moderns are privy. It is not surprising that the mark of this terminal fallacy is most evident in the single chapter which is not the work of a professional historian, a chapter entitled "The young researcher" prepared by Simone Raspail, the great-granddaughter of the subject and herself a biologist and pharmacist. Another slight weakness in this book arises out of the author's laudable aim of gauging the significance of Raspail's double allegiance, to science and to democracy. In considering Raspail's attempt to "serve both masters," she betrays hints of a commitment to a stereotyped view of the nature of science and the scientist as "coldly analytic" and "objective." But the positive features of this biography outweigh such reproof.

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Theories of Suicide

The Social Meanings of Suicide. JACK D. DOUGLAS. Princeton University Press, Princeton, N.J., 1967. xiv + 398 pp., illus. $8.50.

I doubt that any serious scholar writing about or researching any issues concerning suicide could fail to read and, in one or another way, to use *The Social Meanings of Suicide*. Douglas analyzes in detail and gives critiques of the most important English and some foreign literature on suicide. He presents the reader with summaries, to which he appends footnotes that are delightful excursions into small nuances which the original theorist may have handled too loosely. But more than this, he provides his own lively interpretation of the meaning of meaning and, finally, of the meaning of suicide. He causes us to doubt what has been taken for granted about Durkheim's classic work; he makes the definite now seem problematic; he raises important questions about official documents on which causes of death are recorded; he stirs the reader to think again and more critically about theories of suicide and the studies that correlate many other variables with this phenomenon. For these reasons, the book is a contribution to sociology and the study of deviance.

The book has four major parts: Part 1 is devoted to Durkheim, both the historical context in which his theory developed and the major work itself. Morselli, von Oettingen, and Quetelet are given appropriate attention. Part 2, nearly a hundred pages on post-Durkheimian sociological theories of suicide, contains closely reasoned critiques of the status-integration thesis of Gibbs and Martin, Powell's status and anomie theory, ecological and status change theories, Halbwach's theory, the work of Henry and Short, and the work of Gold. Part 3 is an extended essay on the problems of definition and the use of official statistics on suicide. In part 4, another hundred pages, he gives his own thoughtful analysis of "suicidal actions as socially meaningful actions." There are two major appendices which should not be missed, one a continued discussion of Durkheim, the other a continued discussion of definitions of suicide. (It is not clear why these discussions are not sections of parts 1 and 3, respectively, for they seem not to have the character of extraneous materials or details of data commonly found in appendices.)

In general, Douglas is dissatisfied with all sociological theories of suicide on the grounds that their authors used abstract social meanings, such as abstract values opposing suicide, to explain quite specific social events. Failure to have accurate, valid, and detailed descriptions of the particulars connected with the social event of suicide results in repetition of the "ecological fallacy," the gap between two sets of phenomena, but most commonly the gap between concrete situations and abstract meanings imputed to them. The distinction between "situated meanings" and "abstract meanings" is probably the most important point Douglas wishes to make. He argues strongly that "it is not possible to study situated social meanings (e.g., of suicide), which are most important in the causation of social actions, by any means (such as questionnaires and laboratory experiments) that involve abstracting the communicators from concrete instances of social action (e.g., suicide) in which they are involved" (p. 339).

Part 3 is an especially cogent discussion for anyone concerned with the meanings of official statistics and how they have been too often used to support a theory wtihout asking appropriate questions about the meaning of the data and the data gathering processes. As the author points out, it does no good to make up a formal definition of suicide to be tested with data operationally defined in some very different way. He convincingly shows that the term "suicide" has been used in official statistics to mean quite different things, not only as between America and Europe but within a given country over time. The variations have been great, and Douglas takes pains to show them in different countries during the 19th and 20th centuries. He lists five major sources of unreliability in official statistics: "(1) . . . from the choice of official statistics to be used in making the tests of the sociological theories; (2) . . . from subcultural differences in the attempts to hide suicide; (3) . . . from the effects of different degrees of social integration on the official statistics keeping; (4) . . . from significant variations in the social imputations of motives; and (5) . . . from the more extensive and professionalized collection of statistics among certain populations" (p. 203). Each of these he discusses in considerable detail.

A weakness of the volume is that it has a much too personal quality. Douglas has a somewhat hostile tone when reviewing and criticizing other writers in part 2. He borders on being harsh and acrid, especially with Henry and Short. He could have made the same observations without sounding unnecessarily aggressive and nearly arrogant. He uses convoluted language and split infinitives to the distraction of anyone with the slightest editorial eye. More important, in both text and footnotes he infers things from the writings of others and then proceeds to criticize the inferences he has drawn—sometimes not correct ones, I fear—as though they were the original authors' statements. These are some of the disturbing features of an otherwise erudite volume.

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Monitoring Devices

Bio-Medical Telemetry. Sensing and Transmitting Biological Information from Animals and Man. R. STUART MACKAY. Wiley, New York, 1968. xii + 388 pp., illus. $12.50.

Bio-Medical Telemetry is a book on radiotelemetry, written (as is stated by the author) for biologists, physicians, and engineers. Its contents have been derived from a highly successful series of short courses presented annually by the author, a physicist who has had extensive experience in many areas of

the life sciences and who is one of the pioneers of biotelemetry. The book contains a selection of material ranging from the principles of physiology to the practical aspects of electronics and bioinstrumentation.

The book opens with introductory material on how radiotelemetry can be used practically in the life sciences. It proceeds with a discussion of semiconductor devices (diodes, transistors, tunnel diodes) and omits introductory material on Ohm's law. Negative resistance, impedance, and the arrangement and function of electronic circuits are discussed nonmathematically. A chapter on modulation techniques is followed by one on the electrical characteristics of materials and their suitability for implantation in the body. Following are chapters on sensors (transducers) for a limited number of physiological events. The choice of radiofrequency carriers and antennae is covered and detectors and display methods are discussed. A presentation on the use of ultrasound, magnets, and radioactivity as means for telemetry is inserted at this point. A chapter is devoted to the use of electromagnetic energy transmitted to energize a passive transmitter or to stimulate irritable tissue. The book concludes with descriptions of a few telemetry exhibits that the author has presented, along with appendices of practical data including the legal factors which pertain to the use of biotelemetry.

Despite some omissions, this book contains much useful information for life and physical scientists. Because a wealth of practical data (circuit diagrams, component values, and the like) is given, it will be possible for the relatively unskilled reader to purchase components and assemble a simple, practical telemetry system for a few physiological events. Many will find that transducers are not covered in adequate depth; those that are described in detail will permit telemetry of only a few physiological phenomena. The utility of the book could have been enhanced by expansion in this area and by presentation of data on the conversion efficiency (output signal for a given size of physiological event) of the transducers that are described.

Because the quality of telemetered bioelectric signals is often determined by the stability and properties of electrodes, this reviewer would have desired a broader treatment of this subject. Another area of omission relates to a failure to capitalize on the properties of the field-effect transistor. This valuable solid-state device, which has many of the characteristics of the vacuum tube, is mentioned only briefly. Perhaps field-effect transistors were not available in sufficient quantity when the author composed his first manuscript; nonetheless their use offers the opportunity of using a variety of transducers which cannot be connected to ordinary transistors. The many integrated-circuit operational amplifiers, which are becoming available at a very low cost and are ideally suited to miniaturized telemetry devices, were not available when the author prepared his material; hence no discussion of these is presented.

The only other serious omission is in the bibliography. Many papers might have been cited that contain useful ideas on the transmission of physiological events not described by the author. In addition, there are at least two other books in print on telemetry; although these are merely collections of contributed papers, they should have been cited.

These criticisms notwithstanding, Mackay's book is the only comprehensive treatment of the principles of biotelemetry. It covers nearly all aspects of biotelemetry without the repetition that occurs in a book to which many authors have contributed. The engineer or physicist entering the field of biotelemetry will be fascinated by the ingenious use of devices and circuits known to him; the life scientist will be pleased with the nonmathematical descriptions of electronic circuits which are of practical use to him.

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Viruses

Molecular Basis of Virology. H. FRAENKEL-CONRAT, Ed. Reinhold, New York, 1968. xiv + 642 pp., illus. $18. American Chemical Society Monograph No. 164.

Once more we are presented with a series of review articles masquerading as a "lasting record of our present knowledge of this active field." If we accept this volume for what it really is, some well-written and well-conceived progress reports in molecular virology, interspersed with a few less satisfactory essays, we have little cause to complain. It is the type of book which should be found in the library of every research institute and university, but not necessarily in the personal collection of the student or investigator. Most of the chapters are written by acknowledged leaders in modern virus research and are remarkably up-to-date as of March 1968. The individual articles reflect the special interests of the particular authors to a large extent, which means that an overall integration of molecular virology and its overwhelming contribution to our present views of life processes is left as an exercise for the reader.

The first article, by J. M. Kaper on the physical properties of small RNA viruses, is the least satisfactory presentation in the entire volume. We are presented in a rambling, leisurely fashion (133 pages) with data and concepts that have been reviewed many times. A cursory discussion of the sedimentation equations is inappropriate to the stated and actual intentions of the remainder of the book. The discussion of tobacco mosaic virus structure is painfully familiar, including several often-reproduced illustrations.

Fraenkel-Conrat's article on the chemical properties of small RNA viruses is more satisfactory. There are some valuable tables of the RNA base composition and the amino acid composition of these viruses and also the coat protein sequences of several viruses, although the latter data can be obtained readily from several other recent sources. This is followed by one of the finest articles in the volume—an extremely well-thought-out and well-integrated chapter on the replication cycle of RNA viruses by Hofschneider and Hausen, experts on bacterial and animal viruses, respectively. The next chapter is a curious and disappointing report of the in vitro synthesis of RNA virus components by Fraenkel-Conrat and Weissmann. Particularly the section on viral RNA, presumably by Weissmann, presents a highly biased view which emphasizes the controversial aspects of the detailed structure of the RNA replicative intermediates without quoting any of the recent data published by Spiegelman and his associates. This type of article inevitably appears in such a collection, since so many problems at the forefront of research are open to more than one interpretation. Only through a wise choice of authors or vigorous editing or both can the more controversial issues be fairly presented.