

SEE ALSO *Antiracist Social Movements*.

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GREAT CHAIN OF BEING

From the time of the ancient Greeks, it has been commonplace to think and write about animals as if they were part of a linear hierarchy. While this view of the natural world may be related to the basic structure of writing in general, in that it is an essentially linear mode of communication, it backgrounds much of pre-Enlightenment thought, and it became a formal feature of early modern scientific thought on natural history. The medieval cultural conception of such a natural hierarchy is known as the "Great Chain of Being."

The French anthropologists Émile Durkheim (1858–1917) and Marcel Mauss (1872–1950) famously observed that the way people organize nature replicates, in some fashion, their own social relations; that is, the way in which they organize themselves. The Great Chain of Being is an excellent example of this. In a social environment structured as a rigid linear hierarchy—from the king, princes, and various ranks of nobles down through vassals, peasants, and perhaps even slaves, all occupying particular slots in vertical relation to one another—it is certainly reasonable to imagine the animal kingdom as similarly organized.

The Great Chain of Being, then, represented an imposition of medieval European political relations upon the natural world. To the extent that the idea was present in earlier times, it was part of a plurality of speculations on the relations of animals. Aristotle said that man is the most perfect animal, and he suggested ranking animals in terms of their mode of reproduction and body temperature. He did not take this idea very far, however. Pliny the Elder did not even incorporate it into the framework of his first-century *Natural History*. In medieval Christian Europe, however, it developed into the dominant, if not exclusive, way of thinking about nature. In Latin, the Great Chain of Being was called the *scala naturae*; in French, *échelle des êtres*.

COMPONENTS OF THE GREAT CHAIN OF BEING

The Great Chain of Being was conceptualized differently by scholars at different times. The historian Arthur O. Lovejoy (1936) identified three basic intellectual components of the Great Chain of Being, which he called the principles of Plenitude, Continuity, and Gradation.

The Principle of Plenitude is derived from the Christian view of the earth as a vessel for the products of God's creation, and as evidence of his bounty. In this view, God is demonstrating his wisdom and goodness through the diversity of his species. Since omnipotence and humility would seem to be incompatible, God is considered to be showing his creative power by bringing into existence not

just a finite sample of life forms, but all possible species. Consequently, there was no line recognized between real animal species and imaginary ones; everything from crows and pigs to mermaids and centaurs must exist somewhere.

The Principle of Continuity held that there were no gaps separating different kinds of living beings. The transcendent line on which various species fell was itself unbroken, and it was an additional manifestation of God's wisdom and power that he created species that blended into one another. Thus, the apes (actually, tailless macaques that are technically monkeys) connected monkeys to people, and the discovery of chimpanzees at the end of the eighteenth century filled in another segment between the "apes" and people (Gould 1983).

Finally, the Principle of Gradation incorporated the assumption about the geometry of the natural order as essentially a line leading from lowest (or simplest, or least like us) up to the highest form of life, the most complex and most intelligent—namely humans. This is the sense in which the linear rankings replicated the social order on earth. In some versions of the Great Chain, the human species was not at the top, but rather in the middle, below a celestial hierarchy of angels, and archangels, leading up to God.

The eighteenth century brought a final component to the Great Chain of Being, the idea of Progress (Bury 1932). In a social universe that saw massive growth in the intellectual arena through developments in science, and unprecedented economic growth through the application of technology, it seemed reasonable to look to the future with anticipation. As the history of life, via the fossil record, began concurrently to be understood, it was an easy step to see progress in the succession of living things through time, or a "temporalizing" of the Great Chain.

EVOLUTIONARY IMPLICATIONS OF THE GREAT CHAIN OF BEING

Eighteenth-century scholars of natural history were increasingly pulled in two directions as they tried to reconcile their inferences about nature to their interpretations of scripture. The leading social issue of the day was slavery, which was increasingly being rationalized by recourse to the supposed inferiority and lesser humanity of the non-European races (Stanton 1960). Abolitionists commonly invoked the Bible in support of the unity of the species, the product of a single creative act by God on the sixth day. The monogenists (believers in a single origin of people) were necessarily struck by the diversity of human form that had been produced from the loins of Adam and Eve. If Adam and Eve looked like Europeans, then obviously the facial features of Africans must have arisen subsequently; or vice-versa. Thus, from the very

fact of human variation, coupled with a single origin for the human species as recorded in Genesis, the earliest theories of microevolution were deduced.

However, science seemed to link the other races to apes through measurements of the skull and face, at least according to scholars concerned with justifying the practice of slavery by dehumanizing Africans. Rejecting Biblical literalism, the polygenists (believers in multiple origins of people) separated the human races, but in so doing they drew the entire species closer to the apes and, by implication, to the rest of life on earth in their hierarchical framework. Thus, according to Jordan, "To call the Negro a man and the ape a beast was in effect to shatter the Great Chain" (1968, p. 230). To be sure, the relationships among the Great Chain, slavery, and evolution were somewhat nuanced and idiosyncratic (Haller 1970), but there were nevertheless broad correspondences and rationalizations afforded by relating science and politics to one another.

Two bitter controversies of early modern biology were based on interpretations of the Great Chain of Being and its implications. The first, in the middle of the eighteenth century, was over classification; the second, at the turn of the nineteenth century, was over extinction.

The Swedish botanist-physician Carl (Carolus) Linnaeus revolutionized biology in the eighteenth century with his development of formal principles of classification. In his view, rather than forming a single series, life was hierarchically organized into nested categories of equal rank: On earth there were kingdoms of animals, plants, and minerals; within animals there were classes of fish, reptiles, worms, insects, mollusks, and mammals; within mammals there were orders; within orders there were genera; and within genera there were species. Every species ultimately had its place within a genus, order, class, and kingdom.

This system lent itself to comparison and diagnosis, but not easily to a classically linear conception of nature (see Figure 1). While it took hold quickly and firmly in the academic community, it met opposition among other scholars, chief among them the French naturalist Count de Buffon. Buffon opposed the Linnaean system on three grounds. First, it was fairly obvious that nature was organized into higher and lower forms of life, so the linearity of nature could not be discounted. Second, it seemed to imply common descent, for what else could it mean to say that a donkey and a horse should be grouped together? For that matter, "Once it is admitted that there are families of plants and animals, that the donkey is of the horse family, and that it differs only because it has degenerated, then one could equally say that man and ape have had a common origin like the horse and donkey—that each family among the animals and vegetables have had but a single stem, and that all animals have

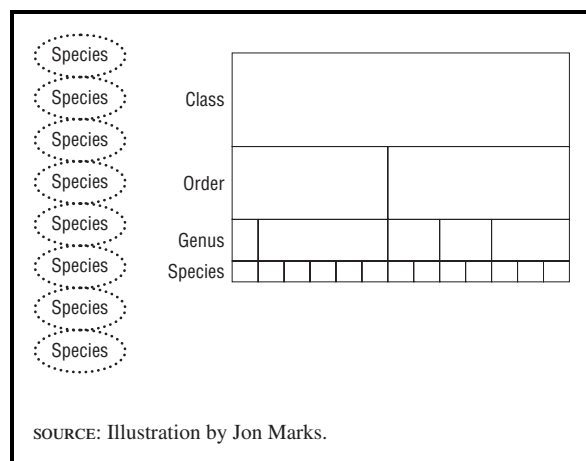


Figure 1. Left, the Great Chain of Being, a one-dimensional hierarchy in which animals are ranked in relation to humans, placed at the top. Right, the Linnaean system, in which animals are placed in relation to each other, in nested categories of equal rank.

emerged from but a single animal which, through the succession of time, has produced by improvement and degeneration all the races of animals” (Buffon, *Histoire Naturelle* IV, “The Ass” 1753) which of course could not possibly be true. Lastly, if the Linnaean hierarchy was not a reflection of common descent, then what produced it? Linnaeus was not saying, and a serious (i.e., post-Newtonian) scholar could not merely describe a pattern in nature, so Buffon felt he was obliged to explain it as well.

Linnaeus and Buffon were both monogenists and creationists, although Buffon developed a theory of microevolution to account for the obvious biological diversity to be found within any species. Late in life, Linnaeus backpedaled from his belief that new species could never arise. But Linnaeus’s nonlinear approach to nature also involved classifying humans into four color-coded geographical subspecies. Tom Gundling (2005) notes that there is indeed linearity in Linnaeus’ treatment of the animal kingdom, which begins with humans and works its way downward; but it may also be noted that he presented his subspecies in an order (American, European, Asian, African) that did not seem intended to express any superiority of Native Americans. Buffon, on the other hand, wrote about human “races” in a very casual and informal sense, and he was struck by their essential identity: “Such differences are not primordial—the dissimilarities are merely external, the alterations of nature but superficial. It is certain that all represent the same human, whether varnished black in the tropics, or tanned and shrunken in the glacial cold of the polar circle” (Buffon, *Histoire Naturelle* XIV “On The Degeneration Of Animals” 1766).

The paradox becomes clearer when Buffon’s use of the Great Chain of Being is seen as restricted to macro-

evolutionary patterns; within a species, such as humans, he saw only undirected variation, or “degeneration.” Further, Linnaeus’s rejection of the Great Chain as an organizing principle incorporated elements of superiority and inferiority in a human classification, as he listed (in the tenth edition of *System of Nature* [1758]) the attributes of white *Homo sapiens Europaeus* as “vigorous, muscular . . . sensitive, very smart, creative, . . . governed by law” but those of black *Homo sapiens Afer* as “sluggish, lazy . . . sly, slow, careless . . . governed by whim.” Buffon’s descriptions could incorporate unflattering terms, but not in such broad strokes and with such zoological formality that they might imply a transcendent ranking of human kinds (Sloan 1973; Eddy 1984).

EXTINCTION AND THE RISE OF BIOLOGICAL RELATIVISM

The other great controversy faced by the Great Chain of Being was the problem of extinction. The late seventeenth-century English naturalist John Ray had made it clear that his basic view of nature would be undermined if it could be shown that any species had gone extinct. Such a fact would represent a break in the cosmic Chain; it would either show a basic flaw in the design of God’s creation or the fragility of God’s handiwork in the face of human agency. It would represent, wrote Ray, “a dismemb’ring of the universe,” which would presumably be a bad thing.

However, by the middle of the eighteenth century, it was clear that extinction was a fact of life that would have to be accommodated by science. Not only was the large, flightless dodo gone for good from the island of Mauritius, but since that was the only place it had ever been found, it was unlikely to turn up again anywhere else. Moreover, the copious fossil remains of prehistoric life forms, familiar yet distinct from any known species, made it increasingly necessary to incorporate the apparent fact of extinction into any scientific theory of the history of life (Rudwick 1985).

The two principal attempts to do so in the earliest part of the nineteenth century were those of Jean-Baptiste Lamarck and Georges Cuvier. Lamarck developed a theory in which the imminent threat of extinction produced a response on the part of the organism that involved incorporating stable improvements into its organic features; in essence, it climbed a notch up the Great Chain of Being to avoid extermination. Within this framework, he explicitly envisioned the possible transformation of an ape into a human. Cuvier, on the other hand, began with the premise that the Great Chain was false, for (following the Linnaean approach) he saw four noncomparable, and therefore nonrankable, kinds of creatures: vertebrates, mollusks, insects, and radiates. Cuvier’s theory incorporated extinction as a real phenomenon—a periodic purging of

existing animals, with their replacement by newer forms of life. In this conception, the transformation of species was neither necessary nor likely.

The shift in the eighteenth century from the linear ranking of life forms (in terms of their approximation to the human) to the establishment of their places in a natural order derived from patterns of similarity to one another must be seen as part of a broader set of relativizing discourses. Civilization could be seen as a glorious culmination of history (as per Thomas Hobbes), or as decadent and unnatural (as per Jean-Jacques Rousseau); perhaps, then, civilization merely comprised one set of ways of living, with its own attendant merits and deficiencies. Concurrently, age-old social and political hierarchies were crumbling, as the revolutionary idea of a nation composed of citizens with equal rights began to be implemented in America in 1776 and in France in 1789. Ironically, the institution of slavery would stand in the way of the full implementation of those ideas in America for many decades.

It was clear, however, that the future of biology lay in establishing the relationships of plants and animals to each other, not to a transcendent and arbitrary standard; just as modern political society would be founded on the equal relationships of citizens to each other, not to the ancient standard of hereditary aristocracy.

RACIAL SCIENCE AND THE GREAT CHAIN

The early nineteenth century was a time of considerable intellectual ferment in natural history, particularly in relation to the position of people in the natural order, and in their relation to one another. Cranial studies were undertaken and quickly invoked to differentiate and rank the peoples of the world. These ranged from Morton's studies of cranial volume through Retzius' cranial or cephalic index, a measurement of skull shape. The most powerful measure, however, turned out to be the facial angle, derived by a Dutch anatomist named Pieter (Petrus) Camper, who tried to devise a method that would permit the accurate artistic rendering of the heads of different people for aesthetic purposes. However, Camper's work was seized upon by polygenists to emphasize the differences between Europeans and Africans, for it supposedly showed the intermediacy of Africans in facial form between Europeans and apes.

Indeed, the power of the Great Chain of Being to dehumanize non-Europeans by linking them to lower forms of life proceeded largely unaffected by the emergence of Darwinism. Some pre-Darwinians, such as the French naturalist Julien-Joseph Virey, placed Europeans, Africans, and apes in a series and casually connected the dots. The famous pre-Darwinian evolutionary scheme in

Vestiges of the Natural History of Creation (1844) ran from amoebas, through other species and other races, to Europeans:

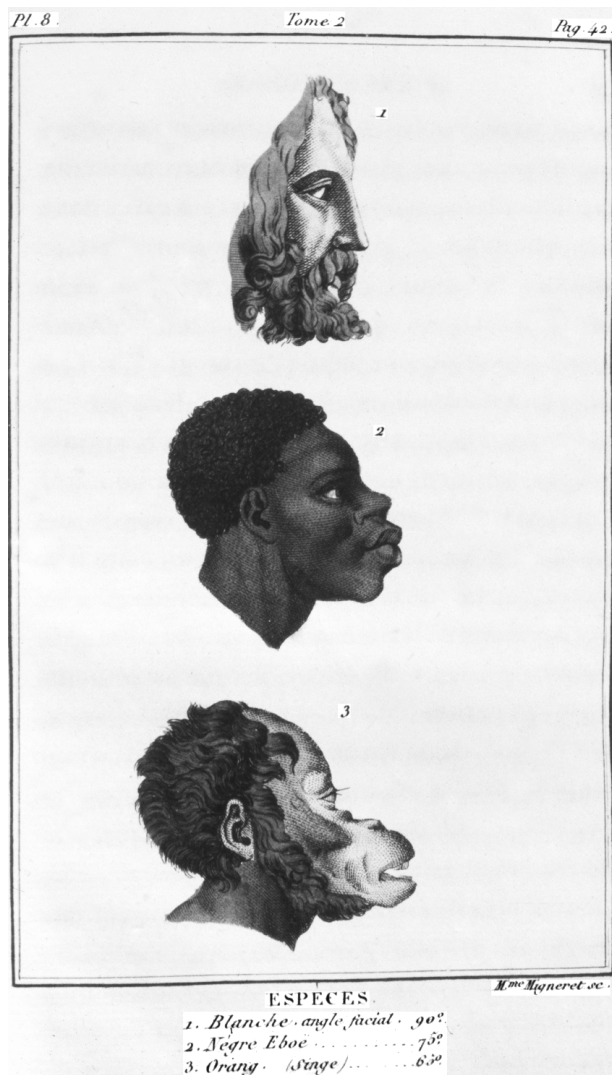
We have already seen that various leading animal forms represent stages in the embryotic [sic] progress of the highest—the human being. Our brain goes through the various stages of a fish's, a reptile's, and a mammifer's brain, and finally becomes human. There is more than this for, after completing the animal transformations, it passes through the characters in which it appears, in the Negro, Malay, American, and Mongolian nations, and finally is Caucasian.

The leading characters, in short, of the various races of mankind, are simply representations of particular stages in the development of the highest or Caucasian type. The Negro exhibits permanently the imperfect brain, projecting lower jaw, and slender bent limbs, of the Caucasian child, some considerable time before the period of its birth. The aboriginal American represents the same child nearer birth. The Mongolian is an arrested infant newly born. (Chambers 1844, pp. 306, 307)

The Darwinian revolution had little effect upon the racial conception of the Great Chain. Scarcely two decades after the initial publication of the *Vestiges*, Thomas Huxley (who had recently reviewed and excoriated a later edition of the *Vestiges*) would be faced with arguing for Darwinism in the absence of a human fossil record. Fatefully, the first-generation Darwinians would argue that the absence of such evidence for evolution was unnecessary, since (by drawing upon preexisting imagery) Europeans could be linked to the apes via the nonwhite races.

Thus, Thomas Huxley—an abolitionist, monogenist, and evolutionist—explained the position of black people in the natural order in an 1865 essay:

It may be quite true that some negroes are better than some white men; but no rational man, cognisant of the facts, believes that the average negro is the equal, still less the superior, of the average white man. And, if this be true, it is simply incredible that, when all his disabilities are removed, and our prognathous relative has a fair field and no favour, as well as no oppressor, he will be able to compete successfully with his bigger-brained and smaller-jawed rival, in a contest which is to be carried on by thoughts and not by bites. The highest places in the hierarchy of civilisation will assuredly not be within the reach of our dusky cousins, though it is by no means necessary that they should be restricted to the lowest.



Histoire naturelle de genre humain by Julien-Joseph Virey (1824). The Great Chain of Being doctrine dehumanized non-Europeans by linking them to lower forms of life. French naturalist Julien-Joseph Virey placed people of African descent between apes and whites in the evolutionary ladder, as seen by this illustration. REPRINTED FROM JEAN-JULIS VIREY, HISTOIRE NATURELLE DE GENRE HUMAIN. PARIS: CHROCARD, 1824.

Darwinism's German apostle, Ernst Haeckel, would go further, constructing a theory of evolution that stretched from the amoeba to the German nation, driven by his "biogenetic law" (that ontogeny recapitulates phylogeny, or that individuals personally pass through developmental stages representing their ancestry). In such a grand view, not only would other races be primitive and inferior, but so would other social institutions and political systems. These primitivizing and dehumanizing aspects of the Great Chain of Being would be invoked to legitimize (by recourse to nature) the most notorious

practices of modern technological states in the service of imperial aspirations in the nineteenth and twentieth centuries (Dubow 1995; McMaster 2001).

A considerable effort in evolutionary biology and anthropology since World War II has been devoted to divesting Darwinism of the metaphor of linearity. Some notable examples include the interpretation of human ancestry (Tattersall 1998); primate psychology (Povinelli 2000); life on earth (Simpson 1949; Foley 1987; Ayala 1988) and adaptation (Gould and Lewontin 1979). Likewise, to purge Darwinism of the ideology of racism required considerable effort after World War II (Washburn 1951; Haraway 1988; Barkan 1992), and to some extent continues to do so (Graves 2001; Marks 2002; Brace 2005). Perhaps the last major holdout of the Great Chain in science lies in the idea that intelligence is a singular and innate property, ascertainable through standardized tests, and permitting the establishment of everyone's relative positions by their scores, or IQs.

SEE ALSO *Colonialism, Internal; Genocide; Racial Hierarchy.*

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