Kant's biological teleology and its philosophical significance[*]

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Kant's "Critique of Teleological Judgment," the second part of his Critique of Judgment, is concerned with the following question: to what extent is it legitimate to think of nature in teleological terms, that is, in terms of ends, goals or purposes? The "new science" of the seventeenth century, associated with such figures as Galileo, Hobbes, Descartes, Boyle and Newton, had constituted a significant break from Aristotelian science, in which the paradigm of natural explanation was teleological. The alternative explanatory paradigm offered by the new science, was one on which all natural phenomena were to be explained "mechanically," that is, without the assumption of guidance by ends or purposes. More specifically, the so-called "mechanical philosophy" aimed to explain all natural phenomena in terms of a few basic properties of matter: size, shape, motion and (on some versions of the view) solidity or impenetrability. This explanatory framework, especially when developed by Newton to allow attractive or gravitational force to matter, proved to be enormously fruitful for the development of physics and chemistry. But there was still much about nature which seemed to resist this kind of explanation: in particular, the kind of natural phenomena which are now referred to as "biological." Take, for example, the formation of a chick embryo out of the apparently undifferentiated matter contained in a hen's egg. How could this be explained without supposing that the resulting chick was the end or purpose of the process of formation, or in other words, that the process took place in order to produce the chick?

For philosophers and scientists who were committed to the explanatory paradigm of the new science, such phenomena posed a challenge. One way of

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dealing with the challenge was to insist that biological phenomena could, in spite of the appearances, be explained within the mechanical framework. Either gravitational force itself, or forces analogous to gravitational force, were sufficient to account for the production of organisms. Another, diametrically opposed way, was to deny that organisms were in fact naturally formed at all, and to ascribe them instead to a supernatural cause, namely God. This took the form, most commonly, of "preformationism." The apparent development of the chick embryo was merely an expansion of an organism which had been preformed in miniature by God, and this expansion was a purely mechanical process whose explanation required no appeal to purposes.

Debates among defenders of these, and related, positions were prevalent in the mid-eighteenth century, when Kant first started to write about the issue of natural teleology. The "Critique of Teleological Judgment" contains Kant's most developed contribution to these debates, a contribution which differs radically from both positions described so far. Kant himself was, at least in the Critical period, a committed defender of Newtonian science. But he was also concerned throughout his career with the question of how to make sense of living things. Beginning with some of his earliest writings (in particular the Universal Natural History of 1755 and the Only Possible Proof of the Existence of God of 1763) Kant explicitly rejects the view that the fundamental forces of matter alone, which he understood as comprising both an attractive force responsible for gravitational phenomena, and a repulsive force responsible for matter's impenetrability, could account for the existence of plants and animals. But he also denies that we should treat plants and animals as though they were individually created by God as opposed to coming into existence through natural processes. These commitments lead him to develop a third view, articulated most fully in the "Critique of Teleological Judgment," which in effect reintroduces natural teleology. If the study of organisms is to constitute part of natural science, then they must be viewed, not as artefacts, but as products of nature. Yet they cannot be understood as existing merely in virtue of the fundamental forces of matter, and this implies that they must be regarded in teleological terms.

In what follows I try to explain Kant's view in the light of some of the more significant passages dealing with natural teleology in the Critique of Judgment, focussing, in the first section, on the "Analytic of Teleological Judgment" and, in the second section, on the "Dialectic of Teleological Judgment." I also emphasize what I think is the central philosophical question raised by Kant's -- or indeed any -- defence of natural teleology: are the concepts of natural teleology, and the related concept of a "natural end," philosophically coherent, or do they represent a contradiction in terms? I claim that much of Kant's explicit discussion fails to get to the heart of this central question, but, in the third and final section, I suggest a way of addressing it which I think is suggested by the argument of the Critique of Judgment as a whole. Many of the interpretive claims I make in explaining Kant's view are controversial. While there is not space to defend these claims here, aspects of the interpretation underlying them are presented more fully in Ginsborg 2001 and Ginsborg 2004.

I

Kant's account of organisms in the Analytic is structured around the notion of a Naturzweck, a "natural purpose" or "natural end," which he discusses in detail in §§64-65. The notion of a natural end in turn derives from that of an end, which he defines in the "Critique of Aesthetic Judgment" as "the object of a concept in so far as the latter is regarded as the cause of the former" (§10, 220). It is clear that what Kant has in mind here is the example of artefacts such as a chair or a teacup. Such artefacts come into being in virtue of concepts in the minds of designers: for example, the concept of a wooden armchair upholstered in red velvet. When we encounter something falling under that concept, i.e. a wooden armchair upholstered in red velvet, we take it to have been produced in accordance with that concept, and so we regard the concept as playing an essential role in the causal history of the object. But it is a central theme of the "Critique of Teleological Judgment" that the application of the notion of end is not

limited to artefacts. Products of nature too can qualify as ends, and these are entitled natural ends. This should strike us as paradoxical, and indeed Kant warns us that the concept of a natural end may contain a contradiction (§64, 370). We count something as an end if we regard it as produced by the causality of a concept, which implies that it was produced as a result of design. But something counts as natural, on the face of it, precisely to the extent that it is not the product of design, and hence, it would seem, not an end. One of the most important philosophical challenges for any sympathetic interpretation of Kant's views on organisms is to explain how this apparent contradiction is to be reconciled.

Kant's discussion of the notion of a natural end in §§64-65 centers on the conditions which an object has to meet in order to qualify as a natural end. At §64, he gives a "provisional" statement of what is required: a thing, he says, "exists as a natural end if it is cause and effect of itself" (370) He expands on this statement at §65 by distinguishing two conditions, one which is required for the things being an end tout court, the second for its being, in addition, a natural end as opposed to an artefact. The first condition, which applies to ends generally, is that "the parts... [be] possible only through their relation to the whole" (373). In the case of artefacts, this condition is satisfied in that the parts of the artefact, say the legs and the seat of the chair, or the handle of the teacup, can exist only in virtue of the designer's idea or concept of the whole. As Kant puts the condition in a subsequent formulation, each part exists "for the sake of the others and of the whole" (ibid.): the legs of the chair, or the handle of the cup, exist only in order that the chair or cup as a whole should exist. But in the more specific case of a natural end, this requirement is satisfied differently, in a way which is expressed by a second condition: "the parts [must] combine themselves into the unity of a whole by being reciprocally the cause and effect of one another's form" (ibid.). While in the case of an artefact the parts are produced and combined into a whole by an artisan working in accordance with a design, in the case of a natural product there is no artisan. If the object is still to qualify as an end, then, in accordance

with the first condition, it must be the case that the parts of the organism are produced and combined into a whole by one another. As Kant puts it in a more detailed formulation, for something to be judged as a natural end "it is required that its parts altogether reciprocally produce one another, as far as both their form and combination is concerned, and thus produce a whole out of their own causality" (ibid).

Does anything meet these conditions? According to Kant, plants and animals do; indeed they are the only things which do, and hence the only things which qualify as natural ends (§65, 375-376). Thus Kant illustrates his provisional statement of the overall condition on something's being a natural end, that the thing must be "cause and effect of itself," by citing three characteristics of a tree, which he presumably takes to exemplify characteristics of plants and animals more generally. First, a tree produces offspring of the same species, thus "producing itself with respect to the species" (§64, 371). Second, the tree produces itself "as an individual" (ibid.) by taking in nourishment from outside and converting it so that it forms part of the tree itself. Third, the tree's parts stand in relations of reciprocal dependence on one another, in that, for example, the leaves are needed for the preservation of the trunk, but the trunk in turn is needed for the production of the leaves (see ibid.). This last point is the one which is emphasized in the more detailed characterization of the two conditions in §65. But the three points are related in that they all manifest the fundamental "formative force" [bildende Kraft] which is responsible for an organism's self-causing character and which distinguishes it from a complex artefact such as a watch. While a watch meets the first of the two conditions specified in §65, and hence counts as an end, it fails to qualify as a natural end because "one wheel in the watch does not produce another, and still less does one watch produce other watches" (§65, 374); relatedly, a watch cannot repair itself when damaged or replace parts which have been removed. "An organized being," Kant goes on to say "is thus not a mere machine, because that has solely moving force [bewegende Kraft]; rather it possesses formative force, and indeed of a kind which it communicates to kinds of matter [Materien] which

do not have it (it organizes them), thus a self-propagating formative force, which cannot be explained through the capacity for movement (mechanism) alone" (ibid.).

Kant presents his discussion of the "self-causing" character of organisms as though it addresses the threat of contradiction in the notion of a natural end (§64, 370-371). And the discussion does indeed suggest an indirect resolution of the conflict in so far as it points to a readily observable feature of organisms -- their capacity to reproduce and maintain themselves -- which seems to license our regarding them both as ends, and as products of nature. But the resolution is not definitive, in that worries about the coherence of the notion of a natural end might well lead us to doubt whether organisms really do have the kind of fundamental self-causing capacity which Kant ascribes to them. Such doubt might take one of two contrasting forms. One form would allow that organisms meet the first of Kant's two conditions at §65, that the parts are possible only in relation to the whole, but question whether they do so in the way specified in the second condition. Perhaps, it might be suggested, organisms and watches differ only with respect to complexity: while at the superficial level organisms appear to display a fundamental capacity for self-maintenance and reproduction, this can be seen at the microscopic level to reflect the operation of a highly complex mechanism no different in kind from that of a watch. This form of doubt would allow that organisms are ends, but deny that they meet the condition for being natural. The contrasting form of doubt would also question whether organisms have a fundamental capacity for self-maintenance and reproduction, but in a way which challenges their status as ends rather than their status as natural. Why couldn't organisms have come into existence, in the first instance, solely through the operation of basic forces present in all matter? Organisms, once formed in this way, might indeed exhibit self-producing and self-maintaining characteristics, but this would not imply their possession of a fundamental formative force. Rather, they might be compared to weather systems (tornadoes, say) which do indeed preserve and reproduce themselves to some extent, but where this self-preserving character is simply a reflection of the

more basic physical forces that were responsible for their formation in the first place.

Moreover, the two forms of doubt I have described correspond to actual positions that were taken in the eighteenth century about the origin of individual organisms. The first corresponds to the most widespread position in the early eighteenth century, that of preformationism. On a common version of this view, all plants and animals in existence, as well as all their offspring, were directly brought into existence by God, in miniature form, at the time of Creation. The apparent generation of one organism from another, when, say, a hen lays an egg and the matter of the egg develops into a chick, was an illusion. The chick existed all along, as a highly complex artefact, and all that happened in the egg is that the artefact expanded or unfolded, as it had been designed to do, through the operation of an intricate mechanism connecting its microscopic parts. The second corresponds to a view which was developed in explicit opposition to preformation, on which inorganic matter has a fundamental power to organize itself into complex plants and animals, in much the same way as it organizes itself into complex crystal formations such as snowflakes. This view was generally presented as Newtonian in principle. While gravitational force alone was not sufficient for the production of organisms, other basic forces, analogous to gravity, could be invoked to account for the emergence of organic complexity. (The various types of preformationist theories are discussed in McLaughlin 1990, ch. 1; for references to the second kind of view, see Ginsborg 2004, p. 45).

As we will see at the end of section II, Kant explicitly rejects both of these views later in the Critique of Teleological Judgment (§§80-81). But the reasons he gives do not address the threat of contradiction directly. And as long as the threat remains, then it might well seem that these views are the only philosophically coherent possibilities. Now one obvious way in which Kant seems to address the threat directly is by pointing out that the concept of a natural end is, as he puts it, "not a constitutive concept of the understanding or of reason" but rather "a regulative concept for reflective judgment, for guiding research into objects of this kind according to a

distant analogy with our causality according to ends" (§65, 375). This amounts to the claim that the use of the concept of a natural end in application to organisms plays a merely heuristic role, and does not carry the implication that organisms <u>are</u> produced according to design as well as being the result of purely natural causes. Rather, in thinking of organisms as natural ends we think of them only <u>as if</u> they were produced in accordance with design. However, this consideration is, again, insufficient to remove the worry. For, we might ask, how can we coherently regard an object as a product of design, while at the same time regarding it as natural? Even if this does not imply the objective assertion that the object both is, and is not, a product of design, it still seems to imply a parallel conflict in our reflective stance on the object. And the appeal to analogy is empty unless it can be specified, without reference to the idea of design, what feature it is we are ascribing to the object, or how we are regarding it, when we are regarding it as if designed. Otherwise there is no such thing as regarding something <u>as if</u> designed, without regarding it as <u>in fact</u> designed, in which case we again seem committed to regarding the object as having two contradictory features, and hence adopting an attitude towards it which is apparently incoherent.

II

I turn now to the "Dialectic of Teleological Judgment," in which Kant takes up, at considerable length, an issue which seems closely related to the worry we have just been discussing. He does this by presenting an "antinomy" between two principles of reflective judgment, in the form of a thesis and an antithesis which seems to contradict each other. The thesis is the principle that "all production of material things and their forms must be judged as possible according to merely mechanical laws." The antithesis is the principle that "some products of material nature cannot be judged as possible according to merely mechanical laws (the judging of them requires a quite different law of causality, namely that of final causes)" (§70, 387).

Kant's argument in the Dialectic is extremely hard to follow and has been the subject of much interpretive dispute, so my treatment of it will be brief and selective. I begin with a sketch of the main points. Immediately after introducing the two principles at §70, Kant distinguishes them from a parallel pair of principles that are constitutive rather than regulative and belong to determining rather than reflective judgment. The constitutive principle which parallels the thesis of the antinomy is the principle that "all production of material things is possible according to merely mechanical laws" whereas the constitutive principle which parallels the antithesis is the principle that "some production of them [material things] is not possible according to merely mechanical laws" (387). The apparent implication in this and the following section (§71) is that the solution to the antinomy will lie in distinguishing the principles of the antinomy itself from these constitutive principles. When we see clearly that the principles belong only to reflective and not to determining judgment, that is, that they play only a heuristic role in our understanding of organisms, rather than making an objective assertion about how those organisms came to be, then we will see that the seeming contradiction is merely illusory.

To a large extent this implication is borne out in the continuation of the discussion. In §§72-73 Kant considers and rejects a number of metaphysical views about the origin of organisms to which philosophers have been led by adopting one or other of the constitutive principles: the Epicurean view on which they are due to blind chance; the Spinozistic view on which their existence follows by necessity from the nature of an original being; the "hylozoistic" view on which they are due to "living matter" (that is to say, matter endowed with animal life, which involves consciousness and desire); and finally the theistic view which ascribes them to divine intention. The error in defending these views seems to be just that which is, in effect, warned against in §71: that of confusing regulative principles with constitutive principles. §74 connects the merely regulative nature of the principles in the antinomy (in particular of the antithesis, with its implication that some products of nature can only be explained by appeal to

final causes) with a point already mentioned in connection with §65, that is, the merely regulative character of the concept of a natural purpose. In §75, Kant again emphasizes that our need to invoke teleology in order to understand certain objects in nature does not imply that such objects are in fact possible only through design, this time, however, introducing the idea that the principle of teleology holds for us because of the "peculiar constitution" of our cognitive faculties (397). The requirement that we view organisms as teleological is necessary for us as human beings, but we cannot presuppose that this requirement is "necessary for every thinking and cognizing being, thus that it attaches to the object and not just to our own subject" (399).

This last idea is developed in what most commentators regard as the heart of the argument, namely §77, where Kant describes in detail the "peculiarity of the human understanding, by means of which the concept of a natural end is possible for us" (405). Here Kant introduces a distinction between our understanding, which is "discursive," and a hypothetical "intuitive" understanding which (although Kant does not say so explicitly) might be attributed to God. The discursive nature of our understanding consists in the fact that we can cognize a particular thing only by means of general concepts, or "analytic universals," which pick out features it has in common with other things. An intuitive understanding, on the other hand, can cognize things through intellectual intuitions, or "synthetic universals," which represent them in all their concrete individuality. For a discursive understanding, the particular is contingent with respect to the universal under which it is subsumed, since we cannot deduce all the characteristics of a particular thing solely from the general concepts which apply to it. But for an intuitive understanding, there is no contingency in the relation between the universal and the particular: an intellectual intuition determines everything which is to be known about the object it represents. Kant uses this distinction to argue that our need to regard organisms as ends stems from the discursive character of our intellect, and so should not be taken to imply that organisms are in fact possible only by virtue of teleological causality. We regard organisms as ends only because we take them to be contingent with

respect to the universal laws governing nature, in particular the laws of motion which express the fundamental nature of matter. The laws of matter do not determine that the parts of matter have to form themselves into precisely those arrangements that are required for the functioning of a plant or animal, so in order to make sense of the way matter is organized in a plant or animal we have to think of its arrangement as determined by a concept of the plant or animal, that is, as designed. But an intuitive understanding would not recognize this contingency, and so would have no need to regard organisms in teleological terms. Though Kant does not put it this way, we might say that an intuitive understanding comprehends the nature of matter not through general laws, as we do, but by representing the totality of matter as a completely determinate whole. For such an understanding it is not contingent with respect to the nature of matter that it comes to be arranged in the particular ways that it does: rather, all the arrangements, including those characteristic of organisms, are represented a priori in the synthetic universal through which the nature of matter is grasped.

So far Kant's discussion has followed the general line announced in §70 and §71, that of showing the principles opposed in the antinomy to be merely regulative as opposed to constitutive. But in the final section of the Dialectic, §78, the discussion introduces what is apparently a new element in the solution. We can motivate this new element by noting that, even after it has been shown that the principles are regulative, the question still arises of how we are to pursue them both: how, in other words, we are to respect the thesis of the antinomy by seeking a mechanical explanation of organisms while at the same acknowledging that mechanical explanations are insufficient and that instead we need to appeal to final causes. Kant addresses this by claiming that we must "subordinate" the principle of mechanism to that of teleology (414). The assumption of teleology on its own is not sufficient for understanding organisms; we must also consider the means by which the assumed ends are to be achieved, and these means must be understood as operating mechanically. While it is not obvious from the Dialectic itself what is meant by the subordination of mechanism to teleology, the immediately

following "Methodology of Teleological Judgment" offers two examples which seem to shed light on what Kant has in mind. In §80, whose title specifically invokes the "necessary subordination of the principle of mechanism to the teleological principle," Kant describes with approval the way in which some researchers (possibly he has in mind Buffon) pursue the mechanistic principle in accounting for the origin of species. The procedure he describes is one of attempting to trace different species back to a common ancestor by appealing to analogies of form, showing for example how one kind of skeletal structure could have been derived from another through "the shortening of one part and the lengthening of another" (418). But he notes that while this kind of procedure might eventually trace the origin of animal species all the way down to polyps, and indeed to mosses and lichens, it can never attempt to derive organic things from inorganic matter. Rather, explanations of this kind must always assume as their starting-point organized matter, and indeed where the organization is "purposively arranged" (419) for the creatures which are produced by it. A second example is offered in §81, where Kant criticizes the preformationist view of the origin of individual organisms on the ground that it ascribes organisms to a supernatural cause, thus failing to do justice to mechanism. Here again, though, Kant denies the possibility that organisms can be accounted for by appealing to inorganic matter: instead, he defends the view, which he ascribes to Blumenbach, that all explanation of the formation of plants and animals begins with "organized matter" endowed with an irreducibly teleological "formative drive" [Bildungstrieb] (424).

In sketching the Dialectic, I have implicitly taken a stand on two interpretive issues which I now want to confront explicitly. The first issue is that of what Kant means by mechanism in the context of the antinomy, and in particular, why he thinks that organisms cannot be mechanically explained. Most recent commentators follow McLaughlin in holding that mechanical explanation is explanation in terms of parts which do not themselves depend on the whole (1990, 152-153). On this view, organisms are mechanically inexplicable because of what we might call the "non-machine-like" character ascribed to them in §64-65, for example when Kant points out the difference

between an organism and a watch. What makes organisms mechanically inexplicable, in other words, is their self-maintaining and self-reproducing character. (Versions of this view are held by Zumbach [1984, 79-80], Allison [1991, 26-27 and 35], Zanetti [1993, 347], and Guyer [2001, 264-265 and 2003, 45]; I endorsed it myself in Ginsborg 1997, ***). But I think this is a mistake. As I have argued in Ginsborg 2004, organisms are mechanically inexplicable, not in virtue of what distinguishes them from machines, but rather in virtue of what they have in common with machines (or at any rate, complex machines such as watches): they possess a regular structure, and display regularities in functioning, which cannot be accounted for in terms of the basic physical and chemical powers of matter alone. To say that something is mechanically inexplicable is to deny that it can be explained in terms of the powers of the matter from which it comes to be, and this is true no less of watches than of organisms. Matter left to its own devices will no more spontaneously organize itself into a watch than it will into a caterpillar or a blade of grass. While it is important for Kant that organisms do indeed differ from machines in having a self-maintaining and self-reproducing character, this difference does not figure in his reasons for denying that they can be mechanically explained. On the contrary, as will become clearer at the end of this section, it allows us to see them as "mechanically explicable" in the qualified sense which Kant allows to organisms in contrast to artefacts: that is, by appeal to a kind of mechanism which is subordinated to teleology.

The second issue bears on the question of how, precisely, the antinomy is supposed to be resolved. McLaughlin criticizes a long line of distinguished commentators, including Hegel, Adickes and Ernst Cassirer, for holding that the antinomy rests solely on a confusion of regulative with constitutive principles (1990, ch. 3). The most important difficulty for this view, which was pointed out by Hegel as an objection to Kant, is that, even when construed as regulative principles, the thesis and antithesis seem to contradict each other: the thesis implies that organisms must be judged as possible in accordance with mechanical laws, whereas the antithesis implies

that they cannot be (1990, 140f.). McLaughlin proposes instead that the contradiction is resolved by denying that we must be capable of explaining organisms. As he puts it: "[if] the presupposition that everything (all objects of experience) must be explainable for our mechanistic-reductionistic understanding is dispensed with, then the antinomy dissolves and both maxims can be true" (1990, 162).

Now I think that McLaughlin is right to emphasize that the principles contradict one another even when understood as regulative. But I draw a different conclusion with respect to the interpretation of Kant's argument, namely that the resolution to the antinomy requires two steps (on this point I agree with Quarfood [2004, 191], although my understanding of the second step differs from his). In addition to showing that the principles are regulative, so that they do not imply any contradiction from the point of view of an intuitive understanding, Kant must also show how they can be reconciled from the point of view of a discursive understanding applying these principles within the context of scientific enquiry. This second step, which begins in §78, invokes the "subordination" of mechanism to teleology. Specifically, we accord with the mechanical principle in so far as we explain the origin of organisms by appeal to the intrinsic powers of the "matter" out of which they come to be. But, as the examples at §§80-81 make clear, the matter to which we appeal is organized matter endowed with the kind of formative power which makes possible an organism's capacities of self-maintenance and reproduction, as described in §§64-65. And the possibility of this kind of matter is intelligible only on the assumption that it is teleologically directed towards the production of the organisms which it makes possible. In effect, then, this second step completes the resolution of the antinomy by allowing two different, although related, senses of mechanical explanation. On the narrower sense, on which the mechanical explanation of a thing involves accounting for its existence in terms of the fundamental powers of inorganic matter, organisms are indeed (as McLaughlin's view implies) inexplicable by us. But they can still be mechanically explained in a weaker sense which does not exclude teleology, namely in terms of the powers of organized matter.

III

Does the argument of the Dialectic take us any further in addressing the worry left unresolved in section I, namely that the concept of a natural end involves a contradiction? As I have interpreted the Dialectic, its resolution of the antinomy between mechanism and teleology has two components. The first is the argument that the principles of the antinomy are merely regulative. The second is the appeal to the subordination of mechanism to teleology. But both of these components correspond to elements we already identified in the Analytic. Kant's argument for the regulative character of the principles of the antinomy can be seen as an extended defence of the view, expressed briefly at §65, that the concept of a natural purpose is regulative rather than constitutive. And his discussion of the subordination of mechanism to teleology, at least when understood in the light of the examples he gives in §§80-81, is of a piece with his discussion of the self-causing character of organisms in §§64-65: in both sets of passages he is expressing his commitment to a view of organisms, or of organized matter, as endowed with irreducible powers for self-development, self-maintenance and self-propagation.

If this reading is correct, then the Dialectic does not in fact get us any closer to the heart of the worry than the considerations raised in the Analytic. However successful Kant's argument for the regulative character of the principles of the antinomy, it does not resolve the question of how we can coherently adopt both of these principles in our scientific practice, and relatedly, how we can coherently regard an organism both as an end, and as a natural product. Nor is the question resolved by ascribing irreducible formative powers either to organisms themselves, or to "organized matter," for the question still arises of how we can take these powers both to be natural, and to be purposively directed. The fundamental difficulty remains of how to make sense of organisms in terms of natural teleology, given that the very idea of teleology or goal-directedness seems to assume the idea of production in accordance with design, which in turn seems to rule out the idea of

production by natural causes.

In the remainder of this article, I want to suggest a solution to this difficulty which, while not offered by Kant in the "Critique of Teleological Judgment" itself, can, I think, be pieced together from the Critique of Judgment as a whole. The heart of the solution is an idea which I have argued for in Ginsborg 1997: that the notion of an end or purpose [Zweck], and the cognate notion of purposiveness [Zweckmäßigkeit], are essentially tied to the notion of normativity, and only incidentally to the notion of production by design. To regard something as an end is, in essence, to regard it as conforming to, and a fortiori as governed by, normative rules or constraints. This means that we can regard something as an end, without regarding it as in fact a product of design, simply by regarding its structure and behaviour as governed by, normative constraints, but without taking those constraints to be represented in the mind of a designer. We regard the object, that is, as having (or failing to have) the structure it ought to have, and as behaving (or failing to behave) the way it ought to behave, but without any assumption that it was intended to be structured, or to behave, in those ways. This idea, if accepted, allows us to escape the threatened contradiction in the idea of a natural end because it separates the notion of an end from that of a particular causal history. It is not essential to something's being an end that its production be the result of intention. All that is essential is that it be governed by normative constraints, and that is compatible with its being the product of natural processes rather than design.

Here one might worry that, even if there is no direct contradiction in regarding a naturally produced object as governed by normative constraints, it is still unclear how we could be entitled to do so. Surely, it might be protested, natural objects and processes merely are or happen: how can we regard something both as natural, and as manifesting (or failing to manifest) how it ought to be, or what ought to happen? The answer to this question relies on a second idea, having to do with the need to recognize normativity in the natural psychological processes responsible for perception and empirical judgment. This idea, I believe, emerges from reflection on Kant's

account of aesthetic judgment, and more specifically, on the way in which aesthetic judgment reveals the "conditions of empirical cognition in general," but I also take it to be implicit in Kant's account of reflective judgment as the capacity for subsuming the particular under the universal. The idea, in a nutshell, is that in order for empirical cognition to be possible, we must be able to regard the relation between our cognitive faculties on the one hand, and the objects presented to our senses on the other, not only as natural, but also as normative. We must be able to regard the sensory and imaginative responses which those objects elicit not only as natural psychological events, but as governed by normative rules, so that we can think of those responses as not merely caused by the objects, but also as appropriate to them. This is a condition of the responses qualifying as conceptual, and in particular as informed by empirical concepts. For concepts are, or signify, rules for the synthesis of imagination, and if we cannot regard our imaginative activity in response to objects as normatively constrained with respect to those objects, then we cannot regard it as rule-governed. Thus the possibility of empirical cognition, and more specifically experience, depends on the possibility of our taking the natural psychological processes involved in arriving at empirical judgments to be, at the same time, governed by normative constraints (see Ginsborg 1997a, sections II-III, and Ginsborg forthcoming).

If this second idea is accepted, it points the way to what we might call a "transcendental" legitimation for regarding nature in normative terms. We are entitled to regard nature in normative terms because we must do so if empirical cognition, and more specifically experience, is to be possible. Now this is not, of course, to say that we must apply normative notions to those aspects of nature that are not directly involved in the acquisition of empirical cognition. The requirement to regard nature in normative terms is limited to the natural psychological processes involved in cognition, and their relation to the objects which affect our senses. So it does not immediately license the application of normative notions to natural objects and processes over and above those involved in empirical cognition. In particular, it is not sufficient on its own to license our regarding specific

objects in nature -- notably plants and animals -- as governed by normative constraints independently of their relation to our cognitive capacities. What it does do, however, is to remove what otherwise seem to be a conceptual obstacle to regarding plants and animals in normative terms: namely the thought that this is incompatible with regarding them as natural products rather than artefacts. It thus leaves the way open to a conception of organisms as displaying natural normativity, which in turn amounts -- granted the first of the two ideas -- to a conception of organisms as natural ends.

The solution I am proposing obviously requires more defence than I can provide here, but I take it to derive at least some textual basis from an important passage in section VI of the First Introduction, where Kant links the a priori principle of the faculty of judgment -- that is, the principle of nature's (subjective) purposiveness for judgment -- to the ascription of (objective) purposiveness to organisms. Kant points out that this principle "by no means extends so far as to imply the production of natural forms that are purposive in themselves" but that nevertheless, "because we already have a ground for ascribing to nature in its particular laws a principle of purposiveness, it is still possible and permitted, if experience shows us purposive forms in its products, to ascribe these to the same ground on which the first rests." Because we have this principle, as Kant goes on to put it, "ready in judgment," it is "permissible for us to apply such a special concept as that of purposiveness to nature and its lawfulness," and in particular to "natural forms which may be found in experience" (218). In other words, our entitlement to regard particular natural things as purposive, and hence as natural ends, derives from a more general principle belonging to the faculty of judgment, namely that of the purposiveness of nature for judgment. While this principle alone does not imply that there are any natural ends, it does allow us to apply the concept of purposiveness, and thus the concept of an end, to natural objects which are revealed by experience as suiting that concept -- that is, as we saw in section I, to plants and animals.

Whether this passage supports my proposal depends on how we understand the principle of nature's purposiveness to which Kant is referring, and this

raises large and controversial issues. Kant often glosses the principle as that of the systematicity of laws and concepts under which natural phenomena can be subsumed, so that the principle of nature's purposiveness for judgment, or for our cognitive faculties, is the principle that we are capable of arriving at systematic scientific theories in which natural laws and concepts are hierarchically ordered. If we understand the principle in this way, then it is not a condition of the possibility of cognition, but simply of higher-order scientific theorizing. In that case, the key move that Kant is making in the passage is to link our entitlement to regard natural objects as ends, with the demands of scientific theorizing. We might, then, understand him as saying that scientific theorizing requires us to regard nature in general as if it were designed for the sake of our theorizing activities, and that this in turn entitles us to think of particular natural objects as if they were, themselves, products of design. But for the reasons explained in sections I and II, I do not think that this gets to the heart of the philosophical difficulty involved in the idea of regarding something both as natural, and as a product of design.

There is, however, another way of understanding the principle of nature's purposiveness for judgment, on which the passage can be read as supporting the proposal I have offered, and hence, I would argue, as providing a deeper and more satisfying answer to the question of how natural teleology is possible. This way of understanding the principle is suggested by a number of passages, most importantly in section V of the First Introduction, in which Kant seems to regard the principle as a condition, not just of scientific theorizing, but of empirical cognition more generally. So understood, it implies not just that empirical laws and concepts are systematizable, but that nature is empirically conceptualizable überhaupt: that, as Kant puts it, "for all things in nature, empirically determinate concepts can be found" (211). If, as I have suggested, the possibility of bringing natural objects under empirical concepts depends on our being able to think of the cognitive activity elicited in us by those objects in normative terms, then the principle of nature's purposiveness for judgment amounts, in effect, to the

principle that the relation between nature and our cognitive faculties is a normative one. In other words, it is the principle that the perceptual and imaginative activity with which we respond to nature outside of us, while itself a part of nature broadly construed, can also be regarded as appropriate (and, on occasion, inappropriate) to the natural objects which elicit it through their effects on our sense-organs. If the principle of nature's purposiveness for judgment is understood in this way, then we can read the passage as defending the legitimacy of natural teleology along the lines I have suggested. The idea of nature's purposiveness for judgment is the idea of a normative fit betweeen nature outside of us, and the natural psychological processes through which we perceive and conceptualize it. It is ultimately our need to recognize this relation of normative fit which underwrites our entitlement to regard natural objects -- now considered independently of these perceptual and cognitive processes -- in normative terms.

I want to conclude by noting a contrast betweeen the line of thought I have ascribed to Kant in this section, and a line of thought which has recently been defended by some naturalistic philosophers of mind, in particular Dretske and Millikan (see for example Dretske 1995, ch. 1, and Millikan 1993, introduction). This recent line of thought appeals to natural teleology, in particular biological teleology, to account for the representational or intentional character of mind. Our mental states count as representing, in the sense of being about or of, objects and properties external to us, in virtue of the fact that the perceptual and cognitive systems responsible for them have been designed, by natural selection, to respond to those object and properties in certain specific ways. For example, on Dretske's view, our sensory states stand in a representational relation to the objects which prompt them, not only because they make available information about those objects, but because they were designed, by natural selection, to make that information available. Millikan's development of this line of thought lays particular stress on the idea that both the representational capacities of the mind, and biological functions more

generally, have a normative character. The possibility of representing objects depends crucially on the possibility of misrepresenting them, that is, on the possibility of the representational system's failing to function as it ought. The theory of natural selection gives content to this "ought" by allowing us to identify how a system ought to function with what it has been designed, by natural selection, to do.

What is noteworthy, for our purposes, about this line of thought, is that it takes natural teleology to be more secure than the representational character of the mind, and more specifically, the mind's capacity for empirical cognition. The capacity, not merely to respond to objects, but also to represent them -- a capacity which is tied, at least by Millikan, to the possibility of misrepresenting them and hence to the existence of normative constraints governing their representation -- is explained by appeal to a more general notion of natural teleology, or design in nature, which applies to all living things. For Kant, by contrast, the relation between natural teleology and the possibility of empirical cognition is the other way around. Kant takes as fundamental our capacity for empirical cognition, and derives from this our entitlement to regard nature in teleological terms. We are entitled, as a condition of the possibility of empirical cognition, to take our mental activity to be governed by normative constraints; and it is this entitlement which ultimately licenses our use of the notion of design in a biological context.

One might be tempted to suppose that this difference is due to the fact that Kant was writing before the development of the theory of evolution by natural selection. Unlike present-day naturalistic philosophers of mind, he did not have available to him a plausible account of how nature could work as a designer, so, if he was to defend the use of natural teleology, he had to find another source for our entitlement to think of nature in the normative terms which natural teleology seems to require. The theory of natural selection, it might thus be thought, removes the motivation for the kind of account which Kant proposes, and instead makes available the reverse strategy: that of explaining the normativity of cognition in biological terms.

But this, I think, would be to mistake the kind of problem which concerns Kant when he raises the question of how we are entitled to regard things as natural purposes: it would offer an empirical answer to what is, in effect, a conceptual problem. While the theory of evolution by natural selection certainly does constitute a conceptual advance, in that it allows us to understand how natural processes, unaided by conscious design, could have been responsible for the kind of complexity of organization that we see in plants and animals, it does so by providing an empirical hypothesis about how this complexity came about as a matter of historical fact. More specifically, it explains the various traits contributing to the organization of present-day organisms in terms of their causal influence on the capacity of previous organisms to survive and reproduce. However, the empirical fact that an organism displays such-and-such a trait because that trait increased its ancestors' capacity to produce offspring, does not on its own entitle us to think of the animal as <u>designed</u> to have that trait, or more specifically, to claim that it <u>ought</u> to have it. For that entitlement, according to Kant, is not simply an empirical matter. "A teleological judgment compares the concept of a product of nature as it is, with one of what it <u>ought to be</u>... But to think of a product of nature that there is something which it <u>ought to be</u>... presupposes a principle which could not be drawn from experience (which teaches only what things are)" (First Introduction, X 240). Since, according to Kant, we are in possession of the required principle, we are indeed entitled think of natural things in normative terms. Moreover, there is nothing in Kant's view that would prevent us, once this entitlement is granted, from using the theory of natural selection to help us determine <u>which</u> are the norms governing the structure and behaviour of this or that organism. What the theory of natural selection cannot do, however, is entitle us to think of nature in normative terms <u>überhaupt</u>: that is, to bridge the conceptual gap between a view of natural things and processes as simply <u>being</u> this or that way, and the view that some of these ways are ways in which they <u>ought</u> to be. As I see it, the question of how this gap is to be bridged is at the heart of the <u>Critique of Judgment</u> as a whole. And, to come finally to the

issue adverted to in the title of this article, the philosophical significance of Kant's biological teleology lies primarily in the way it helps to bring that question into focus.

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