Advances in the life sciences

AMONG the many books published in the past year on the life sciences, three merit attention in these columns: one for the layman and undergraduate, one for use as a course textbook, and the other an advanced text on evolution.

The Life Science: Current Ideas of Biology (Harper and Row: New York, hardback $8.95; Wildwood House: London, hardback £4.95; Granada/Paladin: London, paperback £1.25), to this reviewer, acted as both a stimulant and an irritant. The authors, P. B. and J. S. Medawar, take their readers on a conducted tour of life along, as it were, a series of stepping stones; each stone is explored in greater or lesser detail and features of importance, or just of interest, are described and popular misconceptions dispelled. Occasionally, as with the chapter on immunology, the area of exploration is larger and the insight gained is the more satisfying. The somewhat staccato nature of the progress from stone to stone highlights those areas or concepts which the authors regard as important, but has the drawback that it leaves the reader in ignorance of those stones which the authors have chosen not to tread upon. For example, set against a chapter on the genetical theory of evolution by natural selection is one on Lamarckism; this is the stuff of many schoolday essays, but totally ignored is the current, and fundamental, argument between neutralist and selectionist theories of evolution. But then, a book cannot be all-embracing, and it would always be possible to criticise what has been included or left out; the book has chapters on eugenics, demography, behaviour, microbiology, circulatory and coordination systems, cancer and senescence, to name but a few.

The careful, indeed precise formulation of the arguments makes for a very clear exposition and a very readable book; it also means that ambiguous statements or teleological (as opposed to teleonomic) arguments are the more noticeable. Does the statement that "hermaphrodite animals such as snails and earthworms invariably cross-fertilize" imply that self-fertilisation does not occur in slugs, or just that they are not like snails? And a "final cause" is surely invoked in the passage " . . . the purpose of the pairing of sense organs is obvious enough. The pairing of eyes is the property that makes stereoscopic vision possible . . . ". A question of logic arises when we are told that all ova are formed by the time of birth. If this were so, why should there be an association between the occurrence of Down's syndrome and the age of the mother; to put it another way, where does the extra chromosome come from if meiosis is already complete? One should not have to turn to other books to find out that protein "backbones" contain nitrogen as well as carbon, nor that the Hardy–Weinberg theorem only holds in the absence of selection. These are, however, minor blemishes and do little to detract from a fascinating book—a book of ideas, as the authors put it—which can be strongly recommended to biologist and non-biologist alike. Comparative physiologists may not think so highly of it, but you must read it to find out why.

Life: Cells, Organisms, Populations (Freeman: Reading, £10.20), edited by E. O. Wilson *et al.*, by contrast, is very definitely a textbook. It is an abbreviated version of the same authors' *Life on Earth* (reviewed in *Nature*, **247**, 582, 1974) and follows the same plan. There are five sections, entitled "The Cell", "Multicellular Life", "Origin and Diversity of Life", "Strategy of Evolution", and "Alternate Futures". It is clearly written, and although there are eight authors, is cohesive and not repetitive. An admirable feature of the book is the quality of the illustrations—there is a profusion of clear line drawings supplemented by good photographs where appropriate; but having said that, one might still ask why a section of a compound eye is not included as well as, or in place of, the surface view on p237.

A volume such as this may be used in two rather different ways; it may form the foundation of a course, as the authors suggest, or it may be used more as a work of reference. To base a course on a single text is probably unsound anyway, and although much of the content is relevant to advanced school studies, a substantial part would not normally be encountered until the first or second year as an undergraduate. It should thus find its rightful place alongside other such compendia in both schools and universities. As a work of reference, it is encouraging to see that the index contains about 2,400 entries, but even if you thought that you remembered seeing Gause's principle, Dollo's law or Gloger's rule in the text, you will not find them in the index; nor will you find "sympatric", except under speciation, and "allopatric" not at all.

The Science of Evolution (Collier Macmillan: London, £12), by W. D. Stansfield, is one of several books on evolution which have recently been published, and is perhaps most directly comparable with *Evolution* by Dobzhansky, Ayala, Stebbins and Valentine (reviewed in *Nature*, **270**, 457, 1977). Both are advanced texts and both cover much of the same ground, but whereas *Evolution* suffers from the not uncommon failings of multi-author books—some repetition and lack of integration—Stansfield's book provides a logical and well balanced progression. Conversely, the advantages of a multi-author volume are seen to good effect in *Evolution*, in which relatively specialised topics are developed in great detail. For these reasons, this latter book is to be recommended as a specialist text for use in seminars and tutorials, whereas the other book provides an excellent account of evolution for more general use. *The Science of Evolution* is divided into four parts: the framework of evolution, the mechanism of heredity, the forces of change, and the generation of taxa; the book is well illustrated.

When formulating his selection models, one cannot help thinking that unnecessary complication is introduced by treating the relative fitnesses differently in each of four models. It would surely be less confusing, especially to those who are not mathematically inclined, to apply the selection coefficients s and t consistently to the homozygous classes and choose values for them appropriate to the degree of dominance; in this way, generally applicable formulae for $\overline{W}$ and Δq may be obtained. Less excusable is the use of the correlation coefficient r to estimate heritability from the relationship between midparent value and that of their offspring (p204). Even if the heritability were 100%, a value of 1 for r would be obtained only if all offspring in a family were identical; it is the slope of the regression line which should have been used.

It is interesting (to a student of the debate that has continued over the past 50 years) that the evolution of dominance is discussed in some 100 pages, and in isolation, from the section on genetic homeostasis; perhaps in a future edition the two topics might be brought together. In the meantime, the relationship, or lack of it, could provide an informative tutorial discussion topic. Another fruitful idea might be revealed by cross-referral between sympatric speciation (p474) and the principle of competitive exclusion (p15); and if one extends the concept of a selection index (p205), it is hard to see the reasoning behind the unsubstantiated statement (p389) that overdominance "when operative at more than 100 loci, is likely to induce intolerable loads on the population".

The figures as a whole are excellent, but two deserve mention. Fig. 16.2 would give a much more satisfactory impression of a cline if the darkness of the shading correlated with the allele frequencies. The upper part of Fig. 12.31 illustrates an interesting pseudo-genetic event—the deletion of Borneo. Even though the pedigree of this map is not acknowledged, the deletion can be traced back several generations—it must be a neutral mutation.

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