

This handbook of keys is an attempt to fill an obvious need at Woods Hole, the need for a general reference on marine invertebrates for the use of students and investigators who want to know what is here and how to identify it.

Relatively few present day biologists realize the difficulties involved in identifying with certainty the myriad species of marine invertebrates. Some species are readily recognized by distinctive form or color, but in most cases the beginner will experience difficulty in making a positive identification, and in many instances the assistance of a specialist may be necessary. Keys are useful mainly in the identification of common and obvious animals, or in making preliminary identification of less common animals (perhaps to family or genus), or by indicating to the observant non-systematist that he has something out of the ordinary which should be referred to a specialist. The problem is akin to that of medical diagnosis; the alert zoologist, like the general practitioner, need feel no shame if he makes some identifications with confidence, but seeks consultation on others.

The purpose of zoological classification is to arrange animals into groups on the basis of fundamental similarities. The completion of this task will presumably reveal evolutionary relationships, but the immediate objective of a set of keys is more utilitarian, that of identifying and providing the names of the local invertebrate fauna as simply, accurately, and painlessly as possible. It cannot be too strongly emphasized that keys are shortcuts and often very misleading; their function is merely to clear the way to an approximation, and identifications made by keys, if to be of scientific reliability, should be checked by reference to the original description or to recent monographs. A key is made to cover a selected list of species, and any species not one of that group will not "key out" or, worse yet, may key out as something which it is not, hence the need for a cross check in all cases of doubt.

The terminology of systematists may be difficult for the non-systematist to grasp, owing to the independent evolution of descriptive jargon within the groups of specialists on different animal phyla. Therefore each key will when necessary be accompanied by a glossary and illustrations of the descriptive terms and by a brief statement of the characteristics used in the taxonomy of that particular group and how the student may locate and recognize them. The spicules of sponges, the setae of polychaetes, the ossicles of sea cucumbers, are of basic importance to systematists in establishing the degrees of similarity which underlie classification; the problem of the biological role of these structures as functional parts of the animals concerned lies outside the immediate field of classification.

An aspect of identification of animals that commonly proves annoying and frustrating to experimental biologists is the "name-changing" that seems so often to occur in systematics, resulting in the production of synonyms for some of the commonly used experimental animals. In the annotated check lists we have attempted to explain the more conspicuous synonymies. Experimentalists should realize that, in an active field, terminology must change (it is no longer sufficient to speak merely of "Vitamin B", and such terms as muriatic acid, yellow enzyme and even DPN, while understandable in context are considered outdated today). In the same sense it is not good current usage to apply such well-known older names as Nereis limbata and Nassa obsoleta, although these particular names are perfectly understandable when encountered in the older literature. It is hoped that this manual will provide useful information on the synonymies of local experimentally used animals and contribute to a better understanding of the efforts of systematists to provide a more rational and stable nomenclature. The short discussion of nomenclatorial rules in Hyman's "The Invertebrates", Vol. I, 1940, pages 22-26 will be found useful to those who wish to review this topic briefly, and the more extended discussion in Mayr, Linsley and Usinger's "Methods and Principles of Systematic Zoology", McGraw-Hill (1953) provides a more complete account. In case there are any laboratory biologists who feel that animal classification is outside their proper sphere

of interests, we recommend "A Classification of Living Animals", Wiley (1961), by no less an experimentalist than Lord Rothschild. And for those who decide to plunge into serious systematic work, two more references must be mentioned: "International Code of Zoological Nomenclature", published by the International Trust for Zoological Nomenclature, London (1961); and Schenk and McMasters, "Procedure in Taxonomy", third edition, Stanford University Press (1956).

This manual does not pretend to be an exhaustive faunal survey of the Woods Hole Region which, for our purposes, is that area in which one may reasonably collect, using Woods Hole as a base. Hence it includes not only the animals of Buzzards Bay and Vineyard Sound, but also species commonly taken on the northern shore of Cape Cod, as at Barnstable. Only by limiting its scope and content can the manual be kept simple and inexpensive enough to be useful and available to the students and beginning investigators who need it most. There are in existence two old but comprehensive faunal surveys which contain much valuable information for the field worker:

- Verrill, A. E. and S. I. Smith, 1873. Report upon the invertebrate animals of Vineyard Sound and the adjacent waters. Rept. U. S. Fish Comm. 1871-1872: 295-778 (also published as a separate volume in 1874).
- Sumner, F. B., R. C. Osburn, and L. J. Cole, 1913. A biological survey of the waters of Woods Hole and vicinity. Section III. A catalogue of the marine fauna. Bull. Bur. Fisheries, 31: 545-794.

A work much used at Woods Hole in recent years is Miner's "Field Book of Seashore Life", Putnam (1950). This is illustrated and has much textual material, but since it covers the wide area from Laborador to Cape Hatteras and is not provided with diagnostic keys, it is inadequate for critical identification of many local species and its terminology is not up to date.

The present keys will be found to vary in ease of use and in completeness of coverage, and will naturally become less reliable with increasing distance from Woods Hole. Some groups, e.g. amphipods, are still too incompletely known to permit the construction of specific keys that would be generally useful.

For certain important groups which are intrinsically difficult because of the number of species and small size of individuals, such as Protozoa, nematodes, ostracods, no keys have been attempted. Those wishing to embark upon studies of such groups will need special instruction and more detailed literature than we can provide. Plankton, especially its component of immature stages, will not be treated in these keys, although representatives of certain groups may be identifiable. In other instances, the keys will serve not to provide answers, but to clarify the problem. We regard this edition of the keys as tentative: they will be found inaccurate or incomplete in many respects. We should appreciate receiving criticisms or suggested revisions at any level.

In Woods Hole at the present time the preponderance of experimentalists places a burden of identification upon those who are undertaking systematic problems and who are expected to make reliable identifications. With the aid of proper keys, this load can be more fairly distributed, routine identifications accomplished, non-identifiable animals more readily detected and referred to specialists, and the exchange of vital information between laboratory and field workers facilitated.

This manual has been made possible only by the generous assistance and cooperation of numerous individuals, actually too numerous to list fully. However, certain ones have given very liberally of help and advice, and are listed here, together with an indication of the areas in which they contributed. It should be noted that there is no clear distinction between those listed as "authors" of chapters and those who contributed heavily to chapters in which a good deal of editorial

compilation has taken place. It seems appropriate to acknowledge gratefully this help, and to express the wish that users of this manual will feel free to pass on to editors, and advisors alike, the criticisms and comments that will be inevitable.

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(cover design), and several of the above contributors.

My thanks are due the staff and students of the MBL Invertebrate Zoology Class of 1963, who cooperated extensively in collecting material and critically testing keys. The Supply Department has also been most helpful, and I owe much to Mr. John Valois for his help in the summer of 1963, and especially I am indebted to Mr. Milton Gray, as whose helper in 1939 I learned much that has proved useful in all my work in marine zoology. Above all, the unstinting support given to the preparation of these keys by the Systematics-Ecology Program of the MBL has been the decisive factor in their publication at this time. I wish to record my appreciation for all that Dr. Melbourne R. Carriker and his entire group have done to facilitate this task, and especially am I grateful to Mrs. San Lineaweaver and Mrs. Virginia Smith for their extraordinary efficiency and cheerfulness in the typing involved.

Ralph I. Smith, Editor
May, 1964