

Mechanisms of animal locomotion

Mechanics and Energetics of Animal Locomotion. Edited by R. McN. Alexander and G. Goldspink. Pp. 346 (Chapman and Hall: London, 1977.) £15.

FOR nearly 30 years from the early 1930s, Sir James Gray and his colleagues at Cambridge published a steady stream of papers analysing how animals move in locomotion. There were distinguished earlier and contemporary contributions by others, but Gray set the foundation for the modern development of the subject. His body of work was largely concerned with the kinetics of locomotion and explained how the movements of most groups of animals exerted appropriate thrusts against the environment and produced locomotion. Some progress was made with explaining the nervous coordination of locomotory movements in a few animals and the energetics of locomotion, but there was little advance in the formidably difficult subjects of the aerodynamics or hydrodynamics of animal movement through fluids. During this period, studies of animal locomotion had their firmest links with comparative anatomy, exemplified in the magnificent and detailed functional analysis of the locomotory musculature of arthropods by Sydney Manton (whose book on arthropod locomotion will be published later this year). The physiological dimensions remained relatively underdeveloped alongside this.

The past 20 years have seen a remarkable change in the subject. Previously, animal locomotion was a specialised, rather isolated topic which could be safely ignored by most zoologists. Now, it has become a coherent, mainstream subject drawing together a great variety of scientific knowledge and expertise. As the preface to this volume says with some justice: "it seems a good time to produce a book".

This is an exceptionally good one. It deals with the entire subject of animal locomotion from muscle physiology and nervous coordination to energetics and the kinetics and dynamics of locomotion. Nearly all the topics discussed are difficult for the non-specialist to penetrate, but here they are introduced in an unusually clear, economical and intelligible style. Every concession is made to the reader, and an undergraduate with no previous knowledge of any of these subjects could read this book without much difficulty and with enormous profit. Inevitably, this has led to some simplification and loss of

detail. There is a good chapter on coordination of invertebrate locomotion by Delcomyn and another, shorter, chapter on crawling and burrowing in soft-bodied invertebrates by Trueman and Jones. Otherwise, invertebrates (arthropods in particular) get rather brief treatment and the main emphasis is on the locomotion of vertebrates. Viewed as a whole, however, the book provides an excellent account of the current state of our understanding of the mechanisms of animal locomotion.

The book starts with chapters on the design, mechanics and energetics of muscles involved in locomotion, the coordination of invertebrate and vertebrate locomotion, the energy cost, and then concludes with chapters on terrestrial locomotion, crawling and bur-

rowing, swimming, flying and, finally, the locomotion of Protozoa and single cells. There are good bibliographies at the end of each chapter and the book is well illustrated and produced. The editors are to be congratulated on having recruited a very authoritative team of nine authors and, still more, for having achieved a remarkable consistency of style and uniformity of treatment throughout the book. This is not a compendium of separate, contributed articles as so often happens with multi-author volumes; it has rather been welded into a coherent book.

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Cell division

Mechanisms and Control of Cell Division. Edited by Thomas L. Rost and Ernest M. Gifford. Pp. vii+387 (Dowden, Hutchinson and Ross: Stroudsburg, Pennsylvania; Halsted/Wiley: New York and Chichester, UK, 1977.) \$31.50; £18.75.

BIOLOGY is suffering a proliferation of books, many of which are simply new combinations of material that has already seen printer's ink at least one and often more times. Sometimes this is justified; a comprehensive well-planned collection can usefully summarise and occasionally illuminate a particular field. This expensive little collection, though containing some new material, does neither. The editors describe it as a "compendium of several areas of cell cycle research, especially those dealing with plants. Some . . . reviews . . . new ideas and the results of recent research" for "researchers and advanced students interested in cell behaviour". The precise purpose is not stated. Was it perhaps simply to market another book? Certainly, the title has all the keywords for the big sell.

In the chapter summarising their elegant dissections of the cell cycle in *Allium* meristems, Giménez-Martin *et al.* point out that in the strict sense "cell division" refers only to mitosis and cytokinesis but is often loosely applied to all processes of proliferation including interphase growth. In making their selection, the editors seem to have been confused about which sense to follow. As a result the collection, which contains some good material, is a hotch-potch.

Gurley *et al.* review their work on biochemical events associated with proliferation of an animal cell-line in culture. Douvas and Bonner re-describe the isolation of contractile proteins from liver chromatin. There follow two interesting reviews of plant hormones and cell proliferation, a list of factors affecting plant cell cycles, a catalogue of structural changes in plant and animal nuclei during replication, two reports on plant cell ultrastructure during mitosis and one of several current hypotheses purporting to explain chromosome movement. The penultimate article is part 1 of an anatomy of cell division in euglenoid algae and the ultimate a detailed description of *all* the stages of mitosis and meiosis and their variations in basidiomycotinal fungi. Several contributions have the prose density of a Patrick White novel.

Despite its dynamic title the collection contains much that is purely descriptive. Being diverse, it lacks the connecting thread that makes a cover-to-cover reading easy or inspiring. Being thinly spread, it fails as a definitive reference source.

The book is strongly bound, but paperbacking would have sufficed and might have halved the price. There is a subject but no author index, nor notes on contributors other than the editors. Many of the numerous electron-micrographs are reproduced with a fuzziness that seriously obscures fine detail. The layout is wasteful: a line diagram of six microtubules occupies a page, as do many other diagrams originally published at a quarter of the size.

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