for April to September has been used to predict the quantitative development of zooplankton.

Many of the technical papers in the third chapter describe apparatus which can be used for continuous recording of specific measurements such as redox potential, density, salinity and dissolved oxygen (by dropping mercury electrode). This has also been measured by oxidation of Ce^{3+} to Ce^{4+} and can be done colorimetrically in the field. I hope, though, that the manual of methods will include the Mackereth oxygen electrode. The methods used during the past twelve years for the determination of particulate and dissolved carbon are reviewed. The carbon analyser (carbon dioxide by infrared) enables 20 μl. samples to be analysed every two minutes with a range of 2–1,000 mg/l. Organic carbon and nitrogen can be measured as carbon dioxide and nitrogen by gas chromatography.

The fourth chapter describes the use of 'Sephadex' to separate lake water humic materials. Results indicate their wide range of molecular size, and show a correlation between size and iron holding capacity.

The fifth chapter is concerned with micronutrients, microcompounds, and their availability. A dramatic response of zooplankton when molybdenum was added to a lake deficient in this is reported. The growth of iron starved *Microcystis aeruginosa* correlates with iron by thiocyanate at *p*H 1·5. The turnover of glucose and acetate is more important than the absolute concentration in a study of aquatic ecology. Algal bioassays for vitamin B_{12}, thiamine and biotin, and the problems associated with the measurement of chlorophyll as a measure of biomass, are described.

The sixth chapter on miscellaneous topics has two papers on sediments, one describing methods for determining diffusion coefficients, the other a review of the influence of mud on the chemistry of water. The acidity of the aquatic environment of sphagna may in part be caused by cation exchange. Hydrographic conditions have been shown to influence the concentration of particulate carbon in sea water.

This will be a useful book to have. It gives a picture of the analytical problems facing limnologists and oceanographers and with many references in the text it makes a good starting point for newcomers to the field.

C. D. BAKER

LOOK UP A VIRUS

Viruses of Vertebrates

Second edition. By Sir Christopher Andrewes and H. G. Pereira. Pp. xiii+432. (London : Ballière, Tindall and Cassell, 1967.) 70*s*. net.

AFTER little more than three years this valuable book has reappeared considerably changed. The rapid increase in virological knowledge has necessitated the revision, in which Sir Christopher Andrewes has been aided by Dr Pereira.

Viruses are dealt with under the headings RNA viruses, DNA viruses and the unclassified viruses. Since the first edition it has been possible to move a number of previously unclassified viruses to different parts of the book, and several additions have been made to the DNA viruses; much of this section has been rewritten. There are also a few more RNA viruses.

Because of general agreement that they are bacteria, related to the rickettsiae, the organisms of the psittacosis–lymphogranuloma–trachoma group, the Chlamydozoaceae, are not given a place in this edition, although the seventeen dealt with in the first edition are listed, together with page references, for the reader's convenience.

The authors say in their preface that they have resisted the temptation to offer new group names—they await the decision of the international committee for the nomenclature of viruses—although they have used the unofficial term Paramyxoviruses for the group of RNA viruses containing mumps and the para-influenza viruses.

Clearly anyone who wants to know about the properties of viruses, and where they can read the most important literature, will need to have this edition of *Viruses of Vertebrates*.

MARY LINDLEY

MECHANICS OF MOVEMENT

Animal Locomotion

By Sir James Gray. (The World Naturalist.) Pp. xi+479+8 plates. (London: Weidenfeld and Nicolson, 1968.) 126*s*. net.

How Animals Move was published in 1953 and, although based on lectures delivered to an audience of children, few biologists will be ashamed to have read and learnt much from this book. Many will also have read contributions that Sir James Gray has made to more specialized aspects of animal locomotion during the past thirty-five years. In the present book this background of personal thought and research has been expanded into a logical and continuous description of the development, operation and control of locomotor mechanisms. Fully acknowledged data have been drawn from the papers of authors working in the same field, many of whom have at some time worked in the Zoological Department at Cambridge. This material has not been included merely for the sake of completeness but is used critically in support of the main thesis of the book.

The book itself is intensely written and requires considerable concentration from the reader and continuous reference to the many explanatory diagrams. Those not acquainted with the application of Newton's laws of motion should not ignore the introductory chapter in which these are explained in biological terms, for a grasp of them is essential to the understanding of subsequent argument. This is followed by a consideration of the movement and stability of the three main varieties of fish form, and a rare moment of speculation about the evolutionary transition from aquatic to terrestrial life. The initial relatively simple analysis is followed by an admission of the great difficulties inherent in a three-dimensional study of movement in a disturbed fluid medium.

A survey of the mechanical principles involved in the support and motion of a terrestrial quadruped precedes a chapter devoted largely to the terrestrial locomotion of urodeles and anura. This section contains an account of an elegant series of experiments designed to reveal the neuromuscular co-ordination that leads to the orderly sequence of limb movements of the amphibian when on land.

The increase in propulsive force and speed of movement of the reptiles is shown to be associated with the increased ability of the stable pectoral girdle to transmit force to the vertebral column. The four types of terrestrial progression used by snakes are also carefully analysed.

The flight of birds is introduced by a discussion of the aerodynamics of gliding and soaring before the complex problems presented by active propulsive flight are explored. This latter section is largely based on the work of R. H. J. Brown on the flight of pigeons. The chapter on mammalian locomotion is in some ways disappointing. The emphasis lies on cursorial animals the repetitive gait of which is amenable to accurate observation and recording. The disappointment is due rather to the relatively stereotyped structure of the terrestrial mammal's limb than to any failure on the part of the author. Where variety of locomotion is found in mammals it is often of a sudden, unpredictable or inconsistent nature and its