

The contents of the book served as the basis for three lectures given in spring 1968 at the Department of Plant Pathology, University of Wisconsin, in honour of Professor J. C. Walker. They are based largely on the results of recent and hitherto unpublished work on two viruses, tobacco mosaic and sugar beet yellows, chosen as exemplifying contrasting virus/tissue relationships: tobacco mosaic is unselective in its invasion of the host whereas beet yellows virus seems dependent on the phloem for successful invasion of the plant. The five chapters deal successively with the forms of viruses in cells, their relationship to host-cell components and to cell type, intercellular transport of viruses and the response of infected cells to virus infection. The text occupies only half the book's 200 or so pages and serves largely as an explanation of a series of 120 excellent electron micrographs, superbly reproduced and including what must be the first published evidence of the filaments of beet yellows virus trapped in pores of sieve plates and in plasmodesmata.

As the author herself would probably agree, the study of the ultrastructure of tissues infected by viruses is only just emerging from the descriptive phase, and the book is mostly an account of the author's experiences in this field with two well known and contrasting kinds of plant virus. Many of the observations are novel and serve as a salutary reminder of the dangers of too facile an interpretation of the behaviour of viruses in cells: others tend only to emphasize the problems of distinguishing cause from effect. This volume is essentially a memento of a special occasion and an eminent researcher, though its not so modest price will tend to deter some of the author's admirers.

C. H. CADMAN

WATCHERS IN THE NIGHT

Animals in the Night

Senses in Action after Dark. By J. H. Prince. Pp. 111. (Angus and Robertson: Sydney and London, December 1968.) 40s.

It is difficult to produce an account of sensory physiology which can be understood by all but which does not offend the knowledgeable. Professor J. H. Prince's attempt to do this is unsuccessful; his style is simple and explanatory, but it is basically dull and the information is poorly presented. The absence of colour plates is unfortunate, and this becomes particularly obvious when the work is compared with, for example, *Signals in the Animal World* by Burkhardt, Schleidt and Altner (Allen and Unwin, London, 1967), where similar topics are covered in a colourful and stimulating manner. In fairness, it must be said that the latter is probably intended for a more adult readership than *Animals in the Night*. Nevertheless, the schoolchild is entitled to more than a dry text meandering through badly arranged plates and artless diagrams.

The author considers the selective pressures at work in the dark environment in the first section, pointing out that probably eighty-five per cent of all mammals are nocturnal or occasionally active at night. The performance of sensitive eyes, their protection against daylight and the data processing of their information by the brain are examined, together with the biochemistry and physiology of bioluminescence as shown by some species of abyssal fish. Then there is a description of sensitive, direction finding ears and echolocation as used by bats, cave swiftlets, oilbirds, dolphins and whales. To see a bat navigate by echolocation and catch about two hundred flies in fifteen minutes must be exhilarating to anyone interested in animal life, yet in this book the entire impact of this experience is lost. The olfactory sense is discussed with reference to fish, and to birds such

as the kiwi. Gustation is described with reference to barbels in fish and Jacobson's pit organ in reptiles. The final section, "Touch and Special Senses", looks at, in particular, the detection of infra-red rays by snakes and the lateral line system of fishes.

This book is too expensive for the school reader interested in biology, too simplified for the zoologist and too ugly to grace the coffee table. JOHN A. PATTERSON

MEASURING TEMPERATURE

Precision Measurement and Calibration—Selected NBS Papers on Temperature

Edited by J. F. Swindells. (NBS Special Publication 300—Vol. 2.) (US Department of Commerce—National Bureau of Standards.) Pp. 513. (Government Printing Office: Washington DC, October 1968.) \$4.75.

This book is a collection of papers published by members of the staff of the National Bureau of Standards during the past thirty years relating to precision measurement of temperature and the calibration of temperature measuring instruments. Thus it gives a fairly good indication of the programme of research of the bureau in this field during that period. As one would expect, the papers are of very high quality and in some instances are classic papers of reference. In general, they deal with the standards of measurement of temperatures; that is, the establishment of temperature scales and the design and use of the primary instrument of measurement in a standards laboratory.

Basic to all measurements of temperature is the realization of thermodynamic temperature achieved over a wide range by gas thermometry. Only one of the papers is concerned with gas thermometer measurement—that describing the derivation of the bureau temperature scale for the range from 10° K to 90° K in 1939 which forms the basis of the present day NBS 55 scale. A note has been inserted showing that the NBS 55 scale was derived from the 1939 scale by decreasing the values of temperature by 0.01° K. The further development of the NBS scale is described in a paper on the acoustic thermometer by means of which the thermodynamic temperature is derived by measuring the velocity of sound in helium gas over the range from 2° K to 20° K. At still lower temperatures, a magnetic temperature scale is used. The derivation of such a scale for the range 0.02° K–2° K is described, the paramagnetic salt cerous magnesium nitrate being the magnetic cooling and thermometric medium. This section on temperature scales includes also the 1960 text revision of the International Practical Temperature Scale of 1948 and the tables of the vapour pressure-temperature relationships of ³He and ⁴He which have been approved by the Comité International des Poids et Mesures for use as standard tables.

The eight papers chosen to represent the thermocouple methods of measurement include some rather old ones about base metal thermocouples and more recent ones giving reference tables and their derivation for the 30 per cent Rh–Pt/6 per cent Rh–Pt thermocouple (0–1,800° C) and the 40 per cent Ir–60 per cent Rh/Ir thermocouple (0–2,100° C). No information is given about the classic 10 per cent Rh–Pt/Pt or the 13 per cent Rh–Pt/Pt thermocouples which are so widely used.

The accounts of the use of platinum resistance thermometers for both low and high temperatures are very valuable, the description of NBS practice for the realization of the IPTS using this instrument being particularly informative. There are also two excellent papers on the performance and calibration of germanium resistance thermometers for the range 2° K to 20° K. It was observed that in this section the final page of paper 36 is missing.

The rather small section on optical pyrometry deals only with the basic principles and the NBS photoelectric pyro-