The Switch to Evolutionism

The Darwinian Revolution. Science Red in Tooth and Claw. MICHAEL RUSE. University of Chicago Press, Chicago, 1979. xvi, 320 pp., illus. $20.

Immersed in the deluge of books and articles on Darwin and Darwinism published during the last two decades, Michael Ruse, a philosopher of science by training, has undertaken to produce "a synthesis of the Darwinian Revolution, using the most recent findings and interpretations, for readers like myself who have a serious interest in the history of science and want to dig beneath glib generalizations and stark dramatizations, but who do not have the specialized knowledge and aims of the professional scholar." The result is an eminently readable, informative, and enlightening study of the British scientific community's confrontation with the problem of organic origins in the period 1830 to 1875, with special reference to Charles Darwin's role in bringing about a "switch to evolutionism" in that community.

Ruse's strategy is simple but effective. By relegating the earlier history of evolutionary ideas to an introductory chapter and concentrating on British developments, including some important Continental ideas as seen through British eyes, he reduces his task to manageable proportions and focuses attention on the special set of circumstances that gave rise to a viable theory of evolution in the sixth decade of the 19th century. But Ruse is not a narrow "internalist" historian of science. Recognizing that the development of science is influenced not only by scientific evidence and argument but also by religious, philosophical, and social beliefs and attitudes, he treats each of these factors separately in the various chapters, suggesting at the same time how they interacted in the thinking of particular individuals. A notable example is Charles Lyell's stubborn opposition to the idea that the fossil record exhibits a gradual progression toward higher and higher forms of life. Beginning with Lyell's switch from progressionism to nonprogressionism after reading Lamarck, Ruse shows how Lyell's antiprogressionism was dictated partly by scientific evidence indicating the presence of mammals fairly early in the fossil record, partly by his fear that progressionism would undermine his steady-state brand of uniformitarian geology, and partly by concern that progressionism would pave the way for evolutionism, thereby undermining man's special place in the universe. Ruse also notes that Lyell's belief in the wise design of the system of nature prevented him from conceiving a naturalistic explanation for the production of new species to take the place of those that had become extinct in the struggle for existence. By hinting at the possibility of such an explanation, however, Lyell brought the question of species formation to the center of attention and, in effect if not in intention, challenged his fellow scientists to discover a *vera causa* in the realm of nature.

Having indicated how Lyell posed the problem of organic origins, Ruse goes on to show how the British scientific community wrestled with it in the years from 1830 to 1859. One by one he introduces the dramatis personae—William Whewell, Adam Sedgwick, John Henslow, Charles Babbage, William Buckland, Baden Powell, John F. W. Herschel, Charles Lyell, Richard Owen, Robert Chambers, Herbert Spencer, T. H. Huxley, and Alfred Russel Wallace—and shows how the ground was prepared for Darwin's bombshell by developments in the scientific, philosophical, religious, and social realms during the years when Darwin was working quietly on his own solution to "the mystery of mysteries." This discussion of the evolution of British ideas and institutions in the years 1830 to 1859 and of British assimilation of Continental science in the same years provides a useful synthesis of recent researches on the crucial pre-*Origin* decades in Britain and makes one wish for similar syntheses of developments in France and the German states in the same period. Ruse gives good brief accounts of the ideas and researches of Owen, Hooker, and Huxley, including the Owen-Huxley quarrel about the brains of humans and apes, although, curiously, he overlooks Owen's highly relevant work *On the Classification and Geographical Distribution of the Mammalia . . . To Which Is Added an Appendix "On the Gorilla," and "On the Extinction and Transmutation of Species,"* published in the same year as Darwin's *Origin of Species*.

The controversy precipitated by Robert Chambers's anonymous *Vestiges of the Natural History of Creation* (1844) is discussed in considerable detail in its scientific, philosophical, religious, and social ramifications. In regard to the social aspect, Ruse suggests that the Industrial Revolution prepared people's minds to accept the idea of origination by law rather than by special creation, that hard times and social unrest in the 1840's made the *Vestiges* seem dangerously subversive, especially in its appeal to women readers (who, said David Brewster, lacked "those rough phases of masculine strength which can sound depths, and grasp syllogisms, and cross-examine nature"), and that the popularity of Tennyson's *In Memoriam* (1850) revealed a widespread yearning for the hope of a brighter future for mankind in a society unsettled by rapid social change. These are interesting and plausible speculations, but one wonders why Ruse overlooks the pervasive influence of British political economy and the competitive ethos on British scientific thinking about nature in this period. It is a curious and not insignificant fact that nearly all the writers who came up with some idea of natural selection in the first six decades of the 19th century—William Wells, Patrick Matthew, Edward Blyth, Herbert Spencer, A. R. Wallace, and Darwin, for example—were British. Competitive struggle was in the air in Britain, but not in France or Germany.

Ruse's main addition to our understanding of Darwin's intellectual development is his analysis of the influence of Whewell's and Herschel's conceptions of sound scientific method on Darwin's efforts at theory construction. Ruse shows that Darwin read Herschel and Whewell and tried to conform his scientific theories to their precepts. In Ruse's view, it was the quasimathematical, lawlike character of Malthus's propositions with respect to population and food supply that caught Darwin's attention and led him to conceive natural selection by analogy to the selection practiced by plant and animal breeders. Natural selection was a *vera causa* for Darwin both in Herschel's sense of being analogous to a known true cause in another realm (selective breeding) and in Whewell's sense of a "consilience of inductions" linking disparate phenomena in many fields of investigation.

Like Michael Ghiselin, Ruse portrays Darwin as a skillful and dedicated champion of the hypotheticodeductive method in science. Ruse's exposition of Dar-

win's scientific work is less comprehensive than Ghiselin's but also less dogmatic and humorless. For Ghiselin, Darwin was a thinking machine grinding out scientific generalizations by a foolproof method. In Ruse's view, Darwin was a human being influenced by philosophical ideas, religious beliefs, and social attitudes as well as by scientific evidence, and a member of an interacting scientific community. Unlike Ghiselin, Ruse recognizes that Darwin was an evolutionary deist when he wrote the *Origin of Species*, but Ruse underestimates the influence of Darwin's deism on his scientific thinking. He also undervalues the importance of Darwin's belief in the long-run progressive tendency of natural selection for his speculations concerning the causes of progress and retrogression in human society, as set forth in *The Descent of Man*. Darwin did not originate "social Darwinism," but he shared its tenets to a marked degree and thereby added to its influence.

Perhaps because of his desire to get on with the main argument of his book, Ruse's introductory chapter gives a rather truncated view of the prehistory of evolutionism in natural history. One misses some reference to Buffon, the most "Darwinian" of all Darwin's forerunners. Buffon attacked the species problem with many of the same tools—studies of geographic distribution, experiments on hybridization, investigation of variation under domestication, and construction of a theory of pangenesis—that Darwin used. One is also surprised to see Lamarck described as "not greatly innovative" and as having never conceived organic evolution as branching. Strange to say, Ruse reproduces the branching diagram of animal evolution from Lamarck's *Philosophie Zoologique* and then warns the reader "not to confuse Lamarck's diagram with Darwin's superficially similar diagram" (p. 9)! It is true that Lamarck began by trying to arrange animals in a "unique and general series" rising steadily toward more and more complex forms. But he was too good a naturalist to fudge the facts, and he eventually conceded that "this simple series is really not entirely conformed to the order in which nature has produced the different animals; for that order is far from being simple; it is branching [*rameux*] and appears even to be composed of several distinct series." The diagram of Lamarck's evolutionary system given on p. 10 is Ruse's, not Lamarck's. Like Darwin himself, Ruse underestimates Darwin's debt to the pioneers who first broke with the static view of nature and natural history.

But it will not do to end this review on a negative note. True to his purpose, Ruse has produced a useful and highly readable synthesis of the literature bearing on the conversion of the British scientific community to belief in organic evolution in the years 1830 to 1875 and on Darwin's role in that process of conversion. The book is skillfully organized and written with verve, imagination, and welcome touches of humor. The illustrations are well chosen and instructive, and there is a good bibliography at the end of the book. A philosopher of science has proved himself a good historian.

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Hunter-Gatherer Demography

Demography of the Dobe !Kung. NANCY HOWELL. Academic Press, New York, 1979. xxii, 390 pp., illus. $24.50.

Hunter-gatherers who number only 455 and who do not reckon age would seem to defy demographic analysis. But in this book Howell orchestrates longitudinal censusing, stable population modeling, and simulation to overcome these hurdles in a generally convincing study of these noted Kalahari desert dwellers. The undertaking will interest anthropologists, demographers, and human biologists because of its methods, its uncovering of one of the lowest known levels of natural fertility without contraception, and its implications for hunter-gatherer existence, once prevalent but rapidly disappearing in the late 20th century.

Equilibrium assumptions and stable population methods underlie Howell's quest to exemplify a hunter-gatherer adaptation with !Kung materials. The data in hand, a population registry of Dobe-area camps periodically updated from 1963 to 1973 and fertility histories of 62 postmenopausal women, do not extend through time or in numbers enough to permit our inferring basic demographic parameters except through stable population analysis. But these techniques presume unchanging age patterns of mortality and rates of fertility. Fortunately, the !Kung long have dwelled in isolation substantial enough to rule out the major changes in mortality and fertility that recent centuries' altered diet, public health, and lifeways have brought the rest of the world. Thus the techniques make sense here more than for many groups of similar size that ethnographers might study elsewhere in the world. Howell uses population features observed in the best of the field data to select the level-5 model of mortality from the Coale and Demeny "West" family of stable models. This becomes the basis for her inferring such features of the !Kung population as age-specific mortality and absolute ages of individuals who can otherwise only be ranked younger or older than one another. Independently derived fertility parameters complete the stable model.

Howell makes innovative use of microsimulation to evaluate her stable population analysis. Monte Carlo methods allow her to observe what happens to !Kung-sized populations of individuals who reproduce and die according to the vital rates of the model. In effect she takes the stable model as a null hypothesis and generates the sampling distributions of various population parameters resulting from stochastic variation within it. As a result, she can estimate the probable error in having used stable models to estimate individual !Kung ages. She discovers that the stable population model is consistent with various empirically observed features of the !Kung. She demonstrates, as is required if the !Kung are to stand as exemplifying a long-term Kalahari desert adaptation, that such populations do not tend to extinguish because of stochastic variations in size. Finally, she paves the way for more refined microsimulation of !Kung kinship networks and domestic composition later in the analysis. The approach is innovative in that demographers, who rarely study such small populations, concern themselves little with stochastic variability. Further, this taking of Coale and Demeny stable models as null hypotheses not to be rejected for hunter-gatherers unless observations about them fall outside ranges of variability expectable under them is an important alternative to the building of completely new stable population models that some students of hunter-gatherer populations have espoused.

Howell's substantive findings about !Kung fertility are more interesting than those concerning mortality because they are more difficult to explain. The moderately high mortality suggested for the !Kung prior to their recent contact with outsiders, largely attributable to infection and parasitic disease, is not uncommon among human groups, and the only features notable about death among the !Kung are that malnutrition does not play a major role as cause and that violence does, the latter finding belying the !Kung reputation as "harmless people."