Book Reviews

The Life and Death of Cells. Joseph G. Hoffman. Hanover House, Garden City, N.Y., 1957. 301 pp. $4.50.

Here is a biophysicist's fresh approach to the problem of the life and death of cells. Among the topics considered are, what is life?, living tissue cells, automation in cells, organization and flux in cells, effect of environment on cells, cell division, variations and mistakes (in cell division), cancer cells, submicroscopic fibers, growth and death as stochastic processes, physical forces, and the importance of death. In many cases the problems are discussed with vivid imagery, particularly with respect to cellular movement and underlying molecular movements; for example, "There is literally a simmering and throbbing of the cytoplasm. It appears to be a boiling vortex of matter, even though it is known to be mostly water." Or again, in connection with the effects of ionizing radiations: "There is, however, one physical agent which strikes through the defences of a cell and can blast it like a bolt of lightning." Staid statements are often given zest by calculations and extrapolations; for instance, "A tissue cell may have a voltage across its walls of 50 millivolts . . . a rate of change of voltage of 50,000 volts per centimeter . . . across the wall."

Among the interesting discussions are those on the relationship between mistakes in heredity and the number of cell generations intervening between zygote and adult. The mistakes which occur only infrequently are considered to be one of the causes of cancer. There is also an intriguing chapter on physical forces, reactivity, enzyme specificity, macroscopic force fields, van der Waals forces, and Coulombic forces as possibilities for the explanation of some cellular phenomena. The last chapter, on death, includes an interesting discussion of the template hypothesis of duplication of biological units. The treatment of cells in tissue culture and the problems of cancer appealed to me as being especially original and informative.

A few unfortunate slips are found—for example, the failure to follow convention in capitalizing only generic names, not specific names, of animals and microbes. Also, a statement like: "When a plant or tree makes ten thousand seeds, it must assume that there will be more than barren rocks to greet the seeds," may raise eyebrows, as will the acceptance of the evidence that grain from ancient Egyptian tombs will sprout on being planted. A person who wants authority for various interesting statements regrets the lack of citations to the literature, but the book is apparently intended for the general reader, not the specialist. However, all in all, its merits far outweigh its minor deficiencies, and *Life and Death of Cells* should provide interesting reading matter for the large number of individuals who are intrigued by the ways of cells.

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Algebraic Geometry and Topology. A symposium in honor of S. Lefschetz. R. H. Fox, D. C. Spencer, A. W. Tucker, Eds. Princeton University Press, Princeton, N.J., 1957. 408 pp. $7.50.

Algebraic Geometry and Topology is a volume dedicated to S. Lefschetz on his 70th birthday (3 September 1954) by his students and friends. Lefschetz's main contributions to pure mathematics lie in the fields of algebraic geometry and algebraic topology, which thus become the subject of this book. One would like to add that, in the past 15 years, Lefschetz has been mainly interested in the theory of ordinary differential equations and has exerted a considerable influence in its development, although the subject is not touched on here.

The book starts with articles by W. V. D. Hodge and N. E. Steenrod which summarize, in a vivid fashion, the essential contributions of Lefschetz to algebraic geometry and topology. The remainder of the book contains 12 papers on algebraic geometry (in its broad sense) and 11 papers on topology. All of these are original papers on current developments in the two fields. There is also a bibliography of 98 items, covering Lefschetz's mathematical publications, which includes several books and sets of lecture notes.

Both Hodge and Steenrod admit the benefit they have derived from studying Lefschetz's work. Hodge acknowledges his indebtedness for the stimulus to his ideas on harmonic integrals, and Steenrod, for a treatment of some cohomology operations, known as reduced powers, which he introduced. These are certainly the best possible tributes to a great mathematician, the more so since these contributions of Hodge's and Steenrod's are among the most important in modern mathematics.

The contributed papers cover a wide range. It may be of interest to observe that many of them have contact with some phase of Lefschetz's work.

This book will be an indispensable piece of mathematical literature. It appears at a time when both algebraic geometry and topology are in the process of a vigorous development. Algebraic geometry has extended itself, on the one hand, to complex manifolds and differential geometry and, on the other hand, to abstract algebraic geometry and number theory. In recent years, algebraic topology has been closely interwoven with algebra, particularly with the so-called homological algebra. The basic problem in mathematics, as in many other fields of science, is the relation between the discrete and the continuous. A topological space is a continuous object, but the algebraic structures associated with it, the homology groups, the cohomology ring, and so forth, are generally discrete. An algebraic variety in the complex field has a topological structure, but an abstract variety in a finite field is basically discrete. We see, in the recent development of algebraic geometry and topology, this interplay of the discrete and the continuous on a high level. It must be for this reason that the field, like the work of Lefschetz himself, occupies such a central position in pure mathematics.

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Chemical Applications of Spectroscopy. vol. IX of *Technique of Organic Chemistry*. W. West, Ed. Interscience, New York, 1956. 787 pp. Illus. $15.

The past decade has witnessed remarkable increases in both the importance and diversity of applications of spectroscopy for the practicing organic chemist. Perhaps the most striking development has been the creation and almost explo-