with which Koshland proselytizes a faith in the significance of the study of bacterial chemotaxis should be effective in generating outside interest and support, but it also confronts those of us in the field with the responsibility to get on with our experiments.

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Highly Anisotropic Solids

The Physics and Chemistry of Low Dimensional Solids. Proceedings of an institute, Tomar, Portugal, Aug. 1979. LUIS ALCÁCER, Ed. Reidel, Boston, 1980 (distributor, Kluwer Boston, Hingham, Mass.). x, 436 pp., illus. $50. NATO Advanced Study Institutes Series C, vol. 56.

There are several classes of unusual materials that can be described as "low-dimensional." Every year since a meeting at Lake Arrowhead in 1974, they have been the subject of a convention of synthetic chemists, experimental physicists, and theorists meeting at a retreat in North America or Europe. In August and September 1979 such a conference was held in Tomar, Portugal, and the present volume contains the papers presented at that meeting. All of the papers published were invited and are, in principle, of a review or tutorial nature. Naturally, many of the authors took the opportunity to present their own recent work and to stress in review the importance of their earlier work. Therefore it will probably be impossible for a reader to obtain an unbiased summary of each aspect of the field.

The electronic properties of the solids discussed at Tomar are all so highly anisotropic that for "low-dimensional" one might well substitute "quasi-one-dimensional." Interest in the chemistry whereby such anisotropy can be achieved in electrical conductivity or magnetic interactions, and the unusual physical phenomena that result, is the reason for the high level of activity in the field. There are basically three classes of material that fall into the quasi-one-dimensional category: organic charge-transfer salts, polymers, and a variety of inorganic chainlike metal complexes. The chemistry of each is described in several papers. It was hoped, in the infancy of the field, that by studying the properties of such materials, particularly the organics, it would be possible to develop a scheme for "molecular architecture," that is, to tailor the molecules in such a way as to produce specific solid-state properties. That goal remains elusive, and indeed, as Wudl, Bechgaard and Andersen, and Miller all point out, the most interesting materials obtained to date have resulted largely from serendipity.

Research on other aspects of the subject has, however, resulted in greater reward. The instabilities that result from the Fermi surface geometry of a one-dimensional metal, the wide temperature range over which fluctuations toward the more stable low-temperature state can be observed, and the existence of unusual mechanisms for the propagation and scattering of electric current carriers have all been demonstrated. Theoretical advances have been made in dealing with the interactions of many electrons with each other and with the ions of the lattice. At the time of the Tomar meeting neither superconductivity nor spin-density waves were known in organic materials. Since both have since been discovered it is fair to say that *The Physics and Chemistry of Low Dimensional Solids* is already outdated.

Nevertheless the book may be useful in some ways. The tutorial lectures by Schultz and Chaikin could serve as an introduction for graduate students entering the field. Schultz's treatment of the Ginsburg-Landau formalism is clearer than any I am aware of in a textbook. The papers by Thomas and Weger are much more specialized and certainly require either prior knowledge of the field or extensive parallel reading (both do give relatively comprehensive bibliographies). Thomas presents a case study of a particular subclass of materials, and Weger reviews some of the theoretical work aimed at explaining the electrical conductivity of organic charge-transfer metals.

I believe that the greatest use of the book will be as a reference volume for workers already broadly familiar with the field. Particularly noteworthy is the paper by Jérome in which he describes the extensive studies by the Orsay group of the pressure dependence and thermoelectric power of TTF-TCNQ, the fruit-fly of organic conductors. Many data that are widely scattered or unavailable in the journal literature are collected here, and the paper is the most recent survey available of the experimental situation in the controversy concerning the transport properties of this remarkable material.

Many other subjects are covered, but I believe that at the time of the meeting they were either in a state of flux or past the point of vigorous activity, and they are reviewed better elsewhere. The controversial concept of solitons, in polyacetylene and in magnetic chains, which certainly germinated before 1979, has flourished only more recently. The observation of quasi-harmonic noise in the non-ohmic regime of niobium triselenide was also a new phenomenon in 1979. That a book can become so much out of date in two years is testimony to the progress and excitement of a vigorous field of research.

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(Continued on page 250)