

CIRCULAR 124

Research Program
of the
Ichthyological
Laboratory



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RESEARCH PROGRAM OF THE ICHTHYOLOGICAL LABORATORY

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Since the founding in 1871 of the U.S. Fish Commission by Spencer F. Baird, the Bureau of Commercial Fisheries has actively supported biological exploration and taxonomic research. As Baird and subsequent administrators have realized, knowledge of the nature and extent of our resources is a prerequisite to their efficient utilization. Furthermore, in order to comprehend the bionomics of a given kind of animal the biological, chemical, and physical environment must be properly understood.

The program of this Laboratory has been in the field of classical fish taxonomy, based upon comparative anatomy. We have studied commercial fishes, potentially commercial fishes, and fishes which in all probability will never be of commercial importance. The justification for studying the first two categories is obvious. As for the third, it includes in many instances those forms which are part of the biological environment of commercial fishes. It is also true, of course, that many species of considerable commercial importance are related to noncommercial forms, and in order to understand the taxonomy of any particular form it is often necessary to range far afield. Once the taxonomist's main job was to catalogue, now it is to study evolution, and this means that the taxonomist must try to understand not only the comparative anatomy but the total biology of the animal with which he works.

The objectives of this Laboratory are to carry out taxonomic studies on marine organisms of sufficiently high quality to serve as a basis for subsequent ecological work and which illustrate patterns of evolution.

The staff of the Laboratory presently consists of two ichthyologists who are stationed in the Fish Division of the U.S. National Museum where they have access to one of the best technical libraries and reference collections in the world. Due to space limitations in the Museum, other personnel, including a secretary and an illustrator, work in a downtown Washington office building. Although we do not now direct a field program, we carry on field work in cooperation with other branches of the Bureau and with outside agencies when such work is of benefit to Laboratory programs under way.

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Problems

There are an estimated 40,000 species of recent fishes, most of which are marine. The problem of all taxonomic ichthyologists is to try to comprehend the course of evolution within this vast group of animals and thereby formulate a logical and meaningful classification. This task is, of course, a joint enterprise of many workers, and our contributions are dictated by such considerations as available material, interests and abilities of the researchers, and benefit to the Bureau.

Solutions

Support of the monographic series: "Fishes of the Western North Atlantic." This series of regional monographs, published by the Sears Foundation for Marine Research, will consist of high-quality original research upon the marine fishes found between Hudson Bay and the Equator. A cooperative effort of many scholars, it is intended to be a painstaking exposition of the taxonomy and bionomics of the organisms concerned, some of which are the objects of the most important fisheries in the world. The late Dr. Samuel F. Hildebrand was on the original editorial board; Dr. Giles W. Mead, formerly of this Laboratory, served in an editorial capacity as does Dr. Daniel M. Cohen. Sections prepared in this Laboratory on Clupeidae (herringlike fishes), on benthic Iniomi and on argentinoid fishes are in press. Sections on Anacanthini (codlike fishes) and certain Synentognathi (halfbeaks and needlefishes) are in preparation. In addition, we have collected specimens in cooperation with other Bureau activities and distributed them to cooperating authors.

Preparation of worldwide monographs. Many marine organisms are members of geographically wide-ranging taxonomic groups. In order to view with proper perspective the evolutionary relationships of animals dwelling within a particular area, the relatives of these animals from other areas must also be studied. As a result the taxonomist often finds himself studying an entire group when he started out merely to clarify the status of one or a few species. In the final analysis, preparing group revisions is the taxonomist's most important task, for it is a systematic accumulation and synthesis of information into a workable classification which illustrates how the animals under study have evolved. Working space in the U.S. National Museum allows us unique opportunities for this type of study. At present two group-monograph projects are under way at this Laboratory. One is a worldwide study of the Bathylagidae, little-known mid-water fishes, some of which are very abundant and have been taken from tuna and fur seal stomachs. Studies on the eastern Pacific members of this group are being carried on jointly with the Bureau of Commercial Fisheries Biological Laboratory at La Jolla, California. A second group under study is the

Brotulidae. Although some of these fishes are found near shore and in fresh water, they are probably the predominant abyssal fishes, and undoubtedly play an important part in the economy of the ocean floor. There are many species of brotulids, although specimens are understandably rare in collections. Present studies are being aided by invaluable material collected by exploratory work of the Bureau in the Atlantic, Gulf of Mexico, and Caribbean.

Projects of immediate concern to the Bureau. Field studies conducted by the Bureau are often hampered by lack of information concerning the identity or relationships of organisms upon which research is being done. A project is presently under way which will attempt to clarify the identity of the numerous nominal genera and species of tuna. In another project this Laboratory has cooperated with the Bureau of Commercial Fisheries Biological Laboratory at Woods Hole, Massachusetts, on a study of the North Atlantic redfish. There is no certainty as to how many forms enter the fishery or how they may be separated, and further work on this problem is necessary. Some other possible problems concern the identity of tuna bait fishes, and the taxonomy of shrimps and fish parasites. Increased personnel and funds will enable us to make more investigations of this type and also permit us to participate, to a certain extent, in investigations concerned with taxonomic problems that must be solved in the field rather than in a museum.

Informational and curatorial services, and other projects

1. This Laboratory serves as a source of specialized information for the Fish and Wildlife Service, other Government offices, professional biologists, and the general public.

2. Most of the collections which come to us are deposited in the U.S. National Museum. We carry out the task of processing and incorporating most of our material into the national collections.

3. Personnel of this Laboratory are specialists in the study of animals which are not currently part of a major study program. As such they bear a responsibility to the scientific public to answer requests. Continuing interest in these animals results in the production of shorter papers from time to time.

Future Plans

Future plans call for continuation of the type of research noted above with the addition of at least one invertebrate systematist, preferably a specialist in decapod crustaceans or bivalve mollusks. These two groups in which the Bureau has continuing interest need taxonomic study. The increasing research and exploratory programs of the Bureau also demand the services of additional ichthyologists, and it is hoped to station these about the country, either in major museums where they will have available the necessary comparative material and technical libraries or in Bureau laboratories.

In either event they will be available to and work with Bureau laboratories.

The National Oceanographic Program now under consideration within the Federal Government designates the Bureau as the agency to carry out biological aspects of extensive oceanic survey programs. Certain collections from this program will be handled by the Ichthyological Laboratory. This program plans for the collection of marine organisms from many environments in all oceans of the world. Personnel will be needed to collect, properly preserve, label, and pack specimens on board ship. On shore the material will require sorting and identification. It might be best to locate one or more sorting depots in a university area where the services of students are available, and where there is more space than is presently available in the U.S. National Museum. Finally, the material will be shipped to specialists who can make best use of it or who can furnish museum storage and curating until such time as the material can be studied. Storage space will be a critical factor; the volume of material will be large. It will be necessary to reach an agreement concerning curatorial space and funds with the U.S. National Museum and probably other museums as well.

This Laboratory also looks forward to participating with several other institutions in a field program in oceanic ecology. Questions arise concerning the seasonal occurrence of species, vertical and horizontal movement, reproduction, habitat of young, growth, and so on. This type of information is in many respects basic to understanding the taxonomy of an organism. It cannot be gained by the study of museum collections from scattered localities, but it would be obtainable through intensive investigations of a few contiguous stations. It is planned to study intensively the bottom, the water column above it, and the fauna contained therein, at several depths (for instance above the thermocline, in the thermocline, and at several depths below the thermocline). These stations will be occupied perhaps 12 or more times in a year for a period of at least 3 years. An oceanic habitat has the advantage of being a more stable environment than one adjacent to a continental area, for instance an estuary. This means, of course, that fewer variables are encountered, thus making analysis of the data a simpler task. Furthermore, such ecological information is available for many inshore species, but is virtually unknown for bathypelagic and offshore benthonic species.

This program will attempt to take advantage of existing facilities and will be carried on with the assistance of many specialists. Our role will consist mainly of planning a detailed sampling program and coordinating efforts to study the data and specimens collected. In addition, we will furnish personnel to collect and study some of the material.

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