Chapter 5, the final one, deals with compactness. At first compactness is studied in general topological spaces but later the restriction to a metric space is considered. A metric space is compact if every infinite subset A has at least one point of accumulation, P, the latter being defined as a point such that every neighbourhood of P contains infinitely many distinct points of A. The chapter closes with a section on identification topologies and spaces, including a discussion of the classical surfaces such as the torus, the Möbius strip, the Klein bottle and the projective plane.

All students of topology will find the reading of this book rewarding, and there is little doubt that the text will become a standard introduction to the subject.

L. S. Goddard

ANALYSIS OF MICROCLIMATE

Physics of Plant Environment

Edited by W. R. Van Wijk. Pp. xvi + 383. (Amsterdam: North-Holland Publishing Company, 1963.) 80*s*.

Land plants are anchored by their roots in a porous medium providing water, nutrients and oxygen, and they grow when leaves use solar energy to reduce carbon dioxide to carbohydrate. Below ground, the physical environment of plant roots governs the conduction of heat, the flow of water, and the diffusion of water vapour, oxygen, carbon dioxide and ions. Above ground, leaves and stems are exposed to radiation and behave as sources and sinks of turbulent fluxes of momentum, heat, water vapour, carbon dioxide, pollutants, spores and small insects. The physics of plant environment is a diverse and youthful science. Although in British universities it is not yet recognized as a child of natural philosophy, it has reached the curriculum of several departments of agriculture. In Holland, Prof. van Wijk has for many years directed the Laboratory of Physics and Meteorology in the Agricultural University of Wageningen, and the book which he has edited and partly written is a summary of research, mainly in his own department, prefaced by three introductory chapters. There is little reference to work later than 1959.

The first chapter of *Physics of Plant Environment* is a statement of philosophy that will be shared by most agricultural physicists. In many farming problems, a simple physical model isolating a few relevant parameters will often give a better working solution than a purely empirical relationship derived statistically. The second and third chapters review the physical properties of the atmosphere and soil; and the theory, measurement, and estimation of solar and terrestrial radiation. In Chapters 4–6, van Wijk, de Vries and Derksen discuss the mathematical physics of soil temperature in the most comprehensive account of this topic that has appeared in book form. This section might more logically have followed Chapter 7, in which de Vries shows how the thermal properties of soil can be predicted from its composition, and summarizes measurements in several useful tables. Chapter 8 is on the turbulent exchange of heat in air with special reference to the theory of sinusoidal temperature variations, and Chapter 9 is a detailed account of the heat balance of glass-houses, in which J. A. Businger shows theoretically that the 'glass-house effect' depends on shielding from wind rather than on preventing radiative losses. Horticultural engineers will find this section a valuable source of reference. The final chapter, by F. H. Schmidt, presents equations for the diffusion of atmospheric pollution and quotes an interesting investigation where damage to vegetation around a steel works was greatest almost 1·5 miles from the source of the pollution.

The book has two weaknesses. First, although the scope of the book was never intended to match its comprehensive title, the index suggests that the editor has been too selective. There are 49 entries under 'temperature' and 'heat', 24 under 'soil', 13 under 'radiation', 4 each under 'evaporation' and 'photosynthesis', and 3 each under 'humidity' and 'carbon dioxide'. Other readers will regret this bias. During the growing season, soil temperature is one of the least important components of plant environment, whereas evaporation and photosynthesis are the main links between weather and plant growth and development. Evaporation is dismissed in a few pages and photosynthesis in a few lines.

A quotation from p. 266 illustrates a second weakness. "A systematic discussion of the application of the principles (of turbulent transfer) set forth in the preceding text to plant environment would largely surpass the scope of this book." (Yet a derivation of the dry adiabatic lapse rate gets space in Chapter 2 and this has little relevance to the central theme.) The writers have tried to describe the environment of plants without reference to plants themselves or to the ways in which they modify their own microclimate. Several chapters open with the development of complex mathematical theory and close with much briefer reference to experimental results. Neglect of plant-environment feed-back is almost inevitable in this attempt to treat environmental physics as an inductive science.

The authors, all Dutch, achieve remarkable fluency in English and there are very few minor flaws in a book that is distinguished for its clean and elegant lay-out. Symbols are qualified by a plethora of suffixes—many unnecessary. A diagram on page 97 shows an inconsistent heat balance. It is debatable whether the surface temperature of a lake can be measured without difficulty (p. 273); or whether the mathematical theory of buoyancy has not reached the stage of application to plant environment (p. 253).

Despite limitations of content and approach, the book will find its way to many shelves alongside "Geiger" and "Sutton", as a standard text on the physics and mathematics of soil temperature.

J. L. Monteith

JURASSIC FLORA OF YORKSHIRE

The Yorkshire Jurassic Flora

By Prof. T. H. Harris. II: Caytoniales, Cycadales and Pteridosperms. Pp. viii + 191 + 7 plates. (London: British Museum (Natural History), 1964.) 130*s*. net.

In Volume 1 of *The Yorkshire Jurassic Flora* (1961), Prof. Harris has described the Thallophyta, Bryophyta and Pteridophyta. In Volume 2, he deals with seed-bearing plants, the Caytoniales, Cycadales and Pteridosperms. It has been found necessary to extend the series to four volumes. There are few areas of comparable size to Yorkshire which have yielded such considerable collections of well-preserved fossil plants from one geological formation. It is fortunate, too, that most of the plant fragments, leaves, etc., have well-preserved cuticles which may be isolated and used for purposes of identification. This method of investigation has been very effectively used by Prof. Harris in classification and in establishing the connexion between different organs of one plant species. A great deal of the best material on which the work is based was collected by the late Dr. Hamshaw Thomas and Prof. Harris himself.

The Caytoniales are a particularly interesting group, which has received much attention from morphologists. Thomas considered that the group exhibits features indicating possible relationship to the Angiosperms but perhaps it is more generally regarded as being closely related to pteridosperms. Prof. Harris has been able to distinguish four species in the genus *Caytonia*. The fossil remains consist of detached leaves (*Sagenopteris*), microsporophylls (*Caytonanthus*) and the ovuliferous parts