graphical sketch of the author. The latter are particularly valuable, although I noted some inaccuracies. One of the objections I have to the introductions is that they sometimes repeat each other unnecessarily. It is obviously impossible always to express matters as difficult as those treated here precisely and briefly in everyday language; in most cases the editors have succeeded remarkably well, but in others a little elaboration could have avoided the lack of precision.

There are two cases where, in my opinion, the editor's exposition has missed the point:

In the case of Perrin's determination of the Avogadro number by the distribution of particles in the field of gravity, the editors say that the barometric formula cannot successfully be applied to the atmosphere because it is not isothermal. This is true, but not the essential point. The exponent is mgh/kT (m, mass of molecule), but multiplication of numerator and denominator by the unknown Avogadro number gives Mgh/RT (M, mass of mole), which contains macroscopic quantities only. The point is that for suspensions m is determined directly, and then the Avogadro number follows from M, determined by the barometric formula (pp. 626–7).

In the discussion of Bohr's atomic theory, the statement "No one else had applied Planck's quantum concept to anything but to the behavior of radiation" (p. 742) is wrong. In 1911 Hasenöhrl tried to find conditions under which an atom would emit the Balmer lines. Bohr's genius brought great advance and success because of three points: He used the correct quantum conditions; he used them twice, once on the structure of the atom, and a second time for the radiation; he used the Rutherford model.

I think this book should be in every physics library.

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Surface Science

Surface science is, as A. Many, Y. Goldstein, and N. B. Grover, the authors of **Semiconductor Surfaces** [North-Holland, Amsterdam; Interscience (Wiley), New York, 1965. 512 pp., illus. $17.50] say, a very difficult field both experimentally and theoretically, but it is important for practical purposes. One might therefore fear an avalanche of undigested, uncritically repeated facts on every semiconductor surface that has ever been looked at. This book, however, turns out to be quite the opposite. The wealth of information is there, with over 400 references in one chapter alone, but the important pieces of work are picked out for discussion with enough detail that one can understand them. The chapter on surface states, for example, shows that the authors have not only read the references but also understood them; a crisper, more readable account would be difficult to find, and a tight binding calculation of Tamm and Shockley states is outlined in sufficient detail to give one the feeling of how it all works.

Most of the volume is devoted to the experimental methods, and to the results insofar as reasonable agreement between different workers exists. There is plenty of useful advice on how to etch and how not to etch, as well as a comment on where a useful gadget for lining up the spots is available commercially. The brief introduction is followed by a chapter reviewing the bulk properties of semiconductors and one covering lattice structure and the chemical reactivity of the surface. Subsequent chapters cover the surface space charge region, surface states, the field effect, other experimental methods, and transport processes; and there is a discussion of what has been found out with these methods about the electronic structure of the surface. The last chapter covers real germanium and silicon surfaces—that is, surfaces as normally prepared and chemically cleaned—as well as the atomically clean surfaces prepared in ultrahigh vacuum. The emphasis of the book is distinctly more on the electrical than on the chemical properties of the surface.

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A Small, Autonomous Community

In **Lamotrek Atoll and Inter-Island Socioeconomic Ties** (University of Illinois Press, Urbana, 1965. 191 pp., illus. Paper, $4), William Alkire presents some of the results of 15 months of field research among the 200 inhabitants of Lamotrek Atoll in the western Carolines and its satellite islands of Elato and Satawal. During the period of the author's residence (1962–63) Lamotrek was being visited by a trading ship only four times a year and, as a result, was still relatively unacculturated.

Alkire first discusses land tenure, economic activities, and political organization on Lamotrek in detail. As in Truk and other matrilineal societies in Micronesia, land is the joint property of a small lineage and is normally cultivated by the women of a matrilocal extended family and their husbands. People connected with a lineage by patrilateral ties frequently exercise provisional rights to cultivate part of its estate, in return for which they periodically bring gifts to the residual owners. The social organization of Lamotrek and its dependencies is pervaded by the stratification typical of much of Micronesia, with ranked lineages, subclans, clans, and islands. Each of the three districts of Lamotrek is administered by the chief of an aristocratic clan, under a paramount chief who was reigning over both Lamotrek and Elato at the time of the field work. Many people thus have obligations to both a district chief and to their clan chief residing elsewhere. The smallness of the island allows all of the inhabitants, regardless of descent-group affiliation, to attend funerals, assist in such projects as the purchase of a large canoe, and participate in communal fishing expeditions.

Alkire demonstrates that the economics of Lamotrek and its neighbors can be understood only in the context of a multi-island system traditionally centered on the high island of Yap. Since the same clans and subclans occur in several communities, and inter-island marriages and adoptions are common, all sorts of agricultural produce, artifacts, and imported goods are exchanged between islands as gifts to real or putative kinsmen. In addition Elato regularly used to send turtles, and Satawal coconuts and preserved breadfruit, to Lamotrek, which in turn paid tribute to Ulithi and Yap, its own superiors in the network. The islands receiving tribute permitted their subordinates to utilize unihabited atolls and islets as coconut plantations and

fishing grounds and assisted them after typhoons and other natural disasters.

Alkire provides a great deal of useful statistical data on agricultural production, work schedules, canoe-building, inter-island voyages, and other subjects. However, some additional general statements would have been desirable. For example, the reader has no way of knowing to what extent the funeral described on pages 103–110 was typical, or how the land disputes mentioned in several places (for example, on page 85) were resolved.

This study of Lamotrek is a significant contribution to the social anthropology of small, autonomous communities, whose organization is often astonishingly complex. The author suggests that this complexity is partly functional, constituting a form of insurance against catastrophe, and partly the result, as Lévi-Strauss would put it, of multiple expressions of a single underlying structure.

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Chemical Reference Book

Publication of the **Polymer Handbook** [J. Brandrup and E. H. Immergut, Eds. Interscience (Wiley), New York, 1966. 1276 pp., illus. $19.50] marks another significant milestone in the growth of macromolecular chemistry since its inception early in this century. It points up the fact that the synthesis and production of polymeric materials now take approximately one-third of the total manpower and capital resources of the chemical industry. The *Polymer Handbook* deals with the specialized facets of theoretical and experimental polymer science in much greater depth than has been possible in existing handbooks of chemistry. It is a much-needed addition to the polymer literature and merits a place beside the standard chemical reference works.

The primary sectional headings are polymerization, solid state properties, solution properties, miscellaneous properties, physical constants of some important polymers, physical data of oligomers, and physical properties of monomers and solvents. Major compilations of data pertain to such subjects as decomposition rates of organic free radical initiators, transfer constants, copolymerization reactivity ratios, crystallographic data, viscosity-molecular weight relationships, sedimentation and diffusion constants, specific refractive index increments in dilute solutions, and solvents and nonsolvents for polymers. Among the miscellaneous properties covered are activation energies and products of thermal degradation, permeability constants, radiation chemical yields (G-values), nuclear magnetic resonance, and optical activity. A 29-page subject index facilitates location of specific information on 250 topics.

An introductory chapter on "Nomenclature rules" provides a useful guide to the system used in classifying and naming the polymers for the purpose of listing them alphabetically within groups in the tables. This is particularly helpful in the case of the confusing situation with regard to the naming of polyurethans, polycarbonates, and copolymers. The editors admit, and inspection of the tables reveals, that in an initial compilation of this type, involving over 50 contributors, many inconsistencies are bound to occur. For example, vinyl ether polymers are placed under polyethers in one table (III-24) and under vinyl polymers in another (IV-195). Polyformaldehyde is listed under polyoxides in most instances (for example, Table III-26), but is under polyethers occasionally (IV-207). It is obvious, as the editors point out, that the problem of polymer nomenclature is one which needs extensive further work, both nationally (by the American Chemical Society) and internationally (by the International Union for Pure and Applied Chemistry). Progress in applying sound chemical principles to the naming of polymers would certainly be greatly facilitated if major chemical firms would abandon the practice of bastardizing standard chemical terms by labelling new polymers with such misnomers as acetal, phenoxy, and polyvinyl dichloride.

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Word Associations

James Deese's **The Structure of Associations in Language and Thought** (Johns Hopkins Press, Baltimore, 1966. 232 pp., illus. $6.50) is in part a critique of the traditional views of word association and in greater part an argument for his own interest in the structural analysis of associations. Deese starts from the notion that the general meaning of a word is given by the potential distribution of responses to it. He then takes the associations to a word, obtained by the usual method of one response per subject, as a sample of this distribution and proposes that this sample defines a subset of the general meaning which he terms the *associative meaning* of the word in question. This definition permits easy computation of the degree of similarity of associative meaning existing between words: the degree of similarity of associative meaning existing between two words is measured simply by the extent to which their distributions of associations intersect. A matrix of these measures may then be factor analyzed to find clusters of words sharing certain features of meaning. Thus Deese finds, for example, an animate set, *bees, flies, bug*, as opposed to an inanimate set, *sky, yellow, spring*.

After consideration of the measurement of similarity among stimuli, Deese takes up the relation between the stimulus and the kind of associations it elicits. One aspect of this relation is whether or not the associations tend to belong to the same grammatical category as the stimulus. In the case of adverbial stimuli associations tend to belong to a different category whereas in the case of the nominal or adjectival stimulus associations tend to belong to the same category as the stimulus. The associations to adjectives, however, tend to include many more antonyms than do those to nouns, which tend, on the other hand, to form semantic groups. Deese conceives of these two processes of antonymy, or contrasting, and grouping as playing important roles in laws of association; words are associatively related when they may be *contrasted* uniquely or when they may be *grouped* on the basis of two or more shared characteristics.

The book ignores most of the pressing issues of present-day psycholinguistics but will still be of interest to those who are convinced of the significance of word-association research. Information retrievalists may also profit from reading this book, although the Giuliano and Jones linear association model that they may be familiar with is probably more sophisticated than the approaches described here.

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