Paleontology: Handbook of Techniques

Handbook of Paleontological Techniques. Bernhard Kummel and David Raup, Eds. Freeman, San Francisco, 1965. xii + 852 pp. $18.

Budgets for paleontological equipment are generally in the hundreds or at most thousands of dollars rather than the millions. Paleontologists do not at present require particle accelerators or space vehicles (although they are capable of finding uses for both). Nevertheless, no science uses a greater variety of techniques, and none is more dependent on them. Some are of course as old as the science itself. Others are just now changing its scope and potentialities. Despite those facts, there has hitherto been only one book on paleontological techniques. It is unduly brief, and it is now far out of date.

Acquisition of technical skills in paleontology has been almost entirely by the apprentice system. Dissemination of new techniques, to the extent that it occurred at all, has been by word of mouth or by unsystematic, dispersed, and often obscure mention in brief articles. All those considerations and some others prompted the Paleontological Society to initiate activities that have eventuated in the hefty handbook now before us. Some 5 years of committee and editorial work have gone into its making. In view of the complexity of the undertaking, that is a remarkably short time.

The main body of the handbook consists of 87 essays by 87 different authors. (The equality of numbers is a coincidence, since many authors have written more than one essay and many essays are by more than one author.) Most of the essays are supplemented by references, and the book further includes 124 pages of classified bibliographies compiled by Kummel. Without important exceptions, the 87 authors (and also the editors) are professional paleontologists who are themselves outstandingly expert in the techniques that they discuss.

Part 1 consists of 21 essays, all rather brief, on general procedures and techniques applicable to each of the most important groups of fossil protists and animals, plus one essay on plants. There is inevitably some overlap of one group with another and with later discussion of particular techniques, but in quite summary form this section successfully highlights methods peculiar to the major paleontological specialties.

Part 2, with six subsections, is devoted to descriptions of special techniques. The first group of 13 essays on collecting is a somewhat mixed bag. It includes such oddities as a downright inane article on collecting in sedimentary rocks ("Fossils are most commonly found in sediments . . . or sedimentary rocks. . . . Field clothing should be comfortable, durable, and functional. . . .") and an article on collecting fossils on tropical Pacific islands, which is interestingly esoteric but hardly an outstanding contribution to the purposes of the handbook. However, among other useful things, this section also includes an adequate exposition of the washing and screening technique responsible for some of the most remarkable recent advances in vertebrate paleontology.

The 18 essays on mechanical methods of preparation include do-it-yourself information on an astonishing variety of methods ranging from serial grinding to centrifuging and "Rotapping." This section alone would repay the project for this volume. The following section, on chemical methods, consists essentially of a single, short essay which does cover the subject but is nevertheless mildly disappointing. Chemical preparation is among the most widely applicable of paleontological techniques, is subject to considerable refinement and modification for special applications, and continues to have profound effects on the whole science. It might have been treated in even broader extension and to greater depth.

"Radiation and related techniques" includes not only x-ray and electron microscopy but also infrared and ultraviolet photography and a wide variety of analytical techniques. Casting and molding, discussed in three essays, play an even larger part in paleontological research than is here explicit, but the procedures and the new plastics and other compounds now available are clearly expounded. A section on illustrations, seven essays, is almost entirely devoted to photography. Comments on the drawing of specimens are competent but too brief to be of much real use, and other kinds of illustrations are not discussed.

Finally (except for the long classified bibliographies already mentioned) there is a section of 15 essays, 238 pages, on techniques in palynology. This subject is covered in much greater detail and from more points of view than any other aspect of paleontology. Here is a whole book within the handbook, and one wonders whether publication as a separate volume might not have been considered. Some other subjects might then have been given more exhaustive treatment. However, this section makes certain that palynologists *must* have the handbook, and that may increase the circulation of the whole work. What might otherwise be undue stress on palynology may also be justified by the current excitement of this "hot" subject and the novelty of some of its procedures.

Large as the book is, even aside from the sub-book on palynology, it could not have treated all the subjects that could be included under its title. There is a necessary truncation at both ends. The techniques covered do not include stratigraphy, mapping, or, in general, field records, without which collecting is virtually worthless. They also do not include such techniques as cataloging, measurement (except for a short bibliography), statistics (except in pollen analysis), and many others essential in systematics and other research.

What the book does include is a great amount of information of generally high quality; thus, it is an extremely useful volume. The authors, editors, and publishers deserve not only praise but also thanks.

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Physics: Scattering Experiments

Collision Theory. Marvin L. Goldberger and Kenneth M. Watson. Wiley, New York, 1964. x + 919 pp. Illus. $19.95.

The analysis of scattering experiments has played a significant part in the growth of nuclear and elementary particle physics, for scattering processes underlie nearly all of the interactions between particles. Although the development in the subject of collision phenomena itself has been extensive, the results, to a great extent, have been available only in the published literature. Summaries have been available in the report literature, or in lecture notes, but the texts and mono-