but the book is not saturated with formulas. The interrelationships of these topics are left up to the reader.

The review is general, brief, and to the point. The extent to which each topic is discussed depends on the amount of published literature on the subject, and the author shows no original thought in presenting the subjects. His intentions could have been accomplished just as well by outlining the topics and listing the appropriate references under them. However, this book will be useful as a review for research workers and for those who are generally interested in social insects or in initiating research in this field. In view of the increased interest in population studies and the large amount of recent work, it serves as an adequate comprehensive survey of the subject.

DAVID R. SMITH
Entomology Research Division,
Agricultural Research Service,
U.S. Department of Agriculture

Geology

Controls of Metamorphism (Wiley, New York, 1965. 368 pp., $13.50), edited by Wallace S. Pitcher and Glenys W. Flinn, is a miscellaneous collection of essays on aspects of regional metamorphism considered against the background of experimental and analytical chemical data. Perhaps unavoidably, considering the broad scope implied by the title, the book is scrappy in content and uneven in quality. Much of its substance is accessible elsewhere; few of the ideas are new.

I found the following sections of interest: Part of chapter 3, on deformation paths (D. Flinn), in which a relatively new concept in interpreting strain in deformed rocks is presented; chapter 5 on metamorphism in metals (D. McLean), and chapter 12 on isotopic dating of metamorphism (S. Moorbath), which provide useful summaries of topics not previously treated in toto in geological literature; W. S. MacKenzie's concise, timely statement regarding equilibrium (stable versus metastable) in chapter 13; J. Sutton's model of regional metamorphism (chap. 2) based on his wide experience with its manifestations—especially structural aspects—in the Scottish Highlands; chapter 7 on reaction rates (E. D. Lacy) in which some aspects of reaction kinetics in ionic crystals are considered.

Mineralogical data are discussed in several chapters: chapter 14, iron-titanium oxides (M. I. Abdullah); chapter 15, garnets (M. P. Atherton); chapter 16, biotites (B. C. M. Butler); chapter 17, calc-amphiboles (B. E. Leake); chapter 18, pyroxenes in granulites (R. A. Howie); and chapter 20, feldspars (W. L. Brown). The chemical compositions of biotite and calciferous amphiboles are found to shed little light on metamorphic conditions. The inferences drawn from garnet composition are weakened by the recent demonstration of wide prevalence of zoning in garnet crystals. There is little new regarding feldspars. It is questionable whether these mineralogical essays are appropriate in a book on the controls of metamorphism.

The granite controversy still echoes in two chapters on migmatites: chapter 10, experiments on melting, said to prove anatexis (H. von Platen), and chapter 11, geological evidence, much of it exhumed from old sources, purporting to refute anatexis and to demonstrate postmetamorphic metasomatism (B. C. King). E. H. Hellner and others contribute a chapter, at most of minor interest, on synthesis of chlorites and amphiboles from unstable initial mixes. W. E. Pitcher, in chapter 19, extends generalizations on paragenesis of Al_2SiO_5 polymorphs into less valuable reflections on their possible stability relations. R. W. Rutland's 17-page chapter on tectonic overpressures adds little to Clark's two-page statement [*Amer. J. Science* **269**, 647 (1961)]. The reader should glance at the sections entitled "Conclusions," in chapter 9 on isograds (M. P. Atherton) and in chapter 4 on mineral nucleation and growth (N. Rast) before deciding whether to read them in full. They are too long and repeat ideas expressed more concisely and with greater insight elsewhere in the literature.

FRANCIS J. TURNER
Department of Geology and Geophysics,
University of California, Berkeley

Laboratory Design

Chemistry and Biology Laboratories: Design, Construction, Equipment (Pergamon, New York, 1965. 265 pp., $17.50), by Werner Schramm, is a translation of the second German edition of his *Chemische und Biologische Laboratorien* (1960); M. Jansen was the translator, and J. M. Leytham edited the translation. The volume is the German counterpart of recent English and Danish publications—*Laboratory Planning* (London, 1962) by James F. Munce and *Laboratorier—Projektering, Bygning, Indretning* (Copenhagen, 1961). The books are primarily intended as technical guides to what is best in building and equipping modern laboratories for chemical and biological work.

The Danish work covers all kinds of scientific and technical laboratories and is a useful source of references for architects and building committees who are concerned with the design of academic or industrial laboratories. It represents the viewpoint of 80 contributors, including civil engineers, architects, engineers, chemists, and biologists.

Schramm's book, on the other hand, contains 15 chapters and gives examples and basic rules for different types of laboratory equipment for use in academic laboratories. I do not believe it will be very helpful to an architect who is not familiar with the space requirements for laboratory facilities for modern courses in general chemistry, organic chemistry, physical chemistry, analytical chemistry, biochemistry, and molecular biology in the United States.

The inexperienced architect would be well advised to consult the books that have been sponsored by the Educational Facilities Laboratories (New York) or by the National Research Council (Washington, D.C.). These books include *Modern Physics Buildings* (Reinhold, New York, 1961) by R. R. Palmer and W. M. Rice; *Buildings and Facilities for the Mathematical Sciences* (Conference Board of the Mathematical Sciences, Washington, D.C., 1963); and *Laboratory Planning for Chemistry and Chemical Engineering* (Reinhold, New York, 1963; published for the Committee on Design, Construction, and Equipment of Laboratories, Division of Chemistry and Chemical Engineering, National Academy of Sciences–National Research Council), edited by Harry F. Lewis.

Schramm's book is based on German practice insofar as laboratory furnishings and services are described. Steel furniture is not commonly available in Germany, where it costs 35 to 50 percent more than traditional materials (wood is given a surface treatment—Desmophen-Desmodur varnish, or Resopal, for example, p. 59). Tops made of reinforced concrete tiles may be

fixed to plywood using the synthetic resin, Asplit, made by Farbwerke Hoechts (p. 63). [Because synthetics are attacked by solvents and have a low heat resistance, slate and asbestos cement have not proven to be popular.] Lead is still used at CIBA (Basel, Switzerland) but is being replaced by other materials (p. 64).

Those who plan science buildings in the United States should remember that all these aspects of laboratory planning have been the subject of considerable research in the United States.

HARRY F. LEWIS
Institute of Paper Chemistry, Appleton, Wisconsin

Solar Radio Astronomy

Detection of radio waves from the sun was much sought after by radio pioneers, and, for a while in 1931, Karl Jansky postulated that his newly discovered "Cosmic Static" was of solar origin. Later, radio amateurs reported intense hissing sounds at the time of sudden interruptions of their communications, and in 1942 a British radar network was jammed by bursts of solar noise. During 1942 and 1943 solar radio waves were systematically detected by G. C. Southworth with microwave equipment at the Bell Telephone Laboratories and in 1943 by Grote Reber, who had privately continued Jansky's original work on longer wavelengths.

The growth of radio astronomy immediately after World War II was explosive, and the results are scattered in many places. The book, **Solar Radio Astronomy** [Interscience (Wiley), New York, 1965. xii + 660 pp., $19.75] by Mukul R. Kundu, is a review and co-ordination of the solar aspect of an extensive literature. The first two chapters, "Introduction" and "Optical features of the active sun," are short and appropriate. "Propagation and Generation of Radio Waves in the Solar Atmosphere," a mathematical treatment of the properties of ionized gases, is the basis for discussing the observational material, and it precedes "Techniques of solar radio observations," which places special emphasis on various types of solar interferometers. Observations are then described and analyzed with reference to physical models of solar features. There is a chapter on the quiet sun radiation which arises from the undisturbed solar atmosphere, and another entitled "The slowly varying component," which is closely associated with the appearance of sunspots, while there are six chapters on various burst types that are associated with sudden releases of solar energy. The relationship of solar radio emisison to the important solar x-ray and particle emissions, a major factor in the space environment of the earth, are described in two chapters. The last four chapters are "The active region and the flare event as a whole," "The irregular structure of the outer corona," "Radar observations of the sun," and "Satellite observations of solar bursts."

The coverage of topics in 18 chapters is complete, and this is followed by an extensive list of references and a subject index. The treatment of the material is concise, with 352 illustrations carefully selected from a wide literature. The various classifications of the difficult type IV burst are well presented. The shortness of the last chapter, on satellite observations, is disappointing but, at this time, understandable. The discussion of solar radio astronomy proper is adequate and accounts for more than one half of the book (eight chapters).

The unique radio telescope constructed in the earth's surface at Arecibo, by Cornell University, appears on the dust cover, and recalls the association of the author, Mukul R. Kundu, with Cornell before returning to his native land to pursue radio astronomy at the Tata Institute, Bombay. Kundu graduated from the University of Calcutta in 1947 with a B.Sc., and in 1951 with an M.Sc. Initial solar studies were commenced in France under the direction of J. F. Denisse and J. L. Steinberg of the Observatory of Meudon. In 1957 the author obtained the Docteur ès Science degree from the University of Paris, and some time later was able to continue solar studies at the University of Michigan. It was there that a review of solar radio astronomy was undertaken and the subsequent report was well received. It is now published with little change as the book under review. Appropriately, publication occurs at the onset of a new cycle of solar activity when the need for a unified account of solar radio observations is great. The book is one of a kind and is highly recommended as a reference.

ARTHUR E. COVINGTON
Radio and Electrical Engineering Division, National Research Council, Ottawa, Canada

Community Health

The prime social goal of medicine is the application of the maximum of scientific knowledge for the benefit of each person in an efficient, easily available, and individualized manner. Optimal health is today, however, far more than the simple sum of the care given to individual patients. By definition, it includes specific attention to the problems created by man's life in complex communities.

The goals, methods, and potentialities of a comprehensive approach to community health must be better known by public and health professions. In no other way can informed decisions be made with respect to the many possible health goals open to an increasingly affluent local and world community.

In **Community Health: Its Needs and Resources** (Basic Books, New York, 1966. 264 pp., $4.95), J. D. Porterfield has attempted an overview of the important field of public and community health. He has assembled 20 lectures given by recognized authorities under the auspices of the Voice of America. The topics considered are the classical ones in public health—the control of communicable disease, maternal and child health, vital statistics, nutrition, and the like.

This assemblage of papers is a loose one, characterized by recitations of progress and accomplishments in a necessarily superficial manner. All of the essays are adequate for the purpose for which they were intended—the information of our world neighbors on the state of this field in the United States—but none of them are particularly sophisticated. All, by and large, eschew a confrontation with fundamental problems. There is virtually no emphasis on the developments in the social, behavioral, and ecological sciences which condition any approach to the definition and solution of community health problems. This is traditional public health, updated to be sure, but not designed to engage the thoughtful general reader or the professional worker.

Indeed, the problems that this book will encounter are finding an appropriate audience and making the transition from a series of radio talks to a coherent and stimulating book. For the student and the expert, as the editor himself notes, the book is too superficial. For the educated layman or the professional who works in the field