

The only examples of natural selection in action Darwin provided in the *Origin* were, as he clearly stated, "imaginary" (page 90 in facsimile of first edition, Harvard University Press, 1964). As even Ghiselin admits, Darwin's theory of pangenesis and his ideas about the origin and maintenance of heritable variability in natural populations were unconvincing; yet natural selection depended upon an exact understanding of this variability. There was ample room for criticism of natural selection. One need only read Thomas Hunt Morgan's 1903 critique of Darwin, *Evolution and Adaptation* (Macmillan, New York) to see why an intelligent biologist could read Darwin carefully and still reject crucial aspects of his idea of natural selection. By reading twentieth century Ghiselin has missed the sense of history Darwinism back into Darwin, torturing proportion his book requires.

Despite these criticisms, this book is the best available analysis of Darwin's works, and it is sure to stimulate substantial further research. In addition, the book contains a wealth of other ideas. Ghiselin analyses aspects of scientific method, philosophy, religion, and history; he even has a comparison of human history with geology and palaeontology. His arguments are consistently bold, clear and provocative. Although readers will surely wish to challenge many of these arguments, they will find this carefully researched book a refreshing and stimulating change from the usual fare of Darwin literature.

WILLIAM B. PROVINE

Collisions in gases

Partially Ionised Gases. By M. Mitchner and Charles H. Kurger jun. Pp. 518. (Wiley Series in Plasma Physics.) (New York and London: Wiley-Interscience, November, 1973.) £12.50.

THIS book is concerned with the theory of collision-dominated plasmas and its application to practical engineering problems, particularly magnetohydrodynamic (MHD) energy conversion. It can be used as a text for graduate level courses of different emphases, by choosing appropriate parts of the nine chapters. The authors have taught the material in this way and make suggestions based on their experience in the introductory chapter.

Chapter 2 begins the book proper, introducing the physical concepts needed to understand collisional and radiative processes. More than twenty graphs for selected collision cross-sections as a function of energy are given at the end of the chapter, so that the order of magnitude of many cross sections not included can be estimated from this collection.

Chapter 3 deals in more detail with plasmas at rest and has a section on diagnostics, which unfortunately includes the erroneous statement that ion temperatures can be deduced from probe curves. The references quoted would correct this. The magnetohydrodynamic equations of motion are derived in chapter 4, after particle motion in combined static E and B fields has been discussed. This leads to a treatment of MHD power generation and other phenomena in flowing magnetised plasmas.

Collision theory as applied to elastic collisions in plasmas is described in chapter 5, where Coulomb scattering and three-body recombination appear. Radiation from plasmas is treated instructively on a semi-classical basis in chapter 6. A more formal treatment of elastic collisions on the basis of a fuller kinetic theory appears in chapter 7. The Cartesian-tensor expansion of the Boltzmann equation is introduced here and applied in chapter 8 to the calculation of transport coefficients for plasmas of all degrees of ionisation.

Inelastic collisions, which determine the degree of ionisation, are considered in chapter 9 on ionisational non-equilibrium. Departures from the Saha equation due to escape of radiation from steady-state plasmas are discussed, as are non-Maxwellian distributions and flowing plasmas.

The material is clearly presented; obviously this textbook has grown out of genuine efforts to teach. A fine selection of numerical examples is provided with each topic, and a multitude of references after each chapter. This makes the book useful as a guide to the original work. Beginners in the field of high temperature gas dynamics would be helped by the discussion of techniques for carrying out useful approximate calculations, and by the data presented in graphical and tabular form throughout the book.

The book is well printed and bound—though my copy contains some optically thin pages—and the diagrams are excellent.

P. F. LITTLE

Reproductive handbook

Female Reproductive System. Edited by R. O. Greep. Part 1: pp. 658; part 2 pp. 375. (Handbook of Physiology: A Critical Comprehensive Presentation of Physiological Knowledge and Concepts. Section 7: Endocrinology: Vol 2.) (American Physiological Society: Washington DC; Distributed by Williams and Wilkins, Baltimore, 1973.) Part 1; \$44.50; part 2; \$25.00.

THIS latest volume of the American Physiological Society's "Handbook of Physiology" maintains the very high standard of its predecessors. Roy Greep has obtained a galaxy of stars to write the 50 chapters on central nervous

system-pituitary-ovarian interrelationships, effects of hormones on sexual behaviour, ovary, female reproductive tract, pregnancy, immunoendocrinology, and fertility control. Greep's approach might appear somewhat parochial in that only four of the chapters have been written by authors not attached to North American laboratories, but it is a pity that his modesty prevented the addition of a chapter under his own authorship.

The various sections made very stimulating reading, though the chapters on, for example, the biosynthesis of the ovarian steroids inevitably provided heavier reading than did other chapters. In general, although each chapter overflows with pertinent information, the provision of facts has not been permitted to obliterate the fundamental concepts that are discussed. As an excellent example of this I would cite Joan Hoffmann's chapter on "The Influence of Photoperiods on Reproductive Function in Female Mammals" in which she lucidly introduces her subject and then continues, to produce a clear diagrammatic summary of the possible interplay in the rat of photoperiodic inputs, hormone levels, and neural thresholds to permit, or otherwise, the pre-ovulatory surge of luteinising hormone. Richard Michael's chapter on "The Effects of Hormones on Sexual Behavior in Female Cat and Rhesus Monkey" is equally entertaining, though it was noticeable that one quarter of the 205 references came from Michael's own publications.

The high standard of production of this volume is reflected in the excellent reproduction of all figures. This standard of illustration is particularly of note in the chapter by S. R. M. Reynolds on "Blood and Lymph Vascular Systems of the Ovary" and the chapter by Arthur Hertig and Barbara Barton on "Fine Structure of Mammalian Oocytes and Ova".

I would quibble, though, with the use of numbers in the text instead of authors' names to indicate references. References are, however, now quoted with full titles, which is an improvement since the handbook first appeared in 1959. Inevitably, reference could in general only be made to works published up to early 1971, and, as a result, some areas of current interest such as those of releasing factors or prostaglandins are not up to date nor given much coverage.

I would, however, recommend unequivocally that anyone working in the field of reproductive physiology should invest in this volume. It certainly fulfils the stated intention of providing a reference 'bible' for predoctoral study, for preliminary orientation in preparation for research, and for preparation of lectures.

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