takes a worldwide perspective, the papers are almost exclusively concerned with Asian Russia. They are typically brief, almost abstract in form. Their heavy emphasis on pure zoonoses contributes to the fields of comparative medicine and veterinary parasitology. For those interested in diseases important to man outside of Russia there is little meat, and the collection of papers is important chiefly from the standpoint of medical intelligence; that is, it provides a miscellany of minor factual information and illustrates the scope of interest of, and approaches taken by, a segment of Russian epidemiologists as of 1959. This volume probably should be available in university biomedical libraries, but only readers with highly specialized interests will wish to add it to their personal collections.

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Physics Summer School

Fundamental Problems in Statistical Mechanics II. Proceedings of the second NUFFIC International Summer Course, Noordwijk, the Netherlands, 1967. E. G. D. COHEN, Ed. North-Holland, Amsterdam, 1968 (U.S. distributor, Interscience [Wiley], New York). ix + 338 pp., illus. $11.

This book records the proceedings of a summer school on statistical mechanics held in 1967. It is a successor to a volume containing the proceedings of a summer school held five years earlier. The contrast is interesting: whereas the first school was largely backward-looking, reviewing progress made chiefly in the previous 10 to 15 years, the recent school was far more "up-to-date" and forward-looking. In particular this volume will be valued because of the introductory accounts by Hugenholtz and Ruelle of the so-called C* operator algebra approach to the treatment of statistical systems of infinite extent. This rigorous approach, developed with much fanfare in the last few years, avoids all consideration of the "thermodynamic limit," in which finite but ever larger systems must be discussed. For physicists not versed in modern mathematical terminology the original papers have been hard going. The lectures by Hugenholtz and Ruelle will ease the way, although one regrets that a more extended expository review of all this work was not presented so that nonexperts could more easily assess its significance.

Another new and fundamental area concerns the "divergencies" which have been found in the theory of the transport coefficients of a fluid. Extensive efforts by many research schools had finally led to agreed-upon formal expressions for the density corrections to the thermal conductivity, viscosity, and other properties of a dilute gas. Unfortunately, once a serious effort was made to actually evaluate these higher-order terms (mainly by Cohen and his collaborators) it was discovered that some of the integrals involved were logarithmically divergent. As is explained by Cohen in his lectures, the origin of these divergencies—essentially in multiple collisions in which one or more of the collisions occurs indefinitely far from and later than the earlier ones—is now understood. It is believed that, in contrast to the equilibrium properties of a gas, for which a Taylor series in powers of the density ρ exists (the virial expansion), the correct expressions for *non*equilibrium properties must include terms such as $\rho^2 \ln \rho$, which are not analytic at $\rho = 0$.

The subject of phase transitions and critical phenomena, which has been under increasingly active investigation, is the topic of the lectures by Kasteleyn and Kac (and a shorter note by Jancovici on theories of freezing). Kasteleyn presents a clear and succinct review of many of the recent developments, but in the proceedings as a whole one misses accounts of some of the beautiful work of Griffiths, Dobrushin, Minlos and Sinai, and others on the rigorous proof of the existence of phase transitions, and of the deep thermodynamic analyses of Griffiths, based on convexity properties, which concern the equation of state of a system near a critical point. This, however, is a carping point: one should indeed be grateful for this excellent and well-produced collection (although typographic errors are rather abundant). Potential readers or browsers should note, in addition to the topics singled out above, the general introduction by Uhlenbeck and the contributions by Glauber on photon statistics, by Casimir on Bose-Einstein condensation, by Waldmann on gases with internal dynamics, and by van Kampen on classical plasmas.

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Tooth Decay

Art and Science of Dental Caries Research. ROBERT S. HARRIS, Ed. Academic Press, New York, 1968. xx + 428 pp., illus. $17.50.

This book gives a picture of the present state of dental caries research and of the activity of a number of highly productive workers in this field. It will be an essential part of the library of persons doing dental research and should be read by any dentist who wants to follow advances in science which touch on his art.

During the last decade quantitative bacteriological studies on animal caries, begun at Harvard by Shaw and Keyes, and similar quantitative studies on man, by Stralfors and by Krasse in Sweden, have converged, notably in the work of Gibbons, to give a great increase in the understanding of the bacteria producing dental caries in man. This work is described in Harris' book by the bacteriologists involved in it. The description of the progress of the research and the techniques used is excellent. Because of the specific nature of the polysaccharide-producing microorganisms concerned there is a real prospect of very much improved prophylaxis if the discoveries are exploited. Moreover, the new bacteriology of caries appears relevant to the other important dental condition, periodontal disease.

The bacteria causing caries establish themselves in a "plaque" adhering to the enamel surface and leach out the enamel salts by altering the surface concentration of hydrogen, phosphate, carbonate, and possibly calcium ions. There results a very specific change in the enamel which can be duplicated by exposing enamel in vitro to sterile inorganic solutions. The highly characteristic change can be observed in sectioned enamel with the polarizing microscope and correlates very well with the nature of the penetration of the enamel, the pathways by which the enamel was originally mineralized, and the known activities of the microorganisms involved. The information essential to the understanding of the biochemistry of this aspect of caries is more readily available in the English, Swedish, and German literature than in publications in the U.S. and U.S.S.R. The coverage in the present book tends to be American in approach.

The clearly written articles on the design of conclusive experiments are particularly valuable because, with the understanding of mechanisms now

available and with the vast amount of human material well observed by public health officials in such cities as Leningrad, a real reduction of this multi-billion-dollar affliction should be in sight. Harris' book is well written; it covers a great deal of important material; it is pleasingly designed and printed.

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Plasmas

Advances in Plasma Physics. Vol. 1. ALBERT SIMON and WILLIAM B. THOMPSON, Eds. Interscience (Wiley), New York, 1968. x + 340 pp., illus. $14.95.

Whenever a collection of charged particles is sufficiently dense and sufficiently mobile that their mutual interactions and coupling to external fields produce significant collective effects, plasma physics is supposed to explain those effects. Thus the physics of plasmas is expected ultimately to provide the underlying framework for understanding a wide variety of phenomena in both science and engineering. From the beginning of plasma studies in the late 1920's and early 1930's the interplay between basic and applied work has been strong; it is not surprising that the last two decades have seen the extension of theoretical understanding to include effects characteristic of controlled thermonuclear fusion research, space and solar physics, propulsion and power generation engineering, astrophysics, and solid state physics.

This book is the first volume of a projected series that is evidently intended to focus somewhat more strongly upon the interplay between basic and applied work than the older and complementary series *Review of Plasma Physics* edited by M. Leontovich. A measure of this focus can be obtained from the following classification of the contents of this first volume.

Articles by J. M. Dawson ("Radiation from plasmas"), H. P. Furth ("Minimum-average-*B* stabilization for toruses"), N. A. Krall ("Drift waves"), and T. K. Fowler ("Thermodynamics of unstable plasmas") are in one way or another directed toward some problems important in controlled thermonuclear fusion research, although the first and the last two subjects are fundamental to the behavior of most plasmas. An article by F. L. Scarf ("Plasma in the magnetosphere") is concerned with the interaction of the solar plasma with the earth's magnetic field. An article by T. R. Brogan ("The plasma MHD power generator") concerns a strictly engineering application. No papers on astrophysical or solid state plasmas are included.

The papers are written by leaders in their respective fields. Very little of the material presented is new, but it is here presented in a readily accessible format. The paper "Radiation from plasmas," although not the most comprehensive available on the subject, does treat most aspects of plasma radiation generated by particle encounters. But it omits any discussion of cyclotron or synchrotron radiation, topics of great importance to astrophysical plasmas. Furth's paper on minimum average magnetic field stabilization is the best summary available on this topic. Scarf's discussion of the magnetospheric plasma displays in marvelous detail the validity of his contention that the magnetosphere constitutes an invaluable, giant plasma laboratory in which an enormous variety of phenomena can be observed.

The article on drift waves is very hard reading because the author has taken little pains to be clear. Undefined symbols and an unbending style leave little reason to recommend this paper to anyone unfamiliar with the subject matter. In his article on plasma thermodynamics, Fowler shows how upper bounds can be placed upon plasma transport properties by virtue of thermodynamic constraints and without deducing these properties in detail from first principles.

Of 330 text pages in this volume, 103 are devoted to the development of plasma MHD power generators. This reviewer suspects that this paper will be useful to a very different audience than the others in this volume, being concerned as it is with the difficult "nuts and bolts" problems of making such a generator operational. The proofreading of this article is poor.

All in all the volume contains substantial and useful treatments of some very diverse topics of plasma physics and its applications. Few individuals will likely find a sufficient fraction of the whole to be of such interest as to warrant purchase, but it should be a valuable library item wherever plasma physicists work.

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Familiar Animal

The Biology of the Cockroach. D. M. GUTHRIE and A. R. TINDALL. St. Martin's, New York, 1968. viii + 408 pp., illus. $19.

Especially in the past two decades, great strides have been taken in probing the individual and family secrets of cockroaches. They now are among the best-known insects, even rivaling mosquitoes in the extent to which we understand their growth, reproductive cycles, and responses to various conditions of their environment. Because they are constant domestic pests, occasionally transmitting disease, and also are recognized as fine laboratory animals for teaching purposes and studies of physiology and the action of insecticides, this comprehensive new book by two British entomologists, of the universities of Aberdeen and Birmingham, respectively, is particularly welcome. Its main stated purposes are to help researchers and to introduce cockroaches to general readers. It is a fine book and will doubtless be used in many laboratories as a guide for advanced students and investigators, though too technical for most readers without special background.

The classic work by Miall and Denny in 1886, *The Cockroach*, dwelt more on gross anatomy and included more general illustrations; the present book emphasizes refined physiology and microanatomy. However, the introductory chapter brings out many interesting aspects of the general natural history of cockroaches. Though there are about ten species which frequently occur in modern dwellings (fortunately not all at the same time), there is a surprising number of strictly outdoor species, mostly in tropical and subtropical countries. Some 3500 to 4000 species are "described," that is, already bear scientific names, but at least 2000 more probably remain to be recognized. The authors suggest regions of origin for several common species which have been distributed by human commerce; in the case of *Blaberus craniifer* I believe that West Africa is a mistaken origin, because all 50 species catalogued in the subfamily containing *craniifer* are tropical American in native habitat.

There is now a vast literature on cockroach biology, quite apart from that on taxonomy (with which this book is not concerned). Each chapter has its own supporting bibliography, apparently compiled with much care. Only a few significant omissions or misspellings have come to my attention. Both text and