Expert differences

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Modern Biotechnology. By S. B. Primrose. *Blackwell Scientific: 1987. Pp. 176. Hbk £25, $47.50; pbk £12.95, $24.50.*
Introduction to Biotechnology. By C. M. Brown, I. Campbell and F. F. Priest. *Blackwell Scientific: 1987. Pp. 169. Pbk £9.95, $22.50.*
Biotechnology: The Biological Principles. By M. D. Trevan, S. Boffey, K. H. Goulding and P. Stanbury. *Open University Press, Milton Keynes/Taylor & Francis, Philadelphia: 1987. Pp. 256. Hbk £32.50, $45; pbk £14.95, $22.*

THE academic world is awash with biotechnology courses. They range from fully structured degree programmes to sets of lectures, given by a hastily assembled clutch of individuals, who are asked to explain their interests without any overall coordination of the topics. Neither sort of course should be offered to undergraduates. Although there is a case for a multidisciplinary course to be taught to postgraduates, until there is a solid background of textbooks available to demonstrate the heuristic method of the subject an undergraduate degree is premature.

All disciplines develop their own *modus operandi* and unique problem-solving techniques. The techniques may be logical, mathematical, empirical, knowledge-seeking, analytical or design-orientated, but in each case the technique fits the field. Microbiologists are acutely aware of the diversity of life; every organism is different and it is extremely difficult to draw generalizations. With biochemistry, some general principles are apparent, but prediction in a new environment is no easy matter. In physics and engineering, general principles dominate and are reliable, thus allowing prediction of the results of experiments and extension of results to different scales and different materials. Chemistry solves problems by creating new materials or simplifying pathways; a knowledge of the past allows synthesis of the future. Design engineers behave much like chemists, creating the new from the principles of the old to solve problems that are new or have currently unsatisfactory solutions.

Where, in all this, does biotechnology lie? It is not yet a discipline but a field of application to which many disciplines contribute. To the biochemist, biotechnology is principally concerned with developments in recombinant DNA technology, as this is the source of new products and requires many new techniques. The older technologies such as brewing tend to be dismissed. On the other hand, to produce new materials industrially through biochemical engineering requires old technologies, use of established methods in the discipline and a small but vital contribution of novel technology. Biotechnology is not an isolated endeavour, but is grafted onto the old technology in which its practitioners must be proficient.

These three textbooks cover a wide range of topics, but only one (Primrose's) might serve as a text in a future biotechnology degree course. The others might be used in connection with single-term or two-term courses taken as an option within another discipline's degree programme.

As a biochemical engineer, I found it interesting to read the three books and see that in their coverage of process engineering there is all too little about the essential predictive design aspects which are fundamental to this discipline. The microbiologist or biochemist in biotechnology will rarely become a process engineer, but he will certainly have to work with one. This multidisciplinary collaboration will never be fruitful until practitioners in each discipline understand their counterparts' approach to problem solving.

It is a pity that the engineer's approach was not communicated in these books. The engineer, fortunately, has the flexibility to understand the biologist's way of doing things, so will the books be useful to engineers wishing to learn how the biologists tackle problems? Primrose's *Modern Biotechnology* certainly will. It is readable and emphasizes how the molecular geneticist uses the array of new techniques to solve the problems. On the other hand, it may be too advanced for anyone below the final year of an undergraduate course in biochemical engineering. The other two texts are pitched more modestly. That by Brown *et al.* covers a wider field, being orientated more towards areas of application, whilst that of Trevan *et al.* deals with the techniques. Both will be valuable in providing background reading and background information for a course for chemical engineers, but because they are long on facts and shorter on principles they will be less useful as formal texts. But they can be used to flesh out lectures on principles, and allow students to have one book to cover the range of biotechnology which has normally only been possible with a collection of texts. □

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Finding a niche

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Community Ecology: Pattern and Process. Edited by Jiro Kikkawa and Derek J. Anderson. *Blackwell Scientific: 1987. Pp. 444. Hbk £39.50, $56; pbk £19.80, $35.*

MULTI-author volumes can be expected to sum up how a particular discipline stands — reviewing and synthesizing principle and practice, and providing pointers for future research. Several such books on community ecology have appeared in recent years. *Ecological Communities*, edited by Strong *et al.* and published in 1984, conveyed the sense of excitement and, indeed, conflict between proponents of different viewpoints that is evident in a dynamic and topical area. Diamond and Case's *Community Ecology*, a collection of essays that appeared in 1986, provided an excellent review of a maturing though still lively science. Most recently, Gee and Giller's *Organization of Communities* has continued the process by filling in some taxonomic and habitat gaps, and stressing insights provided by palaeoecology. The present book has some stiff opposition.

Ecologists ask whether communities are mere unstructured assemblages or tightly linked groups of interacting species. Moreover, if repeated patterns in community organization are discernible, what underlying factors are responsible? Most of the chapters in this multi-author textbook are firmly in the descriptive phase, searching for patterns and beginning to suggest hypotheses. Several of the early contributions have an old-fashioned feel. Others are excellent undergraduate-level reviews, but contain little that is new.

In a few places, the reader is taken beyond mere description to the generation and testing of hypotheses. Terborgh and Robinson discuss convergence in community structure in different parts of the globe. Lawton and MacGarvin look for patterns and explanations about the organization of communities of insect herbivores as compared to mammalian herbivores. And Schoener evaluates tests of the role of competition in structuring communities. The largely anecdotal chapters on prey–predator interactions and succession are disappointing, as they fail to present much of the extensive experimental work on these topics. Sadly, in one of the few areas of community ecology where experiments have been attempted (competition), Underwood delivers a searching and scathing critique of the lack of attention to proper experimental design.

The good parts of this book accurately reflect the problems in community ecology — the anecdotal nature of some of the evidence, the difficulty of developing a coherent body of theory given such a complexity of issues, and the problems in designing experiments. But it generally fails to convey the excitement and vitality being generated by many good scientists working in this important area. □

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