Book Reviews

The Species Concept in Palaeontology. Systematics Association publication No. 2: A symposium. P. C. Sylvester-Bradley, Ed. Systematics Association, London, 1956. 145 pp. Illus. $2.

In 1940 the Systematics Association published its first symposium, *The New Systematics.* It is true, as some critics have commented, that the origins of the new systematics can be traced back another century or so, and no doubt some enterprising classicist will produce an ancient Greek forerunner. Nevertheless, that publication did signalize and stimulate a true revolution in the science of systematics—a change, to state it in the briefest possible terms, from the classification of idealized, fixed types (typology) to the classification of real, varying populations. Since 1940 the new point of view, with its new methods and results, has become usual among students of living organisms.

Now, the second symposium of the Systematics Association demonstrates, among other things, how far the new systematics has affected the study of extinct organisms and to what extent different problems appear in this field. Eighteen paleontologists and zoologists, all but one of whom (Newell) is British, have contributed to the discussion. Almost all of them make the point, implicitly at least, that paleontological systematics is inherently more complex and difficult than neontological systematics. There is, in the first place, the added dimension of time. There is, moreover, a whole series of special difficulties related to paleontological sampling, which are here well discussed by Rhodes, Newell, and George, among others.

Apart from such useful treatments of methodological problems and a few oddities, such as Haldane's washing his hands of the stated topic, the main issues seem to be two: the applicability of population concepts to fossils and the problems that are connected with classifying lineages through time. The interplay of questions that bear on the first and broader of these issues is somewhat obscured by organization and terminology. The body of the book is divided into sections labeled "Theory" and "Practice," a distinction that is seldom valid in science and is rejected by some of the authors here involved. In fact, the distinction achieved is not between theory and practice but between two purposes and attitudes. The nominal "theoreticians" are interested in fossils as organisms, including their "practical" applications. The nominally "practical" students are interested in stratigraphy more than in organisms as such. It is not surprising, then, that the writers on "theory," notably Thomas, Rhodes, Westoll, Newell, and Joysey, are unanimous in welcoming population concepts in systematics, while the writers on "practice," notably Arkell and Eager, mainly support a type systematics. Indeed, this is no question of theory and practice but the same issue that has been fought out since 1940 (and before) in neontology between population systematics and typology.

This issue is somewhat compromised, not only by the false tendency to equate typology with "practical" paleontology, but also by the foreword of the chairman (White). He remarks: "It is true that there is a satisfactory degree of unanimity among those . . . often unembarrassed by prolonged or wide practical experience . . ." and "Fresh breezes are doubtless blowing through the musty halls of orthodox paleontology, but some of us may be forgiven for thinking that in places the amount of wind is excessive"—statements that contributors to the symposium may find discourteous and readers will surely find unjustified. There is a further ambiguity in the usages throughout the book of the term *morphospecies,* which sometimes means a real, biologically significant population that is recognized on morphological evidence and, sometimes, an idealistic grouping on the basis of resemblance to an arbitrary type, with consequent haziness of logical grasp of the differences between these two concepts. In spite of editorial bias and of some logical confusion among their opponents, it is clear from the book as a whole that, in paleontology as in neontology, the typologists are now the old guard still fighting a lost battle. It is even clear, although here not perhaps as fully demonstrated as it could be, that the supreme argument of the typological stratigraphers is flatly fallacious. Population systematics is demonstrably superior for the most fully practical stratigraphic applications.

The problem of ancestral-descendent species (if such they should be called) successive through time is peculiar to paleontology and is here considered at some length, especially by Thomas, Rhodes, Westoll, Newell, Joysey, Kermack, and George. There is not complete agreement, but there is a consensus that there are available sensible criteria for specific subdivision of these continua and that the units so achieved may be arbitrary but are not, as has been claimed, "unreal."

Authors not previously named are Parker, Ager, Parkinson, Melville, Smout, McKerrow, and Sylvester-Bradley, who has supplied a stimulating introduction. There are a meager index and a good glossary. The latter, as glossaries so often do, raises the question whether some terms are really necessary.

It is not likely that the Systematics Association's second symposium will achieve the fame and influence of the first. This book is, nevertheless, another important milestone, indispensable for all paleontologists, zoologists, and evolutionists.

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Metallurgy of Chromium and Its Alloys. vol. II of *Chromium.* Marvin J. Udy, Ed. Reinhold, New York; Chapman & Hall, London, 1956. 402 pp. Illus. $11.

The metallurgy section of the monograph on *Chromium* represents the efforts of a number of eminent contributors, each of whom is a recognized expert in his particular field. The result is a comprehensive coverage of the various phases of the extractive metallurgy of chromium and of the properties of chromium, its alloys, metallurgical uses, and its uses in refractories.

The section on the extractive processes for chromium covers these methods very well and goes into great detail about the prevailing commercial processes, thus providing the reader with full information about the subject. For one concerned with the pure metal, however, the information which is included is somewhat meager.

The physical properties of the metal are given in excellent detail; thus, the book is excellent for purposes of reference. Also, the behavior of chromium in various steels, cast irons, high temperature alloys, electrical resistance alloys, and nonferrous alloys is described in detail by competent specialists in these several fields of endeavor. However, current investigations concerning chromium-base