The Idea of Racial Degeneracy in Buffon's Histoire Naturelle*

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I

In the history of eighteenth-century racial speculation, Buffon's Histoire naturelle, générale et particulière occupies a position of paradoxical ambiguity. Supplying the Enlightenment with the first fully articulated analysis of man as a natural and primarily zoological phenomenon, a world-wide species whose "natural history" was to be studied in the same terms and categories as that of any other species of animal,1 Buffon offered a model of a naturalistic and empirical science of man which would leave its deep imprint on scientific anthropology of the succeeding two centuries.2

In insisting, as an integral part of this empirical science, that theory be grounded on concrete empirical evidence, Buffon departed from the previous, largely speculative, approach to the question of racial origin and diversity. Against the polygenetic theory deriving from the writings of Paracelsus, Giordano Bruno, and Isaac de la Peyrère, which had provided the backbone of much of the speculation on the origin of the races in the early Enlightenment,3 Buffon unequivocally asserts that an empirical test, fertile interbreeding, is to stand as the sole criterion of specific identity, taking precedence over all distinctions made on the basis of mor-

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phology, culture, intellectual achievement, and technological ad-

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eration of organisms. Through the underlying biological theory

Les hommes diffèrent du blanc au noir par la couleur, du
double au simple par la hauteur de la taille, la grosseur, la légè-
reté, la force, &c., & du tout au rien pour l’esprit; ... mais ces
différences de couleur & de dimension dans la taille n’empêch-
ent pas que le Nègre & le Blanc, le Lappon & le Patagon, le
géant & le nain, ne produisent ensemble des individus qui peu-
vent eux-mêmes se reproduire, & que par conséquent ces hom-
mes, si différents en apparence, ne soient tous d’une seule &
même espèce. ... 

Si le Nègre & le Blanc ne pouvaient produire ensemble, si
mêmes leurs productions demeuraient infécondes, si le Mulâtre étoit
un vrai mulet, il y aurait alors deux espèces bien distinctes; ... 
mais cette supposition même est démentie par le fait, & puisque
tous les hommes peuvent communiquer & produire ensemble,
tous les hommes viennent de la même souche & sont de la même
famille.6

But to emphasize only Buffon’s strict monogenism, his occasional
eloquent outcries against human slavery,8 and his glimmerings of
egalitarianism8 would be to call attention to only part of the pic-
ture. For even though Buffon supplied, in its historically most in-
fluential form, the empirical criterion that was seen by many of his
contemporaries to break the back of the polygenetic theory,7 he
also used arguments that are cited by later polygenecists in sup-
port of their thesis.8 And if he hints in several places at the fun-
damental unity of mankind and the basic natural equality of men,
explicit statements suggesting his intellectual, physical, and moral
inequality could readily be culled by Buffon’s contemporaries and
successors from the fifteen volumes and supplements of the Histoire
naturelle.

To discern some intelligible unification of Buffon’s thought in
the face of the overt ambivalence which a catalog of his statements
on the race issue would disclose, Buffon must be read not so much
against the background of the main currents of prior racial specula-
tion, from which he departs in significant respects, but rather in
terms of his claimed resolution of seemingly remote problems in
eye-eighteenth-century biological science concerned with the gen-

The crisis over the phenomenon of organic generation that arose
in scientific circles in the latter half of the seventeenth century
took its origin from the failure of the “mechanical” philosophy, in
its initial formulations, to supply a satisfactory explanation of the
teleological character of biological phenomena, and in particular
those presented by the generation and formation of living crea-
tures.9

The radical extirpation from nature of all vital faculties and di-
recting substantial forms, which had provided intrinsic efficient
and formal causes of the generation of organisms for their Renais-
sance predecessors, committed the early mechanists, both meth-
odologically and metaphysically, to accounts of generation solely
in terms of the twin categories of matter and motion. In their at-
ttempts to supply such mechanical accounts of bisexual generation,
the early mechanists treating this issue—Kenelm Digby, Henricius
Regius, Gassendi, Nathaniel Highmore, and (posthumously)
Descartes—had offered accounts which explained the orderly for-
mation and differentiation of the embryo in terms of such material
efficient causes as the degree of heat in the uterus of the mother,
chemical fermentation reactions, and the transferral of specific
amounts of motion in the semen.10
These early mechanistic accounts were, however, confronted with difficulties of a theological and empirical nature which served, in effect, to create significant conceptual lacunae within seventeenth-century mechanism over the generation of organisms. On the theological plane, such mechanistic accounts threatened to give to the material world the ability to create by mechanical laws all living things, with man forming no exception. Such a threat to a theistic and providential view of the world was only reinforced by Descartes’ banishment of the appeal to final causation from science.

With the empirical refutation by William Harvey in his *Exercitationes de Generatione Animalium* of 1651 of the central material assumption of all these early mechanistic accounts of bisexual generation—the existence of the male and female *semina*, and their combination as the material substrate from which the foetus took its origin—a critical difficulty for the mechanical account of generation was created on the empirical level.11

This combination of theological and empirical opposition set the stage in the latter half of the seventeenth century for the one solution to the problem of generation which seemed capable of resolving all the various difficulties while still remaining within the general confines of mechanism, the theory of the preexistence of the embryo. This singular theory, understood either in the panspermist version of the French physician Claude Perrault,12 or in the famous *emboitment* version of the Dutch physician Jan Swammerdam and the French philosopher Nicholas Malebranche,13 resolved the problem of generation simply by denying all actual generation of one creature by another. All generation was instead pushed back to the initial creation of the world, positing that all creatures and all their historical progeny had been created at the moment of the foundation of the world and either dispersed in minute seeds throughout nature, as the panspermists held, or else in its more popular form, encased in the sexual organs of their archetypal parents.

Supported by a complex blend of theological and metaphysical assumptions and seemingly verified by, or at least consistent with, the empirical observations of Harvey, Marcello Malpighi, Niels

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Stensen, William Croone, Theodore Kerckring and Anton van Leeuwenhoek, the preexistence theory, in its various forms, was able to achieve a majority, if not a unanimous, endorsement by physicians and biologists of the Continent and England from the 1680’s through most of the eighteenth century.14

By resolving the problem of the generation of organisms in terms of the preexistence theory, however, the mechanistic biologists and physicians had, in effect, removed man and all other creatures from one central dimension of historical process. In their presumption that all organisms had been created contemporaneously, complete in their fundamental features, the generation of the offspring by its parents in historical time was only an appearance, actually involving nothing more than the stimulation of the growth and unfolding of an already existent embryo. In such a conceptual framework, varieties in food, environment, climate, and geography could at most act only in immediate and superficial ways on each generation, and would be unable to affect in any substantial and permanent way the hereditary characteristics of each natural kind.15

As regards the bearing of the above matters on the problem of racial origin and diversity in the context of early Enlightenment thought, the preexistence theory implied conclusions which, if reflected upon at all, could be seen to lead to a position in fundamental opposition to common non-theological accounts of the origin of the races.16 The ancient environmentalist theory, given influential Renaissance restatement by Jean Bodin,17 and endorsed by such figures as the Abbé Dubos18 and John Arbuthnot19 in the early eighteenth century, presumed a common historical origin of man, with a subsequent diversification into races under the action of climate and migration. In light of the preexistence theory, however, such an account gave no satisfactory explanation of how such factors could produce their presumed permanent hereditary effect on men whose creation and embryonic organization dated from the foundation of the world.20 The polygenetic theory endorsed, as we have seen above, by numerous intellectuals of the period explained the origin of the races by presuming multiple origins of mankind. This account was, however, incompatible with the pre-
remains of the cortex, might possibly become because.

"The action of the cortex, and the action of the thalamus, proceeds in a way that is not yet understood. However, the thalamus seems to play a crucial role in the reception of sensory information, particularly in the processing of visual and auditory stimuli."

In the second paragraph, the author mentions the importance of the thalamus in the integration of sensory information and its role in the regulation of consciousness. The thalamus is described as a critical component in the neural networks that mediate perception and consciousness.

"The thalamus is known to play a role in the integration of sensory information from different modalities. It acts as a relay station for information from the sensory periphery to the cerebral cortex. This process is essential for the perception of the external world and the regulation of consciousness."
through the direct incorporation of these same particles in the male and female semen, and thence into the historical formation of the embryo. With his epigenetic theory, which allows for the impact of historical circumstance into the ancestor-descendant lineage, Maupertuis hints that the gradual but cumulative influence of the environment, operating on the hereditary material transmitted from one generation to another, is a possible explanation of the origin of the races from a common historical root.

The key ingredients of Maupertuis' loose synthesis, combining a return to a mechanistically conceived epigenetic theory of development, a particulate theory of inheritance, the reliance on semi-Newtonian concepts of force and attraction, and the new twist given to classic environmentalism in explaining racial origin, all can be seen to reappear, with significant modification, in Buffon's lengthy analysis of the two questions of generation and the origin of the races in the second and third volumes of his Histoire naturelle of 1749. Furthermore, with Buffon we are given an analysis of the issues which in scope, explanatory power, empirical detail, and alleged experimental support reaches far beyond the chatty and popularized discussion of Maupertuis, an analysis progressively integrating the generation of organisms and the origin of the races of man into a general naturalistic cosmological theory.

In his lengthy analysis of the problem of generation, which logically and chronologically precedes his "Histoire naturelle des hommes," Buffon presents a lengthy attack on the preexistence theory, giving both a history of the problem and a discussion of the difficulties the theory was confronting by the late 1740's. In offering his own resolution of the question, a resolution which was admittedly formulated prior to any experimental work, through reflection on the difficulties facing the doctrine of preexistence, Buffon suggests his famous hypothesis that all living creatures are composed of a basically homogenous but particulate matière vivante, the so-called molécules organiques, constant in total quantity and simply recycled throughout animated nature by assimilation through food and return by excretion and death. As his resolution of the classic problem facing all mechanistic and materialistic epigenetic theories, the explanation of the form and organization of the embryo simply from material particles in motion, Buffon, like Maupertuis before him, summons the activity of Newtonian-type penetrating forces between the organic molecules. Differing significantly from Maupertuis' suggestions, however, Buffon's conception of the operation of these attractive forces, setting up veritable type-specific fields of force, provides his theoretical resolution of the problem with a concept of implicit substantial forms, the molécules intérieures, serving as the ultimate efficient and formal causes of biological phenomena and also as immanent archetypes explaining the existence and permanence of discrete species.

With this set of explanatory entities, relying on an indestructible, recycling, living matter, and the form and organization-giving activity of the internal molds, Buffon claims to be able to render a coherent theoretical explanation of the main phenomena of organic life. Growth and nutrition, on his assumptions, take place through a species-specific sorting and assimilation of appropriate particles from the food through the action of the internal mold. Reproduction is now explained by the assumption that out of the excess of these same molécules organiques are formed the male and female semina, the particles in these pairing in specific configurations, upon intercourse, through the action of the maternal internal mold, and creating in turn a replicate internal mold to govern the growth and development of the embryo. With suitable modifications, Buffon claims, the theory can explain reproduction in parthenogenetic insects as described earlier by Bonnet and Réaumur and the self-regeneration of Trembley's polyp. Other anomalous empirical phenomena facing the preexistence theory—hereditary transmission and biparental resemblance, the explanation of monsters, the empirical evidence which at least since the observations of Harvey had suggested a serial and epigenetic formation of the embryo, and the problem of the sterility of hybrids—are all, at least implicitly, resolved to Buffon's satisfaction by his theoretical principles.

With the claimed empirical verification of the main predictive consequences of his theory of generation—the existence of a particular male and female semen, and the presumed demonstration of similar particles in macerations of various organic materials—
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through experiments carried out in the spring of 1748 in the company of the microscopist Father John Turbeville Needham and three other competent naturalists, Buffon was provided at the beginning of the writing of the Histoire naturelle with a fundamental set of empirical certitudes and an enduring theoretical framework upon which his subsequent speculations on the race issue would subsequently be developed.

III

When Buffon turns to the specific treatment of the origin of the races of man, at greatest length in the "Variétés dans l'espèce humaine" of the third volume, and to a limited extent throughout various articles of the succeeding eighteen years, he offers the progressive development of a highly significant synthesis of ideas, integrating a rather traditional thesis of monogenetic origin and a historical diversification of the races under environmental influence with the underlying reductive materialism of Buffon's biological theory, a theory by then allegedly supported in its main features by concrete empirical evidence.

This synthesis only develops gradually, however, and is at best only implicitly discerned in the discussion of the "Variétés" where one might readily expect it. Here we find Buffon's analysis to be rather traditional in form, making no mention of the role of the moule intérieure and the molécules organiques, and relying on direct climatic influence as the primary cause of differences in skin color, with unspecified effects of differences in food, rigor of life, and form of social organization to account for the remaining hereditary differences between the races.

The underlying structure of Buffon's biological theory has, however, provided a route by which direct environmentalism, with all its attendant empirical difficulties, could be deemphasized in favor of a more subtle influence of climate, geography, and food, via slight variations in the organic molecules, and hence on the internal mold itself.

The express development of this idea takes place not specifically in the context of the discussion of the races of man, but rather as part of the explanation of the geographical variability within the species of domestic and wild animals, a matter that increasingly occupies Buffon's attention during the course of the Histoire naturelle. By defining conspecificity solely in terms of reproductive compatibility, Buffon was forced to confront the general question of geographical variation in a way which had not been appreciated by the preceding biological tradition. And to do this required some account of variation which reconciled with the implicit essentialism and form-conserving activity of the moule intérieure.

The problem is raised immediately with the treatment of the domestic animals opening the Histoire naturelle des quadrupèdes, commencing in 1753. In the lengthy article on the horse, Buffon asserts that the first horse has served as the external and internal archetype for all horses past, present, and to come. But he concludes that this archetypal form does not perpetuate itself perfectly unchanged:

... Ce modèle, dont nous ne connaissons que les copies, a pu s'altérer ou se perfectionner en communiquant sa forme & se multipliant; l'empreinte originale subsiste en son entier dans chaque individu; mais quoi qu'il y en ait des millions, aucun de ces individus n'est cependant semblable en tout à un autre individu, ni par conséquent au modèle dont il porte l'empreinte.

Furthermore, the variation Buffon conceives is not simply individual and random, but is also directional and determinate in direct response to factors related to geography and climate having an indirect influence via the food on the internal mold itself:

On fait par expérience que des animaux ou des végétaux transplantés d'un climat lointain, souvent dégénèrent & quelquefois se perfectionnent en peu de temps, c'est-à-dire, en un très-petit nombre de générations: il est aisé de concevoir que ce qui produit cet effet est la différence du climat & de la nourriture: . . . le développement de la forme, qui dépend en partie de la nourriture & de la qualité des humeurs, doit donc changer aussi dans les générations: ce changement est à la vérité presque insensible à la première génération, . . . mais le jeune animal essuyera, dans un âge tendre & faible les influences du climat, elles lui feront plus d'impression qu'elles n'en ont pu faire sur le père & la mère,
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celles de la nourriture seront aussi bien plus grandes & pourront agir sur les parties organiques dans le temps de l’accroissement, en altérer un peu la forme originale, & y produire des germes de défectuosités qui se manifesteront ensuite d’une manière très-sensible.41

Although Buffon continues to assert in this and other articles of this period the operation of “moral” causes as also instrumental in producing this geographical variation—causes which he sees as particularly important in the case of man, whose technology and society serve to isolate him from environmental circumstances in many instances—when he turns to the discussion of the wild animals in Volume Six, it is primarily physical causes that he envisages as operating, creating most importantly a geographical specificity in the organic molecules themselves, and thereby transmitting its effect through the entire food chain, with effects reaching beyond the purely anatomical level to that of temperaments as well:

Et comme tout est soûmis aux loix physiques, que les êtes même les plus libres y sont assujétis, & que les animaux éprouvent, comme l’homme, les influences du ciel & de la terre; il semble que les mêmes causes qui ont adouci, civilisé l’espèce humaine dans nos climats, ont produit de pareils effets sur toutes les autres espèces: le loup, qui dans cette zone tempérée est peut-être de tous les animaux le plus féroce, n’est pas à beaucoup près aussi terrible, aussi cruel que le tigre, la panthère, le lion de la zone torride, ou l’ours blanc ... de la zone glacée. Et non seulement cette différence se trouve en général, comme si la Nature, pour mettre plus de rapport & d’harmonie dans ses productions, eût fait le climat pour les espèces, ou les espèces pour le climat, mais même on trouve dans chaque espèce en particulier le climat fait pour les moeurs, & les moeurs pour le climat . ... Les végétaux qui couvrent cette terre, & qui y sont encore attachés de plus près que l’animal qui broute, participent aussi plus que lui à la nature du climat; chaque pays, chaque degré de temperature a ses plantes particulières; ... des climats excessifs ... l’on tire les drogues, les parfums, les poisons, & toutes les plantes dont les qualités sont excessives: le climat tempéré ne produit au contraire que des choses tempérées: les herbes les plus douces, les légumes les plus sains, les fruits les plus suaves,

In the article on the stag deer of the same volume, Buffon explains in more detail how this influence of food is conceived:

Ce qu’il y a de plus constant, de plus inaltérable dans la Nature c’est l’empreinte ou le moule de chaque espèce, tant dans les animaux que dans les végétaux ... La matière, en général, paraît être indifférente à recevoir telle ou telle forme, & capable de porter toutes les empreintes possibles: les molécules organiques, c’est-à-dire les parties vivantes de cette matière, passent des végétaux aux animaux, sans destruction, sans altération, & forment également la substance vivante de l’herbe, du bois, de la chair & des os. Il paraît donc à cette première vue, que la matière ne peut jamais dominer sur la forme. ... Cependant, en observant la Nature plus particulièrement, on s’apercevra que quelquefois ces molécules organiques ne s’assimilent pas parfaitement au moule intérieur, & que souvent la matière ne laisse pas d’influer sur la forme d’une manière assez sensible: la grandeur, par exemple, qui est un des attributs de la forme, varie dans chaque espèce suivant les differens climats: la qualité, la quantité de la chair, qui sont d’autres attributs de la forme, varient suivant les différentes nouritures. Cette matière organique que l’animal assimile ... n’est donc pas absolument indifférente à recevoir telle ou telle modification: ... elle agit donc elle-même par sa propre forme sur celle du corps organisé qu’elle nourrit; & quoique cette action soit presque insensible, ... il doit en resulter avec le temps des effets très-sensibles.42
With man in his aboriginal condition more closely analogous (in Buffon’s view) to the wild animals than to the domestic, geographically confined, and more directly dependent on endemic and unrefined foodstuffs, his early isolation from the effects of geographical determinism is at best partial.44

Armed with such a thesis, we see how Buffon’s strict monogenism can become a monogenism with a vengeance. The unity of mankind, given its empirical guarantee by the interbreeding criterion, is still a unity permitting significant and progressive populational divergence within the absolute limits imposed by the molé interne, creating geographically delimited hereditary lineages within the human species. Furthermore, for Buffon the changes produced by this geographical speciation are always conceived in distinctly valutational terms. Progressive change away from the primitive type is for Buffon primarily, although not exclusively, what it has been for the preceding tradition—a literal degeneration, imperfection and decline.45

The consequences of this developing train of thought are revealed with increasing force as Buffon proceeds towards an integration of his theory of geographical variability and historical degeneration with his developing cosmological theory. In the important articles of the 1760’s, wherein he begins to put together the various dimensions of his speculative theories, culminating in the great synthesis of historical geological process, biological development, and cosmology of the Des époques de la nature of 1778, Buffon relies on an increasingly naturalistic account of the origin of the organic molecules, now attributing their source to the simple action of light and heat on an original matière brute:

Les molécules vivantes répandues dans tous les corps organisés sont relatives, & pour l’action & pour le nombre, aux molécules de la lumière qui frappent toute matière & la pénètrent de leur chaleur; par-tout où les rayons du Soleil peuvent échauffer la terre, sa surface se vivifie, se couvre de verdure & se peuple d’animaux.46

Given such a hypothesis, the abundance, and more importantly, the degree of inherent vitality of the organic molecules becomes a function of temperature and the degree of solar irradiation, variables directly related to the tilt of the earth on its axis, the elevation of the land, and such variables as the degree of cloud cover:

L’inclinaison de l’axe de la Terre produisant, dans son mouvement annuel autour du Soleil, des alternatives durables de chaleur & de froid, que nous avons appelées des saisons... La constitution particulière des animaux & des plantes est relative à la température générale du globe de la Terre, & cette température dépend de sa situation, c’est-à-dire de la distance à laquelle il se trouve de celui du Soleil: à une distance plus grande, nos animaux, nos plantes ne pourroient ne vivre ni végéter;... à une distance moindre, elles s’évanouriront & se dissiperont en vapeurs: la glace & le feu sont les éléments de la mort; la chaleur tempérée est le premier germe de la vie.47

The valutational connotation that Buffon has, from his earliest articles, given to the concept of geographical variation is now interpreted in terms of natural differences in the degree of fertility and vitality of various geographical regions, in direct dependence on cosmological conditions outside any human control. With the influence of such conditions reaching to the very foundation of all organic life, transmitting to the entire food chain a corresponding vitality and vigour, or weakness and degeneracy, Buffon’s theoretical principles had supplied a foundation upon which he could subsequently argue for a natural hierarchy of races and human groups as the product of the impersonal forces of nature. As Buffon’s later thought reveals, such determining environmental factors do not simply affect the physical level of organisms, but that of temperament and, in man, the level of intellectual achievement and the capacity for cultural advance.

With the temperate climatic conditions of northern Europe and to some extent those of Asia the locus, conveniently enough, of Nature’s optimal generative power, at least as far as the human species is concerned, and with this region being, as he will argue in the Des époques de la nature, the all-important site of the origin of man,48 Buffon develops the empirical evidence for a geographical degeneration of man as he has moved from his place of origin.
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To effect a restoration of the degenerate races to the purity and vigor of the original type, Buffon argues that a veritable transplantation of these peoples to the temperate zones, a change of diet, and a long expanse of time would be required. And, with the possibility raised in the “Nomenclature des signes” of 1766 that the orang-outang might indeed be the most degenerate of men, one step beyond the Hottentot—a possibility which is, to be sure, rejected on the basis of Buffon’s residual Cartesian dualism and the empirical guarantee of the interbreeding criterion—an indication may be drawn as to the gap which Buffon sees to have arisen between the European and African races through the degenerative process, in spite of their biological conspecificity.

If Buffon does not openly condone human slavery, it is, I would conclude, for reasons inconsistent with the logical consequences of his theoretical principles, and such reasons, if they are to be found at all, must be sought in those dimensions of his thought which prevent him from drawing a completely materialistic interpretation of man. The weak and vitiated savage peoples have neither the power to improve themselves, nor, because of their degenerate condition, can they bring about the technological domination of nature that Buffon sees as imperative if European man is to escape similar geographical determinism as he migrates to the tropics and the New World. Such peoples are but excess baggage on the earth, contributing nothing to its control, and by implication at least, would either have to be eliminated or else made instruments of labour in the immediate technological advance of man.

Even granted a strict monogenetic origin of mankind, such conclusions are latent in Buffon’s thought. And with the weakening at his own hands, in the latter volumes of the Histoire naturelle, of the keystone of his monogenism, the universal validity of the interbreeding criterion, Buffon effectively removes the one thing separating him unequivocally from the polygenacists. Buffon, by suggesting in the “Dégénération des animaux” of Volume XIV—an article which ostensibly opens with a proclamation of the biological unity of the human species—that perhaps the interbreeding criterion is not universally valid, and by then arguing in the
"Nomenclature des signes" of the same volume that fertile crosses of Negroes and apes have taken place and entered both lineages, and that will supply scientific support for a return by some scientists to a morphological criterion of species, with its latent polygenetic consequences.

More significant than any support his later writings may have given to a revitalization of polygenicism was, however, that he had really rendered polygenicism and Biblical curses unnecessary as rationalizations for racial domination. Through his break with the ahistorical assumptions of the preexistence theory, Buffon had suggested within a scientifically respectable context the means by which a naturalistic view of man, a scientific materialism, and a secular philosophy of history could be synthesized with traditional ideas of geographical determinism and historical degeneration, with the action of general physical and historical causes deemed a sufficient explanation of the origin of a presumed invidious hierarchy of races and peoples. Similar combinations of the same intellectual ingredients, if not the specifics of Buffon's biological theory, reappear in the anthropological treatises of Kant, John Hunter, Blumenbach, and Lacépède, with Buffon's influence apparent on each of these works.

Perhaps of primary importance, however, in assessing Buffon's significance in the spectrum of racial speculation of the eighteenth and early nineteenth centuries is a more general dimension of his thought. Notable about the anthropological treatises from the 1770's onward, whether the author be a monogenetic or polygenetic, physiologist or anatomist, pro- or antislavery, is the presumption that the central issues in the race question are empirical issues, questions in which anatomical data, physiology, zooseographical analysis, and tests on the interbreeding criterion are presumed to be decisive, taking precedence over all philosophical, ethical, and theological tenets. And it seems to have been Buffon's analysis and empirical approach to the question, posing problems which animal breeders, zoogeographers, natural historians, and anatomists could presumably solve, presenting these in a work rivalling the Encyclopédie in general dissemination, which was able to produce most significantly this transition to an empirical level of argument.

With such assumptions guiding the anthropological writings of the succeeding decades, not surprisingly the answers the empirical data could supply were totally ambiguous, lending support to any conclusions the various scientists wished to read into them.

NOTES

1. As Buffon summarizes the approach to characterize his natural history: "L'histoire d'un animal doit être non pas l'histoire de l'individu, mais celle de l'espèce entière de ces animaux; elle doit comprendre leur génération, le temps de la premiers, celle de l'accouplement, le nombre des petits, les soins des pères & des mères, leur espèce d'éducation, leurs moeurs, leurs ruses et leur chasse. . . . "Histoire naturelle, générale et particulière, avec la Description du Cabinet du Roi (Paris: imprimé royale, 1749–67), (1st series) "Premier discours" 1, 30. All references will be made to this edition, now generally available on the Landmarks of Science microprint series (New York: Readex Microprint). Most of Buffon's references can also be found in: Oeuvres philosophiques de Buffon, ed. J. Piveteau (Paris: Presses universitaires de France, 1954).


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7. Buffon’s arguments in favor of a unitary origin of man, with the races conceived as originating by subsequent diversification under differing environmental conditions, were regarded as conclusive by many of his contemporaries. See review of *Histoire naturelle* in M. Freron, *Lettres sur quelques écrits de ce temps*, nouv. ed. (London: Duchesne, 1752), IV, 98–99. See also “Humaine espèce,” *Encyclopédie*, VIII (1765), 348.

8. See note 60, below.


11. The theory of the formation of the foetus from two analogous seeds, drawn from the body and collected in the testes of the male and the *testes foeminae* (ovaries) of the female, is presumed in the ancient accounts of generation offered by Hippocrates, Democritus, Lucretius, and in a modified form by Galen. These stood in opposition to the Aristotelian theory of sexual generation, which assumed the formation of the embryo to take rise solely from material supplied by the female, with the male contributing only the immaterial substantial form. Harvey regarded his observations to have refuted both theories. On Har-
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that each individual is a separate species. (See, for example, Charles Bonnet, Contemplation de la Nature [1764] in Œuvres d’Histoire naturelle et de philosophie [Neuchatel: Fauche, 1774] IV, 131.) Bonnet, writing after Buffon’s statement of the interbreeding criterion, immediately clarifies his suggestion, however, so as to be taken as implying only that there are infinite varieties within the human species as defined by the interbreeding criterion (ibid., p. 130 n; see also p. 287).

23. As Maupertuis summarizes the consequences of the preexistence theory for the race question in 1745: “If all men began by being formed from one egg inside another, there must have been in the first mother eggs of different colors. These must have contained an innumerable series of the same kinds of eggs, to hatch only in their proper order of development, after a number of generations and at the time Providence had intended for the origin of the peoples so contained. . . . Were we to accept the system of animacules and say that all men had been originally contained inside the animals swimming in the first man’s semen, we would have to repeat about animacules what we have said about eggs.” Maupertuis, The Earthly Venus, trans. S. B. Boas (New York: Johnson Reprint, 1966), pp. 69–70. See also Roger, op. cit., pp. 215–16.

24. For example, Henry Baker; see n. 12, above.


26. The major embryologists of the mid-eighteenth century—Haller, Bonnet, Trembley, Réaumur, and Spallanzani—opted for a modification of the preformation theory. See Bodemer, op. cit., and Gasking, op. cit.

27. Maupertuis’ theory is proposed in his two pseudonymous, partially identical treatises, the Dissertation physique à l’occasion du négre blanc (Leyden, 1744) and its expanded version, the Vénus physique (The Hague, 1745). In spite of its title, the first treatise has neither a discussion of albinoism nor of the origin of the races, which are only taken up in the second section of the Vénus. On Maupertuis’ theory of epigenesis and generation, see Roger, op. cit., pp. 468–87; B. Glass, “Maupertuis, Pioneer of Genetics and Evolution,” in Forerunners of Darwin: 1745–1859, ed. B. Glass, O. Temkin, and W. L. Straus (Baltimore: Johns Hopkins, 1959), chap. 3; E. Callot, La Philosophie de la vie au XVIIIe siècle (Paris: Rivière, 1965), chap. 4; and Gasking, op. cit., chap. 6.

28. See note 11, above. Harvey’s refutation of the “two seeds” theory had lost much of its force with the discovery of the microscopic size of male spermatzoa. See Maupertuis, op. cit.

29. For brief remarks on the use of Newtonian attraction in eighteenth-

10th-Century Studies, 24 March 1972, for leading me to this reference.

20. Significant empirical arguments against the environmentalist theory had also been raised with the demonstration by Santorius, Malpighi, and other anatomists of the anatomical basis of Negro skin color. In Barrère’s treatise on the subject in 1741 (Dissertation sur la cause physique de la couleur des Nègres [Paris: Simon, 1741] as summarized in the unsigned review in the Journal des Scavans, CXXXII [May, 1742], 23–45), this is considered a decisive refutation of the environmentalist theory, and Barrère asserts that “... c’est l’opinion généralement reçue que dans le germe des corps des animaux se trouvent comme concentrées toutes les parties qui les composent avec leur figure & leur couleur déterminées.” (Barrère, as quoted in review, p. 39.) More general empirical arguments against environmentalism as a cause of the origin of the races are raised by Robert Boyle (The Experimental History of Colours Begun in Works, ed. T. Birch [London: Mill, 1744], II, 34–47), and in an unsigned article sometimes attributed to Francois Bernier (“Nouvelle division de la terre, par les différentes espèces ou races d’hommes...,” Journal des Scavans XII [April, 1687], 150) in terms of the hereditary permanence of racial characteristics in different climates.

21. John Ray, “A Discourse on the Specific Differences of Plants,” read to the Royal Society in 1674 and published in T. Birch, The History of the Royal Society (London: Millar, 1756), II, 171. The interbreeding criterion can be traced in an elliptical form to Aristotle (Generation of Animals, 746a 30, and History of Animals, 491a 1–5). The interbreeding criterion, although without specific reference to the race question, is also stated by Ray in his influential The Wisdom of God, p. 7, and by the preformationist René Réaumur (Mémoires pour servir à l'Histoire des Insectes [Paris: Imprimerie royale, 1736]), II, 24, and is implicitly endorsed by Linnaeus in his early writings (see his Critica botanica [1737]), trans. A. Hort [London: Ray Society, 1938], aphs. 270–71, p. 150). Although, following his discovery of Peloria in 1741, Linnaeus came to accept the production of new species by genuine interspecific hybridization, he refused to extend this conclusion, with its polygenetic consequences, to the origins of the human races, a possibility readily suggested by his inclusion of the Orang-outang in his genus Homo (see his Metamorphoses Plantarum [1755], quoted in E. Callot, La Philosophie de la vie au XVIIIe siècle [Paris: Rivière, 1965], p. 428). Buffon stands as unique within this tradition, however, in insisting upon the interbreeding criterion as the sole criterion of specific identity and distinction.

22. Preexistence theory, by itself, does not, to be sure, necessarily imply a monogenetic conclusion, and Voltaire, for example, could endorse both polygenism and the preexistence theory (see Roger, op. cit., p. 733). Carried to its extreme conclusion, the preexistence theory could not only suggest that the races of men comprised distinct species, but even...
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36. Buffon's assistants on the experiments, in addition to Needham, included the anatomist and subsequent collaborator on the Histoire naturelle, Louis Daubenton, the naturalist Gueneau de Montbeillard and the botanist Thomas Dubard.

37. As Buffon expresses his conviction at the conclusion of the experiments: "Il est clair pour quiconque entendra bien le système que nous avons établi . . . que nous avons prouvé par des expériences, . . . que la reproduction se fait par la réunion de molécules organiques renvoyées de chaque partie du corps de l'animal ou du végétal; . . . que les mêmes molécules qui servent à la nutrition et au développement du corps, servent ensuite à la reproduction; que l'une & l'autre opèrent par la même matière & par les mêmes loix. Il me semble que j'ai prouvé cette vérité par tant de raisons & de faits, qu'il n'est guère possible d'en douter. . . .("Histoire générale des animaux," H.N. II (1749), 332).

38. Buffon's adherence to the fundamental tenets of his theory from this point onward will prove to be one of the most enduring aspects of his biological thought.

39. "Variétés dans l'espèce humaine," H.N. III (1749), 526 ff. Buffon attempts to circumvent the empirical difficulties raised by Barrère, Boyle, and Bernier (see n. 20, above) against simple environmentalism by claiming that the uniformity of climate throughout the New World is the explanation of the uniformity of color of the aborigines of the New World.


41. Ibid., pp. 217–19.


43. "Le Cerf," H.N. VI (1756), 86–88. A decade later, Buffon expresses this same idea with direct reference to human races: " . . . Il faut admettre pour ces altérations [of the races] . . . quelques autres causes réunies avec celle du climat: la plus générale & la plus directe est la qualité de la nourriture; c'est principalement par les aliments qu'homme reçoit l'influence de la terre qu'il habite, celle de l'air & du ciel agit plus superficiellement: & tandis qu'elle altère la surface la plus extérieure en changeant la couleur de la peau, la nourriture agit sur la forme intérieure par ses propriétés qui sont constamment relatives à
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rageux dans les pays froids, plus civilisés, plus doux dans le climat tempéré, plus lâches, plus foibles & plus laissons dans les climats trop chauds” (“Le Chat,” H.N. VI [1756], 16. See also “Le Chien,” H.N. V [1755], 202–3). The wild animals, less susceptible to geographic transposition, and thus to the forces of degeneration, presumably do not, in most cases, exhibit a geographical degeneration, exhibiting instead more of a valuationally-neutral geographical endemism (see quote above, p. 14 and “Dégénérescence des animaux,” H.N. XIV [1766], 322). The conveniently ad hoc quality of Buffon’s position is apparent, however, in his conclusions on the parallel degeneration of man and the wild animals under the same natural causes in the case of the New World.

53. “Nomenclature des signes,” H.N. XIV (1766), 32. Throughout the Histoire naturelle, Buffon repeatedly appeals to the Cartesian criterion of rational discourse as the sign that man is comprised of both a material body and an immaterial mind, thus insuring his radical distinctness from the animals and the impossibility of his evolutionary origin from the ape” (see “De la nature de l’homme,” H.N. II [1749], 439–40) and “Les animaux carnivores, H.N. VII [1758], 29). For remarks on Buffon’s relationship to eighteenth-century French Cartesianism see Roger, Des époques, “Introduction,” p. Ixxix. See also Vartanian, Descartes and Diderot, pp. 262–72.
54. But see below, nn. 58, 60.
55. For example, in the Cartesian dualism that persists in his thought. See above, n. 53.
56. The need for man to dominate and subdue nature by his technology, a theme through numerous articles of the Histoire naturelle, takes on absolute urgency in the Des époques de la nature with the prospects of a gradually cooling and dying earth. See “Ville Epoque,” Roger ed., p. 213. See also “De la Nature, Première vue,” H.N. XII (1764), esp. xiv–xv.
57. As he writes in Des époques: “Comparez en effet la Nature brute à la Nature cultivée; comparez les petites nations sauvages de l’Amérique avec nos grands peuples civilisés; comparez même celles de l’Afrique...; voyez en même temps l’état des terres que ces nations habiuent,
you jugerez aisément du peu de valeur de ces hommes par le peu d'impression que leurs mains ont faites sur leur sol; soit stupidité, soit paresse, ces hommes à demi-brutes, ces nations non policées, grandes ou petites, ne font que peser sur le globe sans soulager la Terre, l'affamer sans la féconder, détruire sans édifier, tout user sans rien renouveler." (Des époches: "VIIe Epoque," Roger ed., pp. 211–12). See also "De la nature, Première vue" H.N. XII (1764), xii–xiii.

58. H.N. XIV (1766), 336 ff. The relevant section of this article was also reprinted under the title "Sur la dégénération des animaux par le mélange des espèces," in Collection académique VIII (1770) "Appendix," 25–30. The growing strain upon the empirical validity of the interbreeding criterion can be observed in Volume Eleven of 1764, where Buffon is forced into arguing that the one and two-humped camels are conspecific because of fertile interbreeding, even though their specific distinctness has been recognized "beyond all memory," "Le Chameau et le dromadaire," H.N. XI (1764).


60. As Lord Kames writes in justification of his polygenic theory with direct reference to Buffon and the interbreeding criterion: "Has [Buffon] proved this to be a law of nature? On the contrary, he more than once mentions several exceptions. ... Though in distinguishing a horse from an ass, he affirms the mule they generate to be barren, yet afterward, entirely forgetting his rule, he admits the direct contrary." Henry Home, Six Sketches on the History of Man (Philadelphia: R. Bell, 1776; first published London, 1774), I, 7–8. Kames' assertion is, of course, strengthened considerably by Buffon's further weakening of the interbreeding criterion in the 'Des mulets' of 1776 (supplement to H.N. III), in which Buffon now cites empirical evidence for the fertility of hybrids and claims that hybrid sterility is simply a matter of degree. The apparent inconsistency of Buffon's position is only enhanced by the rearrangement of the articles in some later editions of the Histoire naturelle. The English translation by William Smellie (2nd ed.), for example, places in a single volume Buffon's articles on the horse, the ass, the "Degeneration of Animals," and the dissertation on mules.


63. Blumenbach, "On the Natural Variety of Mankind," (1795), in Anthropological Treatises. Blumenbach acknowledges, however, the difficulties raised by Buffon and others against the interbreeding criterion, and is inclined to accept a morphological criterion of species (p. 73) without going so far as to embrace polygenesis. He acknowledges later in the treatise, however, that interbreeding is usually a valid sign of conspecificity.

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65. Samuel Stanhope Smith argues, for example, with evident consternation, that the whole force of the eighteenth-century appeal to a universal human nature and a moral sense as a foundation of ethics depends purely on the unity of the human species, a unity which he feels rests solely on the debatable empirical validity of Buffon's interbreeding criterion. An Essay on the Causes of the Variety of Complexion and Figure in the Human Species, ed. W. D. Jordan (Cambridge, Mass.: Belknap Press, 1965) (reprint of 2nd ed., 1810), pp. 8–10.

66. For an indication of Buffon's popularity, at least as reflected in the holdings of private libraries of Enlightenment France, see D. Mornet, "Les Enseignements des Bibliothèques privées (1750–80)." Revue d'Histoire littéraire de la France XVII (1910), 460. In order of frequency of holdings, the Histoire naturelle ranks third, preceded only by Bayes' Dictionnaire and the works of Marot. Diderot's Encyclopédie, by comparison, ranks in twenty-first position.