

prepared to admit Copernicanism as a calculating device, precisely like Ptolemy's epicycles. To overlook this fact and to under-estimate Galileo's concern with physical reality rather than with mathematical hypotheses of planetary motion is to run in peril of the "double-think" that Mr. Koestler detects in others, and contributes to that lack of feeling for Galileo which is so marked and astonishing a feature of this book.

For Mr. Koestler is a violent partisan in the way he treats ideas and characters. For him Copernicus is a fumbler, a second-rate second-hand Aristarchos, cold, timid, anxious; Galileo is arrogant, vain and deceitful, contemptuous of the achievements of others and rashly confident that he can over-reach the theologians, so precipitating a disastrous and unnecessary conflict. Kepler is the hero of the story because his scientific discoveries were the fruit of his mystical leanings; Galileo its villain because he turned his back on Kepler and constituted himself the champion of science against religion. All this forms an interesting and provocative point of view; but it is a highly personal one.

Not less singular is Mr. Koestler's chief term of historical appreciation: schizophrasia. The tension he finds in the history of cosmology he attributes to "split-mindedness" and its product "double-think". This journalistic distortion of a precise psychopathological concept may itself be deplorable to purists: it becomes objectionable to historians when the whole of the Middle Ages is dismissed as an age of the split mind, and to physicists when quantum mechanics enters the category of "double-think" (whatever that may mean). Perhaps one should not insist on an author's idiosyncrasy; in this book, however, psychological theorizing is fundamental to the interpretation of history, and to the conclusions of the epilogue on the contemporary state of scientific thought. In short, the brilliance of the book lies in the literary use of recent historiography; Mr. Koestler's allusions to the mental hospital give it an additional and perhaps more dubious colour.

A. R. HALL

THE PINNIPEDIA

Seals, Sea Lions and Walruses

A Review of the Pinnipedia. By Victor B. Scheffer. Pp. x+179+32 plates. (Stanford, Calif.: Stanford University Press; London: Oxford University Press, 1958.) 30s. net.

THE Pinnipedia are a highly specialized group of about thirty species, which present unusual difficulties to the systematist. Their large, greasy skins are difficult to preserve, and are consequently scarce in museum collections; the skeletal parts, especially skulls—on which the systematist has usually to rely for comparative material—in some cases undergo progressive change of form and proportion as the animal's age advances. Particularly in the various polygamous species the males do not stop growing at maturity, as do most warm-blooded vertebrates, but may continue to increase in size, in some species quite rapidly, throughout life. Consequently the average measurements of a sample can be materially affected by the age-composition of the group from which it was taken. In these circumstances the diagnosis of subspecies often proves almost impossible, and the boundaries between species and

genera sometimes appear indefinite also. In the past, confusions of names have been common and synonyms are therefore unusually numerous.

No comprehensive synopsis of the Pinnipedia has appeared since the early years of the century, and this makes Dr. Scheffer's modern, practical and authoritative review of their taxonomy and distribution particularly welcome. I notice with interest that he feels the group ought to be regarded as an order in its own right, separate from the Carnivora. Fifteen of the twenty genera into which he divides the present-day forms are monotypic; among these is *Phoca*, to which only the common or harbour seal (*P. vitulina*) is here assigned. Seals are characteristically distributed coastwise, often strung out in long chains rather than occupying broad regions, and this may have facilitated speciation. In none of the five polytypic genera is there any instance of two species in the same genus (as defined by Scheffer) occurring together in the same area.

Some of the more widespread species have disrupted ranges: the harbour seal, for example, has two distinct North Atlantic centres, one on each side, and two corresponding ones in the Pacific. Here the author has decided to assign separate subspecific names, notwithstanding the fact that constant physical differences between the races are not always discernible. The name *mellonae* is applied to a fifth, freshwater population in Ungava, "not because it stands for a remarkably different kind of seal but because it represents a situation . . .". Such an unorthodox criterion is presumably justified by the convenience of having labels for populations which are geographically distinct and definable as living entities.

The systematic section is prefaced by fifty pages of highly condensed, almost laconic information, chiefly on the anatomy, physiology and evolution of seals. The introduction contains an illuminating table in which the world populations of all the numerous forms are critically estimated; one recent race—the fur-seal of Juan Fernandez—is probably extinct, and some others are dangerously low; but considering the ravages that seals and their allies have suffered all over the world at the hands of man they have shown surprising powers of resistance and recovery.

The book contains distribution maps, excellent photographs and figures, and a very full bibliography. Only systematic names are listed in the index; but some indication of the numerous topics included in the book can be gleaned from the subheadings to the introductory chapters, given in the table of contents. It is a very useful work of reference.

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BRITISH WATER BEETLES OF THE FAMILY HYDROPHILIDAE

British Water Beetles

Vol. 3. By Prof. Frank Balfour-Browne. Pp. by liii+210. (London: The Ray Society, 1958. Sold Bernard Quaritch, Ltd., 11 Grafton Street, W.1.) 30s.

PROF. F. BALFOUR-BROWNE is much to be congratulated on having produced a third volume on British water beetles. The first two volumes, published in 1940 and in 1950, deal with the Hydradephaga, the present volume with the aquatic