sensibly determined wills and the natural powers responsible for the generation and functioning of the general class of organized beings.

The 'generative material of organized bodies' is only raw, or unformed, in the phenomenal sense of not yet exhibiting the characteristics that serve as our basis for identifying some body as an organized body. If we looked at the mixed matter formed by the contributions from the male and the female, independently of any knowledge concerning the history of this matter, we would not be able to tell that it was the 'generative matter of organized bodies'. Herder and C. F. Wolff are right that no eye has seen the pre-formed germs that Kant thinks of as the inexplicable limits on the exercise of the generative power that result in its generating an organized member of a particular natural species. This does not mean, however, that this raw matter does not already have the form of the species, unless the form of a species simply means the observable characteristics that we use to identify its members. If this is what the form of a

¹²⁰ This quote is from the second edition of Blumenbach's *Über den Bildungstrieb und das Zeugungsgeschäft* (1789), which appeared as a revision of the, in Blumenbach's estimation, 'unripe' 1781 version.

species is, however, then the embryo is first 'liquid', then 'viscous', then 'crystal', then 'plant', then 'animal'. In our case, the last natural stage of this development, if Herder is right, is when we begin to walk upright. This posture is purposive relative to the purely spiritual capacities that are developed after that, such as language and culture, which prepare us for the final transformation to 'pure spirit'. The individual undergoes a series of transformations in which, roughly speaking, ontogeny is recapitulating phylogeny.¹²¹

From Kant's perspective, the observable form that is generated successively in the 'raw generative material' is the continuous alteration of the phenomenal state of a body that was itself produced by the activity of the form of the natural species of which it is a member in the bodies from which this mixed material comes. Our understanding of the laws according to which this occurs, and our investigation of the mechanisms through which the formative power achieves its regular effects in nature, depend on the existence of organized members of a natural species that generate other organized members of the natural species. From there we can form and test hypotheses concerning commonality of origin of provisionally accepted logical species that are similar in outward form; i.e., we can ask whether they are distinct species, or whether they are merely varieties, races, or families within a single species. Kant does not believe that at his point in time we have actually *fixed* the species, or answered the most relevant questions that we ask concerning the transition from the *Schulbegriff* of *Naturbeschreibung* to the *Weltbegriff* of *Naturgeschichte*. Accordingly, it is somewhat presumptuous to attribute to him a view of the fixity of species, as if he is committing the same error that the *CTJ* is designed to diagnose and correct.

The passages from the *CTJ* that are cited in this relation are, I believe, claims concerning what is still a largely dogmatic approach to history in Herder and French physiologists and *philosophes*. Having observed outward similarities in form and in processes of transformation in

¹²¹ Or the individual, in its personal history, is progressing through the same stages of development that the species underwent in its natural history. This was a common view amongst evolutionary theorists until Gould [1977]

various kinds of matter, it is assumed that matter and transformation over time are first principles from which progressively more perfect forms in nature follow according to some or another law of cosmic teleological necessity.¹²² Celebrating the eradication of the spiritual entities and the substantial forms that are the tools of the tyrannical rule of metaphysics over natural philosophy does not entitle us to replace them with equally speculative natural first principles and equally dogmatic deductions of the possibility of observable forms in nature.¹²³ This, I believe, explains why Kant claims the following in the Doctrine of Method of the *CTJ*:

No one has done more for the theory of epigenesis, both for the proof of the theory and for the grounding of the principles proper for its application, in part through limiting an overly presumptuous use of these, than Privy Councilor **Blumenbach**. He begins all physical kinds of explanation of these formations with organized matter. For he rightly declares it absurd that raw matter has originally formed itself according to mechanical laws, that life arose out of the nature of the lifeless, and that matters could have directed themselves to the form of a self-preserving purposiveness; at the same time, he attributes to the natural mechanism under this for us inscrutable principle of an original organization an indeterminate, but also unmistakable, role. It is because of this that the capacity of matter (in contrast to its merely mechanical formative power, which is present universally in matter) in an organized body is called by him a formative drive (standing, as it were, under the higher guidance and direction of that former principle).¹²⁴

Kant is not concerned to maintain the utter mystery of life, or to relegate life to some other realm, but he is concerned to avoid the tendency to seek unity in the manifold by neglecting the kind of variety that is relevant for our attempt to understand what we claim to have explained. If one finds reason to claim that matter forms itself, one cannot simply add that it does this according to mechanical laws. The context in which it makes sense to talk about changes in matter that occur in accordance with mechanical laws is one in which talk of the directionality of these changes is consciously analogical; i.e., we talk about attraction and repulsion as causes of alteration in the states of motion of bodies, but we are not actually claiming that bodies desire or

¹²² The vital materialism of eighteenth-century French thinkers and the vital pantheism of late eighteenth and early nineteenth-century thinkers tend to share this idea.

¹²³ Again, I am thinking of La Mettrie and Diderot in this relation.

¹²⁴ 5: 424

are averse to motions towards or away from each other. Formation, however, appears to be a slightly different matter, and self-formation an even more obviously different one.

Precisely because this is seen as something that is *not* an externally generated alteration of the state of a body, we are taking away the conditions under which we are able to say that we think about it according to analogy with our own sensible states, but it occurs through the mechanism of material nature. If our empirical criteria for the identification of some existing as alive are not met, we cannot conclude straightforwardly that the thing is not alive. Our empirical criteria make use of external characteristic marks, and it is, in principle, possible for something to fail to exhibit these marks and yet to belong to the class of things we contingently identify in this way. If we turn this around, however, and say that it is possible for something to exhibit the characteristics made use of in our empirical criteria and, yet, not to belong to the class of things identified in this way, the matter is somewhat different. In the latter case, the argument is no longer about whether the thing has or lacks a specific characteristic, but about whether or not our empirical criteria are adequate. If ‘activity from an inner principle’ is taken to be the identifying mark of the presence of life, and inertia or ‘lifelessness’ is taken to be an essential characteristic of objects that are subject to mechanical laws, then ‘self-formation according to mechanical laws’ is not something that we can have empirical evidence for. Self-formation according to natural laws could be, but as long as we have no reason to think that external causes are involved in the production of some change, we also have no reason to think that mechanical laws describe the necessary relation between the starting point and the end-point of the alteration in question.

The same is true of life coming from what is lifeless. As far as our experience is concerned, we have no reason to deny the axiom ‘whatever generates something that is living does so through living’. We can speculate about a point in the distant past where there were no external signs of life on earth and say ‘*were* we there then, we *would* have had no reason to judge that anything was alive’, (which is strictly false, because *were* we there then, we *would* have to be alive to make any judgments concerning whether anything *else* was alive or not). Whether that

tells us anything conclusive about whether or not it is really possible for life to have come from something lifeless, however, is another matter entirely. If the issue is to be dealt with through more than a merely verbal dispute over the analysis of concepts, then one has to provide good reasons for re-defining terms in ways such that previously analytically false judgments turn out to be synthetically true. If Kant is right, the law of continuity will serve us as a guide in the empirical observations and experiments through which we place the presuppositions of prior theories and practices concerning nature into question. It cannot, however, license any synthetic judgments a priori concerning the necessary reduction of all variety in nature to some original identity.

Accordingly, when Kant addresses change over time in the organic realm, his aim is not to derive the currently observed variety in nature from its unobserved grounds at some distant point in the past, or from its unobservable grounds in the present. It is, rather, to proceed from observable regularities in the present to an understanding of general laws, ask about the natural powers and natural mechanisms through which these lawful phenomena are generated, and in cases where we cannot understand the necessity of particular laws or of their unification solely by reference non-directional (blind) causality, to think about the ground of this unity as something that is not explicable for us, but is a ground of explanation in nature. The following passage reveals this same approach to accounting for the lawfulness of the contingent 'fit' between particular members of natural species of organism and their environment, which provides the primary basis for Kant's teleological reflections in the 1775 essay on race:

Even with respect to changes to which certain individuals of organized species are contingently subject, if one finds that the character that has been modified in this way is inheritable and is taken up in the generative power, this cannot reasonably be judged in any way other than as the occasional development of a purposive predisposition for the self-preservation of the kind that is originally present in the species: since the generation of one's own kind, in the thoroughgoing inner purposiveness of an organized being, is so closely connected with the condition that nothing is to be taken up into the generative power that does not also belong in such a system of ends to one of the undeveloped original predispositions. If one ignores this principle, one cannot know with certainty, whether or not more parts of the form met with now in

the species might also have a contingent, purposeless origin; and the principle of teleology, 'do not judge anything that preserves itself in the propagation of an organized being to be without purpose', would become very unreliable in its application and would be valid only for the original family (which we, however, no longer cognize).¹²⁵

Kant begins here with a statement concerning something that we do not understand adequately, namely, how some characteristic of an individual plant or animal that is contingent with respect to the natural species of which it is a member can be understood to be the result of environmental influences *and also* be something that is inherited by its offspring. We can understand how contingent characteristics arise through environmental influence, e.g., how a member of a species that is naturally bipedal could come to have one leg. We also understand that contingent characteristics can be inherited by offspring, e.g., that polydactylity runs in families. What is harder to understand is that and how some contingent characteristic could be caused by circumstances and 'taken up into the generative power' such that subsequent generations exhibit this characteristic in the absence of the stimuli responsible for the progenitor's possession of it.

This is an issue that one has to address in attempting to proceed backwards from the tremendous variety that is currently exhibited by individual members of species, e.g., of birds, to form hypotheses concerning the correlation between the present distribution of its members in various regions of the earth and the possession of particular ranges of characteristics that are contingent from the standpoint of the species. If members of a particular population, *a*, within a potentially interbreeding species of bird tend to have more layers of feathers than members of another population, *b*, and we think that environmental factors play a role in explaining this difference, yet descendants of members of *a* still tend to have more feathers when they are generated and develop in an entirely different climate, it appears that we have a case of an externally caused contingency being inherited. We are not certain exactly how this happens,

¹²⁵ 5: 420

according to Kant, but we have good observational and methodological reasons to believe that it actually does.

Accordingly, Kant thinks it is reasonable to suppose that there is a range of predispositions for the self-preservation of the kind within the generative power of the species, that environmental factors originally ‘select’ between these, and then over the course of generations these become relatively fixed characters. If we did not make this assumption, then we would have no guide for understanding why and investigating how some contingent characteristics are passed on from generation to generation while others are not. That would be the functional equivalent for the physiologist of giving up the claim ‘nothing happens by chance’.

This is a prime example of the kind of use of the teleological power of judgment that Kant believes is necessitated by and warranted for empirical investigations of order in the organic realm. The final passage from the ‘Doctrine of Method’ that I will address has in many ways provided the guiding thread for this entire work. In it Kant addresses in a clear way the same general options that we see him address in the *OPA* concerning the natural generation of organized beings. He begins by claiming that all theories of generation that attempt to explain organic phenomena will have to involve appeal to the teleological power of judgment, which reflectively considers the *mechanism of nature* as subordinated to the natural end of the self-preservation of the species. If we take Herder at his word concerning the organic force as the ‘finger of divinity’ and generation as a process of genesis (creation) rather than one of epigenesis (procreation), then Kant believes we can fairly assume that Herder has no concern for philosophy. Any defensible theory of generation will have to involve some kind of preformation, and the key issue will be how we conceive of this, and how we make use of it in causal accounts:

If the teleological principle of the generation of these beings is accepted (as it cannot but be), one can take either the **occasionalism** or the **pretabilism** of its cause as the basis of their intrinsically purposive form. According to the first, the highest world cause gives organic form, according to its idea, on the occasion of each mating directly to the matters combined in this mating; according to the second this cause would have supplied the original products of its

wisdom only with predispositions, through which an organic being brings forth others of the same kind and the species preserves itself constantly, in that departed individuals are replaced through the same nature that simultaneously works on their destruction. If one accepts the occasionalism of the production of organized beings, all nature is entirely lost and, with it, all use of reason in judging the possibility of products of this kind; thus one can presuppose that no one with any concern for philosophy would accept this system.

Prestabilism can proceed in two different ways. Namely, it can consider each of the organic beings that are generated by others of their kind to be either an **educt** or a **product** of these others. The system of generations as mere educts is called **individual preformation**, or also the theory of **evolution**; that of generations as products is called the system of **epigenesis**. The latter can also be called the system of **generic preformation**, since the productive capacity of the generating being, and thus the specific form, was still *virtually* preformed according to the intrinsically purposive predispositions that belong to its line. Given this, the opposing theory of individual preformation might be better named the **theory of involution** (or the theory of encapsulation).¹²⁶

Here we see Kant returning to the dispute concerning whether generation is a matter of the mere unfolding of structures that are already present within the body, *Gu*, or a matter of the formation of a genuinely new organized body, *Gf*. The latter view, which he has clearly supported since the 1760s, he here calls both *epigenesis* and *generic preformation*. He appears to be including the views of Buffon, Maupertuis, and Blumenbach with his own in the class of epigenetic views, since they too think of the productive capacity of the being responsible for forming new individuals in terms of already formed members of the same natural species. The theories of the other two men whose names are most commonly identified with the term *epigenesis* at the time, C. F. Wolff and Herder, however, both appear to fall in the category of *occasionalism*. If we get rid of all appeal to preformation, in Kant's view, then the reflective principle of the *technic of nature* forces us to locate the causality in accordance with an idea at the level of the generation of the individual organized body. This leaves even less to the powers of nature than does the theory of individual preformationism, which at least allows that the unfolding of the encapsulated organism begins due to a mechanical stimulus, and the subsequent functioning of the body occurs in accordance with psycho-mechanical laws.

¹²⁶ 5: 422-3

A more charitable interpretation might see these men as working towards the same kind of view that Kant himself is working towards and simply stressing more than Kant does their perception of the significant differences between their own views and those of *individual* and *germ-theory preformationists*. That may be true, but it would be a disservice, I believe, to the originality of Kant's view and to the significance of his careful work in synthesizing the important contributions to physiology and natural history made by thinkers like Linneaus, Buffon, and von Haller, to fault him for responding in the way he does to the views of C. F. Wolff and Herder. Seen in light of the projects in metaphysics and natural history that he works on continuously between 1755 and 1790, Kant's reaction to the dogmatic approach to nature still embodied in C. F. Wolff's commitment to deduction of physiological phenomena from their *supersensible* grounds in accordance with the principle of sufficient reason, and in Herder's deduction of natural historical phenomena from their *supernatural* grounds in accordance with a principle of perfection, appears to be fairly well justified. Kant's own view concerning organisms and the use of teleological considerations in natural philosophy appears to me to provide an historically original and philosophically plausible approach, both to the phenomena themselves and to the principles according to which we are constrained to investigate these phenomena.

In the *CTJ*, Kant reiterates and defends the views we have seen him developing, concerning the physical basis of natural species of plant and animal and the appeal to original dispositions within the *generative power* common to the members of these species. The preservation of the species or, what amounts to the same, the existence of the species itself, is what we represent as an end when we appeal to ideal standards for judging the powers, capacities, and determinations of natural bodies, according to Kant's considered view. What is more, the fundamental physical powers comprising the causal nature of the species, and the derivative capacities dynamically pre-formed in this causal nature, serve as the natural means to this *natural end*. Accordingly, the teleological power of judgment allows us to *explain* the generation and functioning of particular members of natural species of organism as the beneficial, but

unintended, consequence of the prior states of the members of this species. The events in the life history of the species occur according to natural laws that govern the exercise of natural powers, the unification of which in a single being can be represented *by us* only through an idea of the natural species as an *effect*, the representation of which as a *good* serves as a unifying ground for the physically fundamental powers that make up the causal nature of the species. This means that Kant provides us with a truly natural teleology that avoids the common tendencies to:

- a) Attribute the efficient-causal powers immediately responsible for aspects of material nature that appear to serve determinate purposes either to beings with immaterial natures or to supernatural beings
- b) Take the ends at which we represent natural powers as aiming to be exclusively the ends of beings with immaterial natures or of supernatural beings
- c) Attribute intentional causality to the substances whose powers explain the generation and maintenance of orderly connections in nature
- d) Try to derive the mechanism of nature from the causal efficacy of vital principles or the appearances of life in nature from the causal efficacy of mechanical principles
- e) Think that in referring to a teleological ground in our explanation of a natural arrangement, we are making it either unnecessary or impossible to understand and explain the mechanisms through which the effects we represent as grounds are brought about
- f) Think that in providing mechanistic explanations of the generation and functioning of some being or class of beings, we are making it either unnecessary or impossible to appeal to beings with immaterial natures or to supernatural beings in reflecting on the principles in virtue of which our physical constants, and their relations to one another in a system, are possible.

There are views put forth during Kant's time, and in the generation immediately following, that have attracted the attention of historians and philosophers of biology because of their equal emphasis on history and their greater emphasis on the power of nature to transform itself into a variety of forms that we have evidence for believing did not exist 'since the time of creation' and are not simply 'tokens of eternal types in the mind of a creative intellect'. The view of natural history as progressive adhered to by many of these thinkers, and the view of physiology as following the guidelines laid out by comparative anatomy have since been rejected by mainstream biologists and philosophers of biology. It is not generally accepted that evolutionary

history is the history of a natural progression from states in which the natural world is characterized by less perfect forms to states in which it is characterized by more perfect forms. Nor is there a great deal of emphasis on the idea of a common form, or *Bauplan*, to which various particular forms approximate, as being of central explanatory value either in physiology or in natural history. Despite the significant differences between what Darwin meant by evolution and what is meant by evolution in contemporary discussions,¹²⁷ on the one hand, and the vital transformist projects of eighteenth- and nineteenth-century French materialists and German *Naturphilosophen*, on the other, one is more likely to find these latter thinkers referred to as fore-runners of contemporary biological thought than to find Kant referred to in this way.

One notable line on this relation has Kant tempted to follow the views of the French materialists early on and then changing his mind and becoming a fairly traditional creationist.¹²⁸ Another has Kant's third *Critique* inspiring, in obvious but not clearly definable ways, the views of later thinkers who will reject his scruples in maintaining a merely regulative status for teleology and go on to assert the priority of a biological view of nature over the mechanistic view that Kant inherits and never abandons.¹²⁹ Yet another sees some importance in the relation between Kant and Blumenbach, which is evidenced by the fact that a student of Blumenbach's saw fit to publish a work stressing the similarities between them, and connects Kant to the subsequent development of natural history largely through this relation.¹³⁰ Although it is not primarily with the historical influence of Kant's work that I am concerned here, I do find it interesting that the comparisons made between his views and the views of his contemporaries and successors in work that is concerned with this topic do not tend to emphasize those aspects of Kant's thought concerning organisms and teleology that I find to provide the clearest grounds of difference between them.

¹²⁷ For a discussion of the range of positions one could hold on this difference, see Gould [2002]

¹²⁸ This is the view of Zammito [2003, 2007].

¹²⁹ This is a common view that can be found, among other places, in Ameriks [2000b] Zammito [1992], Sloan [2002].

¹³⁰ Zammito [2003], Sloan [forthcoming]

If I am right about a) through f) above, then there may actually be far less in Kant's view that we would have to ignore, or make allowances for, in adopting a strategy for biological investigation than there is in the views of others that are generally seen to have been far more influential historically and to be far closer to us scientifically than is Kant. What is more, if I am right about the development of Kant's views leading up to the third *Critique*, and about the substantive view for which he is arguing there, he is doing far more than merely reflecting on the general structure of biological explanation and the reasons for the age-old debate within biological explanation between mechanists and vitalists.¹³¹ He is also recommending a particular solution based on principles for biological explanation that are still generally accepted in contemporary work on the subject; namely, the self-replicating powers of organized bodies, hereditary and environmental variation between the members of species of plant and animal, and the co-coordinated functioning of these members as a natural means for the self-preservation of individual organisms and of groups of mutually reproducing organisms that share common lines of descent. Kant obviously has not worked out the mechanisms through which these principles are active, but he appears to have been closer to a set of principles that are capable of marking out an autonomous scientific discipline that studies living forms than are any of his contemporaries who are working on the same general issues. Whether this is a claim that will survive further critical scrutiny, including that of a future self who has continued on the path that these investigations recommend, it certainly seems to me to be a plausible suggestion that deserves to be taken into consideration.

¹³¹ This is the line that McLaughlin [1989] takes on the *CTJ*.

Bibliography

PRIMARY LITERATURE

- Baumgarten, Alexander. *Metaphysica*. Reprinted in Immanuel Kant's *Gesammelte Schriften*, vols. 15, 1 (pp. 5-54) and 17 (pp. 5-26). 1739. Rpt. Berlin: de Gruyter, 1902-.
- Blumenbach, Johann Friedrich. *De generis humani varietate natura*, Goettingen 1776 (2nd edn. 1781; 3rd edn. 1795).
- _____. *Handbuch der Naturgeschichte*, Goettingen 1779/80 (2nd edn, 1782; 3rd edn. 1788; 4th edn. 1791; 5th edn. 1797; 6th edn. 1799; 7th–12th edns. 1803, 1807, 1814, 1821, 1825, 1830).
- _____. *Ueber den Bildungstrieb und das Zeugungsgeschaeft*, Goettingen 1781 (2nd expanded edn. 1789; 3. Aufl. 1799).
- _____. *Institutiones physiologiae*, Goettingen 1786 (2nd edn. 1798; 3rd edn. 1810).
- _____. *Geschichte und Beschreibung der Knochen des menschlichen Koerpers*, Goettingen 1786 (2nd edn. 1807).
- _____. *Anfangsgruende der Physiologie*, trans. of *Institutiones physiologiae* by J. Eyerel, Wien 1789 (2nd edn. 1795).
- _____. *Ueber die natuerlichen Verschiedenheiten in Menschengeschlechete*, trans. of *De generis humani varietate natura* by J. G. Gruber, Leipzig 1798.
- _____. *Kleine Schriften zur vergleichenden Physiologie und Anatomie und zur Naturgeschichte gehoerig*, Leipzig 1800 (2nd edn. 1804).

- Buffon, George Louis Leclerc, Comte de. *Allgemeine Historie der Natur nach allen ihren besonderen Theilen abgehandelt; mit einer Vorrede Herrn Doctor Albrecht von Haller, zweyter Theil.* ed. and trans. Abraham Kaestner, 8 vols. (Hamburg, Leipzig: Grund und Holle, 1750-72)
- Diderot, Denis. *D'Alembert's Dream.* In *Rameau's Nephew and Other Works*, trans. and ed. by J. Barzun and R. Bowen. Indianapolis: Hackett Publishing Company, 2001.
- Förster, Georg. Noch etwas über die Menschenraßen. *Teutsche Merkur*, October and November, 1786.
- Girtanner, Christoph. *Über das Kantische Prinzip für die Naturgeschichte* (Göttingen: Vandenhoeck & Ruprecht, 1796). Reprinted in *Concepts of Race in the Eighteenth Century* 7, ed. R. Bernasconi. Bristol, England: Thoemmes Press, 2001.
- Haller, Albrecht von. *Primae lineae physiologiae in usum praelectionum academicarum* (Goettingen: Vandenhoeck, 1747, 2nd ed. 1751, 3rd ed. 1765)
- _____. *First Lines of Physiology.* Reprint of 1786 ed. with intr. L. S. King. The Sources of Science 32. New York & London: Johnson Reprint Corporation, 1966
- Herder, Johann Gottfried. *Ideen zur Philosophie der Geschichte der Menschheit.* In *Herders Sämtliche Werke*, ed. B. Suphan. Vols 1-33. Berlin: Weidmann, 1893.
- Hume, David. *An Enquiry Concerning Human Understanding.* Indianapolis: Hackett Publishing Company, 1977.
- Kant, Immanuel. *Kants Gesammelte Schriften, herausgegeben von der Deutschen Akademie der Wissenschaften*, 29 vols. (Berlin: de Gruyter, 1902-)
- _____. *Kritik der reinen Vernunft / Immanuel Kant.* Nach der 1. und 2. Orig.-Ausg. hrsg. Von Raymund Schmidt. Mit einer Bibliogr. von Heiner Klemme. –3. Aufl. Hamburg: Meiner, 1990.
- _____. *Metaphysische Anfangsgründe der Naturwissenschaft / Immanuel Kant.* Mit einer Einl. hrsg. von Konstantin Pollok. –Hamburg: Meiner, 1997.

- _____. *Ertse Einleitung in die Kritik der Urteilkraft / Immanuel Kant*. Mit einer Einl. hrsg. Von Gerhard Lehmann. 2. Aufl. Hamburg: Meiner, 1970.
- _____. *Kritik der Urteilkraft / Immanuel Kant*. Hrsg. von Karl Vorländer. Mit einer Bibliogr. von Heiner Klemme. –7. Aufl. – Hamburg: Meiner, 1990.
- _____. *Theoretical Philosophy 1755-1770*, trans. and ed. D. Walford and R. Meerbote. In *The Cambridge Edition of the Works of Immanuel Kant*, ed. P. Guyer and A. Wood. New York: Cambridge University Press, 1992.
- _____. *Religion and Rational Theology*, trans. and ed. A. Wood and G. Di Giovanni. In *The Cambridge Edition of the Works of Immanuel Kant*, ed. P. Guyer and A. Wood. New York: Cambridge University Press, 1996.
- _____. *Lectures on Metaphysics*, trans. and ed. K. Ameriks and S. Naragon. In *The Cambridge Edition of the Works of Immanuel Kant*, ed. P. Guyer and A. Wood. New York: Cambridge University Press 1997.
- _____. *Critique of Pure Reason*, trans. and ed. P. Guyer and A. Wood. In *The Cambridge Edition of the Works of Immanuel Kant*, ed. P. Guyer and A. Wood. New York: Cambridge University Press 1998.
- _____. *Practical Philosophy*, trans. and ed. M. Gregor. In *The Cambridge Edition of the Works of Immanuel Kant*, ed. P. Guyer and A. Wood. New York: Cambridge University Press 1996.
- _____. *Critique of the Power of Judgment*, trans. P. Guyer and E. Matthews. In *The Cambridge Edition of the Works of Immanuel Kant*, ed. P. Guyer and A. Wood. New York: Cambridge University Press, 2000.
- _____. *Political Writings*, ed. H. S. Reiss, trans. H. B. Nisbet. New York: Cambridge University Press, 1991.
- La Mettrie, Julian Offroy de. *Man a Machine and Man a Plant*, trans. R. A. Watson and M. Rybalka. Indianapolis: Hackett Publishing Company, 1994.

- Leibniz, G. W. *Philosophical Essays*, trans. and ed. by R. Ariew and D. Garber. Indianapolis: Hackett Publishing Company, 1989.
- _____. *Philosophical Papers and Letters*, trans. L. Loemker. Dordrecht, 1969.
- _____. *Theodicy*, trans. E. M. Huggard. La Salle, Ill., 1985.
- _____. *New Essays on Human Understanding*. ed. P. Remnant and J. Bennet. New York: Cambridge University Press, 1996.
- Maupertuis, Pierre-Louis Moreau de. *The Earthly Venus*, trans. and ed. S. B. Boas. The Sources of Science 29. New York & London: Johnson Reprint Corporation, 1966.
- Reinhold, Karl L. *Briefe über die Kantische Philosophie*. Leipzig: Goschen, 1790-92.
- Rousseau, Jean-Jacques. *Discourse on the Origins of Inequality*. In *The Basic Political Writings*. Indianapolis: Hackett Publishing Company, 1987.
- Wolff, Caspar Friedrich. *Theoria generationis*. Halle: Hendel. Reprinted ed., (with German translation *Theorie von der Generation in zwei Abhandlungen erklärt und bewiesen*) Hildesheim: G. Olms Verlag, 1966.
- Wolff, Christian. *Vernünfftige Gedancken von Gott, der Welt und der Seele des Menschen, auch allen Dingen Überhaupt*. Reprinted in Abt. 1, Bd. 2, of Christian Wolff's *Gesammelte Werke*. 1724. Rpt. Hildesheim: G. Olms Verlag, 1983.
- _____. *Vernunfftige Gedancken von den Würckungen der Natur*. Reprinted in Abt. 1. Bd. 6, of Christian Wolff's *Gesammelte Werke*. 1724. Rpt. Hildesheim: G. Olms Verlag, 1981.

SECONDARY LITERATURE

- Adickes, Erich. *Kant als Naturforscher*. Berlin: de Gruyter, 1925.
- Adams, Robert. *Leibniz: Determinist, Theist, Idealist*. New York: Oxford University Press, 1994.

- Allison, Henry. "Kant's Antinomy of Teleological Judgment." *The Southern Journal of Philosophy* (1991) Volume XXX, Supplement, pp. 25-42.
- _____. *Kant's Transcendental Idealism: An Interpretation and Defense*. New Haven: Yale University Press, 1982.
- Ameriks, Karl. "Kant on Science and Common Knowledge." In *Kant and the Sciences*, ed. E. Watkins. New York: Oxford University Press, 2001, pp. 31-52.
- _____. *Kant's Theory of Mind*. New York: Oxford University Press, 2000 (1st ed. 1982)
- _____. *Kant and the Fate of Autonomy*. New York: Cambridge University Press, 2000.
- _____. "Introduction: interpreting German Idealism." In *The Cambridge Companion to German Idealism*, ed. K. Ameriks. New York: Cambridge University Press, 2000.
- _____. "The Critique of Metaphysics: Kant and Traditional Ontology." In *The Cambridge Companion to Kant*, ed. P. Guyer. New York: Cambridge University Press, 1992, pp. 249-279.
- Bartuschat, Wolfgang. *Zum Systematischen Ort von Kants Kritik der Urteilskraft*. Frankfurt am Main: Vittorio Klostermann, 1972.
- Beck, Lewis White. *Early German Philosophy: Kant and His Predecessors*. Cambridge: Harvard University Press, 1969.
- Beiser, Frederick. "Kant's Intellectual Development 1746-1781." In *The Cambridge Companion to Kant*, ed. P. Guyer. New York: Cambridge University Press, 1992, pp. 26-61.
- _____. *The Fate of Reason: German Philosophy from Kant to Fichte*. Cambridge: Harvard University Press, 1987.
- Calinger, Ronald S. "The Newtonian-Wolffian Controversy (1740-1759)" *Journal of the History of Ideas*, Vol. 30, No. 3. (1969): 319-330.
- Düsing, Klaus. *Die Teleologie in Kants Weltbegriff*. Kantstudien Ergänzungsheft, 96. Bonn: H. Bouvier u. Co. Verlag, 1968.

- Ferrini, Cinzia. "Testing the Limits of Mechanical Explanation in Kant's Pre-Critical Writings." *Archiv für Geschichte der Philosophie* 82. Bd. (2000): 297-331.
- Fisher, Mark. "Kant's Explanatory Natural History: Generation and Classification of Organisms in Kant's Natural Philosophy." In *Understanding Purpose: Kant and the Philosophy of Biology*, ed. P. Hunemann. (North American Kant Society Studies in Philosophy, v. 8). Rochester, NY: University of Rochester Press, 2007, pp. 101-122.
- _____. "Blumenbach, Johann Friedrich" forthcoming in *Dictionary of Eighteenth Century German Philosophers*, ed. M. Kuehn a. H. Klemme, Bristol: Thoemmes.
- _____. and Eric Watkins. "Kant on the Material Ground of Possibility: From the *Only Possible Argument* to the *Critique of Pure Reason*." *Review of Metaphysics* 52 (1998): 369-395.
- Franks, Paul W. *All or Nothing: Systematicity, Transcendental Arguments, and Skepticism in German Idealism*. Cambridge: Harvard University Press, 2005.
- Friedman, Michael. *Kant and the Exact Sciences*. Cambridge: Harvard University Press, 1992.
- _____. "Causal Laws and the foundations of natural science." In *The Cambridge Companion to Kant*, ed. P. Guyer. New York: Cambridge University Press, 1992, pp. 161-199.
- _____. "Regulative and Constitutive". *The Southern Journal of Philosophy* (1991) Volume XXX, Supplement, pp. 73-102.
- Garber and Ayers eds. *The Cambridge History of Seventeenth-Century Philosophy*. New York: Cambridge University Press, 1998.
- Gasking, Elizabeth B. *Investigations into Generation 1651-1828*. London: Hutchison & Co., 1967.
- Gebler, Fred. *Die Gottesvorstellung in der frühen Theologie Immanuel Kants*. Epistemata Reihe Philosophie 65. Würzburg: Königshausen & Neumann, 1990.

- Gillispie, Charles Coulston. "Johann Friedrich Blumenbach." *Dictionary of Scientific Biography*. 2(1970): 203-204.
- Ginsborg, Hannah. "Kant on Understanding Organisms and Natural Purposes." In *Kant and the Sciences*, ed. E. Watkins. New York: Oxford University Press, 2001, pp. 231-258.
- _____. "Two Kinds of Mechanical Inexplicability in Kant and Aristotle." *Journal of the History of Philosophy* 42 (2004): 33-65.
- Gould, Stephen Jay. *Ontogeny and Phylogeny*. Cambridge: Harvard University Press, 1977.
- _____. *The Structure of Evolutionary Theory*. Cambridge: Harvard University Press, 2002.
- Guyer, Paul. "Organisms and the Unity of Science." In *Kant and the Sciences*, ed. E. Watkins. New York: Oxford University Press, 2001, pp. 259-281.
- _____. "Absolute Idealism and the Rejection of Kantian Dualism." In *The Cambridge Companion to German Idealism*, ed. K. Ameriks. New York: Cambridge University Press, 2000, pp. 37-56.
- _____. *Kant and the Claims of Knowledge*. New York: Cambridge University Press, 1987.
- Hall, Thomas S. *Ideas of Life and Matter: Studies in the History of General Physiology 600 B.C. – 1900 A.D.* Chicago: The University of Chicago Press, 1969.
- Horstmann, Rolf-Peter. "Der Anhang zur transzendentalen Dialektik (A642/B670A704/B732)". In *Kooperativer Kommentar zu Kants Kritik der reinen Vernunft*, ed. G. Mohr and M. Willaschek. Berlin: Akademie Verlag, 1998, pp.525-546.
- Hunemann, Philippe. "Reflexive Judgment and Wolffian Embryology: Kant's Shift between the First and the Third Critiques". In *Understanding Purpose: Kant and the Philosophy of Biology*, ed. P. Hunemann. (North American Kant Society studies in philosophy v. 8). Rochester, NY: University of Rochester Press, 2007, pp. 75-100.
- Jacob, François. *The Logic of Living Systems: A History of Heredity*. Great Britain: Allen Lane, 1973.

- Koyré, Alexandre. *From the Closed World to the Infinite Universe*. Baltimore: The Johns Hopkins University Press, 1957.
- Kreines, James. "The Inexplicability of Kant's *Naturzweck*: Kant on Teleology, Explanation, and Biology." *Archiv für Geschichte der Philosophie* 87 (2005): 270-311.
- Kuehn, Manfred. *Kant: A Biography*. New York: Cambridge University Press, 2001.
- _____. "Kant and His Teachers in the Exact Sciences." In *Kant and the Sciences*, ed. E. Watkins. New York: Oxford University Press, 2001, pp. 11-30.
- Kulstad, Mark. *Leibniz on Apperception, Consciousness, and Reflection*. Munich: Philosophia Verlag GmbH, 1991.
- Larson, James L. *Interpreting Nature: The Science of Living Form from Linnaeus to Kant*. Baltimore: The Johns Hopkins University Press, 1994.
- _____. *Reason and Experience: The Representation of Natural Order in the Work of Carl von Linné*. Berkeley: University of California Press, 1971.
- Laywine, Alison. *Kant's Early Metaphysics and the Origins of the Critical Philosophy*, North American Kant Society Studies in Philosophy, vol. 3. Atascadero, Calif.: Ridgeview, 1993.
- Lovejoy, Arthur O. *The Great Chain of Being: A Study of the History of an Idea*. Cambridge: Harvard University Press, 1936.
- _____. "Kant and Evolution." In B. Glass et al. *Forerunners of Darwin 1745-1859*. Baltimore: Johns Hopkins University Press, 1959, pp. 173-206.
- Löw, Reinhard. *Philosophie des Lebendigen: Der Begriff des Organischen bei Kant, sein Grund und seine Aktualität*. Frankfurt am Main: Suhrkamp, 1980.
- Lyon, John and Phillip R. Sloan. *From Natural History to the History of Nature: Readings from Buffon and His Critics*. Notre Dame, Ind.: University of Notre Dame Press, 1981.
- Makkreel, Rudolf A. "Aesthetics." In *The Cambridge History of Eighteenth-Century Philosophy*, ed. K. Haakonssen. New York: Cambridge University Press, 2006.

- _____. "Reflection, Reflective Judgment and Aesthetic Exemplarity."
- _____. "The cognition-knowledge distinction in Kant and Dilthey and the implications for psychology and self-understanding." *Studies in the History and Philosophy of Science* 34 (2003): 149-164.
- _____. "Kant on the Scientific Status of Psychology, Anthropology, and History." In *Kant and the Sciences*, ed. E. Watkins. New York: Oxford University Press, 2001, 185-204.
- _____. "The Confluence of Aesthetics and Hermeneutics in Baumgarten, Meier, and Kant." *The Journal of Aesthetics and Art Criticism* 54 (1996): 65-75.
- _____. "Regulative and Reflective Uses of Purposiveness in Kant." *The Southern Journal of Philosophy* (1991) Volume XXX, Supplement, pp. 49-63.
- _____. *Imagination and Interpretation in Kant: The Hermeneutical Import of the Critique of Judgment*. Chicago: The University of Chicago Press, 1990.
- Marc-Wogau, Konrad. *Vier Studien zu Kants Kritik der Urteilskraft*. Leipzig: Otto Harrasowitz, 1938.
- Mayr, Ernst. *The Growth of Biological Thought: Diversity, Evolution and Inheritance*. Cambridge: Harvard University Press, 1982.
- McLaughlin, Peter. *Kants Kritik der teleologischen Urteilskraft*. Bonn: Bouvier Verlag, 1989.
- Polonoff, Irving I. *Force, Cosmos, Monads, and Other Themes in Kant's Early Thought*. Kantstudien Ergänzungsheft 107. Bonn: Bouvier, 1971.
- Poter, Roy et al. "Johann Friedrich Blumenbach." *The Blackwell Companion to the Enlightenment*. 1991: 65.
- Reill, Peter. "Between Preformation and Epigenesis: Kant, Physiotherapy and Natural History." In *New Essays on the Precritical Kant*, ed. T. Rockmore. New York: Humanity Books, 2001.
- Roe, Shirley A. *Matter, Life, and Generation: Eighteenth-century embryology and the Haller Wolff debate*. New York: Cambridge University Press, 1981.

- Rutherford, Donald. *Leibniz and the Rational Order of Nature*. New York: Cambridge University Press, 1995.
- _____. "Metaphysics: The late period." In *The Cambridge Companion to Leibniz*. ed. N. Jolley. New York: Cambridge University Press, 1995, pp. 124-175.
- _____. "Philosophy and Language in Leibniz." In *The Cambridge Companion to Leibniz*. ed. N. Jolley. New York: Cambridge University Press, 1995, pp. 224-269.
- Schmucker, Josef. *Die Ontotheologie des vorkritischen Kant*. Kantstudien Ergänzungsheft 112. Berlin/New York: DeGrutyer, 1980.
- Schönfeld, Martin. *The Philosophy of the Young Kant: The Precritical Project*. New York: Oxford University Press, 2000.
- Sloan, Phillip R. "Kant on the History of Nature: the Ambiguous Heritage of the Critical Philosophy for Natural History." Forthcoming.
- _____. "Performing the Categories: "Eighteenth-Century Generation Theory and the Biological Roots of Kant's A Priori". *Journal of the History of Philosophy* 40 (2002): 229-253.
- _____. "Buffon, German Biology, and the Historical Interpretation of Biological Species." *British Journal for the History of Science* 12 (1979): 109-153.
- Spencer, Frank. "Johann Friedrich Blumenbach." *History of Physical Anthropology and Encyclopedia*. 1(1997): 183-189.
- Stark, Werner. "Immanuel Kants physische Geographie -- eine Herausforderung?" Text der am 4. Mai 2001 (20.00 Uhr) in der Philipps-Universität, Marburg (Germany) als Honorarprofessor gehaltenen Antrittsvorlesung. /staff.uni-marburg.de/~stark/ws_lese4.htm
- Watkins, Eric. *Kant and the Metaphysics of Causality*. New York: Cambridge University Press, 2005.

- _____. "Forces and Causes in Kant's Early Pre-Critical Writings." *Studies in History and Philosophy of Science* 34 (2003): 5-27.
- _____. "Kant on Rational Cosmology." In *Kant and the Sciences*, ed. E. Watkins. New York: Oxford University Press, 2001, pp. 136-162.
- _____. "The Argumentative Structure of Kant's *Metaphysical Foundations of Natural Science*." *Journal of the History of Philosophy* 36 (1998): 567-593.
- _____. "From Pre-established Harmony to Physical Influx: Leibniz's Reception in Early 18th Century Germany." *Perspectives on Science* 6 (1998): 136-203.
- _____. "Kant's Theory of Physical Influx." *Archiv für Geschichte der Philosophie* 77 (1995): 285-324.
- _____. "The Development of Physical Influx in Early Eighteenth Century Germany: Gottsched, Knutzen, and Crusius." *Review of Metaphysics* 49 (1995): 295-339.
- Wilson, Catherine. "The reception of Leibniz in the eighteenth century." In *The Cambridge Companion to Leibniz*. New York: Cambridge University Press, 1995, pp. 442-474.
- Zammito, John H. "'This inscrutable *principle* of an original *organization*': epigenesis and 'looseness of fit' in Kant's philosophy of science." *Studies in History and Philosophy of Science* 34 (2003): 73-109.
- _____. *Kant, Herder, & the Birth of Anthropology*. Chicago: The University of Chicago Press, 2002.
- _____. *The Genesis of Kant's Critique of Judgment*. Chicago: The University of Chicago Press, 1992.
- Zumbach, Clark. *The Transcendent Science: Kant's Conception of Biological Methodology*. *Nijhoff International Philosophy Series* 15. Boston: Kluwer Academic Publishers, 1984.