Natural Selection

In Western history it was the 18th century when evolutionary theories began to emerge. Certainly Hegel's philosophy was a philosophy of change and transformation and the emergence of qualitatively new types of existent (the quantity/quality dialectic). For the evolutionists the aim was to identify the mechanism by which evolutionary transformations occurred. There was a difficulty that would have to be confronted, however—society was in the grips of prevailing religious beliefs that rejected the proposition.

William Paley (1743–1805), in defense of religious belief, had introduced the *argument from design*, the proposition that the complicated organs of various species are so perfectly constructed and adapted that they must have been designed as finished products by some powerful and knowledgeable creator (Fancher, 1990); in other words, creationism.

Jean Lamarck (1744–1829) developed a theory of evolution prior to Darwin that was supported by Erasmus Darwin—Darwin's grandfather. Lamarck studied molluscs at the Paris Basin and became convinced species changed over time. He thought that individuals make adaptations during their lifetimes and pass those on to their offspring and that offspring continue their adaptations from where their parents had ceased. Abilities could either be increased through exercise or lost through disuse. This was the basis of his theory of *inheritance of acquired characteristics* which proposed that adaptive abilities developed during an organism's lifetime are passed on to the organism's offspring (Hergenhahn, 2001). Suppose, for instance, a giraffe began as a short-necked animal grazing on foliage above the neck. As lower-level foliage became less available, due to drought or overconsumption, they had to stretch their necks out to reach higher foods. This was exercised, stretched, and strengthened and was passed on to offspring. This would lead to rapid changes but evolution appeared to be much less rapid that would be the case with this theory.

Charles Darwin (1809–1882) served as an unpaid naturalist on the *Beagle* (1831–1836). The captain, Robert FitzRoy, was a physiognomist who judged people's character by the shape of their face and he judged that the cut of Darwin's nose suggested a "lack of energy and determination" (Fancher, 1990). At sea Darwin read Lyell's (1797–1875) *Principles of geology* which promoted *uniformitarianism*, the proposition that the earth's major features have resulted from gradual processes occurring over vast stretches of time, and which continue in the present as much as they have in the past. This theory disputed the then-dominant theory of *catastrophism* the idea that geological features arose because of a few

relatively sudden and massive cataclysms or catastrophes on the earth's surface. This was consistent with a literal interpretation of the Bible—particularly the great flood. It further fit with the accepted estimate of the earth's age—about 6,000 years (as calculated by James Ussher, 1581–1656, based upon adding the age of patriarchs in the Old Testament after Adam and Eve). As he traveled Darwin became more and more impressed with the work of Lyell because of his discoveries—islands and atolls were accountable for in terms of gradual, uniform processes, e.g., lava flows, coral growth, a rising and falling ocean floor.

Darwin adopted two lines of thought regarding his biological findings: 1) ask what the possible *functions* of all animal characteristics are and try to understand the *usefulness* of particular behaviors; 2) take note of the geographical distribution of the species. Upon return he began to ponder the traditional answer to the biological "mystery of mysteries": how the millions of species came into being. The traditional answer was that each species was created at a single time, complete, distinctive, and unchangeable.

Besides Lyell, a further influence on what became the theory of evolution by natural selection was his reading of Thomas Malthus' (1766–1834), *Essay on the principle of population* (1798). Malthus noted that the earth's food supply increased arithmetically but the human population tended toward geometric increases—more people than foods were produced (Hergenhahn, 2001). The balance between the two was maintained through, war, starvation, and disease. Darwin, coupled with his own observations, drew from that this conclusion: species numbers are relatively constant but there is an overproduction of pollen, seeds, eggs, larvae, pups, etc., and there is a high mortality rate. Darwin recognized his indebtedness to Malthus:

> as more individuals are produced than can possibly survive, there must in every case be a struggle for existence, either one individual with another of the same species, or with the individuals of distinct species, or with the physical conditions of life. It is the doctrine of Malthus applied with manifold force to the whole animal and vegetable kingdoms; for in this case there can be no artificial increase of food, and no prudential restraint from marriage. Although some species may be now increasing, more or less rapidly, in numbers, all cannot do so, for the world would not hold them. (Darwin, 1859/1979, p. 117)
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> There is no exception to the rule that every organic being naturally increases at so high a rate, that if not destroyed, the earth would soon be covered by the progeny of a

> single pair. Even slow-breeding man has doubled in twenty-five years, and at this rate, in a few thousand years, there would literally not be standing room for his progeny. (p. 117)

Darwin hesitated 20 years to publish but in 1858 he received a letter from Alfred Russel Wallace (1823–1913) presenting Darwin's theory. The evolutionary geologist Charles Lyell suggested presentation of both theories at the Linnaen Society—*On the origin of species by means of natural selection* was published in 1859.

According to the theory of natural selection, different environments impose a culling influence on its inhabitants—favoring, disproportionately, certain individuals for survival and propagation of their kind. Adaptive functions are those that promote continued existence (survival) and reproduction which allows for transmission of favorable (adaptive tendencies) to offspring. There is in this an implicit proposition of *mutualism* since an organism is fit to its environment. Were it not it would cease to be viable and would become extinct. This idea would influence the *ecological theory of perception* and became the basis for a realist theory of perception.

References

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