whole rather than at random, for which rigorous methods are not yet at hand. This illuminates the old and new physics and focuses attention on the relation between the sciences of the material world and those of living organisms and of human societies.

Here is an excellent volume for a scientist to give his layman friends (it includes reading lists) and—since who among us is not a layman in most of the wide stretch of science?—an excellent volume for him to read himself.

R. W. GERARD

The University of Chicago

Life: its nature and origin. Jerome Alexander. New York: Reinhold, 1948. Pages vii + 291. (Illustrated.) $5.00.

What is life? One darned thing after another; something one relaxes from on the psychoanalyst's couch; a question of importance only to an embryo; a matter of the liver; a matter of catalysis, says Dr. Alexander.

Catalysis is defined by Dr. Alexander as the process whereby a specific particulate unit or surface (the catalyst) continuously brings about chemical union, breakdown, or structural change in other units as a result of very close contact or approach. This view of the nature of life is now of respectable antiquity, and Dr. Alexander claims no title to it. Indeed, he quotes many earlier workers who have identified themselves with this viewpoint. L. P. Troland, for example, has resumed the viewpoint very clearly in his statement that "life is fundamentally a product of catalytic laws acting in colloidal systems of matter throughout long periods of geologic time." I am, however, somewhat astonished to find that the two works in which this viewpoint has been admirably presented find no mention whatever in the pages of Dr. Alexander's book. I refer to A. I. Oparin's *The origin of life* (Macmillan, 1938) and R. Beutner's *Life's beginning on earth* (Williams & Wilkins, 1938), the latter being a particularly pleasant as well as informative book. Can it be that Dr. Alexander has never heard of them?

However that may be, Dr. Alexander's book, though by no means an original contribution to the subject, is full of the most interesting and chemically recondite facts and theories. Expert and general reader alike will find the book both readable and informative. There is a brief, simple coverage of nuclear physics, with especial reference to the smallest particles of matter and the manner in which molecules make masses. The author then considers the nature of living units (bionts), and emerges with a definition of a living unit as one which can direct chemical changes by catalysis and at the same time reproduce itself by autocatalysis, as for example, genes, bacteriophages, and ultrafiltrable viruses.

The evidence, the author suggests, indicates that the primal cause of evolution is a heritable change in existing and potential biocatalysts. The discussion of this subject in relation to genetics is most stimulating.

The final chapter, "Philosophy, the Guide of Mental Life," is rather more to the point than most such concluding chapters, in which the writer frequently reminds one of the pure mathematician, referred to by Dr. Alexander, who is never so happy as when he doesn't know what he is talking about!

Dr. Alexander's book has it faults, it sometimes wanders and the reader wonders, but I hope I have said enough to indicate that it is a book very well worth reading.

M. F. ASHLEY MONTAGU

235 North 15th Street, Philadelphia

Experimental designs in social research. F. Stuart Chapin. New York-London: Harper, 1947. Pp. x + 483. $3.00.

After a preliminary characterization of experiments by "trial and error," Chapin makes a study of three types of experimental designs which he takes to be superior: (1) the "cross-sectional" (which attempts to establish present relationships), (2) the "projected" (which involves a relationship between the present and future), and (3) the "ex post facto" (which involves a relationship between the present and past). Each method is treated both in a general way and through specific illustrative research projects. The limitations and possibilities of these approaches are considered in some detail in the last two chapters. In this last portion of the book Chapin also provides a listing and classification of available types of social measurement and discusses some of the representative testing procedures.

The experimental designs are species of a methodological approach that combines J. S. Mill's *Method of Difference* and *Method of Concomitant Variations*; that is, Chapin seeks to impose controls by keeping all variables constant save one, which he attempts to "correlate" with the phenomenon in question, and thus set up causal connections. This is a restricted view of scientific method, since it fails to take into account the new methods developed to handle a large number of variables simultaneously, a method which is perhaps more suited to social research (see R. A. Fisher's *Statistical methods for research workers*). Though Chapin acknowledges the fact that complete control is impossible, he does not provide a criterion by which we can determine which are the relevant and critical variables, thus failing to account for the traditional criticism directed against Mill's methods (see, for example, *An introduction to logic and scientific method,* by Cohen and Nagel).

Chapin takes measurement to be quantification along a scale of units and then proceeds to cite many so-called psychological and sociological scales. But in considering such "measures" as are found in attitude and status studies, he fails to recognize that, although there is quantification and ordering of some sort, there is no scale, since the units of measurement are unknown. As yet there are few sociological "feet" or "pounds."

The book is important because it points out a real possibility for advance in social experimentation and directs attention to the sorely neglected study of method in the social sciences. It is questionable, however, that real advances in research can come from an analysis of method which has not absorbed such important methodological contributions as are to be found in pragmatism