

ESTABLISHMENT OF A BIOLOGICAL STATION ON THE GULF OF MEXICO.

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The Gulf region has a coast line much longer than any other geographic division of the coast States. The Gulf coastal line is nearly 7,000 miles long, while the middle Atlantic States have but 5,400 miles of coast. Furthermore, the Gulf region is at the natural trading focus of a very large geographic section. The United States is divided into three great regions, namely, the Atlantic slope section, east of the Appalachian system; the Pacific slope section, west of the Rocky Mountain divide; and thirdly, the great hydrographic basin of the Mississippi. This immense basin contains two-thirds of the area of the United States. Likewise, from the standpoint of foreign trade there are three centers, namely, New York, San Francisco, and New Orleans. Hence the Gulf States are most favorably located for supplying a large part of the the country with marine products.

Again, nature has, for the most part, given the Gulf region a united river system, thus giving the great Mississippi basin a fauna and flora intimately and peculiarly connected with the life of the Gulf region. This great basin offers opportunities not found elsewhere for a study of life under different climatic conditions. Hence the establishment of a biologic station on the Gulf of Mexico is not simply of interest to the Gulf section, but to the Upper Mississippi basin is of more direct value than a station on either the Atlantic or Pacific coast.

Our natural-history resources are proportionally greater, considering the fact that less attention has been given them, than any other section of our country. The Gulf section is supplied with an abundance of marine and fresh-water products, including the oyster, fish, reptiles, sponges, crustaceans, and others. Among invertebrates the oyster ranks first in commercial importance. It is extremely abundant throughout the entire Gulf section, and constitutes the most prominent fishery product. In 1890 Louisiana ranked fourth in the list of States in the quantity of oysters gathered from public reefs, surpassing all the other States excepting Maryland, Virginia, and New Jersey. Louisiana, Florida, Alabama, Mississippi, and Texas each have undeveloped oyster interests. Among crustaceans the shrimp is taken on the coast of Louisiana, Texas, and Mississippi. Crabs of various species are abundant. Several species of crawfish exist in the waters of the Gulf region, becoming very abundant in Louisiana rice fields, where they are sometimes collected and marketed.

The economic value of the reptiles inhabiting the Gulf section is greater than in any other section. They occur in both fresh and salt water. The crocodile is found in Florida, while the alligator occurs in every State of the Gulf coast. Turtle farming is carried on in Mississippi, and is being developed in other States, most notably in Louisiana.

The fishes of the Gulf section are abundant, their great abundance possibly being the cause of the delay in their more scientific propagation. Thus it will be seen that the Gulf section, both from a geographic standpoint and the standpoint of its fauna and flora, is at the natural focus of at least two-thirds of the territory of the United States.

But these are not the only reasons why the Gulf section should favor the study of the biologic sciences. The great problems of the preservation of public health; the prevention of the spread of infectious diseases among both lower animals and man, are in themselves demanding most serious consideration. The scientific study of horticulture and agriculture, recognized in all countries as important, is still more necessary in the Gulf section, where all forms of life are more abundant and difficult to control. Other countries are trying to solve the mysteries of malaria, yellow fever, cholera, and other diseases, and why should not we at least do our part? No country on the face of the globe has greater cause for encouraging scientific investigation and progress. Thousands of other problems of equal importance remain to be solved by careful, painstaking investigation.

The great need of the biologic interests of the Gulf section is a well-directed Gulf laboratory liberally supported. Marine biological laboratories have distinct purposes of their own. Unlike many of the summer schools, they are not designed to give many brief courses, from which students can obtain merely a smattering of a large number of subjects. The biological school confines itself to the pursuit of one branch only, is designed to give thorough work in this line, and the work in these laboratories must not be confused with that of many of the summer institutes. A summer biological laboratory must almost of necessity be placed upon the seashore. The ocean is the great home of life. Some large groups of animals are absolutely confined to the ocean, and others are almost wholly so. Marine life, too, furnishes the biologist with most of the interesting and important problems whose solution is solving questions of wide interest.

So well understood is it that the ocean is the great source of life that it is beginning to be felt that no biologist is to-day thoroughly equipped until after he has had the opportunity of spending more or less time in work with living specimens at the seashore. The marine laboratory has about the same relation to biological work in the schools that the ordinary laboratory has to the text-book. We no longer regard text-book knowledge as sufficient for a satisfactory equipment in scientific lines, and it is beginning to be felt with equal force that no biologist is properly trained until practical seashore work has familiarized him with the great ocean and its inhabitants. Students in our schools taking their courses away from the shore can, of course, gain a certain practical knowledge, but a knowledge that ought to be completed by the study of the living specimens in their native haunts. Many departments of zoology indeed can hardly be studied except at the seashore. Embryology and comparative physiology are hardly possible except where living, growing specimens are at hand, and certain types of life can not be satisfactorily studied except alive. The teacher in our public schools is learning that to teach zoology or any branch of biology requires not only text-book knowledge, together with laboratory instruction, but requires actual contact with life as it exists in the ocean. Summer seashore work is fast becoming a necessity for the science teacher who wishes to take high rank.

To the college professor also a marine laboratory offers its own special advantages. He who tries to keep himself in the front ranks among our teachers knows

that he can only do this by carrying on research in some chosen line. Along biological lines it is the ocean that contains the great problems for solution, and there the college professor comes, therefore, to obtain his material and to carry on those researches which he knows are the means of keeping himself abreast with the advanced students of his day. The ocean, indeed, is the great source of supply for most departments of biological work. Hence it is that summer biological schools locate themselves at the seashore and aim at work of the very highest character.

A marine laboratory supplements the college or university, and through these the lower schools. It is here that the student meets representative investigators and fellow-workers. Here he finds out technical methods and carries on quietly investigations which could not be made elsewhere. In every country the marine laboratory has become a need to the student and a guide to scientific economic work.

The entire coast line of Europe has become dotted with biologic stations established by societies, private individuals, or governments, or by the combined efforts of these organizations. As early as 1891 France had at least eight biological stations; Great Britain, five; Austria, Holland, and Sweden, two each; Belgium, Germany, Italy, Japan, and New South Wales, one each. In the main each of these laboratories is liberally supported and supplied with buildings and other equipments. The biological laboratory at Naples has cost in plant alone over \$100,000, and is carried on at an annual expense of at least \$20,000. The laboratory and fittings of the English station at Plymouth were completed at a cost of over \$60,000, raised by subscription. These facts alone are sufficient to attest the efficiency and popularity of these stations in Europe.

Of late years biologists have established marine stations at Woods Hole and Cold Spring Harbor on the Atlantic coast, while Leland Stanford Junior University has a station on the Pacific. In the interior stations have been established by the University of Illinois and Monmouth College, Illinois, and the University of Indiana. Other schools, as well as legislatures and private individuals, have made appropriations for natural-history explorations and discoveries. But so far the entire Gulf section, with its immense geographic and biologic interests, has not a single Gulf station. Shall we longer delay this matter? Are not our interests sufficient to induce this Congress to take steps toward encouraging the establishment of such a station?

A Gulf biological station should supplement the school work being done through the school year, more particularly our State schools and higher schools. Here all these schools may combine equipment and biologic faculties, and otherwise materially aid each other. One of the objects, though not the prime object, of a Gulf biological laboratory should be to give instruction to teachers of the biologic sciences. Throughout the Gulf section, teachers possessing more thorough and more modern training in the sciences are needed. In addition to more advanced work, courses should be given in elementary zoology and botany. These courses should be designed both for the teachers whose knowledge of elementary biology is somewhat slight and for students of higher institutions who may desire to supplement a college biological course with a practical study of marine forms. Each of these courses should be arranged so as to provide the fundamental training needed for a teacher or for independent work of investigation. Hence emphasis should always be placed upon practical work rather than upon class work. A biological laboratory might add much to its usefulness by creating a department of supply. Colleges and high schools are constantly demand-

ing more material for class work, while the lower grades of the primary schools are using natural-history specimens for nature studies. The demand for such specimens has been growing, but such material is costly. The price of this material should be made low in order to stimulate more practical work in our schools. The great good already accomplished by the United States Fish Commission through the Smithsonian Institution is an excellent illustration of what may be done in this direction.

It is customary in connection with these stations to arrange for courses of semi-popular lectures. These lectures are authentic résumés of the most recent investigations, and when published do much toward educating the masses and directing public opinion in proper channels. They create a healthy public feeling in reference to the function of scientific work and the utility of original investigation.

All of the arguments so far advanced are important, but the highest and greatest benefit to be derived from a station must come from its original contributions to our knowledge of biology. The distinctive features of such a station must be its capability for carrying on independent investigation. Private rooms for research should be provided and every facility for research supplied. The station should be a place where investigations are made by people who come together for experiment and mutual assistance. Its work should be of such a character and should attain a reputation such that persons contemplating economic work of a biologic nature will unhesitatingly trust the results of its investigators.

The work of a Gulf biological station should be carried on in connection with similar work of the U. S. Fish Commission. This Commission has for some time had under contemplation the establishment of a laboratory on the Gulf coast, and this Congress, in our opinion, should in every way further this movement. The establishment of a biological station in connection with the laboratory and Fish Commission would offer an especially desirable place for public-school teachers interested in scientific topics; would draw college students desiring to supplement a college course with practical work; attract medical students who feel the necessity of a knowledge of biological subjects in connection with their work; would serve as a distributing point for schools wanting marine forms; furnish college and university men chances to meet and compare notes; would immensely increase the development of all our economic interests, and lastly, would crown all of these advantages by stimulating that highest of all labors—the capable, painstaking, original investigation.

RUSTON, LOUISIANA.