

Provocative images through the microscope

P. W. Hawkes

Scanned Image Microscopy. Edited by Eric A. Ash. Pp.461. ISBN 0-12-065180-7. (Academic: 1981.) £18.40, \$49.

So accustomed are we to all the conveniences of two-dimensional image formation at optical wavelengths — the existence of lenses and of high-resolution polychromatic recording media in particular — that it is easy to forget that information can often be usefully conveyed by other fields for which no such facilities exist. The absence of lenses for X-rays, at least until very recently, is an obvious example. In such cases, the information may well be useful enough for other means of collecting it to be developed, and this is one of the reasons why the scanning principle is used. Its most obvious advantage arises when the incident radiation can be concentrated into a small spot on the specimen but cannot be focused after interacting with the latter, so that there can be no question of conjugate planes: acoustic microscopy is an example of this. Here, the specimen is scanned mechanically under the spot and a signal collected for each position.

Scanning is thus used for similar reasons in quite different domains, and this volume of Rank Fund Conference Proceedings contains accounts of four types of scanning microscopy: acoustic, optical, photoacoustic and soft X-ray microscopy. Scanning electron microscopy is excluded, on the grounds that it is now too well-known, which is true of the traditional reflection instrument but not of its much newer and still rather uncommon transmission counterpart. It is a pity that some contributions on the latter were not solicited, for the resemblances and differences between the scanning transmission electron microscope and the scanning optical instrument are interesting and this would have been an excellent opportunity to compare and contrast.

Even with this minor cavil, however, the coverage is thorough. Each of the four main sections contains chapters by the inventors or leading exponents of the instrument in question. Thus acoustic microscopy is discussed by C. F. Quate, H. K. Wickramasinghe and B. Nongaillard, as well as by several other contributors concerned with specific applications. Scanning optical microscopy is examined by W. T. Welford, G. J. Brakenhoff and colleagues, and by T. Wilson and C. J. R. Sheppard, among others. The other two sections have no less distinguished a cast. The result is that although the book has all the faults inherent in such proceedings' volumes — much repetition in the chapter openings in particular — it does provide a clear and readable introduction to these four scanning-based types of microscopy and gives a good idea of their potential. I

suspect, too, that practitioners of each technique will find it an extremely useful guide to what is happening in related fields, particularly when these are used to complement one another (the example of scanning optical and electron microscopy, cited in the optical section, is one of many).

In short, this is an extremely useful collection: the individual contributions are long enough for the newcomer to be able to follow and the choice of scanning as leitmotiv makes good physical sense. Apart from the omission mentioned above, the absence of one other topic is to be regretted: spectroscopy using orthogonal transforms. Here, it is the need to "scan" a field with small detectors that has provided the incentive to seek new solutions, resulting in Hadamard transform techniques for example. Nevertheless, it is probably because the material that E. A. Ash has assembled for us is up to date, well presented and frequently provocative that we should have liked a little more. □

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Pelagic predators

Geoffrey Fryer

Predation and Freshwater Communities. By Thomas M. Zaret. Pp.187. ISBN 0-300-02349-9. (Yale University Press: 1981.) £9.50, \$15.

THIS book considers predation on the basis of evidence obtained in the wild, a welcome change from the generation of endless equations. The title notwithstanding, it is largely confined to freshwater zooplankton communities. Here, changes in the level and kind of predation can have dramatic effects on species composition and may even lead to complete restructuring. It is to these phenomena that Zaret addresses himself. Unfortunately the outcome is disappointing.

Two types of predators, gape-limited and size-dependent, are recognized. These, in effect, are vertebrates and invertebrates respectively. The logic of referring to fishes, much the most important vertebrate predators on the zooplankton, as gape-limited in this context is puzzling, for it is admitted that gape limitation is at most "of very brief duration in the fish's life and can be ignored for most considerations". To regard hemipterous insects, the only invertebrates so classified, as gape-limited seems equally odd.

The ways in which animals react to increased predation or pressure from different kinds of predators are described.

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