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THE ESTABLISHMENT OF THE DEPARTMENT OF OCEANOGRAPHY IN THE AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS

Dale F. Leipper

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of the Agricultural and Mechanical College of Texas)

The need for a central agency to teach oceanography and to undertake studies of the Gulf of Mexico has been recognized for many years. Texas herself has 600 mi of tidewater coastline. Eight of the principal rivers of the United States empty into the Gulf of Mexico across her shores, creating changing environments which affect marine life and sedimentation processes. Thirteen man-made deep-water ports between Brownsville and Orange handle a large amount of sea traffic, having moved approximately 130,000,000 tons of freight during the 12-month period ending June 30, 1949. Shipping on the intra-coastal canal extends the length of the coast. On the continental shelf along the Gulf Coast, which averages 70 mi in width, it has been estimated that crude oil recovery per square mile of area will exceed that of the oil-rich coastal land belt. A huge chemical industry along the Texas coast makes extensive use of raw materials from the sea. There is a grand total annual catch of fish and shellfish in Texas which exceeds 21,000,000 lb. Weather from the Gulf receives particular attention because of its daily importance in activities along the coast and because of disasters which have occurred, such as the Galveston flood of 1900. Because of these and other similar facts, it was only a matter of time until one of the state universities would embark upon the study and teaching of oceanography.

There are many oceanographic problems which face the local fishing industry. In addition, there are others arising in the production of the offshore oil [BATES and GLENN, 1948]; in the operation of the industrial plants along the coastline; in the forecasting of hurricanes, squalls, and fogs of marine origin; in the reduction of beach contamination; in the prevention of beach erosion; in the reduction of dredging costs in marine channels; in the development of recreational facilities on the beaches; in construction along shore and offshore; in aiding marine transportation; in providing information of value to national defense; and in unifying local oceanographic knowledge. An academic organization is needed which can offer the secure and promising positions required to attract outstanding scientists into this field and can provide facilities for the gradual accumulation and dissemination of the large body of oceanographic information.

The interest in a department of oceanography at the A. and M. College developed naturally out of an extensive marine program, at times involving the services of as many as 90 individuals, conducted largely by the staff of the College through the Texas A. and M. Research Foundation. During this program the Departments of Chemistry, Biology, and Geology, and the School of Engineering, in particular, recognized the need for the Department of Oceanography and were instrumental in its establishment in the School of Arts and Sciences.

The curriculum in oceanography, which has been approved by the Academic Council, includes courses at the senior and graduate levels only. Three types of training are available. The first is an introductory or survey course for seniors in the biological or physical sciences or in engineering. The second is a group of courses which graduate students working toward degrees in other fields may use as a minor. Finally, there is a full curriculum leading toward a graduate degree in oceanography. The basic textbook used is SVERDRUP, JOHNSON, and FLEMING [1942], but emphasis is also placed upon publications describing recent developments. A graduate student in his first semester registers for a course in each major aspect of the field. In succeeding semesters he concentrates upon research and advanced course work related to his basic field and to his chosen aspect of oceanography.

In the present semester two courses are being offered with an enrollment of 54 students. Next year the full curriculum begins.

Prerequisites for the graduate study of oceanography are a bachelor's degree or its equivalent from a recognized college or university, with a major in biology, chemistry, engineering,

geology, meteorology, mathematics, or physics. Also required are at least eight semester hours in each of mathematics, physics, and biology or chemistry.

To qualify for a graduate degree in oceanography the student must be thoroughly trained in one of the pertinent basic sciences, must know how to apply this training in the marine environment, (which requires a combination of principles and methods unique to oceanography), and must have an interest in the other marine sciences as well as at least an elementary knowledge of them.

Although the subject matter of oceanography has been divided into five major aspects, an essential feature of the program is the integration of these various parts into a unified whole within a single department. The aspects are: (1) biological oceanography, which is the study of life in the sea including both plants and animals; (2) physical oceanography, which is the physics of the sea and includes the study of ocean waves and water movements, of transformations of energy, and of the physical characteristics of sea water; (3) geological oceanography, which deals with the relationships between the land and the oceans and includes studies of beach erosion and sedimentation, determination of bottom topography, and the interpretation of marine deposits; (4) chemical oceanography, which is the study of the chemical constituents of the sea and of chemical reactions which take place within it, and which includes determinations of the amount of various constituents present, development of methods of extraction, and studies of corrosive effects; (5) marine meteorology, which deals with the winds and weather over the sea, with the manner in which winds set up ocean waves and currents, and with the climate as determined by evaporation and conduction from the sea surface.

The initial academic staff of the department has been selected with one specialist in each of these fields. J. G. Mackin is Professor of Biological Oceanography. W. Armstrong Price is Professor of Geological Oceanography. The writer is Associate Professor of Physical Oceanography and Marine Meteorology. Donald W. Hood, who is completing work for his doctor's degree in Biochemistry and Nutrition, will become Assistant Professor of Chemical Oceanography on August 1, 1950. A position is open for an additional physical oceanographer and marine meteorologist.

Work at sea will be conducted by cooperative arrangement from the Alaska, oceanographic vessel of the U. S. Fish and Wildlife Service, which is to be based in Galveston. A completely equipped shore laboratory is available through the Texas A. and M. Research Foundation at Grand Isle, Louisiana. Also, a reserve fund of $50,000 has been set aside for laboratory equipment.

One of the great advantages of the oceanographic program as set up at A. and M. College is the opportunity for close coordination of this program with the work of the other schools and departments of the college. Undergraduate students may take the survey course in oceanography as an elective and, on the basis of information gathered in this course, may plan further work as desired. Students taking oceanography as a major may also register for any of the courses offered in other departments. Thus, they may continually improve and augment their basic training. In case of the candidates for the Ph. D. degree, double majors - one major being in the basic field and one in oceanography - are encouraged.

Financial assistance is provided for worthy students. A $2000 research fellowship in chemical oceanography is sponsored by the Dow Chemical Company. A graduate assistantship paying $100 per month is available and it is expected that four half-time assistantships in physical oceanography paying $125 per month will be offered.

As has been mentioned, the oceanographic program is conducted at the graduate level. A graduate course is defined in the College catalog as one "requiring an attitude of critical analysis or of research on the part of instructors and students." Also, since only preliminary oceanographic studies have been completed in the Gulf of Mexico, further information is needed for the development of material to be used in teaching. For these reasons, research comprises a large part of the academic program. According to F. C. Bolton, President of the College, "This department should serve as a nucleus around which to develop fundamental research into the varied scientific problems of marine life and should provide a group of men with the technical training to assume the leadership both in the basic research and in its industrial application."

Through the Texas A. and M. Research Foundation, which is legally and financially independent of the College but is dedicated to its welfare, the staff and facilities of the Department of Oceanography may be made available for sponsored research when the research is of such nature that it can be conducted more efficiently through an independent corporation than through a state organization such as the College itself. The objectives of the Research Foundation are partially expressed in the following excerpt from the Articles of Incorporation:

> "The objects for which this corporation is organized are to promote educational purposes by encouraging, fostering, and conducting scientific investigations and research; by training and developing persons for the conduct of such investigations and research; and by acquiring and disseminating knowledge in relation thereto; and further, both in connection with the Agricultural and Mechanical College of Texas and independently thereof in case it is found necessary, to foster and encourage education and learning in all fields and to promote the liberal and practical education of all classes in the several pursuits and professions of life."

The Foundation is administered by a body of counselors representing equally agriculture, industry, the Texas A. and M. College System, the alumni of A. and M. College, and the public at large. Research undertaken through the Foundation may use the services of the personnel and the facilities of any or all of the departments of the College, as well as those of other institutions or organizations when needed.

For both research and teaching purposes, oceanographic problems are defined as being those marine problems requiring the use of two or more of the basic sciences for their proper solution. Marine problems and subject matter not falling into this category are referred to the appropriate basic department.

The administration of the A. and M. College of Texas feels that, by the establishment of an academic department and the encouragement of a program of teaching and research in oceanography, it will be contributing to the conservation and proper utilization of one of our greatest natural resources, the Gulf of Mexico. This should lead to an improvement in the general welfare and to the further cultural and economic development of the people of Texas and adjoining states.

References

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Department of Oceanography,
College Station, Texas

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