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Actualism and the Archaeology of Nature

Despite the best efforts of Arthur Lovejoy 100 years ago, the notion still persists that Kant should be read as a forerunner of Darwin. In particular, some passages from the Methodology section at the end of the *Critique of Judgment* often still serve as a surface of projection for the desire to read the 19th century into the 18th. In his classic paper "Kant and Evolution" (1911) Lovejoy marshaled argument after argument to refute the interpretation of Kant as a proto- or crypto-evolutionist, but to no avail: Kant's speculations in the Methodology section about the "archaeologist of nature" and a "daring adventure of reason" continue to capture the imagination of unwary readers even into the present.[1] It must however also be admitted that some of Lovejoy' s interpretations of the text and some of his polemics against Kant have not stood the test of time. But the basic problem with this and with contemporary presentations that argue that Kant did not mean to entertain, much less advocate, a theory of evolution is that it is just not very satisfying to be told that Kant didn't mean something, without being told what he did mean. In the following, instead of once again contradicting the assertion that Kant was an evolutionist avant la lettre, I shall rather argue for the contrary of that assertion and try to explain the position that Kant was actually advocating or entertaining as a possible line of thought and analyze what he actually meant by those fantasy-provoking passages. I hope to make the anachronistic interpretations superfluous by showing them to be incompatible with a convincing reading of this passage from the Methodology. This will involve both an understanding of Kant's program and of the role of these speculations in that program, but also an understanding of the intellectual context that explains what Kant's readers could be expected to think when they read these words. I shall quote and explicate the two long paragraphs and the footnote that have so often led to misunderstandings.

In various writings from 1775 onwards, in particular the two papers on human races that Kant published in connection to his lectures on physical geography and in later controversies with J.G. Herder and Georg Forster, Kant articulated a distinction between natural history

[1] Two recent sources are Pogge 1997, 370 and Roth 2008, 276–279. A contemporary presentation of the argument against interpreting Kant this way can be found in Zammito 1992, 214–217.

(*Naturgeschichte*) and natural description (*Naturbeschreibung*) (AA 2: 434). With the term *Naturbeschreibung* Kant meant the traditional *historia naturalis,* in particular the discipline exemplified by Linnaeus, that classified organisms according to overall similarity or one or more shared characters. This was the discipline that almost everyone but Kant at the time called natural history. In recognition of this fact Kant also suggested other terms such as "physiogony" or "archaeology of nature" to denote his favored discipline (AA 8: 163). A species or other class in *Naturbeschreibung* was held together by similarity of form. A species in *Naturgeschichte*, on the other hand, was held together by common descent and similar laws of production. Natural history was to be considered as the science that provides historical reconstructions of the course of nature explaining what exists now on the basis of natural laws and the history of the earth: As opposed to the merely descriptive and classificatory *Naturbeschreibung*, natural history is a causal explanatory science that appeals to empirical laws and law-governed processes. This is the discipline that Kant defended against Herder and Forster. Natural history presupposes the principle of actualism introduced by Descartes in the *Principia Philosophiae,*[2] which specifies that all and only those natural laws (and processes based on them) that hold today are to be used when reconstructing the history of nature. Natural history starts from contemporary scientific knowledge of nature and its laws and proceeds back in time:

> But merely to trace back, as far as the analogy permits, the connection between certain present-day conditions of natural things and their causes in earlier times according to causal laws *(Wirkungsgesetze),* which we do not make up but derive from the forces of nature as it presents itself to us now, that would be natural history ... (AA 8: 161–62).

It is left open – and this was a dominating theme later in nineteenth-century geology – whether only those processes based on natural laws that are *observable* today (e.g., gradualism) may be adduced in explanations or whether other processes that might also be traced back to natural laws but are not today observable (e.g., catastrophism) may be appealed to as well. But it is always clear that *Naturgeschichte,* as opposed to *Naturbeschreibung,* is Kant's favored science.

In the *Metaphysical Foundations of Natural Science* (AA 4: 468) as well Kant divided what he called the "historical study of nature" *(historische Naturlehre)* – and which he somewhat deprecatingly characterized as "systematically ordered facts" – into these two

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[2] See Bk 3, §42–50.

fields. However, in the "Critique of Teleological Judgment" Kant limits the prospects of natural history when he limits the prospects of a scientific explanation of the organism. He argues at length in the Analytic and the Dialectic of Teleological Judgment that a genuine mechanistic explanation of the organism would only be possible if the purposiveness of organisms and their striking adaptation to their life conditions turned out to be merely apparent, indicating that they were really just products of straightforward deterministic mechanisms. Towards the end of the first section of the Methodology (§79, AA 5: 417) Kant apologizes for the limited character of his program for understanding organic nature, since it remains confined merely to the area of *Naturbeschreibung,* which is not a part of "theoretical natural science" and thus does not succeed in integrating the study of the organic world into a causal explanatory science. In §80 he proceeds to describe (and then to criticize) under the title of *the archaeology of nature* what the natural history of the organism – now apparently the alternative to his program – might look like. In this section Kant explores the speculative possibility of a mechanistic explanation of the organism.

What resources might mechanism be able to mobilize to explain the organism? The Count Buffon had conceived of nature as a sort periodic table of organic species: based on the nature of organic molecules and the forces of heat and attraction, certain basic forms of life – species – were possible. The place in nature for each of these species is reserved by what Buffon called a *moule interieur,* an inner form or mould of the species, which constrains the results of the motion of matter to a number of pre-given forms. Johann Friedrich Blumenbach later presented a vitalistic version of this theory according to which a formative drive *(Bildungstrieb)* is aroused in primitive chemical systems taking a particular developmental direction for each species.[3] Although Kant in his work in natural history was normally oriented on these two thinkers (both of whom assumed an original spontaneous generation of organisms from anorganic matter), he turns on this occasion to less offensive, albeit more extravagant, speculations.

Kant cites no sources, and there is also no reason why any particular one of the numerous speculative naturalistic theories need be singled out as the source to which Kant was consciously referring. However, two thinkers of the time stand out as most prominent (and for our purposes relevant) in this area: Denis Diderot and Jean-Baptiste-René Robinet. Diderot, in his *De l'interprétation de la nature* (1754), speculated that perhaps all animals

[3] See McLaughlin 1982.

were just variations on one mechanical theme; there might be a *prototype* of all animal forms that can be converted into any species of animal by stretching and shaping it in various ways.

> It seems that nature has been pleased to vary the same mechanism in an infinite number of different ways. It abandons one kind of creation only after multiplying the individuals according to all possible aspects. If one considers the animal kingdom and perceives that, among the quadrupeds, there is not a single one that doesn't have functions and parts – especially internal parts – entirely similar to those of another quadruped, could not one easily believe that there was once a first animal prototype of all the animals, in which nature has only lengthened, shortened, transformed, multiplied, obliterated certain organs?[4]

This type of speculation, better known today in the form of Goethe's notion of an *Urpflanze* in botany, was popularized in a somewhat more flamboyant manner by Robinet in his *De la nature* (4 vols. 1761–1766)[5] and his *Considérations philosophiques de la gradation naturelle des formes de l'être* (*1768*):

> When I contemplate the innumerable multitude of individuals scattered on the surface of the earth, in its bowels and in its atmosphere, when I compare the stone to the plant, the plant to the insect, the insect to the reptile, the reptile to the quadruped, I recognize across the differences that characterize each of them relations of analogy *(rapports d' analogie)* that convince me that they were all conceived and formed according to a single plan *(dessein)* of which they are variations graduated to infinity. They present to me all the striking traits of this model *(modele),* of this primal exemplar *(exemplaire original),* of this prototype *(prototype),* which, realizing them, has taken on successively the forms infinitely multiplied and diversified, under which the Being reveals himself to our eyes.[6]

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[4] Diderot 1754 §12: "Il semble que la nature se sait plu à varier le même mecanisme d'une infinité de manières différentes. Elle n'abandonne un genre de productions qu'après en avoir multiplié les individus sous toutes les faces possibles. Quand on considere le règne animal, et qu'on s'aperçoit que, parmi les quadrupedes, il n'y en a pas un qui n'ait les fonctions et les parties, surtout intérieures, entièrement semblables à un autre quadrupède, ne croirait-on pas volontiers qu'il n'y a jamais eu qu'un premier animal prototype de tous les animaux, dont la nature n'a fait qu'allonger, raccourcir, transformer, multiplier, oblitérer certains organes?"

[5] The first volume was put on the Index within a year of publication and was already translated into German in 1764. For the later reception of such notions by way of Kant see Huneman 2006.

[6] Robinet 1768, p. 2: "Quand je contemple la multitude innombrable d'individus épars sur la surface de la terre, dans ses entrailles & dans son athmosphere, quand je compare la pierre à la plante, la plante à l'insecte, l'insecte au reptile, le reptile au quadrupede, j'apperçois au travers des différences qui charactérisent chacun d'eux. des rapports d'analogie qui me persuadent qu'ils ont tous été concus & formés d'après un dessein unique dont ils sont des variations graduées à l'inflni. Ils m'offrent tous des traits frappans de ce modele, de cet exemplaire original,

Kant begins his consideration of the possibility of a mechanistic explanation of the organism by asking whether a speculation of this kind might not turn out to be right. If comparative anatomy of different species could in fact demonstrate an underlying unity of form out of which all the empirical diversity could be derived by slight deviations, then mechanism might indeed have the resources necessary to explain the organism, and we could at least hope that such an explanation will be forthcoming:[7]

> It is commendable to go through the great creation of organized natures by means of a comparative anatomy, in order to see whether there is not be found therein something similar to a system, one indeed regarding the principle of their generation, without which we would have to settle for the mere principle of judging (which provides no insight into their production) and would have to give up in discouragement all claim to *insight into nature* in this field. The agreement of so many species of animals in a certain common schema, which seems to lie at the basis not only of their skeletal structure but also the arrangement of their other parts, and by which a remarkable simplicity of the basic outline has been able to produce such a great variety of species by the shortening of some parts and the lengthening of others, by the involution of these parts and the evolution of those, allows the mind at least a weak ray of hope that something may be accomplished here with the principle of the mechanism of nature, without which there can be no natural science at all. (AA 5: 418–19)

These analogies among animal forms could moreover not only indicate that all animal forms were generated in accordance with a common prototype but also lead us furthermore to hypothesize that they were all actually generated by a single "primal mother" (*Urmutter*). This would mean that all species are genuinely related as *sister species* making up one family all descended from that same mother. This is not yet a theory of descent with modification, but just a very large nuclear family with many siblings; all forms belong to the first generation of progeny. The primal mother might even get better at her job with each new child, producing ever better organic forms. Perhaps it might be possible thus to explain the entire diversity of the organic world and all the steps of purposive organization up to that species we know and love the best. If nature began with the simplest forms and varied the scheme improving each product as she went along she might advance to some kind of perfection: humankind.

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de ce prototype qui, en se réalisant, a revêtu successivement les formes infiniment multipliées & différencées, sous lesquelles l'Etre se manifest à nos yeux."

[7] In the following pages I shall quote the entire passage from AA 5: 418–420 (2 paragraphs and a footnote). I use the translation of Guyer and Matthews with numerous modifications to make it more literal and definite.

> This analogy of forms, insofar as in spite of all the differences it seems to have been generated in accordance with a common prototype [*Urbild*], strengthens the surmise of a real kinship among them in their generation from a common primal mother [*Urmutter*] through the stepwise approach of one animal to the other, from that in which the principle of end seems best confirmed, namely human beings, down to polyps, and from this even further to mosses and lichens and finally to the lowest level of nature that we can observe, that of raw matter: from which, and from whose forces, according to mechanical laws (like those according to which it acts in the production of crystals), the entire technique of nature, which is so incomprehensible to us in organized beings that we believe ourselves compelled to think of another principle for them, seems to derive. (AA 5: 419)

Should this be the way nature actually made all organic species, Kant speculates, then we could draft a program of natural history to reconstruct this process. This consideration would be historical and present an example of the practice of natural history or the archaeology of nature: the reconstruction of the past on the basis of current knowledge of nature and its laws.[8] Kant's subsequent speculation about a possible original state of the earth also characterizes it as a primeval "mother's womb." The "archaeologist of nature" must start with the oldest evidence he has of past upheavals; he must apply his knowledge of natural laws and observable processes, and he may even develop hypotheses about other possible natural mechanisms in order to reconstruct the history of nature:

> Now here the archaeologist of nature is free to let that great family of creatures (for thus one would have to represent it, if the above mentioned thoroughly interconnected kinship is to have any basis) originate from the remaining traces of its oldest revolutions in accordance with any mechanism for it that is known to or conjectured by him. (AA 5: 419)

Kant then illustrates this archaeology of nature with a common Enlightenment speculation drawn from Lucretius about the origin of animals: We can imagine a period when the Earth was young and basically organic in which it generated various forms of animals some more, some less viable. Lucretius himself (and a tradition going back to Empedocles and Democritus) envisioned a mother earth that generated various parts and organs, which joined together to make up living creatures: some of these were viable; some of these in turn were fertile. The well-formed survived and the less well-formed died out or never lived at all. A form of selection explains why the unfit forms have disappeared; but it is the fundamental nature of matter that determines which forms are viable. This is not a mechanism of organic

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[8] Werner Stark pointed out in the session at which this paper was read that Kant probably took the term 'archaeology' from an essay by Peter Simon Pallas published in 1777 (see also Stark 2009).

change over time, but rather a mechanism of massive superfecundity of matter that has to be curbed by death and extinction. This process however occurs only once, and after that Mother Earth loses her fertility and organic character. Lucretius wrote: [9]

> Therefore again and again the earth deserves the name of mother which she gained, since she herself created the human race, and produced almost at a fixed time every animal that ranges wild everywhere over the great mountains, and the birds of the air at the same time in all their varied forms.
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> But because she must have some limit to her bearing, she ceased, like a woman worn out by old age. For time changes the nature of the whole world and all things must pass into another and nothing remains as it was (Bk. 5, 821–30) ...
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> And many species of animals must have perished at that time, unable by procreation to forge out the chain of posterity ... (Bk. 5, 855)

Kant himself, speaking for the archaeologist of nature, embellishes on this Lucretian theme and entertains the notion that it is perhaps not Mother Earth herself, conceived as a grand animal womb, that with time improves her ability to produce viable organisms, but rather that she originally produces organisms fairly well suited to their environments and that these organisms themselves have the ability to produce better suited, better adapted organisms in the next generation and so on – until their ability to effect change runs dry. After that the forms no longer change. This apparently evolutionary speculation is however of very limited extent. Kant appeals here to a popular Enlightenment theory (which he describes in slightly more detail in the footnote) about the origin of land animals from sea animals.

> He [the archaeologist of nature] can let the maternal womb [*Mutterschoß*] of the earth, which had just emerged from its chaotic condition, (so to speak as a great animal) initially give birth to creatures of less purposive form, which in turn bear others that developed more suitably for their place of generation and for their

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[9] Titus Lucretius Carus (ca. 99–55 B.C.) *De rerum natura* Bk. 5, lines 821–831, 855–856.

Quare etiam atque etiam maternum nomenadepta
terra tenet merito, quoniam genus ipsa creavit
humanum atque animal prope certo temporefudit
omne quod in magnis bacchatur montibus passim,
aeriasque simul volucres variantibus formis.
sed quia finem aliquam pariendi debet habere,
destitit. ut mulier spatio defessa vetusto.
mutst enim mundi naturam totius aetas
ex alioque alius status excipere omnia debet
nec manet ulla sui similis res: omnia migrant,
omnia commutat natura et vertere cogit. ...
Multaque tum interiisse animantum saecla necessest
nec potuisse propagando procudere prolem.

> relations to one another – until this uterus [*Gebärmutter*] itself, grown stiff, became ossified, restricted its offspring to determinate not-further-deviating species, and the variety remained as it turned out at the end of the operation of that fruitful formative power (AA 5: 419).

However, Kant objects, this speculation must presuppose that the potentiality for all this purposiveness and adaptation as well as for the change in purposiveness was already prefigured in the original organization of the primal maternal womb. Thus, the archaeologist of nature must project into the original purposiveness of the fertile mother earth all the purposiveness that he wants later to derive. He has gained very little by letting the animals themselves make the improvement instead of having mother earth do this herself because they must have this ability from her. In fact he has merely evaded the question of the spontaneous generation of the organic from the anorganic by making the earth organic – "a great animal." This speculative mechanistic derivation of the animal forms is just as dependent on an unexplained purposiveness as is the mechanism discussed in the Analytic and the Dialectic.

> – And yet to this purpose he must attribute to the universal mother an organization purposively aimed at all these creatures, for otherwise, the possibility of the purposive form of the products of the animal and vegetable kingdoms cannot be conceived at all. In that case, however, he has merely pushed back further the explanatory ground and cannot presume to have made the generation of those two kingdoms independent of the condition of final causes (AA 5: 419).

To this objection Kant adds a long footnote analyzing the presuppositions of such a speculative naturalistic explanation, in which he explains why the apparent spontaneous generation involved in these hypotheses is not absurd – although he takes it to be false and also incompatible with good natural history. In what he calls a "daring adventure of reason" Kant also fleshes out his minor embellishment on Lucretius with a concrete example, of how the animals might have improved themselves on their own if sea animals turned into land animals as the ocean withdrew from a flooded earth. Kant clearly rejects this speculation, but tries in the footnote to differentiate between theories that he considers false and theories that he considers absurd.

Let us first look at the brief speculation on the origin of land animals from sea animals, which Kant derives from another popular and scandalous Enlightenment tract: Benoit de Maillet's anonymously published *Telliamed*[10] (1748) presented a history of the earth in which

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[10] *Telliamed* ("de Maillet" backwards) was written sometime between 1692 and 1720; it was published posthumously only in 1748 – and later in numerous editions and translations. The quote below is from vol. 2,

the whole earth was at first covered with water. When the waters receded some of the aquatic animals were forced to live on land, and they adapted to the new situation: for instance, the fins of the fish were converted into legs. Each kind of land animal (by way of a swamp phase) is derived from a water animal that presumably still exists in the ocean somewhere. Basically, each species form has a water version, a land version and perhaps an airborne version. De Maillet wrote:

> Concerning the origin of terrestrial animals, I notice that there are none of them, whether walking, flying, or creeping, of which similar or closely related species do not exist in the sea, and for which the change from one of these elements to the other would not only be possible and probable, but even supported by a great number of examples ....
> The resemblance in shape and habits observable between certain fish and some land animals is highly worthy of our attention, and it is surprising that nobody, to my knowledge, has tried to find out the reasons for this similarity.[11] (*Telliamed* 1968, 184–85)

The main purpose of Kant's footnote that takes up this speculation is to clarify the notion of spontaneous generation, which had a somewhat complex history in the seventeenth and eighteenth centuries: The term "equivocal generation" (*generatio aequivoca*) did not cover all forms of spontaneous generation in this period. *Generatio aequivoca* was universally rejected, but not all forms of generation without parents were considered to be equivocal – for instance, those governed by natural laws. In the *Universal Natural History* (1755) in spite of his skepticism about our ability to explain even a worm on the basis of mere matter and its laws of motions, Kant was nonetheless committed to the possibility of a vast spectrum of life on various planets throughout the universe (AA 1: 361ff). This meant of course some form of spontaneous generation (*Urzeugung*) – presumably including larger mammals. Natural

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133–34. Leibniz in his *Protogaea* (written around 1692 but first published only in 1749) criticizes without attribution a similar speculation that "when the ocean covered everything, animals that now live on land were aquatic; then, as the water departed, these animals became amphibians, until their descendants eventually left that original home" (p. 15).

[11] De Maillet 1748, vol.2, 133–34:" Pour venir à present a ce qui regarde l'origine des animeaux terrestres, plus je remarque qu'il n'y en a aucun marchant volant, ou rampant, dont la mer ne renferme des espéces semblables, ou approchantes, & dont le passage d'un de ces élémens à l'autre ne soit possible, probable, même soutenu d 'un grand nombres d'exemples ....

"Or la ressemblance de figure, même d'inclination, qui se remarque entre certains poissons & quelques animeaux terrestres, est non seulement digne d'attention; il est même, surprenant que personne, que je scache, n'ait travaillé jusqu'ici à approfondir les raisons de cette conformité."

historians from Buffon to Blumenbach had propagated various forms of a universal spontaneous generation as the origin of life, and a long discussion through the 17th and 18th centuries distinguished between an original generation of all animals, the present spontaneous generation of insects and intestinal worms, and the "equivocal" generation of one kind from another kind of thing – accepting the first two and rejecting the last.[12] Kant undertakes to explain such distinctions by differentiating among four kinds of generation: *generatio aequivoca, univoca, homonyma* and *heteronyma.* Whereas it was not uncommon to consider generation that crosses the species boundary to be equivocal, Kant reserves the term *generatio aequivoca* for the generation of organized creatures from anorganic matter – and declares this to be absurd. The generation of organisms of one species from organisms of a different species, on the other hand, he considers to be univocal, not equivocal, and specifies two different kinds of univocal generation: that which crosses the species boundary (heteronymous) and that which stays within the species (homonymous). This last form (*generatio homonyma*) is however the only form that we can observe today. Generation that crosses the species boundary is not absurd, but it has also never been observed. Whether a natural historian is allowed to adduce such processes in the past is left open. Depending on the concrete interpretation of actualism, it would be permissible or not. In any case Kant takes this kind of speculation to be something that, while basically reprehensible, has probably on occasion led even the best scientists into temptation:

> One can call a hypothesis of this kind a daring adventure of reason; and there are likely to be few, even among the most acute researchers into nature, whose mind it has not crossed on occasion. For it is not absurd like *generatio aequivoca,* by which is meant the generation of an organized being through the mechanism of raw unorganized matter. It would still be *generatio univoca* in the most general sense of the term, insofar as it is merely that something organic is generated out of something else that is organic – though among this kind of being it is specifically different; for instance, if certain water animals were gradually to develop into swamp animals, and from these, after some generations, into land animals. A priori in the judgment of mere reason there is no contradiction in this. However, experience shows us no example of it; rather according to experience all generation that we are acquainted with is *generatio homonyma* – not merely *univoca* (as opposed to generation from unorganized matter [i.e., *generatio aequivoca*]) but rather brings forth a product that in the organization itself is conspecific [*gleichartig*] with the generator; and *generatio heteronyma,* so far as our experiential knowledge of nature reaches, is nowhere encountered (AA 5: 419–20).

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[12] See McLaughlin 2006.

The archaeology of nature, or genuine natural history of the organism, that Kant entertains here is accused of avoiding the fundamental question of the purposive unity of the organism (*Zweckeinheit*: AA 5: 421).While it is not characterized as openly absurd, since it avoids the question of the first origin of the organic, nonetheless it must adduce processes in the past for which we have no empirical warrant in the present. It is indeed possible that an organic nature has produced all the plants and animals as variations on a mechanistic theme and that they adapted to their environments or even to changes in these environments and that this all occurs on the basis of natural laws, but experience speaks against this. And the fundamental problem of the teleology of the organism remains.

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