Kant on the History of Nature: The Critical Philosophy and Natural History

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Problem Posing:

I commence with a comment by the Scots naturalist, the Rev. James Grierson in a paper to the Wernerian Society in Edinburgh in 1824, echoing a line of argument expounded by the mentor of this society, Robert Jameson.[1] In this, Grierson praised the Freiburg mining engineer and theoretician of geology, Abraham Gottlob Werner. He notes how Werner had made an important distinction between geology, as a science of the history of the earth, and minerology, as a true inductive science of rocks and minerals. The latter inquiry, termed by Werner "geognosy," is seen by Grierson to denote "the legitimate and useful department of Minerology," which is to be distinguished "from the purely fanciful and useless part of [geology] which consists in pretending to explain how the Earth was at first formed, and how the successive changes it may have, as a whole, from time to time, undergone [,] took place."[2]

In elaborating on these distinctions, Grierson singles out Descartes, Burnet, Whiston, Leibniz and Buffon, as predecessors who engaged in flights of fancy concerning the first origins of the earth and its gradual development into its present state. He also includes in this condemnation Lamarck, and his theory of how "infinitely small monadic animals and vegetables. . . gradually acquired different habits, became larger and more diverse from one another; and hence [arose] all the animals and vegetables we now have."[3]

Drawing on Werner, Grierson was tapping into a tradition of reflection on the status of a historical science of nature which had developed within one branch of German life and geological science that I will trace back to the impact of Kant on the natural

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[1] For a similar argument see Robert Jameson, *Elements of Geognosy* vol. 3 of *System of Mineralogy* (Edinburgh: Blackwood, 1808), facsimile ed., edited by G. White (New York: Hafner, 1976), p. 42.

[2] James Grierson, "General Observations on Geology and Geognosy, and the Nature of These Respective Studies," *Memoirs of the Wernerian Natural History Society* 5 (1824): 409.

historical sciences. This involved a sharp distinction between two projects in natural history, one the empirical study and classification of objects as they are empirically given in the present, and the other a historical science of nature that might or might not include the development of life over time. As can be seen from Grierson's quotation, there is a sharply different epistemic status given to one of these inquiries over the other. Genuine science is confined to one side of this division, and the other is dismissed, at least by him, as idle speculation. Getting beyond this barrier was, one might argue, the fundamental achievement of German *Naturphilosophie*. But I will argue in this paper that Kant's philosophical program led in a different direction upon which a negative conclusion on the status of historical science could be based. In making this issue, I will be arguing against a thesis defended particularly by James Larson in which it is claimed that Kant preferred the history of nature, and for this reason "his opinions were considered unworkable or superfluous by working naturalists."[4] To the contrary, it is my claim that Kant's arguments worked in the opposite direction, and restricted speculative natural history within limits that appealed to at least some of his most notable successors.

In tracing this issue back to Kant, I am not claiming that he created the distinction between a science confined to contemporary analysis and classification of phenomena, and a historical science of nature. The denigration of the one inquiry in terms of the first had been a frequent theme since the attack on historical science as "world building" by Newton in the queries to the *Opticks*, in which he had attacked the "theory of the earth" tradition of Descartes, Burnet and Whiston.[5]

But with his typical rigor in making distinctions, and also through his development of an epistemic framework for these distinctions, Kant's discrimination between the two forms of "natural history" that I will detail, one a descriptive natural history, and the other a genetic history of nature —*Naturbeschreibung* and *Naturgeschichte* respectively—set out for late eighteenth and early nineteenth century natural history a

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[3] Ibid., p. 404.

[4] James L. Larson, *Interpreting Nature: The Science of Living Form from Linnaeus to Kant* (Baltimore: Johns Hopkins U. Press, 1994), p. 170.

[5] Newton, *Opticks*, 4th ed. (1730), "Query 31," (New York: Dover, 1960), p. 402.

tension between these two inquiries in a form that had an important impact on the warrant for a realistic science of historical transformism. My paper will focus on the development of Kant's distinctions. I will only be able to point to some issues that seem to have followed upon his reflections.

I

I begin this examination midstream in the eighteenth century with the development of new epistemic foundations for natural history by the French naturalist Georges-Louis Le Clerc, comte de Buffon (1707-1788). Through his distinction between two orders of knowing, and two orders of truth, the "abstract" and the "physical," one related to the domain of mathematics and logical relations, and the other to the material connectedness and recurrence of concrete phenomena, Buffon had inverted the relation between mathematics and natural science that had been the heritage of seventeenth-century mathematical physics. This new epistemic framework was first developed in his extended polemic against Linnean natural history that constituted much of the body of the *Premiere discours* that opened the *Histoire naturelle* in 1749. It also created a theoretical framework within which we can interpret the main project of Buffonian natural history.

Most important for my theme is the implication for natural history in the distinction Buffon inserts between two orders of truth, "abstract" and "physical," and the two kinds of certitude attainable from these—the demonstrative mathematical truth, available to geometry, mathematical astronomy, and geometrical optics; and the empirical physical truth, available in the inductive sciences, which may or may not be analyzable in mathematical terms. The novelty in this is that Buffon reversed the conclusions drawn from empiricism by contemporaries like David Hume: [6]

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[6] I have been unable to find evidence that Buffon encountered Hume's discussion of the distinction between "relations of ideas" and "matters of fact" published in the *Enquiry* of 1748, or that he had read the earlier *Treatise on Human Nature*, prior to writing this essay, although Buffon was an avid reader of Anglophone philosophical literature. But if Buffon had read Hume before composing this discourse, it is evident that he *reverses* the Humean conclusions on the relative degrees of certitude available in terms of the knowledge of the demonstrations of "quantity and number" that constitute the only proper objects of "abstract science," and "experimental reasoning concerning matter of fact and existence" that are "incapable of demonstration" (D. Hume, *Enquiry Concerning Human Understanding* edited by Eric Steinberg (Indianapolis: Hackett, 1993), p.114). I have discussed some of the foundations for these arguments in Buffon's interpretation of probability theory in my "From Logical Universals to Historical Individuals: Buffon's Conception of Organic

> There are many kinds of truths, and customarily placed in the first order are mathematical truths [*vérités physiques*], which are, however, only truths of definition. These definitions rest upon simple but abstract suppositions, and all the truths of this kind are only compounded, but always abstract, consequences of these definitions. We have made some postulates [*suppositions*], and we have combined them in all sorts of ways. The body of combinations that results is the science of mathematics. There is, then, nothing in this science except that we have put into it, and the truths that one can draw from it can only be different expressions under which are presented the postulates that we have employed. Thus, mathematical truths are only the exact repetitions of definitions or suppositions. . . ; they are only truths only relative to the very definitions with which we have made. It is for this reason that they have the advantage of being always exact and demonstrative, but abstract, intellectual, and arbitrary.[7]

But the demonstrative truths of mathematics and mathematical physics are so defined only to contrast them with the second order of physical truths:

> Physical truths [*vérités physiques*], to the contrary, are not arbitrary, and in no way depend on us. Instead of being founded on suppositions which we have made, they are grounded only on facts [*faits].* A sequence of similar facts or, if you prefer, a frequent repetition and an uninterrupted succession of the same events, constitutes the essence of physical truth. What is called physical truth is thus only a probability, but a probability so great that it is equivalent to certitude. In mathematics, one postulates. In physics [*Physique*], one sets down a claim and establishes it. There, one has definitions; here, there are facts. One proceeds from definitions to definitions in the abstract sciences, but one proceeds from observations to observations in the sciences of the real [*sciences réele*]. In the first case one arrives at evidence [é*vidence*], while in the latter the result is certitude [*certitude*].[8]

In his rejection of the superiority of mathematical physics, and his claim that mathematics was *less* certain as a key to understanding the natural world because of the abstract relationship between mathematical idealizations and concrete things, Buffon

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Species," in: J. Roger et al. (eds.) *Histoire du concept d'espèce dans les Sciences de la vie* (Paris: Fondation Singer-Polignac, 1987), 102-39.

[7] Buffon, "Premier discours: De la manière d'étudier et de traiter l'histoire naturelle, " *Histoire naturelle, générale et particulière, avec la description du cabinet du ro*i. vol. 1 (Paris: Imprimerie Royale, 1749), In J. Piveteau (ed.), *Buffon: Oeuvres philosophiques* (Paris: Presses universitaires, 1954), 23b-24a.

[8] *Ibid.* 24a.

elevated the kind of empirical inquiry found in natural history to a new level.[9] This critique of mathematics also provided him with the basis for a fundamental critique of Linnean natural history. His argument against his more famous contemporary was that Linnean science imposed *abstract* logical categories on organisms in place of an understanding of their material and physical relationships, such as those of reproduction. For Buffon, it is only when abstract concepts are grounded upon the recurrence of material events that these can achieve the level of physical truth.

II.

It is against this Buffonian backdrop, and the distinction between "abstract" and "physical" truth that I will consider Kant's systematic development of these issues. Kant's awareness of, and use of Buffon's works from an early period is well known. His earliest major publication, the *Allgemeine Naturgeschichte des Himmels* of 1755, developed his own version of a historical cosmology that utilized a naturalistic framework of planetary development by natural laws, similar in some respects to that put forth by Buffon in the second volume of the *Histoire naturelle*. [10] In this text, Kant made the first use in his published writings of the term *Naturgeschichte*, which in 1755 was still broadly used in the German literature to designate many aspects of natural historical inquiry.[11] Nonetheless, from this date Kant seemed to restrict this term in his own writings to denote a historical science of nature.

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[9] The roots of this seem to be traceable in important respects to Buffon's reading of Berkeley's *Analyst* that he used to analyze some aspects of the calculus in his preface to his translation of Newton's *Fluxion* (1740), just as he made his transition from mathematics to a leadership role in French natural history. It is also related to a particular interpretation of Leibnizianism that was articulated at the same time by Gabrielle du Châtelet in her *Institutions de physique*, also published in 1740. See my "Logical Universals." A thorough study is needed of Buffon's relation to the Wolffian metaphysics as it was being expounded in France at this time through the circle associated with Samuel Koenig.

[10] According to his most recent biographer, the work most used as a resource for Kant's lectures on physics and natural science was Johann Peter Eberhard's *Erste Gründe der Naturlehre (*Manfred Kuehn, *Kant: A Biography* [Cambridge: Cambridge University Press, 2001], p. 109). However, Kant was more than casually aware of Buffon's work from an early date. In his 1755 *Allgemeine Naturgeschichte des Himmels*, Kant directly refers to Buffon as "that deservedly celebrated philosopher" and refers on two occasions in this treatise to the theory of planetary formation put forth by Buffon in the *Preuves de la théorie de la terre* of the first volume of the *Histoire naturelle*. See I Kant, *Universal Natural History and Theory of the Heavens*. trans.W. Hastie (Ann Arbor : University of Michigan Press, 1969), pp. 40, 93.

[11] For example, Johann Scheuzer's *Naturgeschichte des Schweitzerlandes* (Zurich, 1746); Georg W. Knorr, *Die Naturgeschichte der Versteinerung zur Erläuterung der Knorrishchen Sammul von Merwürdikeiter der nature* (Nurnberg, 1755); Johann Zückert, *Die Natugeschichte und Bergwercksverfassung des Ober-Hartzes*

The explicit distinction of *Naturgeschichte* from the systematic description of nature—*Naturbeschreibung*— does not seem to have been made explicitly by Kant prior to his post-critical period. This distinction first occurs in a footnote to his 1775 prospectus announcing his summer course in physical geography on the different races of man.[12] Facing Kant was the growing importance of the issue of polygenism: do human beings form a single species, or do they form different species. Linnaeus, for example, had proposed at least four species in the genus *Homo* in the latest edition of his *Systema naturae* of 1766.[13]

Kant's solution to the race question involved the formal distinction between a "variety"—a Linnean designation— and a "race." One involves simply formal criteria of difference, the other the concept of common descent and fertile reproduction:

> In the animal kingdom, the natural division into genera and species [*Natureinteilung in Gattungen underArten*] is based on the law of common propagation and the unity of the genera [*Gattungen*] is nothing other than the unity of the reproductive power [*zeugenden Kraft*] that is consistently operative within a specific collection of animals. For this reason, Buffon's rule, that animals that produce fertile young with one another belong to one and the same physical genus [*physisches Gattung*] (no matter how dissimilar in form they may be), must properly be regarded only as a definition of a natural genus [*Naturgattungen*] of animals in general. A natural genus may, however, be distinguished from every academic genus [*Schulgattungen*]. An academic division [*Schuleintheilung*] is based upon classes and divides things up according to similarities, but a natural division [*Natureintheilung*] is based upon the common stem [*Stamme*], which divides animals according to kinship from the standpoint of generation. The first of these creates an academic system for memorization, the latter a natural system for the understanding [*ein Natursystem für den Verstand*]. The first has only the intent of bringing creatures under names [*Titel*]; the second has the intent of bringing them under laws [*Gesetze*].[14]

(Berlin, 1762).

[12] Kant, "Von den verschiedenen Racen der Menschen zur Ankündigung der Vorlesungen der physischen Geographie im Sommerhalbenjahre 1775," *AK* 2. This was later published in J. J. Engel's periodical *Philosophie für die Welt* in 1777.

[13] The twelfth edition of the *Systema* of 1766 designates four varieties within *Homo sapiens*, and adds *Homo ferus*, *H. troglodytes*, and *H. sylvestris*. Buffon, by contrast, had remained a monogenecist, and had accounted for the differences between human beings by a theory of geographical "degenerations" taking place in parallel to other degenerations within a single "physical" species. On this see my "The Gaze of Natural History," in C. Fox, R. Porter, and R. Wokler (eds.) *Inventing Human Science: Eighteenth-Century Domains* (Berkeley: U California Press, 1995), esp. pp. 121-27.

[14] Kant, "Von den verschiedenen Racen," *AK* 2, 429. I have used with several modifications here the first complete English translation of the 1777 version of this essay by J. Mikklesen appearing as "Of the

The distinction between *Naturgeschichte* and *Naturbeschreibung* is then clarified in an important footnote:

> We generally take the designations "description of nature" [*Naturbeschreibung*] and "history of nature" [*Naturgeschichte*] in a single sense. But it is clear that knowledge [*Kenntniss*] of natural things as they are at present leaves us wishing still for cognition [*Erkenntniss*] of how they formerly were, and through what series of changes they have undergone to arrive at their present location in their present circumstances. The history of nature, of which we presently have very little, would teach us about changes in the shape of the earth, and also the changes that the creatures of the earth (plants and animals) have undergone through natural migrations, and thereby about the degenerations [*Abartungen*] from the original model [*Urbilde*] stem genus [*Stammgattung*]. [The history of nature] would presumably lead us back from a great mass of apparently different species [*Arten*] to races [*Racen*] in the same genus [*Gattung*], and transform the presently overly detailed academic system [*Schulsystem*] of natural description into a physical system for the understanding [*ein physisches System für den Verstand*].[15]

The exact language here is important to note with care. In this contrast he seems to suggest that, like Buffon before him, he has given priority here to the concept of a "physical" relationship within the species, defined by fertile reproduction, and like Buffon, he has contrasted this form of relationship with that given in a rational system of arrangement. Kant seems here to be systematizing Buffon's contrast between "abstract" and "physical" orders. Furthermore, in both quotations given, he has connected the "physical" system sought by *Naturgeschichte* to the understanding—*Verstand*—the mental faculty that Kant develops as the foundation of the categories in the first *Kritik* published six years later. *Naturgeschichte* is concerned with law-governed understanding, whereas a "description" of nature only seeks to bring creation under

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Different Races of Mankind," in R. Bernasconi and T. Lott (eds.) *The Idea of Race* (Indianopolis: Hackett, 2000), p. 8.

[15] Ibid., *AK* 2, 434 (again translated with debts to the Mikklesen translation.) The German of the 1775 original reads: "Wir nehmen die Benennungen Naturbeschreibung und Naturgeschichte gemeiniglich in einerlei Zinne. Allein es ist klar, dass die Kentniss der Naturdinge, wie sie setzt sind, immer noch die Erkentniss von demjenigen wünschen lasse, was sie ehedem gewesen sind, und durch welche Reihe von Veränderungen sie durchgegangen, um an jedem Orte in ihren gegenwärtigen Zustand zu gelangen. Die Naturgeschichte, woran es uns fast noch gänzlich fehlt, würde uns die Veränderung der Erdgestalt, ingleichen die der Erdegeschöpfe (Pflanzen und Thiere) die sie durch natürliche Wandrungen erlitten haben, und ihre daraus entsprungene Abartungen von dem Urbilde der Stammgattung lehren. Sie würde vermuthlich eine grosse Menge scheinbar verschiedene Arten zu Racen eben derselben Gattung zurückführen und das jetzt so weitläuftige Schulsystem der Naturbeschreibung in ein physisches System für den Verstand verwandeln." *AK* 2, 434n.

names or headings. I would interpret Kant to be giving a preference at this time to the standpoint of *Naturgeschichte* over *Naturbeschreibung*.

Explicit discussion of the *Naturgeschichte –Naturbeschreibung* distinction is absent from Kant's published writings between 1775 and 1785.[16] It then re-enters in a flurry of discussion that developed around three interrelated issues that arose in the middle 1780s: first in importance was the appearance of Herder's *Ideen zur Philosophie der Geschichte der Menschheit* in 1784 that formed the topic of Kant's reviews in 1784 and 1785; second, in the wake of Herder, Kant returned to the issue of racial classification in a paper of 1785; and third, Kant developed a rational philosophy of science and a classification of the sciences in the *Metaphysisches Anfangsgrunde* of 1786.[17] I will have time to address only the first two of these here. In the background was also the appearance in 1779 of Buffon's ambitious synthesis of historical cosmology, geology, and a history of life, the *Epochs of nature,* that had been quickly translated into German in 1781 (see plate).

The encounter with Herder, which John Zammito has illuminated in detail as forming a crucial moment in the genesis of Kant's Third Critique, gives evidence of having clearly indicated to Kant the possibilities (and the dangers) inherent in a developmental history of nature. On Herder's progressive historical story, the earth begins in a primordial state from a formless chaos that under the direction of "Nature" is fashioned by stages through the formation of plants and animals from inorganic materials, eventually to pass through various peoples and reach its apex in European civilization. In very broad outlines, Herder's framework, at least as far as the natural world was concerned, resembled to some degree that

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[16] The first reappearance of *Naturgeschichte* in a generic sense as an extension of his epistemic project into a "general" history of nature [*in den allgemeinen Principien eine Naturegeschicte überhaupt systematisch zu machen*] occurs in the conclusion to the *Prolegomena* of 1783 (*AK* 4:364). *Naturbeschreibung* is first employed again in the *Metaphysisches Anfangsgrunde* of 1786. There are, however, discussions of these issues in his lectures on physical geography given regularly, but only published in 1801-1804.

[17] In the classification of the sciences at the opening of his *Metaphysiches Anfangsgründe* of 1786, Kant divides *Naturwissenschaft* from *Naturlehre*, and separates the latter into two inquiries, with *Naturbeschreibung* concerned "with nothing except the systematically arranged facts about natural objects" [nichts als systematisch geordnete Facta der Naturdinge enthält] and *Naturgeschichte* with the "systematic exhibition of the same [facts] in different times and places" [einer systematischen Darstellung derselben in verschiedenen Zeiten und Örtern]. *AK* 4, p. 468.

of Buffon's *Epoques*, with which he was familiar, except the system *ascended* rather than degenerated in time. This ascending direction was made possible by Herder's appeal to the role of vital, dynamic force, developed on the analogy of embryological developmental forces that he had adapted from Caspar Friederich Wolff and behind him William Harvey.[18] Herder generalized Wolff's *vis essentialis* of embryological development into a general creative power of Nature that accounted for the development of life, the differentiation of the plants and animals, and even the production of rational beings:

> Whoever for the first time saw the creation of a living being would be astonished! From little globules between which fluids shoot arises a living point, and from the point is generated a creation of the earth. The heart will soon arise and become visible and although feeble and incomplete, will commence to beat. . . . What would one call this wonder which he saw for the first time? He would say it is a living, organic force [*lebendige, organische Kraft*]; I know not where it comes from, nor what it is in its inner being, but it is, it lives, it appropriates from out of the chaos of homogeneous matter organic parts. That is what I see, that is indisputable.
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> And this vital force [*Lebenskraft*] we all have within us: in health and sickness it remains with us, assimilating similar parts, separating out foreign ones, and expels injurious ones; it is exhausted in old age, and lives on in some parts even after death. It is not the rational capacity of our soul [*Vernunftvermögen unsrer Seele*]. . . , but it is bound to it with a vital force [*Lebenskraft*], like all forces [*Kräfte*] of nature are bound together. [19]

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[18] A careful study of Herder's relation to Buffon still seems needed. The older work by Eugen Sauter (*Herder und Buffon*, Rixheim: Sutter, 1910) is an inaugural dissertation, and develops these connections only weakly. Herder studied Buffon's main works in the 1760s but the impact of the *Epoques* needs further study. For a recent discussion of Herder's use of the biological sciences of his day, including his relations to Buffon, see especially Elias Palti, "The Metaphor of Life: Herder's Philosophy of History and Uneven Developments in Late Eighteenth-Century Natural Sciences," *History and Theory* 38 (1999): 322-47. Peter Reill has developed some of these issues in greater detail in his *Vitalizing the Enlightenment* (Berkeley: University of California Press, 2005). Wolff's conception of the *vis essentialis* was presented in three different versions of Wolff's main treatise: the *Theorie generationis* (Halle: Hendel, 1759); *Theorie von der Generation* (Berlin: Birnsteil, 1764; and the second edition of the *Theorie generationis* (Halle: Hendel, 1774).

[19] Johann Herder, *Ideen zur Philosophie der Geschichte der Menschheit*, ed. H. Stolpe (Berlin, 1965), Bk. VII, chp. 4, pp. 266-68.

Kant's paper on the definition of human races, published in the *Berlinische Monatschrift* in 1785,[20] does not mention Herder, although it was published after the Herder reviews, but in many respects it can be seen to address Herder indirectly by reiterating in more detail Kant's claims about the physical basis of the race concept along lines he had first sketched out a decade before. This attributed the differences of human races to preformed *Keimen und Anlagen*—germs and predispositions—that were present in an original human stock, and that developed into permanent hereditary features over time in response to climate and circumstance. We should note that Herder had

[20] In *AK* 5, pp. 391 ff.

SCHEMA OF BUFFON'S EPOCHS OF NATURE[21]

Epoch	*Events*	***Duration* (Manuscript Chronology)**	***Duration* (Published Chronology**
Epoch 1: When the earth and the planets have taken their form	Comet collides with sun, causes masses of gaseous matter to be thrown off. Earth and other planets form by gradual cooling and assume spherical shape . Satellites formed. Earth assumes its shape of an oblate spheroid by Newtonian principles.	0-117,440	0-2,936 years
Epoch 2: When the consolidation the material of the earth has forme the interior rock of the globe as w the great vitreous masses at its sur	Period of gradual cooling of the earth. Formation of the minerals and metals, formed first at surface, and then in interior. Major mountain ranges formed. Earth cools sufficient to support life.	117,440-700,000	2,936-35,000 years
Epoch 3: When the Waters have covered the Continer	Water vapor condenses on the earth's surface, forming a universal sea covering all by highest mountains. Sedimentary rocks formed. Fishes and bivalves, large in size and different than now found (ammonites, Belemnites, fossil fishes) an shell-bearing creatures appear by spontaneous generation. Plants appear land.	700,000-2,000.000	35,000-50,000 years
Epoch 4: When the waters have retreated and the volcanoes have commenced activity	Period of intense volcanic activity, caused by the action of subterranean activity; Earth is altered by extensive lava flows, causing retreat of the waters over long and slow period of time; Continents take shape; Tides cut the western edge of continents, and build up the eastern.	2,000,000-2,993,280	50,000-60,000 years
Epoch 5: When the Elephants and the other animals fr the equator have inhabited the lan of the north	Vulcanism ceases. Earth largely in its present form. Land animals originate as earth cools in the northern latitudes (elephants, rhinoceros) and move toward the equatorial regions; land bridges and connections of isla with continents permits migration to New World; Human beings arise, presumably by divi creation	Within the previous	60,000-65,000
Epoch 6: When the separation of the Continents Occurs	Earth takes its present form; Land-bridges eliminated; tropics populated and cool enough for passage of humans and others animals to Southern Hemisphere; Islands (England, Cuba, Sicily, Greenland etc.) separate from the mainlands. Main varieties of hun species arise	Within the previous	65,000-70,000
Epoch 7: When the Power of has supplemented that of Natu	Human society is developed; migrations from mainlands to remote islands (Tahiti); technology and science are created Northern Europe; In Northern Europe almost complete domination of nature achieved; Domestication and alteratio plants and animals for human needs	2,993,280 (The Present)	70,000-75,000 (The Present)
The end of Living Nature	Earth continues to cool to point that it no longer supports life	7,000,000	168,000

[21] Adapted from a similar table in "Introduction" to: J. Roger (ed.) *Buffon: Les Epoques de la Nature*, ed. critique (Paris: Editions du Muséum national d'histoire naturelle, 1988) reissue of 1962 original.

explicitly rejected this theory of the preformed germs in the *Ideen*.[22] Kant now used his moderate preformationism to ground a thesis of the constancy of races and species, and he also used it explicitly to oppose historical developmentalism of organisms from a common form that he had seen Herder advocate.

> Now it is clear that if the possibility were allowed that the magical power [*Zauberkraft*] of the fancy [*Einbildung*], or the artistry of mankind on the animal body, could refashion the original model [*Modell*] of nature, or deform it through additions, which would be subsequently maintained constant in the following generations, one would scarcely know any longer the original [form] from which Nature has proceeded, or how far it could go with similar changes, and, since human imagination knows no boundaries, into what grotesque forms [*Fratzengestalt*] the genera and species might be degenerated [*verwildern*].[23]

These issues were then further developed in the controversy with Kassel natural history professor Georg Forster, generated by Forster's two-part essay in the fall of 1786 in the *Teutscher Merkur* that responded to Kant's 1785 essay on the concept of race. Forster's extended critique led Kant to develop these issues in greater detail in his long essay of 1788 that bore the somewhat misleading title of "Concerning the Use of Teleological Principles in Philosophy." Published only a year after the appearance of the second edition of the *Critique of Pure Reason*, and with obvious connection to some of the themes that would receive most systematic development in the second part of the *Kritik der Urteilskraft* two years later, Kant's lengthy 1788 essay enables us to see within the framework of his mature philosophical program the way in which he was conceiving the status of a historical science of nature by this date.

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[22] I have discussed aspects of this in my "Preforming the Categories:Eighteenth-Century Generation Theory and the Biological Roots of Kant's A Priori," *Journal of the History of Philosophy* 40 (2002), 229-53, esp. pp. 242-46.

[23] Kant, "Bestimmung der Begriffs einer Menschenrasse," in *AK* 8, 97. I acknowledge my debt to Jon Mikklesen who made available to the Kant Reading group at the University of Chicago a preliminary draft of his first complete English translation of this essay.

Forster had raised the objection that the distinction of *Naturgeschichte* and *Naturbeschreibung*, and with this the distinction of taxonomic Varieties from what Kant had defined as Races, was unintelligible. Forster's views tend at this time to polygenecism, and to resolve this question by the distinction of a "description" from a "history" of nature was to resolve it through a science open to "gods and not to men." [24] In reply, Kant claimed that his basic principles had been misunderstood:

> These objections, it seems to me, arose simply from a misunderstanding of the principle from which I began. Indeed, this famous man [Forster] found it difficult from the very beginning to establish in advance a principle on the basis of which the natural scientist [*Naturforscher*] might even be led in the investigation and observation of nature. In particular, he found it difficult to find a principle on the basis of which we might differentiate the mere [*blossen*] description of nature [*Naturbeschreibung*] from the kind of observation that furthers the study of the history of nature [*Naturgeschichte*], thereby rendering this distinction illicit. [25]

Kant elaborates on this point by arguing that there is indeed the need for a Linnean descriptive science of nature, but this still must be distinguished from a second form of inquiry:

> Let us return. . .to the subject of the contested, indeed entirely rejected [by Forster] distinction between [description and history of nature]. If by the latter one wanted to understand a narrative account [*Erzahlung*] of natural events to which human reason [*Vernunft*] cannot extend, e.g. the first appearance [*Entstehen*] of plants and animals, then to be sure, as Forster says, this would be a science for gods, who were present at the time of creation or who were themselves the creators, and not for human beings. A history of nature would, by contrast, concern itself with investigating the connection between certain present properties of the things of nature and their causes in an earlier time in accordance with causal laws that we do not invent but rather derive from the forces [*Kräften*] of nature as they present themselves to us, pursued back, however, only so far as permitted by analogy. Indeed, this would be of a kind of history of nature that is not only possible, but one which is attempted frequently enough, as, for example, in the theories of the

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[24] J. Forster, "Noch etwas über die Menschenrassen," *Die Teutsche Merkur* 56 P. 1, (Oct. 1786), p. 80. On the Kant-Forster controversy and the general discussion of the race issue, see Raphael Langier, *Les races humains selon Kant* (Paris: Presses universitaries de France, 2004. I thank John Zammito for drawing this work to my attention.

[25] I. Kant, "On the Use of Teleological Principles in Philosophy," trans. J. Mikkelsen, in R. Bernasconi (ed.) *Race* (Oxford: Blackwells, 2002), p. 38. This is the first and only complete English translation of this essay. I have modified this according to the text at *AK* 8 p. 161, including removal of italicized phrases not in the *AK* version.

> earth formulated by careful natural scientists [*gründlichen Naturforschern*] (among which the theories of the famous *Linnaeus* also find their place). [26]

The conclusion I draw from these passages is that Kant has now clearly restricted any valid knowledge in historical science to a kind of uniformitarianism. The history of nature is a valid and law-governed inquiry, but only because one can reason backward in the history of nature from the present to the past on the analogy of the observation of currently observed causal processes. Furthermore, the role of *Naturbeschreibung* has become definitive. Descriptive science, for example, has revealed the presence of permanent traits in different human populations over time, and therefore this essentialism of race must be projected back into time with a causal account now to be supplied as a history of nature. The relationship between *Naturgeschichte* and *Naturbeschreibung* that seemed to imply the superiority of the first over the second inquiry in 1775 now seems to be reversed:

> Further, if the description of nature makes its appearance as a science [*Wissenschaft*] in all the full splendor of a great system, the history of nature can only offer us fragments or shaky hypotheses [*Bruchstücke, oder wankende Hypothesen*]. But even if the history of nature can, at the present time (and perhaps for ever), only be presented more in outline [*Schattenrisse*] than in a work of practicable science [*Wissenschaft*]. . . , such efforts are not, I hope, without value. For the result of separating and presenting [the history of nature] as a special science distinguishable from the description of nature is that one might not do something with supposed insight for one of these two kinds of investigation which properly belongs to the other. I also hope that we might become more definitely acquainted with the sphere of genuine cognition [*wirklichen Erkenntnisse*] in the history of nature (for we already possess some knowledge of it) along with knowledge of the boundaries and principles of such knowledge lying in reason [*Vernunft*] itself, according to which this knowledge might be extended in the best possible manner.. [27]

This clarification seems on one hand to subject the knowledge claims of a history of nature to the restrictions of the critical philosophy. This is his answer to Herder, and indirectly, it can be seen as a response to anything following in the tradition of Buffon's grand genetic history of the world as put forth in the *Epoques*, if these are to be given a

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[26] "On the Use," p. 39, *AK* 8, 162.

[27] *Ibid.*

realistic interpretation.[28] Kant has acknowledged the validity of the inquiry of *Naturgeschichte*, but he has also restricted it epistemologically. This means that the genetic and historical perspective cannot be constitutive of experience or claimed as a true account except to the degree that it involves a *uniformitarian* principle.

Any further use of the concepts of *Naturgeschichte* can only be regulative:

> I, for my part, derive all organization from organic beings (through reproduction) and account for later forms (of this sort of natural thing) through laws of gradual development [*Gesetzen der allmähligen Entwicklung*] from original predispositions [*ursprünglichen Anlagen*] (of the kind that one frequently finds in the transplantation of plants). I assume that these predispositions were to be found in the organization of the line of descent. To explain, however, how the line of descent itself might have come into existence is a task that lies completely beyond the boundaries of any physics possible for human beings. I certainly believed, therefore, that I had to hold myself within these boundaries.[29]

There is no explicit discussion of the *Naturgeschichte-Naturbeschreibung* distinction within the Third Critique of two years later, and the relevance of his arguments in that text to this distinction must be inferred. The closest this issue comes to the surface is in the often-cited passage from section 80 of part two. Here Kant returns to the issues he had raised in the Herder reviews, but in a text that has given rise to a complex exegesis. He describes here how from the forces of nature the "archeologist" [Archäologen] of nature can arrive at an explanation of organic life, tracing this back to the most ancient revolutions [*älteste Revolutionen*] of nature. From this archeological point of view,

> one can make mother earth (like a large animal, as it were) emerge from her state of chaos, and make her lap promptly give birth initially to creatures of a less purposive form, with these then giving birth to others that become better adapted to their place of origin and to their relations to one another, until in the end this womb itself rigidified, ossified, and confined itself to bearing definite species that would

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[28] Erich Adickes cites the (undated) note on the manuscript of the Barth version of Kant's *Lectures on Physical Geography* in which Barth reports Kant as saying that "the single work which properly treats *Naturgeschichte* is Buffon's 'Epoques de la nature.' However, Buffon allowed his imagination [*Einbildungskraft*] too much free reign, and thus has written more a Romance [*Roman*] of nature than a true history of nature." Adickes *Kant als Naturforscher* vol. 2 (Berlin: Gruyter, 1925), pp. 394-395n.

[29] Kant, "On the Use," p. 50, *AK* 8, 179.

not longer degenerate, so that the diversity remained as it had turned out when that fertile formative force ceased to operate.[30]

The problem with this passage has traditionally been how to take this "daring adventure of reason" as Kant terms it in a footnote, a passage simply dropped into the discussion of natural teleology. In many respects I read it as a restatement of his previous description of Herder's thesis of a general historical development of life from a common source, a thesis which he had previously criticized severely as a "monstrous [ungeheuer] idea" from which reason recoiled.[31] Both Robert Richards and Philippe Huneman have described how some of Kant's readers, such as Goethe, took from this "adventure of reason" the warrant for drawing from Kant a program of developmental transcendental morphology.[32] In view of Kant's prior reflections from 1785 onward, however, it does not seem possible to argue that Kant *himself* had now embraced such a view. As he claims in the note to this passage, there is no empirical warrant for such a conclusion.[33]

III

In this paper I have claimed that Kant's critical philosophy and its application to natural history in the final analysis had a restrictive implication for any realistic interpretation of a developmental history of nature. Remarkably, the same author who in his very first publication developed an imaginative historical account of planetary formation through the action of natural laws over time, by the writing of his latter works had emphasized the primacy of a synchronic science of space—physical geography and the description of nature—, over a genetic and historical account of nature. If the latter did indeed still maintain an important role in Kant's natural philosophy, it was primarily to give a causal explanation explain the data given by a description of nature, and only within a restricted domain does it have some freedom to move beyond this to reflect upon such issues as common origin. Such speculations must

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[30] Kant, *Critique of Judgment*, trans. W.S. Pluhar, Pt. II, p. 305., *AK* 5, 419.

[31] Kant, Review of Herder, *AK 8*, 54. Kant goes on in this footnote to conclude that such an idea is not inconsistent on a-priori grounds, but that there is nothing in experience to warrant it.

[32] Richards, *The Romantic Conception of Life* (Chicago: University of Chicago Press, 2002); and Philippe Huneman, "Lecture," University of Notre Dame, May 15, 2005.

also be controlled by experiments, such as interbreeding experiments, to determine common ancestray.[34] The history of nature, if it is to be embraced in a broader sense than the uniformitarian program Kant now seems to have allowed, is, like that of a general teleology of nature, useful as a guiding principle for its research, but it has a weak or regulative epistemic status only.

The tie between these sceptical conclusions regarding the history of nature, and the kind of negative views we find in Werner, Jameson, Jameson's disciple Grierson quoted at the opening, and to a degree in Werner's protege, Alexander von Humboldt, toward a developmental history of nature, is an issue that needs deeper exploration to work out in detail. My preliminary suggestion is that in this we can see the source of the opposition to transformism that is found in Cuvier and in the emphasis on biogeography over history in such authors as Alexander von Humboldt. The two projects that can claim some inspiration from Kant, one the program of *Naturphilosophie*, and the other one which emphasized description over history, can be seen in some collision in the early nineteenth century. I will simply close with a comment by Cuvier that summarized some of his opposition to the transformism of Lamarck and Geoffroy St. Hilaire:

> We ought, therefore, conclude that if there are resemblances between the structures of the fishes and those of other classes of vertebrates, it is only insofar as there are similarities in their functions. Let us conclude that if it can be said that these animals are ennobled molluscs, molluscs elevated by a degree, or the fetuses of reptiles, reptiles in an embryonic stage, it is only to be understood in an abstract and metaphysical sense. Even then it is a necessary conclusion only insofar as this abstract expression organizes our legitimate ideas. Particularly, we should conclude that there are no links in that imaginary chain of successive forms, in which one form can serve as the source of the other, since none of these could exist by itself. Nor is there that other, no less fictitious, chain of simultaneous and

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[33] See also Reill, *Vitalizing Nature*, p. 201.

[34] For example, as Kant elaborated these points in the Physical Geography lectures, "the history of nature [*Geschichte der Natur*] includes the multiplicity of geography, to wit, as it has been thereby in different times, but not, however, how it is now in the same time, because that would be just a *Naturbeschreibung*. If one, on the contrary, explains the events of the whole of Nature thus, as they have been constituted in all times, so one puts forth, now for the first time, a correctly designated history of nature." Kant, *Physische Geographie*, Bd. I, p. 1 *AK* 9, 162. "Die Geschichte der Nature enthält die Mannifaltigkeit der Geographie, wie es nämlich in verschiednen Zeiten damit gewesn ist, nich aber wie es jetzt zu gleicher Zeit ist, denn dies wäre ja eben Naturbeschreibung. Tragt man dagegen die Begebenheithen der gesammten Natur so vor, wie sie durch alle Zeiten beschaffen gewesen, so liefert man, und nur erst dann, eine richtig sogenannte Naturgeschichte." In elaborating on this point, Kant is willing to allow the freedom to trace, via *Naturgeschichte*, the different breeds of dogs to a single stem [*Stamme*] which has altered in response to climate and geography.

graded forms, which has its existence only in the imagination of some naturalists, more poets than observers of nature. Rather fish belong to the real chain of coexistent beings of creatures necessary to each other and to the whole, which, by their mutual interaction, maintain the order and harmony of the universe, a chain in which no portion can exist without all the others, and in which the coils, ceaselessly united or dispersed, embrace the globe in their contours.[35]

[35] G. Cuvier and A. Valenciennes, *Histoire naturelle des Poissons* (Paris Levrault, 1828) I, 551.