## Elements and Compounds

**A New Dictionary of Chemistry**. L. MACKENZIE MIALL and D. W. A. SHARP, Eds. Fourth edition. Wiley, New York, 1968. x + 638 pp., illus. $14.

**The Encyclopedia of the Chemical Elements**. CLIFFORD A. HAMPEL, Ed. Reinhold, New York, 1968. viii + 849 pp., illus. $27.50.

Encyclopedias and dictionaries have a certain common pattern, and in this dual review it was felt that some comparison could be made between these two compendia. Actually there can be little if any comparison. There is only a minor amount of overlap in content between the books—rather they are complementary. The *New Dictionary of Chemistry* is largely a dictionary of organic compounds with a lesser coverage of inorganic materials and their properties. The *Encyclopedia of the Chemical Elements* is an excellent summary of the properties of all the known elements—and especially those of the more newly discovered ones—including their isotopic forms. While expert organic or inorganic chemists may not find answers to highly technical questions in their respective fields of interest, nevertheless most organic chemists will find the answers to many of their organic as well as general inorganic questions in the *New Dictionary of Chemistry*. The approximately 75 authors of the more than 100 separate sections in the *Encyclopedia of the Chemical Elements* include some of the outstanding experts in the areas in which they write, and their expertise lends particular authority to the material presented.

The *New Dictionary of Chemistry* does not identify the writers of individual entries; to do so would have been less practical, in view of the larger number of short descriptions the work includes. The writing staff of this latter volume is drawn largely from the United Kingdom, but the international character both of the facts of chemistry and the English language makes the volume of use to almost all chemists even though its "coloured" spelling may denote its national origin. This is the fourth edition of the *Dictionary*, which has, in the 28 years since the first edition, undergone gradual improvement and development. A considerable amount of deletion has been made from the materials in earlier editions so as to permit the inclusion of new items and still keep the work at more or less the same size. Both volumes are recommended for personal and library reference.

WALLACE R. BRODE
*3900 Connecticut Avenue, NW, Washington, D. C.*

# The Infinite Variety of Haldane

**Haldane and Modern Biology**. K. R. DRONAMRAJU, Ed. Johns Hopkins Press, Baltimore, 1968. xviii + 333 pp., illus. $10.95.

**JBS**. The Life and Work of J. B. S. Haldane. RONALD W. CLARK. Coward-McCann, New York, 1969. 328 pp. + 8 plates. $6.95.

There is a story of the late J. B. S. Haldane playing a part in some charades at the home of Bertrand and Dora Russell. When he was absent from the room for a protracted period, G. P. Wells was sent to look for him. He found the great man (physically as well as intellectually great) seated naked on the floor of the hall with a tiger-skin rug around his loins and a rosebud between his lips. Questioned as to what he was doing, he murmured with his usual intensity, "I'm trying to look like Cleopatra." However incongruous the scene, Haldane was certainly, in Shakespeare's words, a human being of "infinite variety," as the volumes reviewed here amply testify.

Dronamraju has edited a volume of 27 contributions as a tribute to Haldane's memory. Some of these are original articles in fields in which Haldane worked; others describe and attempt to evaluate his contribution to a particular field; yet others consist simply of reminiscences of Haldane. The collection thus lacks any semblance of unity but contains a number of highly interesting articles and essays. The first two sections (entitled "Genetics" and "Evolutionary Biology and Biometrics") include 15 contributions by distinguished geneticists. Sewall Wright's article is especially valuable for its brief, clear exposition of the differences between the mathematical theories of natural selection put forward by himself, by Haldane, and by R. A. Fisher. This discussion is carried a stage further in the article of Kimura, who stresses the differences between the deterministic and stochastic approaches to population genetics. Haldane was the real originator of the concepts of "genetic loads" and the "cost of evolution" (especially in his 1937 paper "The effect of variation on fitness"); it is appropriate that this aspect is dealt with by J. F. Crow, although without reference to multiple-niche polymorphism ("annidation" in Ludwig's terminology). Jean Sutter, writing from the standpoint of a demographer, claims that in human population genetics Haldane had "the sharpest views by far" (by comparison with his great contemporaries).

T. C. Carter and A. G. Searle deal with Haldane's contributions to two fields of mammalian genetics, radiation genetics and the problem of homology in the coat color alleles of different species. The articles of Lerner and Inouye (on maze-running in *Tribolium*), Schull and MacCluer (on inbreeding in Japanese populations), and Cedric A. B. Smith (on testing segregation ratios) are all on topics that would have interested Haldane but are essentially papers that might have been published in almost any genetics journal.

Biochemical fields are dealt with by Haldane's nephew, N. A. Mitchison, in an article on antigens, and by Ernst Caspari ("Haldane's place in the growth of biochemical genetics"). Mitchison's article is full of interesting concepts and traces connections between modern ideas in this field and the arguments and work of Haldane and his protégé Peter Gorer. But he errs in attributing to Haldane the statement that the Gros Michel (not "Gran Michel") clone of bananas was wiped out by a single epidemic of a pathogen because of homozygosity. Haldane knew very well that Gros Michel is a triploid and probably highly heterozygous. Monomorphism $\neq$ homozygosity.

Haldane always stressed the importance of disease in evolution and natural selection. It is at least possible that if he had not done so the discovery of

the relation between thalassemia and the abnormal hemoglobins on the one hand and resistance to malaria on the other might have been delayed by one or two decades. Allison reviews the latest evidence for these and other, similar relationships in an interesting article in this volume.

Pirie and Oparin deal with the physical and chemical problems involved in the origin, or origins, of life on earth, and Haldane's pioneer contributions to thinking on these problems. Haldane was capable of very imaginative speculation, and it is not surprising if some of his speculations have proved unfruitful, an example being his 1944–1945 ideas (arising out of Milne's cosmological theory) involving changes in physical and chemical constants in the course of geologic time.

There are a number of other interesting articles in this volume and a few dull ones (Mourant's plug for the International Biological Program, for example). Behnke and Brauer's article "Physiologic investigations in diving and inhalation of gases" shows the high regard naval physiologists had for Haldane's wartime experiments carried out with the cooperation of the British Admiralty and the firm of Siebe-Gorman. This work is relatively little known to biologists in general, mainly because, even 25 years later, most of the results are still in restricted archives.

Haldane was so many things that it is useful to consider briefly what he was not. His scientific life preceded the explosion of modern molecular biology and the application of computers to evolutionary, genetic, and taxonomic problems. In this sense, he was not a part of the modern biological scene but one of its most significant forerunners, predecessors, and prophets. As has frequently been pointed out, except for physiological studies on human volunteers (including himself), he was not an experimentalist. He was, I think, interested in every aspect of genetics. But, although a great evolutionist, he was perhaps rather blind to the special genetic phenomena involved in speciation and made no original contribution to this field. He was interested in Darlington's ideas in cytogenetics and later skeptical concerning some of them, but put forward no alternative views of his own.

There are a number of aspects of Haldane's life and career that are not touched upon in Dronamraju's volume. In particular, there is no mention of his communist period (1937–1952, roughly), when a large part of his energies were devoted to writing and speaking on behalf of the British Communist Party. No doubt there are those who feel that this interlude in a great man's life is best forgotten, at least in the pages of a memorial volume. The omission is less important since Haldane's political activity is fully dealt with in Clark's book. But I cannot help regretting that Dronamraju's volume does not contain an article on Haldane's political evolution by, say, Arthur Koestler—and perhaps, to complement this, a contribution by a communist. The reminiscences of Haldane by Naomi Mitchison (his sister), Arthur C. Clarke, A. Lacassagne, and René Wurmser, although of minor importance, all recall colorful and lovable aspects of a great personality. Joshua Lederberg has contributed a series of extracts from Haldane's earlier essays which provide an insight into his mind and ideas before he became a Marxist.

Ronald Clark's biography of Haldane, based on the papers made available to him in Bhubaneswar, India, by Helen Spurway (Haldane's widow) and other sources, including the reminiscences of a number of men and women who had known Haldane, is an honest, conscientious, and sensitive account. Yet it seems to fail in three respects. The descriptions of Haldane's scientific work are full and well balanced. Clearly, however, Clark, a nonscientist, was not competent to assess Haldane's overall significance in the history of genetics, physiology, and biochemistry, and he has wisely not tried to do so. There is no attempt to compare or contrast Haldane's viewpoint in genetics with those of his great contemporaries such as Wright, Fisher, Muller, and Dobzhansky. Haldane's scientific opinions and general outlook in science are not shown against the background of the development of the sciences in his lifetime. Men such as R. A. Fisher and C. D. Darlington appear in the story from time to time, but as lay figures whose personalities are not even sketched in.

Secondly, this is a remarkably gentlemanly and British biography, which owes nothing to Freud. Haldane was engaged in a never-ending struggle with his own contradictory personality and with the society of which he was a rebellious and unwilling part. Clark faithfully recounts the innumerable violent protests, letters of resignation, refusals to lecture, and eventually hunger strikes (all carried out with intense and often ferocious moral fervor) which disorganized Haldane's life and those of his associates. He gives an amusing, if pathetic, description of the incredible accumulation of manuscripts, papers, and reprints that surrounded Haldane's chair in his study. But the psychological causes of all this conflict and chaos are nowhere explored, and the few references to Haldane's relationships with his parents, to his sex life and his childlessness could hardly be more discreet—almost certainly they are more so than either Haldane or Helen Spurway would have wished.

Thirdly, and as a result of his inability to deal adequately with Haldane's ultimate significance in the history of human thought and with the basic causes of his inner conflict, Clark has not drawn any general conclusion or moral from the tragic life of this most remarkable man who combined in himself some of the qualities of a Leonardo, a Tolstoy, and a Lear. Was Haldane a man who wasted his real talents and threw away his chances of an orderly, constructive scientific career in order to devote himself to polemics, controversy, publicity, and disorganized popular and speculative writing? Or was he engaged in a heroic fight to establish scientific objectivity and fundamental human values in an essentially dishonest, hypocritical, and authoritarian society? How can one reconcile his almost superhuman open-mindedness in science with his moral fervor, often tinged with real paranoia, in dealing with the world in general?

To these questions Clark really gives no answer, although his sympathies are clearly with Haldane against the Establishments of Cambridge University, the John Innes Horticultural Institution, University College, London, and the Indian Statistical Institute. He has described the rather drastic pressure-chamber experiments on human volunteers at the Siebe-Gorman works fully, and his account of Haldane's communist period and especially his protracted evasions and intellectual wrigglings over Lysenkoism is full, candid, and fair-minded. In one minor respect, his interpretation differs from mine. In 1946, Haldane received an official invitation to visit the Soviet Union; Clark says that this was countermanded by the British Communist headquarters, whereas my impression is that Haldane avoided making the trip because he was fundamentally unwilling to view Soviet society, and especially Lysenkoism, at first hand. Haldane eventually revolted

against the petty bureaucracy and intrigue of the British Communist Party. But he was a proud and stubborn man of very strong loyalties, and he seems to have lacked the will or ability to criticize the communist philosophy as a whole and remained a Marxist in a number of important respects, although tending in his later years more and more toward the Hindu philosophy of nonviolence. It is probable that his mind was inherently a dialectical one and that his attachment to dialectical materialism was in part a consequence of this. I strongly suspect that the extreme simplicity of his style (which was frequently close to C. K. Ogden's "Basic English") was part of a syndrome that included an extreme political naiveté.

Deeply erudite classical scholar and philosopher, theoretical geneticist and popular journalist, bloody-minded bomber officer in World War I and humane animal-lover in his later years, supremely objective in his science and subjective in his politics, "in some respects . . . the cleverest man I ever knew" yet "not a profoundly original thinker" (in the words of Sir Peter Medawar), Haldane remains something of an enigma. Clark has painted him faithfully, "warts and all." Not for him the evasions of N. W. Pirie, who has implied (*Biographical Memoirs of Fellows of the Royal Society*, vol. 12, p. 237) that Haldane was *not* frequently rude to people who annoyed him. For a man who seems never to have met Haldane, Clark is (as far as the present reviewer is able to judge) extremely accurate in his facts; the only actual errors noted are in the spelling of a few names—Sir Allen Mawer (p. 150), E. L. Tanner (p. 173), and A. de Zulueta (pp. 134 and 173). Lastly, he has been able to do something that even many of Haldane's admirers were unable to do—appreciate the courage and mental quality of Helen Spurway, the dominant influence in Haldane's later years.

It may be worthwhile to point out that the U.K. edition of this book contains an interesting preface by Sir Peter Medawar, which has been omitted from the American edition [an essay by Medawar based on this preface appeared in the *New York Review of Books*, 10 Oct. 1968—Ed.], and 21 photographic illustrations as compared with 13 in the U.S. edition.

M. J. D. WHITE
*Department of Genetics, University of Melbourne, Parkville, Victoria 3052, Australia*

## Aspects of Genetic Research

**Genetic Mosaics and Other Essays.** CURT STERN. Harvard University Press, Cambridge, Mass., 1968. xiv + 185 pp., illus. $6.50. John M. Prather Lectures, Harvard University, 1965.

Four essays—covering the evolution of human genetics, mosaics in humans, developmental genetics, and a brief discourse on the philosophy of research—make up this scholarly and elegant book by Curt Stern. The first gives a history of the tortuous development of human genetics as a respectable science, emphasizing paths of inheritance of scientific thought in this area. His intellectual pedigrees are an interesting variation on those devised by Sturtevant in his *A History of Genetics*. Here also the reader will find a fresh account (based on new sources of information) of the events leading to the formulation of the Hardy-Weinberg law.

The second essay deals with mosaics in humans. Student, instructor, and research worker all will profit from Stern's exposition of the various types of human mosaics, including those for sex characteristics, blood groups, and other antigenic properties. The discussion takes an interesting and original turn when it focuses on the immunological implications of mosaics and the concept of mosaicism in antibody-forming cells. The merits of the Russell-Lyon "single active X hypothesis" are critically appraised.

Bristle formation in *Drosophila*, as a function of autonomy of cell action, and the influence of tissue prepatterns (topics which have been the object of his own recent research and that of his associates) provide the author with a golden opportunity to illustrate the successive stages in development of a fruitful biological hypothesis. Appropriate illustrations clarify the argument, and the complexities of the genetics used are sensibly dismissed with simplified explanations. The thrust of this essay is toward the synthesis of classical embryology and modern *Drosophila* genetics at its best.

The last short section thoughtfully appraises the relationship of the scientist to his work. It takes no great imagination to realize that introspection and autobiography must have fashioned the expressed attitudes. The gentle solicitude expressed for the unproductive or unsuccessful scientist comes as a cool breeze in the harsh, uncompromising desert of Big Science.

The style is pleasant and relaxed. Occasional bits of whimsy—the account of the Lasquenet who bears a child, or the tongue-in-cheek suggestion that women must be endowed with greater versatility of genetic functioning than men—lighten the presentation. The text is remarkably free of the embarrassing typographical errors that creep into every first edition (although Tarkowski loses his Polish origin and becomes a Russian at one point). Inevitably the reviewer must differ on some minor points. The suggestion that Morgan was a direct intellectual descendant of Mendel and de Vries hardly squares with Morgan's unrestrained attacks on Mendelism prior to his conversion in 1910 as a result of his own work with *Drosophila*. Similarly I would have preferred to trace the heritage of Beadle and Tatum not directly from Mendel, but through Morgan and Sturtevant, as well as Ephrussi. The book might have profited from a more extensive discussion of the startling work of Tarkowski and Mintz on cell fusion and of Hadorn and his students Gehring and Nöthiger on transdetermination; however, in a slim volume of essays one cannot expect to find a comprehensive survey of the field. Finally, some readers may find it difficult to forgive the author for providing the translation (parenthetically) of "Eureka."

EDWARD NOVITSKI
*Department of Biology, University of Oregon, Eugene*

## 5-Hydroxymethylcytosine and After

**Virus-Induced Enzymes.** SEYMOUR S. COHEN. Columbia University Press, New York, 1968. xxiv + 320 pp., illus. $11.50. Columbia Biological Series, No. 24.

*Virus-Induced Enzymes* is a series of six lectures given in 1967 at Columbia University. As is explained in the introduction, it is the author's intention to illuminate the role played by biochemistry in elucidating the events that occur after a phage particle adsorbs to the host bacterium. I can think of no one more qualified to discuss this subject than Cohen, who was certainly responsible for the initial discoveries that were instrumental in proselyting a segment of the biochemical community to exploit the phage-host system. His discovery