Book Reviews

Lyell's Principle

Uniformity and Simplicity. A Symposium on the Principle of the Uniformity of Nature, Nov. 1963. CLAUDE C. ALBRITTON, JR., Ed. Geological Society of America, New York, 1967. x + 99 pp., illus. Paper, $4.50. GSA Special Papers, No. 89.

This short book consists of four fine essays that examine the philosophical underpinnings of classical geology. Commonly summarized by the slogan "The present is the key to the past," the Principle of Uniformity has come to mean to some a substantive statement about present and past configurations of the earth, and to others only the logic and method by which geologists attempt to reconstruct the past. Modern viewpoints in historical geology differ considerably from those embodied in the Principle with which Charles Lyell successfully launched the science of geology in 1830. Where does this leave Uniformity today? This question set the tone for the 1963 Geological Society of America symposium at which these papers were originally presented.

The first two essays are excellent discussions of the historical background of Uniformity: M. K. Hubbert's treats the entire gamut of uniformitarian thought from its inception to the present day, and L. G. Wilson's focuses on the work of Charles Lyell. Both provide a great many insights not generally encountered. Nurtured by the vigorous descriptive field studies that characterized the geology of the 1820's, Lyell's Uniformity implanted the concept of geologic time in Western scientific thought. However, the accompanying idea of perpetual cycles contravened the later developed laws of thermodynamics. In this light it is ironic that estimates of the duration of geologic time made by the early uniformitarians were much closer to the truth than were the later estimates of Lord Kelvin, a founder of modern thermodynamics. But Kelvin, of course, knew nothing about radioactivity. The Uniformity of Lyell achieved its purpose—to destroy the constraints imposed by assuming that Divine Providence interferes with geologic events. Inasmuch as this function is no longer needed, that which remains is only a vaguely formulated principle whose chief value lies in its historical interest.

N. D. Newell's "Revolutions in the history of life" departs from the philosophical tack and reviews the evidence for the abrupt appearances and disappearances of important animal groups in the geologic record. He suggests that this evidence supports the 1815 findings of Cuvier, who attributed abrupt appearances of new faunas to sudden migrations, much better than it does the 1859 ideas of Darwin, who felt that invisible breaks in the strata had destroyed much of the record of continuous gradual change.

In Newell's view a "revolution" consists of two phases: (i) an epoch of extinction accompanied or followed by (ii) an epoch of adaptive radiation. The chief problem is to explain extinctions, since these provide the trigger. Here Newell avoids the exotic hypotheses that seem to be in vogue; instead he favors the conservative explanations of migrations, climate, and paleogeographic changes, particularly episodes of submergence and emergence. He suggests that emergences of continents like those at the close of the Permian and Cretaceous periods provided large areal changes in terrestrial and shallow marine environments and that mass extinction resulted.

These hypotheses need further testing. Support must come from detailed biostratigraphic studies throughout broad areas. These in turn must be supplemented by the thorough working out of timetables of physical events for an understanding of the total historical picture.

Nelson Goodman's brief article entitled "Uniformity and simplicity" inquires into the meaning of uniformitarianism for earth science today. In Goodman's view, Uniformity is not simply the affirming of the constancy of natural laws. We write the laws, and if nature behaves according to them, this means only that we have succeeded in describing its behavior. From this, Goodman concludes that the first step toward clarifying the Principle of Uniformity is to transform it into the Principle of the Simplicity of Theory.

Faced with a choice among equally probable hypotheses, scientists choose the simplest. Why? Not merely for the sake of elegance, but because science consists of organizing and systematizing facts—in short, of simplifying. Does this mean that nature tends to obey the simplest laws? Not at all. Nature only follows those laws that have not yet been violated. Some are, in fact, exceedingly complex. It is we who aim at simplicity (and hope for truth), and it follows that the simplest surviving theory should be tested first and abandoned only when it proves false. Goodman concludes in the tone of the symposium that "The Principle of Uniformity dissolves into a principle of simplicity that is not peculiar to geology, but pervades all science and even everyday life."

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Crime and Reason

The Trial of the Assassin Guiteau. Psychiatry and Law in the Gilded Age. CHARLES E. ROSENBERG. University of Chicago Press, Chicago, Ill., 1968. xviii + 289 pp., illus. $5.95.

Rosenberg began his study of the assassin of President Garfield in 1960. After the death of President Kennedy in 1963, when it appeared that the book might be considered timely rather than scholarly, the author almost gave up the project. He was prevailed upon to persist, and two more bizarre events with which the long-awaited publication coincided have given the work relevance to the headlines beyond the worst fears of its author.

Charles J. Guiteau was born in 1841, the son of a religious fanatic. Guiteau, the son, did not smoke or drink, and he was fervently, if confusedly, religious. He also used prostitutes, cheated landladies, and generally welshed on debts and defrauded whenever he could. By profession he was a lawyer, chiefly a bill collector (frequently pocketing his collections without notifying the creditor). He roamed

from city to city, and by 1877–1880 he was spending most of his time speaking on religious subjects and selling his own apocalyptic theological tracts. In 1880 he became a political enthusiast, and he annoyed various Republicans first with offers of service and then with demands for reward. On 2 July 1881, after considerable thought, he shot the president. Garfield died on 19 September. Guiteau was indicted for murder and convicted after a trial lasting from 14 November to 5 January. On 30 June 1882, he was hanged.

Guiteau's only significant defense was the plea of insanity, and the trial offered a public forum for two opposing views within medicine concerning the nature of mental illness and the responsibility of a person for his actions. John P. Gray, an experienced clinician and superintendent of the Utica Asylum in New York, spoke for most psychiatrists of the day. He believed that insanity was a physical illness that could be detected by changes in character; in his view, chronically bad behavior like Guiteau's was a sign of moral lapse, not illness but sin. Another group of physicians, most vociferously represented by a New York neurologist, Edward C. Spitzka, were influenced by recent European advances in scientific medicine, especially neuroanatomy. Spitzka was cautious in his opinions concerning the nature of the disease of insanity; he was willing to believe that a pattern of life might be a sign of mental illness. He also believed that insanity was usually—and demonstrably—inherited, a matter about which Gray, in his turn, was cautious if not skeptical.

Spitzka and Gray had, as leading advocates of competing views within the medical profession, already clashed repeatedly during the 1870's. It was remarkable that the two should show up as principal expert witnesses at the trial of Guiteau. Gray, consistent in his beliefs, defended the M'Naghten rule to the effect that the defendant had to be bereft of the ability to distinguish right from wrong at the time of his crime in order to be considered innocent of wrongdoing. Spitzka maintained that a person might perform actions as a result of mental illness even though he might be able intellectually to make moral distinctions.

By the end of chapter 3 of Rosenberg's book the reader has been acquainted with these facts of the case and its conclusion and has been treated to a thorough discussion of the legal and psychiatric issues involved. He has every right to wonder what more a rehearsal of the details of the trial, to which two-thirds of the book is devoted, could contribute. As in classical tragedy, however, the interest lies not in the predestined fate of the assassin but in the details of the process by which he met his end. Each of the several experts called was not only a principal in a drama but, as it turned out, unpredictably individual in his views in one way or another. The exploration of these views permits Rosenberg to show vividly what the expert opinions meant in practice.

Whatever one's occasional quibble with the author, the book is both sound history—in unusual depth—and good theater. The story is a true one, and the issues are still very much alive. Guiteau believed that God had commanded him to kill the president. "The responsibility," as he put it, "lies on the Deity." Where, indeed, do passion and belief and judgment end and mental illness begin? Rosenberg observes, "In some ways, the psychological medicine of the twentieth century has served merely to reformulate rather than resolve the continuing social dilemma created by the possibly insane criminal." In Guiteau's trial great philosophical as well as medical questions acquired at one troubled point in time flesh-and-blood representation.

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Neurological Handbook

The Human Brain in Figures and Tables. A Quantitative Handbook. SAMUIL M. BLINKOV and IL'YA I. GLEZER. Translated from the Russian edition (Leningrad, 1964) by Basil Haigh. Basic Books, New York; Plenum, New York, 1968. xxxiv + 482 pp., illus. $25.

How many nerve cells are there in the cerebral cortex? What are their dimensions? What is the weight of the brain at different stages of ontogeny? How many fibers are there in the optic nerves of different animals? These are the kinds of questions that this book is designed to answer. As is noted by Lindsley in the foreword and accented by Yakovlev on the jacket, it is the first book of its kind to appear in the neurological literature. The authors have done a great service for investigators of the nervous system by reviewing a large body of scattered material and publishing in one volume a condensation of quantitative findings on the gross and fine structure of the brain and spinal cord. At the same time, the book has provided them with the opportunity to present many of their own observations. Blinkov, the senior author, is head of the Laboratory for the Study of the Structure and Function of the Central Nervous System, Institute of Neurosurgery, Academy of Medical Sciences of the U.S.S.R. Many of his publications deal with the cerebral cortex. Glezer is a member of the Institute of Psychiatry, Academy of Medical Sciences of the U.S.S.R. He has given particular attention to the ontogeny, evolution, and ultrastructure of the brain.

For the sake of the general reader with an interest in portraiture of the brain, it should be noted early in this review that the word "figures" in the title refers to numerals and not to illustrations. Actually, there are only 11 illustrations, and all are graphs or line drawings, with none showing a picture of the brain. As the title would indicate, this is primarily a workaday handbook. Neither the general reader nor the specialist will want to sit down and read it through for pleasure. This does not mean that it will not provide interesting browsing, as one can hardly pick it up to look for one piece of information without stumbling on something else that catches the eye. The absence of an index is certain to be a handicap and an irritation to users of the handbook, and it seems inconceivable that the publishers allowed a work of this kind to be printed without one.

The text of 273 pages is buttressed by 305 tables, which are bound together in the succeeding 170 pages. There are approximately 1100 references, some dated as late as 1966. Most of the 15 chapters deal with such expected topics as the neuron, spinal cord, cranial nerves, brainstem, cerebellum, basal ganglia, and cerebral cortex. Comparative data are given under appropriate paragraph headings. There is an introductory chapter on techniques, and the three last chapters deal respectively with "analyzers and motor apparatuses," the neuroglia, and the blood supply of the brain. In using information from a compendium of this kind, the reader will want to go to the source material to learn for himself