

is, maxima, minima and saddles) of n variables can coalesce as k parameters vary. The central classification theorem is not proved, but the main ingredients of the proof (transversality, stability, and so on) are very fully described, to the point at which it becomes clear why the catastrophe hierarchy depends strongly on k but hardly at all on n . In applications one often encounters functions that are not in the form of one of Thom's standard polynomials; then intricate rules determine which catastrophe is involved. It is one of the pleasant features of this book that a whole chapter is devoted to these. The interplay between algebraic and geometric ideas is emphasised throughout with the aid of a large number of diagrams. Functions are considered in the modern way, as mappings between sets, and the corresponding notation is used abundantly. However, it is explained at the beginning, and there is sufficient reversion to the old-fashioned " $f(x)$ " for traditionally educated scientists not to lose the thread of the argument.

The second half of the book describes some applications. These are

mostly in the physical sciences, so that it is possible to state definitely what 'potential function' it is whose coalescing critical points give the catastrophes. In Zeeman's pretty theory of ship stability, for example, the potential is gravitational energy; in optical caustics it is the ray transit time (more generally, the action); in beam buckling problems it is elastic energy; in fluid flow it is the stream function; and in phase transitions it is the Helmholtz free energy. Usually the fold and cusp yield little not already known to specialists in these various fields; only with the swallowtail, umbilics and higher catastrophes does one start to generate surprising richness of behaviour and genuine applications to the theory as opposed to mere illustrations.

These authors are masters of advanced exposition, and they are to be congratulated on producing what I am sure will become a classic in its subject. The publishers deserve credit for the high standard of presentation, but not for the price.

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Molecular biochemistry

Electrical Interactions in Molecular Biophysics. By R. Gabler, Pp. 352. (Academic: New York, San Francisco and London; 1978.) \$25; £16.25.

THIS text forms a very readable handbook which outlines the fundamentals of electrostatic and dielectric theory on the one hand and of chemical bonding and molecular biochemistry on the other. From the beginning, the chemistry is given in terms of organic macromolecules. The author stresses the electrostatic nature of molecular interactions and takes care to develop the concepts of dipole moments and dielectric constants.

A good chapter uses these foundations for a detailed account of the various types of charge and dipolar interactions encountered in real molecules together with some idea of their relative importance. Even though the author uses tables to full advantage in attempts to give the reader a feel for the magnitudes of dipole moments, dielectric constants and polarisabilities in real bonds and molecules, the book lacks the ability to convey confidence and insight as to how the reader should treat, evaluate and really understand the complicated behaviour of say the nucleic acids, globular proteins or poly-

saccharides, for example. Three good chapters form condensed, readable but detailed resumés of Van der Waals forces, Debye-Hückel theory and the structure of water. Emphasis for these is again placed on biopolymer materials.

The final chapter on experimental electrical techniques is somewhat dis-

appointing, however, in that it deals almost exclusively with electrophoretic methods. Nevertheless, this particular method is described very well. It is less fortunate that, even though the measurement of dielectric constants and dielectric dispersion data feature strongly in the book, they are tucked away in earlier theory chapters rather than in the experimental chapter. Other novel methods such as ion exchange chromatography, isoelectric focusing and precipitation get but brief mentions, and electro-optic phenomena are by-passed altogether.

In conclusion, the topics with which the book deals are treated well. The book provides a very readable and concise account of the electrical and interaction phenomena encountered in biopolymer solutions and makes a valiant attempt to link the fundamentals of electrostatics and biochemistry. However, it is perhaps a pity that, after all the theoretical and conceptual material, the author did not give examples of how the experimental data could be analysed, interpreted and related to the basic properties and functions of macromolecules. A very good handbook for graduate students and researchers in the field of molecular biochemistry in general and for those engaged in electrical or dielectric measurements in particular.

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British bryophytes

The Moss Flora of Britain and Ireland. By A. J. E. Smith. Pp. 706. (Cambridge University Press: Cambridge and London, 1978.) £27.50.

FIFTY-FOUR years have elapsed since the publication of a comprehensive account of British bryophytes. Smith's new book is a worthy replacement for Dixon's *Handbook*, as it combines succinct detail of text with splendid illustrations. It is easier to use than the old *Handbook*, for illustrations are scattered throughout the text rather than being grouped at the end. In many respects it matches the more recent and most popular guide to mosses by E. V. Watson (*British Mosses and Liverworts; Cambridge University Press* second edition, 1968) but surpasses this book in its comprehensive coverage; 692 species are described

and illustrated. It lacks the habit drawings, which were a valuable feature of Watson's book, especially for beginners, but this is not a serious deficiency.

Profuse taxonomic revisions have occurred since Dixon's *Handbook* and the new names will undoubtedly find more widespread acceptance as a result of this publication. *Mnium* now proliferates into *Plagiomnium* and *Rhizomnium*. *Acrocladium* is now *Calliergon* (though we are spared *Calliergonella cuspidata*), and so on. The treatment of that awkward genus *Sphagnum* (contributed by M. O. Hill) is excellent.

This is a book which will be greeted enthusiastically by amateur and professional botanists alike. The price is high but this should not deter the enthusiast; it is worth every penny.

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