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Symposium on Manpower for Oceanography

In planning the Manpower for Oceanography Symposium, held last November in Houston, Texas, it seemed to the officers of the sponsoring organizations (American Society for Oceanography and Gulf Universities Research Corp.) that there were three primary questions to be answered and each speaker was invited to comment on them. The questions were:

1) How may enough of the right people be attracted to ocean science and engineering?

2) How may suitable contact be maintained with these persons and how may they be assisted in building up their educational background requirements?

3) How may they best be prepared for professional and technical positions in these fields?

The invited participants were selected to represent a broad front of experience and opinion. Each presented his own point of view based upon his own experience. Speakers were invited to describe specific educational programs including their own but to use these primarily as examples of different educational approaches.

The participants included a large fraction of the innovators and implementers of oceanographic educational programs in the United States. They also included several experts with a broad overview of the manpower problem in this and other fields.

Starting with a session on the history, present status, and future requirements of the oceanographic manpower problem, the program extended to the areas of prerequisites, recruiting, and preparatory education for oceanographers. Later, the various types of academic degree programs were described. The final session consisted of an overview from industry and examples of particular programs related to manpower.

A prime question was that of definition. What group was encompassed by "Manpower for Oceanography"? Actually, the program did not deal with all persons who have some association with the sea. It was directed, rather, toward career personnel with academic training. It was also primarily restricted to scientists and engineers in ocean professions. This emphasis followed naturally from the interests of the men selected for participation.

Ocean study might be compared to what we may call "landology." Almost every study undertaken on the continents has a counterpart which needs to be developed in working with the oceans. There are growing problems of a legal nature, there are problems of marine architecture, there are problems of economics. The emphasis on these problems is growing rapidly and there no doubt will be a manpower problem in the very near future in these subject matter areas. However, the social studies were not included in the symposium. Not all scientific and engineering subjects were covered. For example, fisheries oceanography has received considerable attention in other meetings and other studies.

One of the basic manpower documents in oceanography is *Scientific and Technical Personnel in Oceanography*, pamphlet No. 21 of The Interagency Committee on Oceanography of the Federal Council for Science and Technology. This pamphlet states that there were approximately 300 oceanographers at Ph.D. level or equivalent after World War II (about 1945). In 1964, this number had increased to about 630 and, according to F. G. Walton Smith, the report which is in preparation at the present time indicates that there are about a thousand such oceanographers.

A documentary coverage of the history of oceanography over the past 40 years was presented by Richard H. Fleming (University of Washington). He emphasized the inadequacy of oceanographic education in the past and urged that now ". . . consideration be given to the possibility and timeliness of establishing professional standards."

Frank Sorenson (University of Nebraska) told of similar problems in the space and air ages and suggested the formation of a foundation to encourage and support education, research, and technology in oceanography. William Nierenberg (Scripps Institution of Oceanography) compared the situation to that previously encountered in the field of nuclear physics and described plans being made in California.

Allyn Vine (Woods Hole Oceanographic Institution) and Hugh McLellan (National Science Foundation) told of the unique personal qualities which are important to an oceanographer. Clarence B. Lindquist (U.S. Office of Education) summarized available support for education.

Charles Bates (Naval Oceanographic Office) stated that the nation has consistently underestimated the number of trained individuals it needs in oceanography and described recruiting methods. Richard A. Geyer (Texas A&M University) said that 60 Ph.D.'s and 99 M.S. degrees were granted in oceanography in 1967 and that 818 graduate students were enrolled in the various universities in that year. He reported on a survey of 35 government and industry organizations which showed that 4500 oceanography graduates would be needed by these units in the next 20 years. (31% engineering, 20% physical, 14% geological and geophysical, 9% biological, and 6% each for chemical and meteorological oceanographers)

Academic programs of the various undergraduate and graduate types were described by Herbert F. Frolander (Oregon State University), T. Saunders English (University of Washington), Capt. Charles R. Stephan (Florida Atlantic University), Norris W. Rakestraw (Scripps Institution of Oceanography), and Paul M. Fye, (Woods Hole Oceanographic Institution).

Relationships between schools, communities, and industries were stressed by Donald McLean (San Diego County Schools), Cecil H. Green (Texas Instruments, Inc.), and Andreas B. Rechnitzer (North American Aviation).

In luncheon and banquet talks, Edward Wenk, Jr. (National Council on Marine Resources and Engineering Development) stressed that the 1970's will be the crucial manpower period in oceanography. John M. Drewry (House Committee on Merchant Marine and Fisheries) described the important role of Congress as a means of communication in this field. Robert B. Abel (National Science Foundation) outlined the plans of the Sea Grant Program and its relation to the manpower problem.

It became evident from the symposium that there are many different approaches to the solution of the oceanography problem, that the efforts in this direction are increasing, and that more emphasis needs to be placed upon preparing students thoroughly in the field and directing their attention to applications of oceanographic knowledge.

In a telegram addressed to the symposium, Vice President Hubert Humphrey stated, "One objective basic to all the others (in the Nation's Marine Sciences activities) is the advancement of education and training. . . . It (the Symposium) properly emphasizes that talented, well-trained scientists and engineers form the keystone of our national program in the marine sciences."

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