

the sudden insight that had dawned on him when comparing the puma and the lion is extended in the same breath to cover the whole series of larger mammals. The animals file past him one after another as though they were just coming forth from Noah's ark. One by one the naturalist looks them over, and each in turn is refused American citizenship, *jure sanguinis et jure soli*.

"Elephants belong to the Old Continent and are not found in the New . . . one cannot even find there any animal that can be compared to the elephant for size or shape."⁵ The only animal that bears a remote similarity is the tapir of Brazil, but this creature, America's largest, "this elephant of the New World," writes Buffon, with heavy irony (as if to say "this ridiculous little miniature elephant of the Americas"), "is the size of a six-month-old calf, or a very small mule."⁶ It is a newborn calf, a baby mule, a pocket pachyderm.

There are no rhinoceroses. Nor hippopotamuses. Camels, dromedaries, giraffes are completely unknown. "There are no real monkeys in America."⁷ The type of camel known as a llama is an even more wretched creature than the tapir. It looks big "on account of its extended neck and the length of its legs." But even if it stands on stilts and cranes its neck, it remains a small animal: "The *pacos* is much smaller still."⁸ The comparisons could be continued. But they all confirm that the biggest American animals are "four, six, eight, and ten times" smaller than those of the Old Continent.

At the same time the species of quadrupeds are much less numerous in the New World than in the Old. Buffon counts one hundred and thirty in the Old and less than seventy in the New. The latter has therefore a more limited selection of species, and those which it has are generally more puny. The immediate conclusion is unavoidable: "Living nature is thus much less active there, much less varied, and we may even say, less strong."⁹

5. *Oeuvres complètes*, XV, 402.

6. *Ibid.*, pp. 429-30. And elsewhere, with even more evident contempt: "This tapir, this elephant of the New World, has neither trunk nor defenses and is scarce bigger than a donkey!" ("Des époques de la Nature," in *Oeuvres complètes*, V, 224).

7. Cf., *contra*, Fr. Acosta: "There are innumerable monkeys" (*Historia natural y moral*, IV, 39; ed. cit., p. 333). The passage is quoted also by Garcilaso, *Comentarios reales de los Incas* (ed. Rosenblat, Buenos Aires, 1943), VIII, 18.

8. *Oeuvres complètes*, XV, 402-04, 429-30, 435. On the morphological relations between the giraffe, the camel, and the llama, see also XIX, 46. Cf. below, chap. 7, n. 311: the llama, "a fine diminutive" of the camel.

9. *Oeuvres complètes*, XV, 429. This summary verdict is quoted in a footnote by Marmontel, *Les Incas* (Paris, 1777), p. 22, and paraphrased by Flourens, *op. cit.*, p. 145. As the examples show and, moreover, as he himself sometimes cautions, Buffon nearly always had in mind only South America. In North America there are a few Old World species (the wolf, the reindeer, the fallow deer, certain fur animals)—a fact which causes him serious embarrassment (see H. Daudin, *De Linné à Jussieu* [Paris, 1926], p. 142; also below, n. 103 and chap. 5, n. 434). Even today the problems of the South American

II. THE DETERIORATION OF THE DOMESTIC ANIMALS

This weakness of nature is confirmed by the fate of such domestic animals as were introduced into America by the Europeans. It is one long story of failure. In the new continent all of them dwindled, shrank, became reduced to dwarves, caricatures in miniature of their prototypes:

The horses, donkeys, oxen, sheep, goats, pigs, dogs, all these animals, I say, became smaller there; and . . . those which were not transported there, and which went there of their own accord, those, in short, common to both worlds, such as wolves, foxes, deer, roebuck, and moose, are likewise considerably smaller in America than in Europe, and *that without exception*.¹⁰

Sheep and goats were successfully acclimatized in America, but "they are generally thinner." The rams "in general are of less tender and less succulent flesh than in Europe." And to sum up—but always "in general"—one may say that "of all the domestic animals transported from Europe to America the pig is the one which has had the best and most general success."¹¹

III. THE HOSTILITY OF NATURE

The argument can thus take a step forward. Indigenous animals are few and small. Imported animals have become smaller and less appetizing (with the exception of the pig). Thus the environment or nature of America is hostile to the development of animals. The purely geographical comparison is succeeded by a genetic criterion, and in this direction Buffon forges fearlessly ahead to extend his observations on quadrupeds to all "living nature":

There is thus, in the combination of the elements and other physical causes, something antagonistic to the increase of living nature in this new world: there are obstacles to the development and perhaps even to the formation of the great seeds; those very seeds which have received their fullest form, their most complete extension, under the beneficial influence of another climate, are here reduced, shrunken beneath this ungenerous sky and in this empty land, where man, scarce in number, was thinly spread, a wanderer, where far from making himself master of this territory as his own domain, he ruled over nothing; where having never subjugated either animals or the elements, nor tamed the waters, nor governed the rivers, nor worked the earth, he was himself no more than an animal

fauna remain largely unsolved; see the provocative observations of H. Krieg, "Tiergeographische und ökologische Beobachtungen und Probleme in Südamerika," in *Tier und Umwelt in Südamerika* (Hamburg, 1940), pp. 1-34.

10. *Oeuvres complètes*, XV, 444. Cf. J. Roger, *Les sciences de la vie dans la pensée française du XVIII^e siècle* (Paris, 1963), pp. 574-75. There may be an element of truth in this thesis. In America the art of stockbreeding remained for a long time in arrears of the more advanced European techniques (cf. Daniel J. Boorstin, *The Americans: The Colonial Experience* [New York, 1966], p. 261). And the natural pastures of America were inferior in nutritive value to those of the Old World (Franklin J. Jameson, *The American Revolution Considered as a Social Movement* [Princeton, 1940], pp. 50-51).

11. *Oeuvres complètes*, XV, 412, 414.

of the first order, existing within nature as a creature without significance, a sort of helpless automaton, powerless to change nature or assist her. And she, Nature, had treated him less as mother than as stepmother, withholding from him the sentiment of love or the strong desire to multiply. For although the savage of the New World is of almost the same stature as the men of our world, that does not suffice for him to be an exception to the general rule of the reduction of living nature in the whole continent. The savage is feeble and small in his organs of generation; he has neither body hair nor beard, and no ardor for the female of his kind. Although lighter than the European, on account of his habit of running more, he is nevertheless much less strong in body: he is also much less sensitive, and yet more fearful and more cowardly; he lacks vivacity, and is lifeless in his soul; the activity of his body is less an exercise or voluntary movement than an automatic reaction to his needs; take from him hunger and thirst, and you will destroy at the same time the active cause of all his movements; he will remain either standing there stupidly or recumbent for days at a time.¹²

IV. THE IMPOTENCE OF THE SAVAGE

The passage is important above all for the function that it assigns to man. Being few in number and weak, the men of the New World were unable to tame a hostile nature, to conquer and subjugate her virgin power and turn it to their own profit. Instead of collaborating in the development of the animal species and the improvement of domestic types, man himself remained subject to the "control" of nature, a passive element in nature, an animal like the rest—hardly *primus inter pares*. Unwittingly Buffon lets himself be drawn on by the thread of his own argument and extends his negative verdict on the quadrupeds to the American savage. Man is no exception. In fact, he is rather worse off than the other animals on account of this sexual frigidity of his: "Nature, refusing him the powers of love, has maltreated and belittled him more than any other animal."¹³

The particular connection between the impotence of the savage and the absence of large wild beasts—an idea typical of that subtly scabrous eroticism of the eighteenth century—seems to suggest to Buffon another great step forward in his argument. The savage is cold. The snake is cold. Cold-blooded animals are cold. In America reptiles and insects abound

12. *Ibid.*, pp. 443–46; cf. Roger, *op. cit.*, p. 562. The loss of stature as a sign of degeneration, as well as the explanation of this by means of the obstacles to the *grands germes*, can be traced back to Pliny, who saw the human race "in the future becoming less rich in seed on account of its progressive drying-out through use" (*Naturalis Historia*, VII, 15, quoted by A. Lovejoy and G. Boas, *Primitivism and Related Ideas in Antiquity* [Baltimore, 1935], pp. 101–02). The absence of hair, which was to give rise to so much discussion, can be traced back, among modern authors, to de Maillet, who had noted in the *Telliamed* (1748), in words identical to those of Buffon, that "the Americans . . . have neither body hair nor beard" (*Telliamed, ou entretiens d'un philosophe indien . . .*, 2d ed. [Paris, 1755], II, 215; but already the editor of this "new edition" noted that "Telliamed is mistaken" because the savages remove the hair they have by plucking it and use depilatories!).

13. *Oeuvres complètes*, XV, 446–47; and L. Bertin et al., *Buffon* (collection Les Grands Naturalistes Français [Paris, 1952]), p. 80. On the other hand Rousseau (*Discours sur l'inégalité* [Paris, 1839], pp. 549–50) naturally praised the erotic moderation of the savage as proof of his placid obedience to natural instinct, being excited neither by murky fantasies, nor female wiles, nor absurd jealousies.

and often in gigantic size. There is no part of the world where the insects are so large as in America. "Toads, frogs, and other beasts of this kind are also very sizable in America."¹⁴ Half the animal kingdom swells, while the other half shrinks. What is required is *one* explanation that can account for the *two* phenomena:

Let us now see why there are found in this new world such large reptiles, such big insects, such small quadrupeds, and such cold men. This is accounted for by the quality of the earth, the condition of the sky, the degree of warmth and humidity, the situation, the elevation of the mountains, the quantity of running or stagnant waters, the extent of the forests, and above all the crude state in which nature is found.¹⁵

Et voilà pourquoi votre fille est malade!

V. THE COLD AND HUMIDITY OF THE AMERICAN ENVIRONMENT

But this confused compendium of causes brings to the fore two very relevant features: the crude state of nature and the marshy aspect of the country. Oviedo had already repeated almost to the point of excess that "these Indies are a very wet land," that "this land is very wet," etc.,¹⁶ and Father Acosta had gone so far as to say (1590) that in fact "the greater part of America, on account of this excess of water, is not fit for habitation."¹⁷ And the reason? The great strength of the sun which draws up the vapors of the ocean and in the cool of the afternoon brings about their condensation into rain¹⁸—an incomplete meteorological explanation, but more rational than that of a flood or an imperfect drying out.

Buffon in his turn portrays the miry continent with all the magic of his descriptive style, giving us a profuse foretaste of Victor Hugo's poetic land "still soft and sodden from the flood" where man makes the disturbing discovery of the giants' footprints (*Booz endormi*), and of that unformed Brazil where "the land has still the softness of the earliest times."¹⁹ The naturalist describes in vivid colors the warm soft climate, with its moist unhealthy vapors which promote the dense growth of a suffocating vegetation, and he concludes:

In this state of abandon, everything languishes, decays, stifles. The air and the earth, weighed down by the moist and poisonous vapors, cannot purify themselves nor profit from the influence of the star of life. The sun vainly pours down its liveliest rays on this cold mass, which is incapable of responding to its warmth;

14. *Oeuvres complètes*, XV, 447–48. On the hyperbolic dimensions attributed to American frogs, see P. G. Adams, *Travelers and Travel Liars, 1660–1800* (Berkeley, Calif., 1962), p. 233, and see below, p. 300.

15. *Oeuvres complètes*, XV, 448.

16. *Historia general y natural*, I, 268b, 289b, 383a, 457b, etc.

17. *Historia natural y moral*, II, 6; ed. cit., p. 103.

18. *Ibid.*, II, 7; ed. cit., p. 107.

19. C. Lévi-Strauss, *Tristes tropiques* (Paris, 1955), p. 178.

it will never produce anything but humid creatures, plants, reptiles, and insects; and cold men and feeble animals are all that it will ever nurture.²⁰

So we come back to the point of departure, according to which nature in America is weak because man has not tamed it, and man has not tamed it because he in his turn is cold in love and more similar to the cold-blooded animals, closer to the watery putrescent character of the continent. And the erotic-hydraulic explanation of the singularity of American nature goes round and round in this same vicious circle:

It is thus principally because there were few men in America and because the majority of these men, leading an animal-like existence, left nature in its wild state and neglected the earth, that it has remained cold, incapable of producing active principles, developing the seeds of the great quadrupeds, for whose growth and multiplication there are required all the warmth and activity that the sun can give to a loving earth; and it is for the contrary reason that the insects and reptiles, and all the species of animal that crawl in the mud, whose blood is water, and who flourish in putrescence, are more numerous and larger in the low wet marshy lands of this new continent.²¹

The "loving earth" on the one hand and these animals that have water instead of blood in their veins on the other sum up in two vivid images the very nucleus of Buffon's theory.

VI. PUTRESCENCE AND GENERATION—WATER AND LIFE

But what is the origin of this theory linking the humidity of the surroundings with the abundance of insects and snakes? Everything points to its being a leftover of the protracted seventeenth-century debate on the spontaneous generation of worms and vipers from putrefying bodies or sodden earth. Father Kircher was satirized by Redi for his claims to have known snakes to be burned, crumbled to pieces, buried in earth sprinkled with rainwater, and then after eight days to produce "little worms" which when fed on milk and water became "perfectly shaped snakes."²² Buffon's cold animals "which abound in putrescence" are descended from these "snakes breeding from putrescent matter" against which Redi argued.

20. *Oeuvres complètes*, XV, 452. See also the famous description of the "savannahs of South America . . . peopled with unspeakable animals . . . the cesspools of nature . . . impassable regions, still unformed," swarming with an "impure race" of reptiles and insects "swollen by the humid heat" (in *Morceaux choisis de Buffon* [Paris, 1829], p. 83).

21. *Oeuvres complètes*, XV, 452-54. On the connection Buffon makes between cold and humidity, on the one hand, and weakness, sterility, and death on the other, see Lesley Hanks, *Buffon avant l' "Histoire naturelle"* (Paris, 1966), pp. 173-74, 191. The example used is precisely that of the American forests, although by Buffon's time climatologists had already refuted that ancient theory. Cf. also Bertin, *op. cit.*, p. 71.

22. *Esperienze intorno alla generazione degli insetti* (1668; ed. Florence, 1688), pp. 63-64. Father Kircher also maintained that Noah did not need to take reptiles and insects into the ark, because these animals are born spontaneously from putrefaction (see D. C. Allen, *The Legend of Noah* [Urbana, Ill.,

But in searching for the antecedents of the thesis of spontaneous generation from putrescent matter, one can go all the way back to Aristotle, for whom it explained the appearance of flies and mosquitoes (in accordance with his general theory of the four elements, in which the corruption of one is the generation of the next). It was reaffirmed specifically for snakes by Pliny, and taken up in modern times as an anti-ascetic motif by Le Roy (1579), by Vanini (1616),²³ in an apologetic and Catholic function by Tasso (1607),²⁴ and only defeated and demolished by Pasteur's famous experiments on fermentation. And not even then definitively: in his last treatise Claude Bernard discusses (and does not actually reject) the thesis that "life is a putrefaction . . . life is no more than decay"²⁵—a statement with a peculiarly preexistentialist flavor about it.

Buffon, in order to avoid the dogmas of creationism and the theories of preformation, had adopted an expanded theory of "spontaneous generation," based on the incorrect observations (1745–48) of his friend Needham, the microscopist, who had observed swarms of infusorians pullulating in the warm broth of his faultily sealed test tubes.²⁶ Buffon then was convinced by the idea of inferior forms of life springing from humidity and decayed matter. The decayed, the wet, the newborn thus came to be for him related aspects of a single reality—which helps to explain how his ideas on American nature wavered between "immaturity" and "decay," between a world in embryo and a world already rotting.

Perhaps Buffon also had in mind the widespread popular belief that toads are born from water or sodden earth. St. Augustine had already mentioned, for example, that "frogs are born from the earth."²⁷ Father Bartoli repeated that frogs "are formed instantaneously when in summer a

23. For Le Roy, see D. C. Allen, "The Degeneration of Man and Renaissance Pessimism," *Studies in Philology*, 35, no. 2 (April 1938), pp. 225–26. For Vanini, who apparently elaborated the ancient atomistic hypothesis of Epicurus, see G. Spini, *Ricerca dei libertini* (Rome, 1950), p. 130.

24. Monsters and birds of the air that "her extinct body produced from putrid limbs; or seedless and fatherless the ancient mother still produces and bears from her warmed and humid womb" (*Il mondo creato*, VI, 1244–47, ed. Petrocchi [Florence, 1951], p. 251).

25. *Leçons sur les phénomènes de la vie communs aux animaux et aux végétaux* (Paris, 1878), pp. 156, 176–77. For the history of this thesis, see E. Guyénot, *Les sciences de la vie aux XVII^e et XVIII^e siècles* (Paris, 1941), pp. 209 ff. The connection between decay and life was also theorized in reverse (i.e., by making the former an effect of the latter) by certain seventeenth-century theologians who, going beyond the fearful Augustinian doctrine of the *massa damnata*, insisted on seeing in every generation an element or principle of corruption, a step which widened irrevocably the distance from the original perfection of Adam *ante peccatum*; see V. Harris, *All Coherence Gone* (Chicago, 1949), pp. 187–88.

26. On Needham, see, for example, Delisle de Sales, *De la philosophie de la Nature* (Amsterdam, 1770–74), IV, 114–20, 241–42n.; and more recently, E. Nordenskiöld, *The History of Biology* (New York, 1936), pp. 225–26, 430; Guyénot, *op. cit.*, pp. 194–95, 220–26; T. Monod, "En relisant Monsieur de Buffon," in *L'hippopotame et le philosophe* (Paris, 1946), p. 424; Paul Hazard, *La pensée européenne au XVIII^e siècle* (Paris, 1946), I, 183–84, 192; Roger, *op. cit.*, pp. 494–520. On Buffon, see E. Genet-Varcin, "La génération des êtres vivants d'après Buffon," in Bertin, *op. cit.*, pp. 149–50.

27. *De Civitate Dei*, XVI, 7. But see even earlier Genesis 1:20: "Producant aquae reptile animae viventis," and St. Basil, *Hexaemeron*, VII, followed by Tasso: "Let the waters now bring forth . . .

drop of water falls from the clouds into the dry dust.”²⁸ And the great Vico records it as a well-known fact that “frogs are born from the earth, with the summer rains.”²⁹ Juan and Ulloa, actually referring to the American Portobello, had said that “the great number that there are of them [toads], and the fact that they all appear after a cloudburst, has led some people to believe that each drop of water is converted into a toad.”³⁰

Buffon must, no doubt, have taken these abundant rainy embryologies as particular instances providing just the confirmation he wanted for what he himself had arrived at by intuition: a notion of awe-inspiring pessimism, a truly tragic viewpoint, according to which the meanest, most abject, most minuscule species are at the same time those which multiply with the most terrifying fertility. It is this morbid fecundity of the lower forms which assures their survival, while in the superior species, the larger, more beautiful and powerful animals, it is their noble courage and serene strength which enables them to protect themselves.³¹ The elephant and the lion hold sway over the shapeless rabble of the unnumbered insects. Their trumpeting and roarings drown the feeble croaking of the myriads of batrachians. America, the moist, prolific mother of these minute and evil little animals, devoid of the great wild beasts, must have seemed to Buffon’s eyes to be marked with the indelible stigma of some repugnant organic weakness.

Some years later Oliver Goldsmith was quick to accept Buffon’s thesis that “the smallest animals multiply the fastest,”³² an idea that turned upside down the apologetic pleadings of the theologians, who had shown themselves quite willing to defend the usefulness of the insects, their lawful worthiness, their value as instruments of divine justice, and even the meager fecundity of their more harmful species!³³

Over the years the idea of prolificity as a passive defense of the lower

28. *La ricreazione del savio*, 1659, in Ezio Raimondi, ed., *Trattatisti e narratori del Seicento* (Milan-Naples, 1960), p. 520.

29. *Scienza nuova*, ed. F. Nicolini (Bari, 1911-16), p. 279; cf. F. Nicolini, *Commento storico alla seconda Scienza nuova* (Rome, 1949-50), I, 39, 115-16, 233-34; II, 234.

30. *Relación histórica*, II, 5, ed. Madrid, 1748, I, 137; cf. earlier F. Carletti, *Ragionamenti* (1594; ed. Milan, 1926), pp. 26-27.

31. See the passages quoted and discussed by W. Lynskey, “Goldsmith and the Chain of Being,” *Journal of the History of Ideas*, 6 (1945), pp. 366-67; and Bertin, op. cit., p. 73. Already Tasso, still following St. Basil, had stressed the meager fecundity of the “savage and untamed beasts” in contrast with the providential fertility of the tame and domesticated animals, which otherwise would have been devoured by the wild ones and made extinct (*Mondo creato*, IV, 738-40; ed. cit., pp. 137-38; and VI, 989-1015; ed. cit., p. 244).

32. *A History of the Earth and Animated Nature*, pt. II, bk. II, chap. 15 (London-Edinburgh ed., Fullarton and Co., n.d., I, 265); cf. J. H. Pitman, *Goldsmith’s “Animated Nature”* (New Haven, 1924), p. 130.

33. F. C. Lesser, *Theologie des insectes, ou Démonstration des perfections de Dieu dans tout ce qui concerne les insectes* (trans. from the German with remarks by P. Lyonnet [the Hague, 1742]), I, 122-23; II, 256-59; cf. P. Hazard, op. cit., I, 125.

species had an eventful history: it was supported by Bonnet too (1764);³⁴ revived by de Pauw;³⁵ justified by Herder as an instrument of providence for the evolution of the nobler and less numerous species, with man as the peak of this “pyramid of creatures”;³⁶ twisted by Brissot into the theory of the continuous and providential extermination of the overproductive species, whether useful or harmful;³⁷ welcomed by Father Molina;³⁸ rediscovered by the naïvely surprised Leopardi;³⁹ and in time endowed with almost proverbial standing.⁴⁰ But its ultimate destiny was to be taken over by representatives of the opposite extreme, so to speak, by much later biologists and ecologists with their idea of the “pyramid of numbers”: “Every animal feeding on another species that is lower in the food chain must select a species that is much more numerous and usually one that is smaller”⁴¹ — a theory as close to the banality of the big eating the little as it is removed from the inspired and impassioned visions of both Buffon and Bonnet.

Buffon’s “application” of these ideas to the New World is too facile. But already a century and a half earlier (1616) Goodman, in his efforts to demonstrate the universal decadence and corruption of the cosmos, had ascribed this same feebleness and misfortune in maternal capacity to the whole earth: “Not able to produce courageous Lions, brave Unicorns, fierce Tigers, stout Elephants, shee makes it her taske and imployment to be the mother, the midwife of wormes, of gnats, and of butterflies.”⁴² And in the following century a poet who had read Buffon (see below, p. 375) was to come back, half in jest and half in desperation, to the theory of multiplication of insects as a sign of the imminent end of the world:

34. C. Bonnet: “The fruitfulness of the species is always proportional to the dangers which menace the individuals” (quoted by Daudin, *op. cit.*, p. 175n.).

35. “Nature . . . has, as one knows, increased the degree of fecundity in proportion to the smallness of the animals” (*Défense des Recherches philosophiques sur les Américains* [Berlin, 1771], p. 97).

36. *Ideen*, X, 2; *Idées sur la philosophie de l’histoire de l’humanité*, trans. E. Quinet (Paris, 1827–28), II, 221–25; cf. *Forerunners of Darwin: 1745–1859*, ed. B. Glass, D. Temkin, W. C. Strauss, Jr. (Baltimore, 1959), p. 209.

37. *Recherches philosophiques sur le droit de propriété et sur le vol* (Paris, 1782), pp. 312 ff.; W. Stark, *America: Ideal and Reality* (London, 1947), pp. 84–85.

38. G. I. Molina, *Memorie di storia naturale* (Bologna, 1821), II, 49: “The species of bigger [animals] . . . are less abundant in individuals.”

39. “I believe that the absolute multitude of each species of animals is in direct relation to their smallness . . . look up the naturalists and see if any of them have made this observation” (*Zibaldone*, ed. Flora [Milan, 1938], I, 102).

40. For example: “Like all the lower organisms, poor books multiply prodigiously, though the total number is kept down by a corresponding mortality” (Samuel M. Crothers, “The Hundred Best Books,” in *Among Friends* [Boston–New York, 1910], p. 69).

41. W. Vogt, *The Road to Survival* (New York, 1948), p. 91.

42. Godfrey Goodman, *The Fall of Man, or the Corruption of Nature* (London, 1616), pp. 16, 19, quoted by Harris, *op. cit.*, p. 44. His ideas also influenced some of the earliest writers investigating the raw state of nature in Australia: Bernard Smith, *European Vision and the South Pacific, 1768–1850* (Oxford, 1960), p. 172.

The scientists say that our planet is growing old, and it is therefore quite possible that the multiplication of insects, more and more noticeable with each passing year, is a festering symptom of the approaching death of the world. O tragic end to the world—to be consumed by lice! *Phthiriasis universalis*, one enormous swarm of lice! Ugh!⁴³

But already in the eighteenth century, for that matter, the earliest students of the population problem had been pointing with either dismay or satisfaction to the sterility of the aristocracy and the unbridled fertility of the poorer classes, and the theory of extreme productivity among the lowest orders of humanity was taken up again after Malthus and Humboldt⁴⁴ by a whole host of philosophizing sociologists and racist demographers; particularly popular at that time were the speculations about a possible “fecundity differential” in the human race, an idea persisting here and there even today. According to this notion the socially and anthropologically “inferior” elements, such as the peasants in the south of Italy, the proletariat of the city slums, or the simple country people of India and China, multiply more rapidly than the “superior” classes: a theory that paves the way for Fra Melitone’s grotesque and horror-struck pronouncement: “But such beggars are of a truly terrifying fecundity.”⁴⁵ Thus these misguided statisticians took what had been originally a hypothetical consequence of Original Sin and succeeded in extracting from it a corollary demonstrating the scientific necessity of poverty.⁴⁶

43. N. Lenau, in a letter of 17 May 1844, in *Sämtliche Werke*, ed. Castle (Leipzig, 1913), V, 184. Lenau’s anxiety is repeated in the contemporary scientists who have expressed their fear of the ruinous consequences that may result from the indiscriminate use of insecticides and pesticides. Insects are not only prolific and have a rapid reproductive cycle, but mithridatize themselves and become immune to chemical poisons. This is not the case with the higher animals—birds and mammals—whose species are much less numerous and whose reproductive cycles are slower. An unchecked use of insecticides over vast areas of the globe “might well result in the final extinction of many species of song-birds and innumerable other kinds of life which we value, leaving a population of insects which is completely resistant!” (W. H. Thorpe, Professor of Zoology at Cambridge, in a review of Rachel Carson’s *Silent Spring*, in the *Observer*, 17 February 1963); cf. also Kenneth Mellanby, *Pesticides and Pollution* (London, 1967), reviewed in the *Times Literary Supplement*, 9 November 1967.

44. Charles Minguet, *Alexandre de Humboldt, historien et géographe de l’Amérique espagnole, 1799–1804* (Paris, 1969), p. 511.

45. F. M. Piave, *La forza del destino* (1861), act 4, sc. 2: “Ma tai pezzenti sono di una fecondità / Davvero spaventosa.”

46. See D. E. C. Eversley, *Social Theories of Fertility and the Malthusian Debate* (Oxford, 1959), passim, but especially pp. 51–58 (“poverty breeds men”), 116, 123, 135, 151 (illiteracy and fertility), 159, 166, 169, 172 (hunger and fertility), 178, 187 (fecundity of the lower animals and of the poorer people), 189, 195. Cf. also *The Determinants and Consequences of Population Trends* (United Nations Population Studies, no. 17), pp. 74, 80–81, etc. One of the most recent students of the problem, Colin Clark, finds that the thesis of the fecundity of the lowest classes, as expounded in the 1930s, was approximately true in the nineteenth century, but is no longer so in the twentieth: “the larger families, so said the writers of those days (and some do still, in spite of the evidence to the contrary), are to be found among rural rather than urban population, among uneducated rather than educated, among poor rather than rich; and so, as a country becomes urbanized, better educated, wealthier, its productivity is bound to decline. These generalizations were on the whole true in the nineteenth century; but this was only a transitory phase”: in the most recent decades in France, England, Sweden, and the United States, it is the wealthier, better-educated, and urbanized families that have shown themselves more prolific (C. Clark, “Do Population and Freedom Grow Together?,” *Fortune*, 62, no. 6 [December 1960], pp. 137–38; cf. Eversley, op. cit., pp. 267–58).

But Buffon, with his distinctions and comparisons, had already removed the discussion from the level of tired and wilting theology to a plane that was at least embryonically scientific. His objective was not the contrition of the faithful but a better understanding of how our world is made.

Later on Hegel, arguing against the idea that nature lives and develops in time, be it centuries or millennia (and thus moving away from the beginnings of historicism already at work in Buffon), was to pour out his scorn on the “nebulous” fantasies of animals and plants being born from water.⁴⁷ But if we try to place these beliefs in the context of the remote past to which they belong, we are forced to recognize that the derivation of life from water is perhaps the most ancient of the scientific explanations, and one of humanity’s remotest myths. In historical times one can go back at least as far as the first Greek philosopher, Thales of Miletus, who—in Vico’s satirical words—“began from too insipid a principle, water; perhaps because he had seen pumpkins grow with water.” As for prehistoric times, Frazer has conjured up pictures of spring storms whose torrential rains revive the animal and vegetable life, and the Wizard Kings whose magic can release the cataracts of the heavens. The Bible teaches us in its very first lines that God created the water before the land and the animals and the plants.⁴⁸ And the lively imagination of the Middle Ages associated life with water in the legends of the fountain of youth and the immortal “Rhine maidens.”

To even the dullest mind, water suggests the unceasing flow of life—fresh, agile, fugitive. “Water, that is life begun anew.”⁴⁹ Even the learned Florentines who gathered in academy in 1540 called themselves *gli Umidi*, “the wet ones,” hoping thus for “strength and sustenance, just as created things grow and are maintained with the assistance of humidity.”⁵⁰ But a knowledgeable and inquisitive naturalist like Buffon was certainly aware of the bold conjectures of de Maillet (1735, 1748) for whom life derived from the ocean, and all animals and man himself were descended from corresponding marine species, when the sea slowly withdrew from the mountaintops, leaving the valleys and the plains dry.⁵¹ And he must certainly have been familiar with that “well-known” fact, that without water the greater organisms die once and for all, “while for the smaller, lesser organisms the withdrawal of water only suspends life,” and that

47. *Enzyklopädie*, sec. 249. Cf. below, pp. 420–21.

48. Genesis, 1:2; see F. E. Jacobi, *Sulla dottrina dello Spinoza* (Bari, 1914), pp. 163–64, following G. Bruno, “De la Causa, Principio ed Uno,” in *Dialoghi metafisici* (Bari, 1925), p. 242.

49. J. Michelet, *La Montagne* (Paris, 1868), p. 44.

50. J. Rilli, *Notizie . . . dell’Accademia Fiorentina* (Venice, 1700); quoted by Croce in a note (*Critica*, XL, 232) in which the “dry” is reciprocally characterized as “the death of all physical and spiritual life.”

51. B. de Maillet, op. cit., see especially the sixth *Entretien*, which concludes ritually with the section: “The conformity of this system with Genesis.” On de Maillet see among others, Roger, op. cit., pp. 520–26.

one only has to sprinkle with fresh moisture the dried-out tissues of rotifers, tardigrades, or maggots taken from blighted corn to see these miniscule and almost always harmful little animals revive and begin to move.⁵² The life that lies latent within them can be reawakened with a few drops of the nearest available dew. The dampness of the New World meant that it was predisposed if not predestined to succor an unending swarm of insects, snakes, and amphibians. In fact, it was easier for Redi in the seventeenth century to laugh at Father Kircher's "blessed little handmade serpents" than for Buffon in the eighteenth century to free himself from the recent and ancient mental association of the liquid with the living.

VII. AMERICA AS A NEW CONTINENT

Another noteworthy fact in the last passage quoted from Buffon is the reemergence of a genetic explanation, at first on the physical level, and immediately afterward in reference to the humanity of America, much like the ideas we have just been admiring. Physically America is a new world, or at least considerably newer than the old, a world that remained a longer time beneath the waters of the sea, that in fact only recently emerged and is not yet properly dried out. On the human level, America is a continent still intact, as yet unpossessed by man and therefore unhealthy for civilized peoples or superior animals. After recalling how recent the historical records of the Mexican and Peruvian dynasties are, how little of the past is penetrated by the chronicles of the Americas, Buffon leaps from history to prehistory:

Everything then seems to indicate that the Americans were new men, or, to be more accurate, men who had left their homeland so long ago as to have lost all notion of it, all idea of the world from which they had issued.⁵³ All the evidence seems to point toward the greater part of the American continent being a new land, still untouched by men, in which nature had not had time to carry out all her plans, to develop herself to the full; the men are cold and the animals small, because the ardor of the men and the size of the animals are dependent on the healthiness and the warmth of the air; in several centuries, when the earth has been tilled, the forests cut down, the rivers controlled and the waters contained, this same land will become the most fruitful, healthy, and rich of all, as it is seen to be already in the parts that man has cultivated.⁵⁴

52. C. Bernard, *Introduction à l'étude de la médecine expérimentale* (Paris, 1865), p. 207. The knowledge of these phenomena at the time of Buffon is evident from Littré's examples alone. In 1701 Leeuwenhoek made experiments on tardigrades and saw them pullulate as soon as he wet them and "these facts have had a great reverberation" (C. Bernard, *Leçons sur les phénomènes de la vie*, p. 85).

53. An incidental reaffirmation of the Buffonian thesis of the unity of the human race.

54. *Oeuvres complètes*, XV, 455-56. Cf. Bertin, *op. cit.*, pp. 81-82 (giving examples of rapid improvement of animal and vegetable species), and below, p. 91.

In his enthusiasm for man's battle to overcome the physical world⁵⁵ Buffon does not quite go so far as to prophesy that the human race will one day succeed in making America teem with wild beasts. Nor will it be able to bring about any increase in the stature of these shrunken local species: the tapir will never be as big as an elephant or a hippopotamus. But "at least the animals transported there will not decrease in size." That's some comfort, anyway.

VIII. THE LARGER SPECIES MORE PERFECT AND MORE STABLE
THAN THE SMALL

Implicit in all these comparisons and conjectures is an assumption that is not stated, but is nevertheless clear, and surprising. Buffon always starts out from the principle that the large is "better" than the small, the bulkier beasts superior to those of less volume, that physical strength is an attribute of the more perfect species. It would be too easy to reply with La Fontaine's boastful little mouse:

Comme si d'occuper ou plus ou moins de place
nous rendait, disait-il, plus ou moins importants! . . .
Nous ne nous prisons pas, tout petits que nous sommes,
d'un grain moins que les Elephants.⁵⁶

It would be too easy to counter with some of the very recent theories according to which the inferior animals are essential in the economy of nature, while the earth could well do without the superior animals: "[It is] a kind of paradox . . . [that] many of the lower forms of animal life [protozoa, insects, invertebrates, and vertebrates down to the smallest mammals] play an essential part in the economy of nature. On the other hand, it is far from easy to prove that some of the higher orders or families of mammals ['large mammals,' such as the ungulates and carnivores, apart from the primates] are necessary to the life scheme of the earth."⁵⁷ And it would be too easy to remind him in this respect of those primitive species, massive and hugely powerful, that have completely disappeared from the face of the earth: the dinosaurs and the *Baluchitheria*, in comparison with which the pachyderms and hippopotamuses dear to Buffon would make an even meaner showing than the tapir compared with the

55. On Buffon's lofty concept of man, understood in the Renaissance sense as a force opposed to nature, see, for example, G. Lanson. *Histoire de la littérature française*, 3rd ed. (Paris, 1895), p. 742; E. Faguet, *Dix-huitième siècle* (Paris, 1894), pp. 444-48. For Buffon, as already stated, the human race is one, and therefore, unlike the animals, is not bound to climate or geographic zones: "Man, white in Europe, black in Africa, yellow in Asia, and red in America, is only the same man tinted with the color of the climate" (*Oeuvres de Buffon*, IX, 2, quoted by Flourens, op. cit., p. 154).

56. *Fables*, bk. 8, fable 15: "As if occupying more or less space should make us, said he, more or less important! . . . Small as we may be, we don't esteem ourselves one jot less than the elephant."

57. Fairfield Osborn, *Our Plundered Planet* (London, 1948), pp. 64-65.

elephant, or the llama craning his neck as he strives to compete with the giraffe.

When at a later stage in the development of his ideas he has to recognize that the mammoth is extinct, one detects a strange admiration, a Bossuet-like note of heartfelt sorrow in his funeral oration for the enormous beast: "The prodigious mammoth no longer exists anywhere. This species was certainly the first, the largest, the strongest of all quadrupeds; since this species has disappeared, how many others, smaller, weaker, and less noteworthy, must have perished without having left us evidence or information on their past existence."⁵⁸

Thus for Buffon the mammoth assumes symbolic value, just as the great men of the world did for Bossuet, those whose deaths furnished an exemplary warning to we other "less noteworthy" and duly awestruck mortals. The *oraison funèbre* has a different subject, but the same tone.

Buffon has somewhat vague ideas on the state of the fauna before the flood, but he is not the man to shrink from any problem that presents itself to him. The problem of the relationship between the size and the evolutionary state of an animal is squarely faced and discussed in his essay bearing the significant title *Concerning the Degeneration of Animals* (1766): "The size of the body, which appears to be only a relative quantity, does in fact have positive attributes and real significance in the ordering of nature: the larger animal is as fixed in this ordering as the smaller is variable."⁵⁹ It is the advantage of the great over the small to be fixed and invariable. Or, if we break up this law into its component elements: the large is superior to the small; the fixed is superior to the changeable; the large is more fixed than the small.

All these relationships seem at first to be somewhat arbitrary. Let us consider them one by one.

IX. BUFFON'S AVERSION FOR MINUTIAE AND SMALL ANIMALS

The probable source of Buffon's preference for large animals, or at least a point of some significance in his psychological makeup, was the fact that he himself was a man of commanding physical presence. Buffon was a strong, well-built person and proud of it. Hume found that he

58. Passage quoted by E. Perrier, *La philosophie zoologique avant Darwin* (Paris, 1884), p. 64. It was precisely the huge animal fossils that induced Darwin to undertake a critical revision of Buffon's theory; see below, p. 454.

59. *Oeuvres complètes*, XIX, 21, repeated by Goldsmith, op. cit., I, 260. Cf. Glass, op. cit., p. 103. It seems possible to find a somewhat sounder logical foundation for another of Buffon's theses, clearly related to this one: namely that short-lived animals have undergone more changes or are more variable (from the prototypes) than long-lived ones, because, in an equal span of time, they have passed through a considerably greater number of generations (cf. Glass, p. 100). And one could draw direct corollaries concerning the cold and humid continent (America) from the related Buffonian theory that the larger animals are also those with more heat, which degenerate when heat is lost (or do they degenerate through loss of heat on the part of the environment?) (Glass, p. 236).

had more the build and manner of a marshal of France than a scientist.⁶⁰ "He was very fond of taking objects and creatures in order of size," and he began his history of the birds with the ostrich "which is as it were the elephant of the genus."⁶¹ In fact, "it seemed as though the greater stature with which he himself had been endowed by nature made it difficult for him to lower himself to study the smaller things. He would willingly consider the cedar of Lebanon, but the hyssop seemed too small to warrant his interest."⁶² The fly, he once curiously stated, must occupy no more space in the naturalist's mind than it does in nature.⁶³

Such disdain was completely anachronistic at a point in time when a good century and a half had passed since Father Acosta first warned his readers that "from the very meanest and smallest animals one may derive much important study and profitable philosophy" (*Al lector*). It was no less long ago that Galileo's defense of his "little" satellites of Jupiter had included an eloquent and highly original plea for the virtue of tiny things, of minuscule animals and organs of restricted volume, concluding with a hymn of praise to Nature for deriving and producing "the most marvelous operations . . . from the most tenuous means."⁶⁴ Giannone (and after him Costantino) had insisted in his unpublished *L'ape ingegnosa* on "the perfection of very small animals like the ants and the bees";⁶⁵ Aldovrandi, following in the footsteps of the author of a 1564 treatise on painting, had exalted the beauty of the insects: "Thus the wisdom of God shines forth in these minuscule little animals";⁶⁶ Torquato Tasso had exalted "the great power of the great Lord, revealed in the tiniest things";⁶⁷ and the revolution brought about in biology by the Dutch microscopists was already nearly a hundred years old. One of the earliest English microscopists, Henry Power (1632–68), a disciple of Thomas Browne, had written in 1663 that the ancients, since they did not possess that miraculous instrument, described the very smallest animals "perfunctorily . . . as the disregarded pieces and hustlement of the Creation. In these pretty

60. C. A. Sainte-Beuve, *Causeries du lundi* (Paris, n.d., but 1924–28), II, 79; XIV, 330.

61. *Ibid.*, X, 61.

62. *Ibid.*, IV, 357.

63. *Ibid.*, X, 61. For similar contempt for the oyster, etc., see Daudin, *op. cit.*, pp. 155–56. "The passage from the small to the large often occupied Buffon's attention, which is not surprising really, considering his two predominant interests: comparisons and great dimensions" (Hanks, *op. cit.*, p. 205; cf. pp. 209, 213, 226).

64. Letter of 21 May 1611, to Mons. P. Dini, in *Epistolario* (Leghorn, 1872), I, 121–22. From the telescope to the microscope: in 1624 Galilei took with him to Rome the *occhialino* that enabled him "to see the smallest things from close to" and with which he had "contemplated many tiny creatures with infinite admiration" (quoted in G. de Santillana, *Processo a Galileo* [Milan, 1960], p. 316).

65. G. Ricuperati, "Alle origini del *Triregno*: la *Philosophia Adamito-noetica* di A. Costantino," *Rivista Storica Italiana*, 77, no. 3 (1965), p. 606.

66. E. Battisti, *L'antirinasimento* (Milan, 1962), p. 271; and in *Le soleil à la Renaissance* (Brussels, 1965), p. 175.

67. *Mondo creato*, V, 596–97; ed. *cit.*, p. 176.

Engines are lodged all the perfections of the largest animals. . . . Ruder heads stand amazed at prodigious and Colossean pieces of Nature, but in these narrow Engines there is a more curious Mathematicks."⁶⁸ The style is elegant, but the accusation leveled at the ancients not altogether justified. One can find almost the same words in the greatest naturalist of classic times. It was Pliny who pointed out at the beginning of his description of the insects (including the fly) that nowhere else does nature display such artifice; and that the vulgar masses (and Buffon!) were wrong to admire the elephants, bulls, lions, and tigers "when nature can only be seen in its entirety in the most miniature creatures."⁶⁹

Take Buffon's contemporaries too; a couple of years before his *Histoire naturelle* began to appear, La Mettrie published his *L'homme machine* (1747), with its eulogies of the proteiform character of matter and the omnipotence of Nature: "No, . . . Nature knows no limitations to her workmanship. . . . Her power shines forth equally in the creation of the meanest insect or the proudest man."⁷⁰

But all in vain. Buffon remained as indifferent to the ancient Pliny's reverent regard for the whole universe and the enthusiasm of the doctor, his contemporary, for the physical world as he did to the coupled lenses of the latest optical devices. His disdain for the most diminutive creatures was reinforced by another particular physiological characteristic of his,

68. Quoted in "The New World of Robert Hooke," *Times Literary Supplement*, 5 January 1946. Hooke himself, in his *Micrographia* (1665), had celebrated the grace, beauty, and strength of the smallest insects. Even the authoritative American, Cotton Mather, after seeing some tiny little worms under a microscope, perorated in one of his sermons (1689): "How Exquisite, how Stupendous must the Structure of them be." Huge whales, floating islands whose length can exceed a hundred feet, are less worthy of admiration than those minutest of fish (quoted by W. M. Smallwood, *Natural History and the American Mind* [New York, 1941], pp. 197-98). And the sermonizing American Emerson was to repeat: "The microscope cannot find the animalcule which is less perfect for being little" ("Compensation," in *Selected Essays*, ed. Nelson, p. 44).

69. *Naturalis Historia*, XI. 1. Pliny's words are echoed in Oviedo, who finds ants more wonderful than elephants, and are exactly repeated by Linnaeus: "Nature is never more complete than in the smallest creatures" (quoted by Daudin, op. cit., p. 157n.).

70. J. Offroy de La Mettrie, *L'homme machine*, ed. M. Solovine (Paris, 1921), p. 139. Similar expressions from Lesser, op. cit., I, 2-10, 113-14; II, 100-02, 122-26, and passim, and Henry Baker, *The Microscope Made Easy*, 2d ed. (London, 1743), are quoted by A. Vartanian, "Trembley's Polyp, La Mettrie, and XVIII Century French Materialism," *Journal of the History of Ideas*, 11 (1950), p. 268. The Jesuit Daniello Bartoli, in his *Ricreazione del Savio* (1659), had already taken up Tertullian's and Augustine's thesis that God is "greatest of all in his smallest creations" and expatiated with pleasure on the magnificence of "contemptible" little animals, such as snails, which even he had observed, by the thousands, under a microscope (in E. Raimondi, op. cit., pp. 517-31). In his *Amusement philosophique sur le langage des bêtes* (1739), the Jesuit Father G. H. Bougeant had pronounced that "ignorance alone, and false prejudice, can induce us to make some distinction of preference amongst the animals based on their greatness or smallness" (op. cit., ed. Petin [Paris, 1783], p. 78). See also the quotations in Roger, op. cit., pp. 233-39, 448; Bonnet's observations on nature which "works in miniature" (quoted by E. L. Tuveson, *Millennium and Utopia* [Los Angeles, 1949], p. 182); the admiration of Delisle de Sales for "the prodigious magnificence of nature in the infinitely small beings" (*Philosophie de la Nature*, II, 286; cf. *ibid.*, IV, 10-15); that of Father Clavigero for the "smallest animals, in which the power and wisdom of the Creator shines forth most" (*Storia antica del Messico* [Cesena, 1780], I, 105); and the analogous words of Pope Pius XII, according to whom "even the most humble creatures, like the microbes, reflect the Creator's perfection" (*Il Mondo*, 29 September 1953).

namely his shortsightedness, so serious as to prevent him from even using the microscope; and further buttressed by a psychological trait, once again negative, namely his unwillingness to involve himself in details or minutiae. This characteristic, a reflection of his faith in his own genius (although it was Buffon himself who coined the phrase “genius is merely an infinite capacity for taking pains”), comes out clearly in the way he refers to the “courage” it takes to “busy oneself continually with little objects, the examination of which requires the coldest patience and makes no demands on true talent.”⁷¹ It is obvious again in the celebrated reply to the chemist who wanted to carry out an experiment to check one of Buffon’s intuitions: “The best crucible is the mind”;⁷² and once again when he expresses his boredom with the thousands and thousands of species of birds: “I have no desire to do any more work on feathers.”⁷³ It is visible again in the curious statement he made, which earned him the ridicule of the students of games and probability calculations, that a “small” probability, less than one in ten thousand, is a “negligible quantity” that can safely be ignored;⁷⁴ in his complaint that in order to classify a plant according to Linnaeus’s system “one must go microscope in hand” to observe not the stem, the shape, or the leaves, but just “the stamens, and if one cannot see the stamens, one knows nothing, one has seen nothing”;⁷⁵ and finally in the contemptuous comments he makes after stating some facts about the intestines of birds of prey: “I leave the exact verification of this fact to those people who busy themselves with anatomy,”⁷⁶ and his haughty refusal to be called a “naturalist” or even a “great

71. *Histoire des animaux*, quoted in *Correspondance inédite de Buffon*, ed. H. Nadault de Buffon (Paris, 1860), II, 335–36, and in C. Sainte-Beuve, *Causeries du lundi*, X, 350.

72. C. Sainte-Beuve, *Causeries du lundi*, IV, 350; D. Mornet, *Les sciences de la nature en France au XVIII^e siècle* (Paris, 1911), p. 114. For him, chemistry was a sort of culinary art, to be practiced in the kitchen and not in a laboratory: “Speaking one day with Monsieur de Buffon on the present ardor of chemical enquiry, he affected to consider chemistry but as cookery, and to place the toils of the laboratory on a footing with those of the kitchen” (letter of Thomas Jefferson to James Madison, 19 July 1788, *Papers*, ed. Julian P. Boyd [Princeton, 1950–], XIII, 381).

73. Quoted by Franck Bourdier, “Principaux aspects de la vie et de l’oeuvre de Buffon,” in Bertin, *op. cit.*, p. 35.

74. Karl Georg Zinn, “Buffons Beitrag zur Sozialwissenschaft—Die Entdeckung der messbaren Psyche im 18. Jahrhundert und die wertsubjektivistische Konsequenz,” *Jahrbücher für Nationalökonomie und Statistik*, 181, no. 4 (March 1968), p. 346.

75. 1749, quoted by Daudin, *op. cit.*, p. 126n.; on the danger of “falling into too many little details,” cf. also *ibid.*, p. 154n. Mornet (*op. cit.*, p. 114) records another of his aphorisms: “The mind’s eye is enough to perceive the real existence of all these little beings, without the microscope.”

76. C. Sainte-Beuve, *Causeries du lundi*, X, 62. “Buffon is right; there are a thousand things that one must leave to laborers, otherwise one would be crushed, and one would never reach one’s object” (Hérault de Séchelles, *Voyage à Montbard*, ed. Jouaust, 1890, p. 46). These words seem to echo Maupertuis, who described as “the philosophers’ laborers” those “indefatigable observers” who waste time examining the auricular apparatus of certain fish or measuring how far a flea can jump, “not to mention so many other miserable undertakings”; minute details “are the sign of the limited genius of those who give themselves up thereto” (quoted by Roger, *op. cit.*, p. 466). See also P. Hazard, *op. cit.*, I, 192, and Hanks, *op. cit.*, p. 181 (antipathy for repeating experiments). Contemporary examples of impatience in the study of natural minutiae: B. Smith, *op. cit.*, pp. 33, 63.

naturalist”: “Naturalists, linkboys, dentists, etc. . . . people who live by their work; a thing ill suited to a gentleman,” whereas he himself insists on his native and inalienable claim to gentility: “I am a gentleman amusing myself with natural history.”⁷⁷

Buffon always says simply, “I had a rabbit [or a dog] opened up,” never “I opened up,” which has been explained, perhaps too superficially, as the reluctance of the gentleman to dirty his own hands with work he considered more becoming to the butcher.⁷⁸ But was the plebeian and systematic Linnaeus in fact very different, when he asked his correspondents to attempt some dissection (of branchiostegals) and then happily carried on without using the precise data furnished by the anatomists and the voluminous detail (on infusorians) contained in the “micrographers’ books”⁷⁹ And did not Vico, another great man who trusted a little too much in his own unarguable genius, write at the beginning of his *Scienza nuova*: “Diligence must be set aside when one is working on subjects that have a greatness about them, because it is a small virtue, and being small likewise slow”⁸⁰ Diderot, too, warned scientists in one of his writings inspired by Buffon that “one fails humanity in observing everything indistinctly.” Posterity demands that great men spend their time better. “What would posterity think of us if all we had to hand down to it was a complete insectology, some immense history of microscopic creatures. Great minds must tackle great themes; the smaller things belong to lesser minds.” After all, if these lesser minds did not have these minutiae to keep them busy, they would not produce anything at all.⁸¹ *De minimis non curat praetor.*

And lastly even the greatest disciple and follower of Buffon, the half-blind Lamarck, disliked having to come down to earth from his lofty observatory where he would remain entranced with the vision of the metamorphoses of living creatures; and in his lectures—so we are told by an unexpected listener—“he would show himself a mortal enemy of the chemists, the analysts and experimenters in miniature, as he would call them.”⁸²

77. Victor Jacquemont, *Correspondance inédite avec sa famille et ses amis, 1824–32* (Paris, 1867), I, 134.

78. Pitman, op. cit., p. 39. Buffon has also been reproached for having spent too much time on polishing his sentences and consequently not enough on detailed and patient experiments (Mornet, op. cit., pp. 207–08).

79. Daudin, op. cit., pp. 75–76.

80. *Scienza nuova*, ed. cit., pp. 11–12; the maxim is taken from Longinus and used elsewhere too by Vico (B. Croce, *Il carattere della filosofia moderna* [Bari, 1941], p. 56; and *Quaderni della Critica*, nn. 17–18, p. 99); cf. F. Nicolini, *La giovinezza di G. B. Vico* (Bari, 1932), pp. 62 ff.

81. Diderot, *Pensées sur l'interprétation de la nature* (n.p., 1754), pp. 79–80.

82. Amaury, in C. Sainte-Beuve's *Volupté*, chap. XI (ed. Paris, 1881), p. 136.

X. QUANTITATIVE CRITERIA AND LITERARY SCRUPLES

The particular interest of these various comments lies in the fact that they reveal in Buffon a psychological attitude not unlike Hegel's in his outbursts of sarcasm and impatience with Master Krug,⁸³ and seem to foreshadow to some extent the naturalist's high-handed arbitrariness with the facts and data of the world, including the Americas. Buffon tells the scientist he cannot afford to waste time on the fly. Hegel was to write that science has other things to do than deduce a rose, a dog, a cat, or even Master Krug's pen. In a celebrated passage from the *Philosophy of History* he throws out the whole discussion about the future of America, which, he says "doesn't interest us," since it belongs neither to history nor philosophy, "which already give us enough to do."⁸⁴ This same impatience with lesser matters receives even more striking and comprehensive expression when he expounds his theory that history should concern itself only with the "great" occurrences, and ignore or leave to the writers of romances the "micrology" of the minor details, the little individual events.⁸⁵ But unfortunately the introduction of the notions of large and small is highly dangerous for the understanding of reality. *Qui incipit metiri, incipit errare* — "he who begins to measure begins to err." Diderot knew this so well that he once wittily put forward plans for a "great work" destined to confute the "mathematicians": the *Treatise on the Aberration of Measurement*.⁸⁶

In Buffon, however, the insistence on quantitative characteristics is not merely psychological in origin, but has a literary motivation too. In every page of his writings one is struck by his enthusiasm, his flowing oratory. For every species lovingly described he tries to bring out some particular feature of excellence which allows him to linger over and enhance the portrait of that species, turning its instinctive reactions into human qualities. An almost inevitable result of this tendency is the making of comparisons of less and more, of better and worse, leading on to a desire to discover the fundamental reasons for such distinctions. The animals are no longer considered for themselves, but in respect to each other, the puma as weaker than the lion, the elephant as larger than the tapir. As early as 1770, Mme d'Épinay's plain common sense had noted

83. See the essay of the Jena period: *Wie der gemeine Menschenverstand die Philosophie nehme*, in *Werke* (Berlin, 1834), XVI, 56–58, *Phänomenologie des Geistes*, ed. Lasson (Leipzig, 1921), p. 69; *Enzyklopädie*, sec. 250; and Croce, *Saggio sullo Hegel* (Bari, 1913), p. 116. The target of Buffon's impatience, however, is minutiae; that of Hegel's, the pretense of deducing empirical realities logically, be they large or small.

84. Ed. Brunstäd (Leipzig, n.d., but ca. 1907), p. 134.

85. See Croce, *Saggio*, pp. 100–01.

86. *Pensées sur l'interprétation de la nature*, p. 3.

the weak point in Buffon's argument. "Why does he insist on pronouncing these eulogies or funeral orations over every species he names? *One is what one is*. One should set forth the chain of creatures, it seems to me, and not have them trespass upon each other's territory."⁸⁷

This was in fact just the period when the theory of the chain of being was revived and temporalized by Robinet (1761–68), and also particularly Bonnet (1770). But Buffon, consistent in his opposition to any sort of rigid systemization, always refused to be enticed by the attractions of this splendid metaphysical structure. Nor was the naturalist at all impressed with the evolutionary theories that were slowly emerging with these ideas of a chain or scale or column of species and prototypes; Buffon at first (1749) expressed his doubts over the validity of the whole concept of species, and finally only accepted species as entities independent of time, invariable units, the real "constants" of creation.⁸⁸ For Buffon, we must remember, it is the privilege of the "large" animal to be fixed and not subject to variation.

XI. THE STABLE SUPERIOR TO THE CHANGEABLE: ARISTOTLE

What strikes one particularly in this basic subthesis is not the logical connection made between large and stable, but the tacit assumption that the stable, the fixed, the invariable has some special virtue setting it off from the variable; that the unchanging species are by nature superior to the changing ones. To alter means to drop in rank. The varieties of a species all are explained as degenerations from a prototype. Leaving aside some major species, such as man, the elephant, the rhinoceros, the hippopotamus, the tiger and lion, which hold a proud place apart, "the privilege of being an isolated species depends less on shape than on size" — the other species mingle with their neighbors and form "deteriorated affinity groups," types that have degenerated *ab immemorabili*.⁸⁹

87. Letter of 6 November 1770, in *La signora d'Epina y e l'abate Galiani, Lettere inedite (1769–1772)*, ed. F. Nicolini (Bari, 1929), p. 114, my italics. In the version published by Perey and Maugras (*Correspondance de l'abbé Galiani* [Paris, 1881], I, 288–89), the concept of the "chain of being" is developed and other variants are noted.

88. A. O. Lovejoy, *The Great Chain of Being* (Cambridge, Mass., 1942), p. 230. Robinet (*De la Nature*, 1761–68) amended the old idea of the continuity of all natural forms, of the infinite chain which included every possible phenomenon and variety, asserting that the differences were merely quantitative. Through his reduction of specific differences from the qualitative to the quantitative, Robinet approaches the Buffonian theory of American fauna: "All the differences in nature must be differences of degree. Her most extreme productions must be recognized as mere exaggerations of something normal" (summarized by A. G. F. Gode-von Aesch, *Natural Science in German Romanticism* [New York, 1941], p. 143; cf. Lovejoy, op. cit., pp. 275–76). W. Lynskey ("Chain of Being," esp. pp. 367–68) has pointed out curious traces of the chain idea in Buffon. But in reality Buffon (like Robinet) always insists emphatically, even in the passages quoted by Lynskey, on the continuity of the real, on the imperceptible gradations of the physical world, or, in fact, on the critical principle *Natura non facit saltus*, much more than on the Platonic metaphysical architecture. For him nature is not a monumental staircase soaring up to the heavens, but an ever so gently inclined plane.

89. Daudin, op. cit., pp. 138, 140; Guyénot, op. cit., pp. 397–99.

One immediate result of this belief in the superiority of the fixed over the variable is that any tendency toward historicism in Buffon remains stifled and without issue. The theory owes its origins to Scholasticism, or rather to Aristotle. Buffon himself recounts how one day after considerable labor he thought he had discovered "a very clever system on generation"; but, he adds, "I open Aristotle, and what do I find but all my ideas in this wretched Aristotle. In fact, it's the best thing Aristotle did, for heaven's sake!"⁹⁰

It is in fact well known that for the Stagyrite invariability is an attribute of perfection, just as immobility is an attribute of the Prime Mover; this is the way he translates into the realm of strict logic and incorporates in a system that superiority of the eternal incorruptible Ideas which Plato and even certain pre-Socratics had arrived at intuitively. Matter, mere Potentiality, is that which is moved and altered without itself moving or altering. Between God (the Pure Act) and nature (mere Potentiality) comes the whole range of natural phenomena, from the fixed stars, ethereal, immutable, close to God's presence, right down to the changeable and chaotic terrestrial world.⁹¹ The more stable a thing is the more it is divine and happy to remain similar to itself (*αἰδιον*); the more variable it is the further it is separated from God, and subject to corruption. In the world of nature, every natural substance is corruptible (*φθαρτόν*), but the species are eternal (*αἰδιον*). The species does not change for Aristotle; and if it does so for Buffon, it is wrong.⁹² In earlier times the alchemists had venerated the fixity or unalterability of gold, in which they saw proof of its incorruptible perfection, and medieval science had been dismayed by the Copernican revolution and certain other advances in astronomy, such as the discovery of transient comets and sunspots, which

90. Hérault de Séchelles, op. cit., p. 28.

91. Cf. Dante, *Paradiso*, VII, 124 ff.

92. In times much closer to our own, Lovejoy has characterized the "classic" point of view as a yearning for uniformity with certain canons of excellence supposedly invariable and conforming to a postulated static constancy of nature (A. O. Lovejoy, "Optimism and Romanticism," *PMLA*: 42 [1927], pp. 942-43, quoted in H. M. Jones, *Ideas in America* [Cambridge, Mass., 1944], pp. 257-58), and John Dewey sees the fundamental error of the ethic of the philosophers and of modern societies in the transference to the moral world of that putative superiority of the eternal, the identical and the invariable which did exist for ancient science but which modern science has by now completely abandoned: "Changes of kind or species in plants and animals were observable only when monstrosities appeared" (by which every alteration seemed a degeneration; cf. also R. G. Collingwood, *The Idea of Nature* [Oxford, 1945], pp. 133-34; and Maupertuis, according to whom "most mutant forms are deleterious and at a disadvantage in comparison with the normal and wild types" and "all the varieties . . . tend to become extinguished; they are the deviations of nature"; see Glass, op. cit., p. 76). "Belief in the eternal uniformity of human nature is thus the surviving remnant of a belief once universally held about the heavens and about the living creatures" ("Challenge to Liberal Thought," *Fortune* [August 1944], p. 180). On this point one might observe that ethical values are, by definition, universal categories, while concepts of species or the laws of nature are typical abstractions. The legitimate criticism of the supposed absolute validity of these abstractions cannot be extended to the very principles of knowledge and to the basic criteria of every possible judgment as if they were particular instances of these abstractions. The constancy of human nature, in a broad sense, is an a priori, not an object of science.

meant that not even the fixed stars were exempt from change and corruption.⁹³ Following the very same path Buffon now takes up the lingering relics of Scholasticism to develop the thesis that the "large" is stable while the "small" is variable, and arrives at the point where he can attribute an objective superiority to the large over the small, and in point of fact sets up a classification of living beings in which they are ranked by volume.

Medieval natural science, influenced by the same canons and principles, had insisted on quantitative categorization; in this it had followed Pliny, who often describes the animals in order of size; this is the attitude which comes to be summed up poetically in Dante's "Greater health the greater body has"⁹⁴ and in the mythologizing of the great beasts like the whale and the elephant.⁹⁵ But Dante himself, rejoicing that Nature had

93. Abundant information, although limited to English literary history, in G. Williamson, "Mutability, Decay and XVII-Century Melancholy," *ELH: A Journal of English Literary History*, 2, no. 2 (September 1935), pp. 121-50; in D. C. Allen, "The Degeneration of Man" ("pessimism, developing from the mutation of things," p. 219); in Harris, op. cit., p. 2 and passim; and in Frank N. Egerton, "The Longevity of the Patriarchs: A Topic in the History of Demography," *Journal of the History of Ideas*, 27, no. 4 (October-December 1966), p. 578. Gordon L. Davies, "The Concept of Denudation in Seventeenth Century England," *Journal of the History of Ideas*, 27, no. 2 (April-June 1966), pp. 278-84, complains that the kernel of truth contained in those theories, namely the importance of erosion and "denudation" of the earth, was lost as eighteenth-century optimism prevailed. Davies quotes Hakewill, Goodman, and Burnet, and concludes by recalling the renewal of these "degenerative" (but only in a telluric, not a zoological, sense) theories on the part of Buffon. Cf. in particular the theories of the "pessimist" Goodman on "privation" as an agent, almost antidialectic, so to speak, of the changes and hence of the "corruption" of nature (Harris, op. cit., pp. 29-30, 187); and, in opposition, the reply of the "progressive" Hakewill, who cautions against confusing "changeableness" with "decadence" (pp. 55-56, 62, 79-80), and still leans desperately on the incorruptibility of the heavens as a guarantee of the constancy of nature (pp. 63-64). On Hakewill, see Perry Miller, *Errand into the Wilderness* (Cambridge, Mass., 1956), p. 220. The "decadentist" thesis was taken up again by Pierre du Moulin (Harris, op. cit., p. 117) and by William Drummond of Hawthornden (Harris, pp. 139-40), while the other was espoused by Tasso, who reaffirms the perpetuity and constancy of the species; no species whether through catastrophe, plague, or slaughter "was ever left extinct or deficient" (*Mondo creato*, V, 1618-19; ed. cit., p. 209); by John Donne in his youthful eulogy of inconstancy (Harris, op. cit., p. 124); by scientists in general after about 1635, who taught that one should see in changeability "a fluctuation rather than a degeneration" (Harris, p. 161); and naturally by the "moderns" in their battle against the "ancients" (Harris, p. 171). Thus the polemic over the decadence of nature ended by merging with the disputes which resulted in the elaboration of a new concept of Progress. And the accent shifted perceptibly from the physical to the human and historical world. But Buffon remained always on the plane of nature. The position of the great Newton had been similarly ambiguous (1706), for according to him the cosmos is a machine that runs down like a clock, ever less perfect and precise in its movements, tending, in short, toward dissolution, so that periodic adjustments are necessary on the part of the Creator, who intervenes from time to time by means of comets, until the salvation and regeneration of the world will be completed by the second coming of Christ on earth: thus decadentism and millenarianism join forces (David Kubrin, "Newton and the Cyclical Cosmos: Providence and the Mechanical Philosophy," *Journal of the History of Ideas*, 28, no. 3 [July-September 1967], pp. 325-46).

94. Dante, *Paradiso*, XXVIII, 68.

95. On the mythicizing of the elephant, see for example, *Physiologus*; Gelli, *Circe*, where it is the only animal that consents to return to being a man; and G. Boas, *The Happy Beast in French Thought of the Seventeenth Century* (Baltimore, 1923), pp. 28-35 (Gelli), 39 (Rorario), 44 (P. Gilles). Buffon's portrait of the elephant, "the most considerable creature of this world" (except for man) for its physical, moral, and intellectual virtues, loved and respected by all the animals, is particularly appealing. Chateaubriand, too, was to say that the elephants, "noble by nature," after the Fall stayed close to the cradle of the world, only leaving it to come and replace their companions who had died without issue in the service of man! (*Génie du christianisme*, pt. I, bk. V, chap. 9; ed. Paris, 1877, I, 117-18).

forgotten "the skill of creating suchlike animals," had expressed his horror of giants and had added that if Nature herself did not "repent of elephants and whales" this is because these great beasts are stupid, and therefore so much less dangerous than giants, who combined with "their evil will and strength . . . the power of the intellect."⁹⁶

With this feeling of slight discomfort before such monstrous creatures, Dante seems to be reaffirming the classic taste for measure and fair proportion, and the subordination of nature to man. Even this "greater body" capable of greater "health" in fact refers to the heavens and is anyway immediately qualified: "provided it is equally well finished in all its parts."

XII. VOLUME AND PERFECTION IN MODERN ZOOLOGY

Some centuries were to elapse, however, before the criterion of size was definitively rejected. Bonnet was still asserting in 1764 that the larger animals are more intelligent and endowed with greater "bodily perfection" than the insects.⁹⁷ But with the dawning of the era of modern zoology, quantitative consideration of the animals was mentioned by Cuvier as the prime error that his new fundamental zoological classification would combat.⁹⁸ Nevertheless, before putting aside once and for all this ancient and ingenuous criterion, one should examine and be prepared to accept such factual truth as it does contain. Claude Bernard notes that "there are significant correlations between the size of an animal and the intensity of its vital phenomena. In general the vital phenomena are more intense in small animals than in large ones."⁹⁹ And a contemporary naturalist, J. B. S. Haldane, has lamented the fact that zoologists generally have paid very little attention to the differences in size between animals. Although he makes no specific reference to Buffon's work, Haldane follows the same line of approach and arrives at the notion of a structural superiority of the larger animals over the small: "The higher animals are not larger than the lower because they are more complicated. They are more complicated because they are larger." The most obvious advantage of size is the capacity it provides for maintaining body heat. And in fact "small" animals cannot live in the colder climates, nor even in the colder

96. *Inferno*, XXXI, 49-57, followed by Tasso in the *Mondo creato*; the earth obeys God, "although the ancients in their madness imagined it as Mother of savage monsters and giants" (III, 1099-1100; ed. cit., p. 97; cf. V, 553-57, p. 175).

97. Quoted in Daudin, op. cit., pp. 103-04, 109-10. Linnaeus attributed to natural instinct the expositive order beginning with man and ending with the smallest animals.

98. "If one considers the animal kingdom according to the principles just expounded, freeing oneself from the established prejudices on the divisions formerly admitted, and attending only to the organization and nature of the animals, and not their size, their usefulness, our greater or lesser knowledge of them, or all the other accessory circumstances, one will find . . ." (*Recherches sur les ossements fossiles des quadrupèdes* [1812], quoted in the *Encyclopedia Britannica*, 11th ed., s.v. "Zoology").

99. C. Bernard, *La médecine expérimentale*, p. 213.

seasons of temperate climates.¹⁰⁰ It is quite clear then that there was and is some solid foundation for Buffon's premise; that there exists at least a tenuous link between the volumetric displacement of animals and the immutability of the species in time.

XIII. THE INSTABILITY AND DECADENCE OF THE DOMESTIC SPECIES

Nature then, for Buffon, is not subject to the law of progress. It is at best immobility, at worst degeneration. And man himself brings about this degeneration of nature when he intervenes in nature seeking his own progress in defiance of nature. By the same token the wild beasts, not being subject to the actions of men, but closer to nature, are also less subject to change and degeneration: "Their nature seems to vary according to the different climates, but nowhere is it degenerate." Such a thesis was naturally bound to be attractive to the champions of nature in its pure state, uncorrupted by man's attentions. It revived the idea, once so staunchly held by Montaigne, that wild fruits are superior to cultivated ones: "It is the fruit that we have altered with our artifices and modified from the common order that we should really call wild. In natural fruits we can still find alive and active the true, useful, and natural virtues and properties, which we have adulterated in our cultivated fruit."¹⁰¹ And it brought the added strength of scientific proof to ideas that were already familiar from Rousseau's impassioned intuition: "Nature treats with special favor all animals abandoned to her care." The wild horse, the wild cat, the wild bull, and even the wild donkey are stronger, more vigorous, and braver in the forest than when domesticated: "They lose half these advantages in becoming domestic, and one might say that the sole result of all our efforts is the bastardization of these types."¹⁰²

The animal species in short are the more perfect the less they have varied, the more similar they have remained to their ideal prototypes. When they change they become weaker. And as they become weaker they leave themselves open to further changes and lose their racial stability. Smallness, changeability, and degeneracy are the alternating characteristics that form the links in the same pernicious chain.

100. "On Being the Right Size." in *Possible Worlds and Other Essays* (1927; ed. London, 1932), pp. 18-26.

101. *Essais* (Paris, 1937), 1, 31, "Des cannibales," ed. Pléiade, p. 213.

102. J. J. Rousseau, *Discours sur l'inégalité* (1754; ed. F. C. Green, Cambridge, 1944), p. 32. Rousseau, in his turn, quotes Buffon on several occasions. The identical thesis is found in Maupertuis (cf. above, p. 23), and in the Buffonian *Animated Nature* of Goldsmith (Pitman, op. cit., pp. 119-20) and, later on, in Humboldt: wild animals are stable, while "modifications in bodily structure and color appear only in the domestic animals" (*Reise in die Aequinoctial-Gegenden des neuen Continents* [Stuttgart, 1859-60], 11, 16, 54).

XIV. REFLECTIONS ON THE NEW WORLD

Let us get back to the Americas. With the sole exceptions of the fallow deer and roe deer, which are larger and stronger in Virginia and in temperate America than in Europe,¹⁰³ all the other animals are weaker and smaller than in the Old Continent: "This great decrease in size, whatever may be the cause of it, is a first kind of degeneration, which cannot have been brought about without considerably influencing the shape."¹⁰⁴

But Buffon remains vague on the causes and phases of this "degeneration." In fact the existence of animals proper to the New World shows that their origin "cannot be attributed to simple degeneration." Other hypotheses are put forward. He suggests for instance that the two continents might once have been joined and that, when the ocean broke forth and submerged the lands which linked the two hemispheres, the species which preferred America found themselves in a differing environment from those which had made their home in Europe. This theory can be traced back substantially to the very earliest naturalists of the New World, to Oviedo and Father Acosta, and is still one of the most widely used by contemporary scientists.

It is true that man seems to be exempted from the general curse laid on the animals of America. Nature may have used a different scale in designing the New World, but "man is the only creature measured with the same yardstick."¹⁰⁵ It is true also that Buffon stresses man's radical difference from the animals: "Man is in all ways the handiwork of heaven; the animals are in many respects mere productions of the earth: those of one continent are not found in the other; those which are found are altered, shrunken, often changed almost to the point of being unrecognizable."¹⁰⁶ But in other passages, as we have already seen, the savage at least is subject to grievous limitations just like the other animals, and sometimes even more so.

One may say, in fact, that in this phase of his thought Buffon sees the American continent as immature, many of the animal species of its southern part imperfect because degenerate, and man afflicted with shortcomings which, although they do not prevent him from adapting himself to his surroundings, do make it extremely difficult for him to adapt these sur-

103. *Oeuvres complètes*, XIX, 22-23. The "skunks or evil-smelling animals of America" constitute another exception, because they exist there in four or five species, instead of the single European species, which is also of an "inferior or less exalted" nature than those of America (*ibid.*, pp. 63-64). See above, n. 9.

104. *Ibid.*, p. 56.

105. *Ibid.*, XV, 415 (a passage quoted by Marmontel too, *Les Incas*, p. 22).

106. *Oeuvres complètes*, XV, 466; cf. Daudin, *op. cit.*, p. 132, and below, p. 156.

roundings to himself, to tame or modify them, and thus to a certain extent cause him to share the sad fate of the higher animals.

XV. NOMENCLATURE AS THE CAUSE OF CONFUSION

The question we must ask ourselves now is this: What is the historical significance and the real value of Buffon's theory?

For a start, when he refuses the puma the noble title of "lion," and so forth, he is only really criticizing the age-old confusion resulting from the application of familiar European names to new species never before seen; from calling the jaguar quite simply a "tiger," and the alpaca a "sheep." "The names had confused the things," as Buffon himself put it.¹⁰⁷ And in another context, after listing various flagrant examples of mistakenly applied zoological labels, he concludes: "I have not attempted to indicate here all the errors in the nomenclature of the quadrupeds; I only want to show that there would be fewer of them if one had paid some attention to the differences of climate, if one had studied the history of the animals enough to recognize, as we did first, that the animals of the southern part of each continent are not found in both at the same time."¹⁰⁸

From a formal point of view then, Buffon's thesis was the result of a need to find some way of overcoming the fact that the zoological types and concepts of the Old World could not be applied exactly as they stood to the natural phenomena of the New. A good two centuries before Buffon, Oviedo had been possibly the first to point out the mistakes in name-giving made by the earlier chroniclers and reporters in their anxiety to draw comparisons between the Old World and the New (the psychological explanation of such mistakes being the greater readiness with which one becomes aware of similarities rather than differences). And again at the end of the sixteenth century Father Acosta had complained that "to many of the things found in the Indies, the first Spaniards gave Spanish names taken from other things to which they bore some similarity, such as *piñas*, *pepinos*, *ciruelas* ['pineapples', 'cucumbers', 'plums'] when in fact they were quite different; nay, the differences between them and what are called by those names in Castile are greater than the similarities."¹⁰⁹

The great philologist Justus Lipsius, a contemporary of Acosta, was another critic of these persistent lexical inaccuracies. Lipsius maintains

107. *Oeuvres complètes*, XV, 23, 421-22; cf. Flourens, op. cit., p. 134. Just as once the philosophers were cautioned against multiplying categories of Being, so "today one must say and repeat ceaselessly to the naturalists, do not multiply names needlessly" (quoted in Pitman, op. cit., p. 85).

108. *Oeuvres complètes*, XV, 462.

109. *Historia natural y moral*, VI, 19; ed. cit., p. 243. And on the banana, which the Spaniards called *plátano* because of "some similarity they found," cf. *ibid.*, IV, 21; ed. cit., p. 248.

that every land has its own characteristic and unvarying fauna.¹¹⁰ It is thus not permissible to apply to the animals of one region the names of the animals of another. There are no bears in Africa; "each animal evidently has its own proper area, according to its nature and characteristics," he goes on. But the Romans, being unfamiliar with the African lions, called them "bears," just as they called elephants "Lucanian cows," and ostriches "sparrows," etc.¹¹¹

After Buffon both Father Molina and Jefferson¹¹² were to come back to the same point, with vehement criticisms of the muddled terminology. But the same thing occurred in physical geography, where its results are still apparent. One hears of mountain "knots" in the Andes, where there exist no such things, of "watersheds" or "divides" that do not divide, and of "passes" which are vast undulating plains disappearing out of sight. And extending the same criticism from the field of nature to that of society, Alfonso Reyes has justifiably lamented the confusion caused by the application of European political concepts to the American political scene.¹¹³

XVI. CONCLUSIONS

A. Buffon and Montesquieu. If at this point, having broken down Buffon's theory into its composite elements and defined its formal aspect, we turn our attention to its central idea, it is immediately revealed as a play of forces in a state of unstable equilibrium.

It contains first of all something found frequently in the eighteenth century, the tendency to interpret the organic link between the living and the natural, the creature and its environment, as a fixed, necessary, and causal relationship—just as Montesquieu established constant and determinate relationships between climates and institutions and customs, between "the nature of the earth" and "political laws." Montesquieu, as is well known, stressed the difficulty of setting up or maintaining free institutions in hot moist climates, which make the people lazy and servile. Buffon, in this respect showing more humanity than Montesquieu, found that man was, up to a certain point, exempt from this causal subjugation

110. Cf. *Physiologia stoicorum libri III* (Antwerp, 1640), bk. II, diss. XIX, pp. 125–26: "Once upon a time God created and produced the earth, the animals, and all you see therein. Certain different species can arise from the mingling of elements, but not absolutely from nothing. Whence comes this diversity then? Tell me, what causes it in Africa? What in furthest Asia? This Europe does not produce either lions or tigers or elephants, nor does it, as they say, nourish them. In the beginning God gave and assigned to each region its own diversity, according to its own particular climate and also its own peculiar nature." Cf. also D. C. Allen, *The Legend of Noah*, p. 130.

111. *Electorum liber II*, chap. 4, in *Opera omnia quae ad criticam propriam spectant* (Antwerp, 1600), pp. 461–62.

112. See below, pp. 213 ff. and 252 ff.

113. E. Romero, *Nuestra tierra* (Lima, 1941), p. 35; A. Reyes, *Ciencia social y deber social* (1941), in *Última Tule* (Mexico, 1942), p. 196.

to nature, and thus established his most important privilege. But as for the other animal varieties, he had no hesitation in "deducing" their qualities from the adverse factors of the soil, the humidity, and the climate. "I have stated principles, and I have seen particular cases adjust themselves thereto as if of their own volition": the famous statement from the preface to the *Esprit des lois* could equally well have been used as Buffon's epigraph.

In fact the naturalist liked to put his own ordered summary of the animal species almost on the same level as Montesquieu's analysis of political and civil laws (and Montesquieu, too, in his turn, made every effort to give his positive laws a scientific dignity equal to that of the laws of nature). Buffon was always happy to recall that his own first volumes and the *Esprit des lois* had come out simultaneously, and that he and Montesquieu had suffered together the torments of the Sorbonne and the assaults of the critics; though he himself managed considerably better than M. le Président to remain unruffled in the face of these attacks.¹¹⁴ In any case Montesquieu was one of the five supreme authors recognized and revered by Buffon. "There are a bare five . . .," he would say, "Newton, Bacon, Leibnitz, Montesquieu, and me."¹¹⁵

But it is none the less true that the application of Montesquieu's methods to the study of the natural world implied a very real scientific revolution. Such an approach took for granted first of all a considerable latitude in criticizing the work of the Maker, which no longer appeared to be perfect in each and every part, since it was now seen to include creatures some more and some less successful, more and less well formed, and even some that were actually enfeebled or corrupt. Buffon is always extremely careful in his choice of words, but this cannot disguise the fact that his attitude is radically different from that of the ancient naturalists, who held it to be their duty to sing the praises of the magnificence of all creation; or even, like Father Acosta, to threaten with the pains of hell whoever aspired to "improve the works which our Maker with highest wisdom and providence ordained in the construction of the universe."¹¹⁶ Already in 1745-52, Maupertuis had demanded of the natural sciences not a mere description or classification, but the explanation of the processes by which the species have changed and animals have altered and diversified. Nature as it appears to our eyes is no more than a ruin, a

114. Hérault de Séchelles, op. cit., pp. 26-27.

115. Ibid., p. 37; see also pp. 44-48, for the plan outlined by Buffon for a treatise on universal legislation ("to take the spirit of all the laws existing in the universe"). "A comparison between Buffon and Montesquieu would be fruitful," wrote Sainte-Beuve, and he provided a rough outline of it himself (*Causeries du lundi*, IV, 366-67).

116. Referring in fact to the projected cutting of the Isthmus of Panama, but a statement which clearly presupposes a reverent adoration for every item of God's handiwork.

nobly proportioned building laid low by a thunderbolt.¹¹⁷ And Diderot repeated (1754): "What we take to be the history of Nature is no more than the incomplete history of an instant," and safeguarding himself with a series of lofty professions of faith in the Bible, he goes on: "Just as in the animal and vegetable kingdoms an individual begins, so to speak, grows, endures a little, fades and passes on—could it not be the same for entire species?"¹¹⁸ Clearly the created world was beginning to take its place in time and become if not actually historicized at least deprived of the attributes of an immobile perfection.

B. Zoological geography: Europe and America. Now examples representing these different levels of development in the natural kingdom were found to be present contemporaneously in the different parts of the globe. Reflection and deduction had decided that they were successive to each other, different stages of one and the same process. But observation revealed their simultaneous existence in this or that part of the globe. "Zoological geography" thus came into being as a provisory formulation of the theory of evolution—an early crystallization of historicist principles applied to the world of nature.

If it immediately showed signs of being affected by an anti-American bias, this was due both to the above-mentioned intrinsic tendencies and to the prevailing intellectual atmosphere of this period. In Buffon, too, one can detect the instinctive preference for the Old World and particularly its focal point, Europe. Although he stands in awe and admiration before the great carnivores, he is still at heart the instinctively superior European, accustomed to observe the strange creatures of other climes with an air of curious if benevolent condescension. Calling the American fauna immature amounted to calling the fauna of the Old World mature and perfect, worthy to serve as criterion and reference point for every other fauna in every corner of the globe. With Buffon "Europeocentrism" becomes firmly established in the new science of living nature. And it is no mere coincidence that this should have happened precisely when the idea of Europe was becoming more fully worked out, more tangible, more forceful;¹¹⁹ nor is it insignificant that just as civil and political Europe was then defined by contradistinction to Asia and Africa, physical Europe should be closing ranks with the other continents of the Old World to present a bold and united front to the American world. The

117. A. O. Lovejoy, "Some Eighteenth-Century Evolutionists," *Popular Science Monthly*, 65 (1904), pp. 244–45, quoted by F. J. Teggart, *Theory and Processes of History* (Berkeley and Los Angeles, 1941), pp. 132–33; and Lovejoy, *The Great Chain of Being*, pp. 255, 268.

118. *L'interprétation de la nature*, ed. cit., pp. 91–92.

119. Cf. P. Hazard, op. cit., II, 221–35; F. Chabod, "L'idea di Europa," *Rassegna d'Italia*, 2, no. 4 (April 1947), pp. 3–17, and 2, no. 5 (May 1947), pp. 25–37, esp. pp. 30–31; C. Morandi, *L'idea dell'unità politica d'Europa nel XIX e XX secolo* (Milan, 1948), esp. pp. 41–44.

philosophers and publicists boasted of how Europe had shown the way to the rest of the world in the civil arts, in her discoveries in the technical field, and in her highly civilized social institutions; and it was actually the discovery of America that marked the date of the beginning of this new and unheard-of power and wealth on the part of the European continent.¹²⁰ Buffon follows just the same trend when he asserts that without doubt all the animals had been created in the Old World, from which some must have emigrated to the New, where in general they degenerated.¹²¹

Using this geographical distribution, and the hierarchy implicit in it, Buffon eluded the strict demands of the Linnaeus-style "systematizers," for whom he never showed anything but a mistrustful hostility; but he did satisfy their lesser requirements, for order, comparison, classification, and "system," which indeed he himself, in tune with them and with his age, felt to be necessary.¹²² It may be true that to achieve this formal unity he made use of abstract antitheses, formed conceptual groupings of things and qualities quite plainly different from each other, and polarized into contrasted classes the "large" and the "small" animals, the Old World and the New.¹²³ But his method of classification and evaluation according to geographical position contained the seeds of an idea of temporal development, and this was enough to save his system from the fatal inflexibility of those other schemes.

C. The new concept of species. The species vary from continent to continent, from the Old World to the New. And they are smaller or

120. "The effect of the discovery of America was to bind Asia and Africa to Europe" (Montesquieu, *L'esprit des lois*, XXI, 21), the first with American silver, the second with the traffic in slaves destined for the Americas.

121. 1766, passages quoted by Daudin, op. cit., p. 142.

122. As early as 1749, Malesherbes reproached him for not having understood Linnaeus and for having ignored the "systematizers" (Flourens, op. cit., pp. 8-9). Both were the object of lively attacks by Diderot, a great admirer of Buffon (*L'interprétation de la nature*, pp. 67-68); while Jefferson, the great adversary of Buffon, would call him "the great advocate of individualism, in opposition to classification" (letter of 22 February 1814, in *The Catalogue of the Library of Thomas Jefferson*, ed. E. M. Sowerby [Washington, D.C., 1952-59], I, 467). Today it is recognized that Buffon loathed schematic classifications of the Linnaeus type, but not classes and categories which were elements of an organic system; that his "descriptions" are the equivalent of the geometers' "definitions" (Perrier, op. cit., pp. 56-62; with reservations, Mornet, op. cit., pp. 113-16, 130-31, 151; Daudin, op. cit., pp. 39n., 166; E. Cassirer, *Goethe und die geschichtliche Welt* [Berlin, 1932], pp. 95-96; Nordenskiöld, op. cit., p. 222; Guyénot, op. cit., pp. 76-77; Glass, op. cit., p. 89; Roger, op. cit., pp. 468, 566-67; Hanks, op. cit., pp. 10, 65, 99-100; Bertin, op. cit., pp. 12, 60, 64); and that what displeased Buffon above all else in Linnaeus was the "awkward and unprepossessing appearance" he gave to natural history (Daudin, op. cit., p. 126; cf. *ibid.*, pp. 128, 153). In general, the enemies of Linnaeus and systems will be found among the observers and lovers of nature (Adanson, 1757, quoted by Daudin, op. cit., p. 121; Rousseau, *Rêveries*, VII, ed. Garnier, p. 72; see also in *Faust*, Mephistopheles's sarcastic advice to the Scholar to "reduce and classify everything appropriately," and for other examples, Mornet, op. cit., pp. 98-104, 123-26).

123. Curious parallelisms and artificial contrasts between the two hemispheres in *Oeuvres complètes*, I, 284. It is also to be noted that Buffon, unlike almost all his friends, admirers, and disciples, looked on the rebellion of the North Americans against England with great coldness and deemed France unwise to have intervened on behalf of the United States (*Correspondance inédite*, ed. cit., II, 369).

weaker in the New World. Buffon's ideas on the weakness of the animals of America foreshadow the later theories of the variability of species—not those which see some sort of progress of the species from the imperfect to the perfect, from the inferior to the superior, but those that talk of species degenerating or possibly becoming weaker in unfavorable environments. Darwin himself was fully aware of the merits and shortcomings of Buffon's argument: "The *first* author who in modern times has treated it (species) in a scientific spirit was Buffon. But . . . his opinions fluctuated greatly at different times [see below, pp. 154–56] and . . . he does not enter on the causes or means of the transformation of species."¹²⁴ There can thus be no doubt that these barely developed intuitions of a real living history of nature, obviously related in Buffon's case to his awareness of the limitations of any schematic classification, form the major scientific result of his tortured inquiries into America's animals.

But if we look a little more deeply into Buffon's theory, we can see that it also contains implications of a logical problem that remains unsolved even today. Buffon never formulates the problem to himself with complete clarity, but instead wrestles with it blindly, with a brave but misguided recklessness. What was the basic problem implicit in Buffon's surprise and "discovery"? Clearly it was the conceivable existence of natural species that are *similar*, but distinct; the enigma of concepts in nature linked by undeniable affinities and yet separated by undeniable and irreducible individual traits. "None of the animals of South America resemble any of the animals of the south of our continent sufficiently for us to be able to regard them as being of the same species."¹²⁵ The puma is not a lion. But between the lion and the puma there are affinities that do not pertain between the fly and the elephant. What is the limit of the concept of species? Where shall we draw the line between the characteristics that seem to link two creatures as one concept, and the features that would make them into two different concepts? The whole logical foundation of the natural sciences is called into question as soon as one attempts to answer this question—even, implicitly, if one's system is built up on an *ad hoc* basis, classifying and defining as one goes along.¹²⁶

124. C. Darwin, *The Origin of Species*, Introd., "An Historical Sketch," Modern Library ed. (New York, n.d.), p. 3; cf. Perrier, op. cit., p. 66; Daudin, op. cit., pp. 130–31, 219n., 231, 234; Lovejoy, *The Great Chain of Being*, pp. 229–30; F. Venturi, *Jeunesse de Diderot (de 1713 à 1753)* (Paris, 1939), pp. 303–08.

125. Only after a long examination can they be "suspected" of being "*the representatives* [*sic*] of some of those of our continent" (*Oeuvres complètes*, V, 224). Locke had already probed into some typical difficulties of the ambiguous concept of species (cf. *Essay Concerning Human Understanding*, III, chap. 6, secs. 33–39), inclining toward an absolute nominalism. On the acknowledgment of the diversity of species as an instinctive form of apprehending reality in its discontinuity, see the provocative observations of C. Lévi-Strauss, *La pensée sauvage* (Paris, 1962), pp. 180–81.

126. On his mistrust of the concept of species (only individuals exist in nature), see Glass, op. cit., pp. 90, 92–93, 96, 107.

Hard on the heels of this formidable problem came the no-less-difficult question of the existence of more or less perfect "species," with the implicit suggestion of teleological forces and evolutionary or degenerative factors. Buffon always remained faithful to a causalistic philosophy of nature, applying it enthusiastically to phenomena quite alien to the mechanism of causes—the concepts of animal species, their geographical instability, the slow varying of generations, in fact to the history, in the full sense of the word, of the world and its organisms. Such an approach revealed simultaneously his strength and his weakness; he demanded that the natural world in its entirety should be subject to his system, even if it meant charging half the known world with weakness, a quantitatively measurable weakness, to explain which he had to make alternative claims on the historicist and qualitative concepts of decadence and immaturity.¹²⁷

127. On the interchangeability, and consequent insignificance, of the concepts of "primitive" and "decadent," see the acute observations of R. G. Collingwood, *The Idea of History* (Oxford, 1946), p. 327.