Book Reviews

Darwin's Century. Loren Eiseley. Doubleday, New York, 1958. xvii + 378 pp. $5.

At the meeting of the Linnean Society in London on the evening of 1 July 1858, the secretary read communications from Charles Darwin and Alfred Russel Wallace that had been sent to him by Charles Lyell and Joseph Hooker. The theory of evolution through natural selection was born. Now, on the hundredth anniversary of that event, it is appropriate that scholars of all sorts should pause to assess the situation, to look at the genesis and at the consequences of that great shift in human thought that has aptly been called the Darwinian revolution.

July 1st, 1858, or November 24th, 1859—when the *Origin of Species* was published—are of course arbitrary moments in the history of a continuously developing idea. Charles Darwin was but one of many intellects who influenced the rate and direction of this development, though of such overwhelming influence that the 19th century, from the point of view of a broad segment of Western intellectual history, can well be called Darwin's century. In writing about Darwin's century, then, Loren Eiseley is writing about the history of an idea—the idea of evolution.

Eiseley shows a complete mastery of his materials, a detailed scholarship that leaves me tremendously impressed. But he does not get lost among these details; each is related to the broad sweep of his story. One is led, almost inevitably, to compare Eiseley's book with Arthur Lovejoy's *The Great Chain of Being.* Eiseley's book in a real sense is built on Lovejoy's book. Because of Lovejoy, Eiseley can begin his story with the 17th century; he can confidently discuss the relations between the idea of the chain of being and the idea of evolution without needing to explore the sources of modern thought in ancient or medieval times.

Eiseley is careful to point out the basic differences between the ideas of a chain of being and of evolution, and the comparison of the two books is not necessarily a consequence of relatedness of subject matter. The comparison comes to mind because both books stand out as superb jobs of blending scholarly detail into reasonable historical interpretation; the two books are, I think, comparable contributions to that most difficult of fields, the history of ideas—the field that on contemporary American campuses would, I suppose, be called the sociology of knowledge. And the similarity remains despite the great difference in the style of the two authors. Both, I think, are masters of English prose, but they have achieved their mastery after quite different fashions. Eiseley, I suspect, is far more readable than Lovejoy. I write this reluctantly, and I am not sure it is praise. The aptness of Eiseley's expression carries the reader through the parts of his story that have been told so often that they have become hackneyed, and the aptness of this expression often serves to put some well-known incident in a new light. But I don't think Eiseley has anywhere quite achieved the memorable dry, yet full-bodied, richness of, say, Lovejoy's discussion of "metaphysical pathos." But I am writing a review of Eiseley's book, not of Lovejoy's.

Perhaps the greatest achievement of Eiseley's book is in explaining lucidly why it took so long for the Copernican revolution, which put the earth into cosmic perspective, to develop into the Darwinian revolution, which put man into biological perspective. The ideas necessary for this transition, and the people who developed these ideas, are partly well known, partly obscure.

First, "an orderly and classified arrangement of life was an absolute necessity before the investigation of evolution, or even its recognition, could take place." The foundations here were laid by John Ray and, outstandingly, by Linnaeus. Eiseley aptly remarks that "Linnaeus shares, with the Comte de Buffon, the distinction of being a phenomenon rather than a man. This achievement, though it demands great energies and unusual ability, is, in reality, dependent upon the psychological attitudes of a given period." Eiseley gives both Linnaeus and Buffon considerable attention. Scattered through Buffon's writings can be found many intimations of an evolutionary theory—of the struggle for existence, of variation within species, of structural similarity among quite different animals, of uniformitarian geology and the vastness of past time, of the extinction of some past forms of life, of the significance of animal and plant distribution. But the knowledge of the time, and perhaps also Buffon's caution, did not permit these bits to be welded into a coherent theory.

A little later Erasmus Darwin and Jean Baptiste Lamarck did develop formal theories of evolution. The ideas of the two men were quite similar—very likely because both derived from Buffon—but neither was able to arrive at a plausible mechanism for evolutionary change. Lamarck, surely one of the great figures of biology, has suffered the curious fate of having his name, in the adjective form "Lamarckian," turned into a term of opprobrium. This is partly, at least, a consequence of the political circumstances of his time. As Eiseley points out, "the reaction, in England, to the French Revolution was destined to sweep Erasmus Darwin's ideas out of fashion, reinstitute a religious orthodoxy, and lead to the derogation of Lamarck as a 'French atheist' whose ideas were 'morally reprehensible.' In the end a conspiracy of silence surrounded his work. As has happened many times before in the history of thought, an idea has become the victim of social events and its re-emergence was to be delayed accordingly."

Before evolution could become a really pervasive idea, geological time had to be discovered and charted. Eiseley builds his discussion of the exploration of past time around three men: James Hutton, William Smith, and the Baron Cuvier. "If there is one mind," Eiseley remarks, "that deserves to rank between the great astronomical geniuses of the seventeenth century and Charles Darwin in the nineteenth, it is James Hutton." He discovered time, boundless and without end, "demonstrated by the very stones of the world, by the dust and clay over which the devout passed to their places of worship." He reaped the rewards of animus and heresy, of silence and disdain; his ideas were eclipsed for a while by the doctrines of catastrophic geology, until they emerged, triumphant, in the works of Charles Lyell.

William Smith, a practical engineer, discovered stratigraphy, discovered a way of charting time through the examination of fossils. Cuvier, the great anatomist, discovered how the structure of the living could be used to interpret the clues left from the past. "A bone, to Cuvier, was never just a bone, because it told, in its curvatures and varied processes, the story of an organized being whose every other bone and organ could be expected to be in harmonious proportion and accord with the solitary fragment."

Hutton, Smith, and Cuvier together "possessed the secret of the past but they never sat down in the same tavern to put the chart together." It was Charles Lyell who first wrote a coherent, general account of geology; and while Lyell did not develop a theory of evolution, Darwin's debt to him—evolution's debt to him—is enormous. "One can scarcely resist the observation that the *Origin* could almost literally have been written out of Lyell's book, once the guiding motif of natural selection had been conceived."

Eiseley discusses Darwin's predecessors in evolutionary theory—William Wells, Patrick Mathew, Robert Chambers. But the major portion of Eiseley's book, naturally, deals with Darwin himself: with his ideas and the sources of his ideas. There is probably more documentation on Darwin—more letters, notebooks, impressions, analyses—than on any other scientist. Yet he remains a baffling personality—difficult to understand, perhaps, because of the very extent of the documentation. The Darwin of the *Autobiography* and of the letters to close friends is, surely, the conscious Darwin, self-revealed. But thought does not reach its full development through conscious processes, and subconscious influences were surely just as important with Darwin as with any of us. Darwin's own concept of how he arrived at an idea is often clearly inadequate, which makes the game of trying to untangle the influences on his thinking even more fascinating. Eiseley makes many thoughtful contributions to this study.

Eiseley has a particularly interesting discussion of two attacks on Darwin that are now not well enough remembered. An erudite Scotch engineer, Fleeming Jenkin, published an article in 1867, pointing out in neat mathematical terms that a newly emergent character, however favorable, would, with blending inheritance, be swamped through backcrossing. The Mendelian answer to this had already been written but was unknown, and Darwin could find no answer. The other attack was from the physicists. Lord Kelvin, looking at the heat production of the sun in thermodynamic terms, found that the biologists and geologists could not possibly have the vast stretch of time that they needed for evolutionary processes. Again Darwin had no answer; there was no answer until the discovery of radioactivity at the end of the century. Darwin could only become more cautious, more Lamarckian, with each successive edition of the *Origin*.

Eiseley draws a moral from this. "Today there is a tendency in some quarters to regard the physical sciences as superior in reliability to those in which precise mathematical adeptness has not been achieved. Without wishing to challenge this point of view, it may still be worth a chastening thought that, in this long controversy extending well over half a century, the physicists made extended use of mathematical techniques and still were hopelessly and, it must be added, arrogantly wrong."

The last chapters of the book are appropriately devoted to the problems of human evolution: to the controversies over the first human fossils, to the divergence between Darwin and Wallace over the special case of man, to the emergence of the concept of culture and of cultural evolution. The book ends with the end of the century, with only occasional allusions to the vicissitudes of evolutionary ideas in the present century. Perhaps Eiseley will now carry the story on, in another book, to our own time. Whether he carries on or not, he has made an important contribution both to the history of ideas in general and to the history of evolution in particular, and through this, I think, a very real contribution to the study of the evolutionary process itself.

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Hospital Treatment of Alcoholism. A comparative experimental study. Menninger Clinic Monograph Series No. 11. Robert S. Wallerstein *et al.* Basic Books, New York, 1957. xi + 212 pp. $5.

The past few years have seen an encouraging rise in the number and quality of investigations of the goals, methods, and results of therapies for alcoholics. Since we are yet far from a satisfactory knowledge of the causes and dynamics of uncontrolled, pathological use of ethyl alcohol, it is clear that methods for rehabilitating alcoholic patients are properly approached from a research viewpoint. The clinical study by Wallerstein and his colleagues, reported in the present monograph, is a commendable and welcome example of this point of view.

What the authors have done is to compare four different methods used in treating a group of 178 alcoholic patients at Winter Veterans Administration Hospital from 1 Jan. 1950 to 30 June 1952 with a subsequent 2-year follow-up. The treatment modalities selected were (i) Antabuse (Disulfiram) therapy, (ii) conditioned-reflex therapy, (iii) group hypnotherapy, and (iv) "milieu" therapy (a control group). Of these modalities, it appeared that Antabuse therapy was most helpful to the most patients. However, of those to whom Antabuse was administered, nearly one-half were not helped. Also, it was concluded that the practical values of the other methods were sufficient to preclude the use of Antabuse as optimal for the mental hospital treatment of alcoholic patients.

In a study of which kinds of alcoholic patients tended to improve with which kinds of therapy, the authors found a significant correlation between *compulsivity* and improvement with Antabuse. The greater the characteristic *passivity* of the patient, the greater, in general, was his improvement under hypnotherapy. The danger of precipitating a psychotic reaction with Antabuse was stressed in borderline depressive or schizophrenic patients; these were helped more by the milieu therapy, which emphasized individual contact with the physicians and avoided threat to defense structure. Hypnosis seemed temporarily helpful to schizoid patients. Conditioned-reflex treatment seemed to evoke a good response in clinically depressed patients, but this treatment was considered contraindicated for masochistic individuals. With every type of therapy, those patients did best who were able to form and maintain close ties with the therapist, the hospital, and the program and, in general, to sustain relationships.

The authors have provided a sound analysis of their study, including analysis of the limitations of their project design (follow-up, patient selection, and so on), and have suggested lines of further investigation.

Karl Menninger's introduction to this monograph points out that enough correlation between the success of specific methods of treatment and the psychological characteristics of the patients has been revealed to merit further exploration of this idea. It is to be hoped that studies of this design will be widely extended.

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Integral Equations. F. G. Tricomi. Interscience, New York, 1957. viii + 238 pp. $7.

The subject matter of this book, as interpreted by the author, is a topic which has become a standard part of everyday analysis, to be used, in particular, in innumerable problems of applied mathematics. A few such problems are treated or alluded to, among them the critical speeds of a rotating shaft, the forced oscillations of finite amplitude for a pendulum, the airfoil equation, the vibrations of a membrane. The book is intentionally short, and yet it covers all the classical types; it presents as simply as possible the essentials of the theories of Volterra, Fredholm, Hilbert, Erhardt