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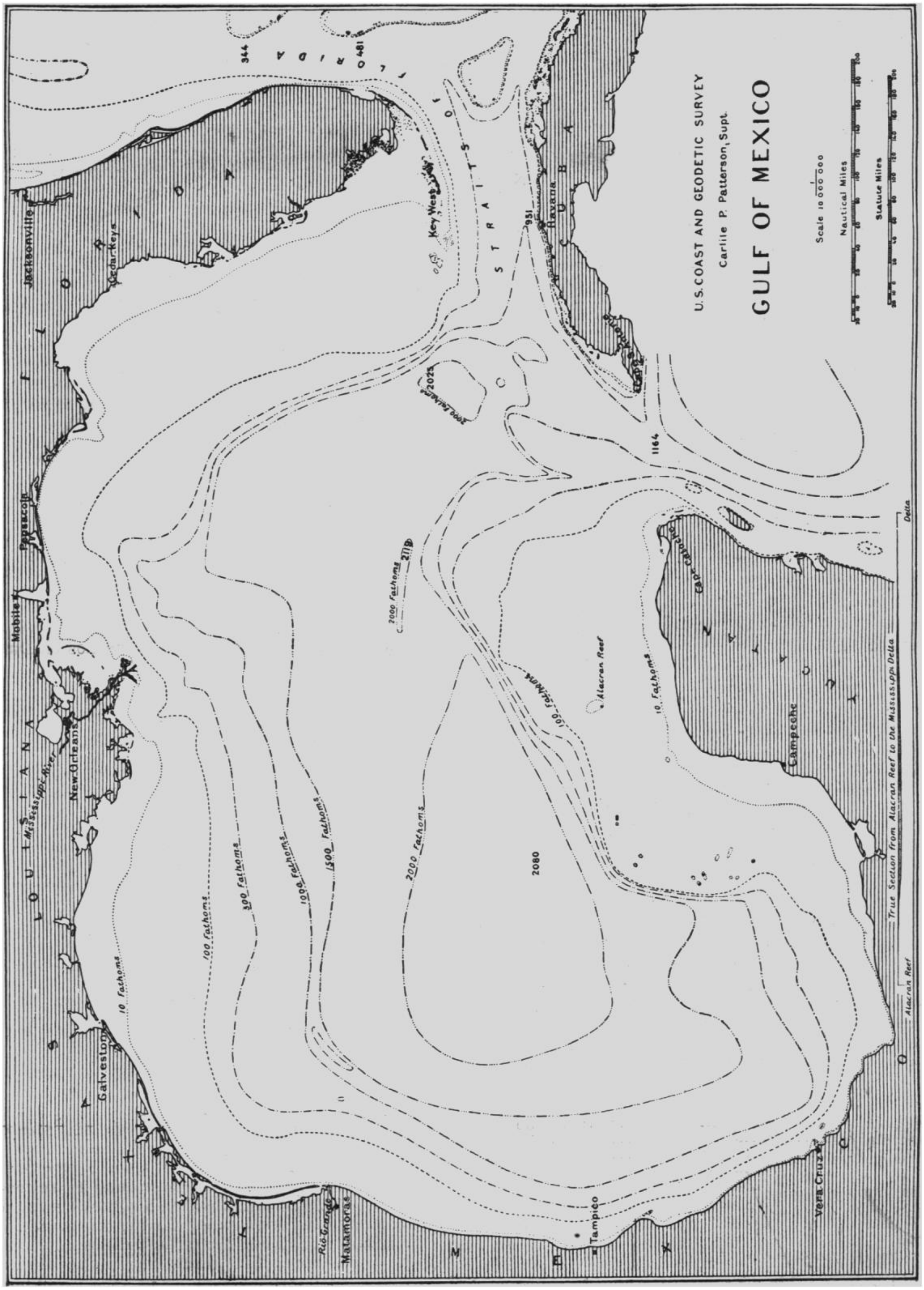
THE BASIN OF THE GULF OF MEXICO.

BY J. E. HILGARD, M. N. A. S.

A COMMUNICATION TO THE NATIONAL ACADEMY OF SCIENCES MADE NOV. 18, 1880, BY AUTHORITY OF C. P. PATTERSON, SUPT. U. S COAST AND GEODETIC SURVEY.

At the meeting of the National Academy of Sciences in New York, Nov. 18th, 1880, Mr. J. E. Hilgard presented, on the part of Hon. C. P. Patterson, Superintendent of the U. S. Coast and Geodetic Survey, a model of the Gulf of Mexico constructed from numerous soundings taken in the progress of that work. The accompanying plate is a reduced plan of the model, the full size of which is 24×32 inches, being on a horizontal scale of 1 : 2,400,000, and on a vertical scale of 1 inch : 1000 fathoms; making the proportion of horizontal to vertical scales 1 : 33. The plan shows the horizontal curves of every 500 fathoms of depth, as well as the curves of 100 and 10 fathoms. The same curves are delineated on the model, the forms of which, however, are shaped in conformity with all the detail obtained from the soundings, those inside of 100 fathoms being quite numerous, varying according to the configuration and importance of the locality, while beyond the 100 fathom line, where the work pertains rather to physical geography than to navi-


U.S. COAST AND GEODETIC SURVEY
Carlile P. Patterson, Supt.
GULF OF MEXICO
Nautical Miles
Statute Miles
STRAITS OF FLORIDA
CUBA
Havana
Key West
Jacksonville
Cedar Keys
Pensacola
Mobile
New Orleans
Mississippi River
LOUISIANA
Galveston
TEXAS
Rio Grande
Matamoras
Tampico
Vera Cruz
Campeche
YUCATAN
Alacran Reef
10 fathoms
100 fathoms
300 fathoms
1000 fathoms
1500 fathoms
2000 fathoms
2080
2119
2023
1164
951
344
481
True Section from Alacran Reef to the Mississippi Delta
Alacran Reef
Delta

gation, 1055 soundings were obtained, of which 355 are in depths greater than 1000 fathoms.

The object of the communication being merely to give a general description of the structural features of the basin of this great inland sea—the American Mediterranean—it is only necessary to mention here, that in connection with the soundings, temperatures were taken at various depths, and the organic life was explored by means of dredges. Everywhere below the depth of about 800 fathoms, the temperature was found to be between 39° and 40° F. The method of sounding was by the use of fine steel wire, indicated by Sir Wm. Thomson, with the mechanical appliances perfected by Commanders Belknap and Sigsbee of the U. S. Navy.

The exploration of the Gulf of Mexico was begun by the U. S. Coast Survey as long ago as 1846, when surveys of the shores were made, and soundings of the approaches were obtained under the Superintendency of Prof. A. D. Bache. These investigations continued until the outbreak of the civil war, Prof. Bache having in view from the earliest date of his work, the exploration of the Gulf Stream and its attendant phenomena, in addition to the surveys requisite for navigation. When after the close of the war the Coast Survey resumed its former activity, under the administration of Prof. Benjamin Peirce, the physical and biological investigations were continued; but it was not until the present Superintendent of the U. S. Coast Survey, (C. P. Patterson, LL.D.) organized a systematic Exploration of the whole Gulf, that its character became rightly understood. These explorations, begun in 1872 by Commander Howell, U. S. N., on the west coast of Florida in comparatively shallow water, were continued and brought to a successful conclusion by Commander Sigsbee, U. S. N., (1875-78) in the steamer "Blake," accompanied by Prof. A. Agassiz in charge of biological investigations. The methods of obtaining temperatures at great depths as well as of dredging have been described in the Coast Survey Reports for several years past, and more especially in a treatise by Commander Sigsbee recently published by the Coast Survey.

Turning now to our model or map, we perceive that the basin of the Gulf of Mexico is an oval connected with the general ocean-circulation by two outlets, the Yucatan Channel and the Florida Straits. The area of the entire Gulf, cutting it off by a line from Cape Florida to Havana, is 595,000 square miles. Supposing the depth of the Gulf to be reduced by 100 fathoms, a surface would be laid bare amounting to 208,000 square miles, or rather more than one third of the whole area, The distance of the 100 fathom line from the coast is about 6 miles, near Cape Florida; 120 miles along the west coast of Florida; at the South Pass of the Mississippi, it is only 10 miles; opposite the Louisiana and Texas boundary, it increases to 130 miles; at Vera Cruz it is 15 miles, and the Yucatan banks have about the same width as the Florida banks.

The following table shows the area covered by the trough of the Gulf of Mexico to the depths stated:

Depth.	Area.	Differences.
2,000 fathoms.....	55,000 square miles.....	
1,500 "	187,000 "	132,000
1,000 "	260,000 "	73,000
500 "	326,000 "	66,000
100 "	387,000 "	61,000
Coast line.....	595,000 "	208,000

This table shows that the greatest slopes occur between the depths of 100 and 1500 fathoms. The maximum depth reached is at the foot of the Yucatan banks 2119 fathoms. From the 1500 fathom line on the northern side of the Gulf to the deepest water close to the Yucatan banks, say to the depth of 2000 fathoms, is a distance of 200 miles, which gives a slope of five-ninths to 200, and may be considered practically as a plane surface. The 2000 fathom area has received the name of "Sigsbee Deep," after its explorer. The Yucatan Channel with a depth of 1164 fathoms has a cross-section of 110 square miles while the Straits of Florida, in its shallowest part opposite Jubiter Inlet, with a depth of 344 fathoms has a cross-section of only 10 square miles.

A view of the model reveals at once some important facts which a study of the plan conveys but imperfectly to the mind, and which were unsuspected before the great exploration of the Gulf was completed.

Among the more striking features displayed by the model to which Mr. Hilgard called attention, were:

1. The great distance to which the general slope of the continent extends below the present sea level before steeper slopes are reached. The 100 fathom line represents very closely the general continental line. The *massifs* of the Peninsulas of Florida and Yucatan have more than twice their present apparent width.

2. Very steep slopes lead from this submerged continental plateau to an area as great as that of the State of Georgia at the enormous depth of over 12,000 feet. There are three ranges on the Florida and Yucatan slopes extending in the aggregate from five to six hundred miles, along which the descent from 500 to 1500 fathoms (or 6000 feet), is within a breadth of from six to fifteen miles. No such slopes and correspondingly elevated plateaus appear to occur on the un-submerged surface of the earth—the suggestion presents itself, that while the latter have suffered atmospheric erosion, those which we are considering have not sensibly changed from the positions assumed in the mechanical shaping of the earth's crust.

3. The far protrusion of the Mississipi Delta towards the deep water of the Gulf, seems to give evidence to the Engineer, of the probably permanent success of the Mississippi Jetties, as delivering the silt of the river into water of so great depth that but few extensions will ever become necessary. In connection with the same feature, the strong indentation to the westward of the present mouths of the Mississippi, indicating the probable site of the original fracture between the two slopes of the Mississipi Valley deserves attention.

4. In regard to the problem of general ocean circulation in connection with the Gulf Stream, the most important feature is the shallowness and small cross-section of the Straits of Florida between the Peninsular and Bahama banks, having at the shallowest part a cross-section of 11 square miles, with a greatest depth of 344 fathoms only. From observations published in the Coast Survey Reports the average northwardly current of the warm water through this Strait is probably not greater than 2 miles per hour—certainly not more than 2½ miles. It is evident, at once, that the warm water which so greatly modifies the climate of Western Europe, cannot all be supplied by the flow through this small channel. The concentration of the warm surface current from the Gulf of Mexico gives to this vein of the general circulation a marked velocity, which is not found in other portions of the Atlantic, and which, being perceptible to the navigator, has given its name of "Gulf Stream" to the whole system of the northeasterly surface-flow in the Atlantic Ocean. It is now necessary to assume that the so-called Gulf Stream is largely reinforced by a general northerly current from the outside of the West India Islands.

SCIENTIFIC SOCIETIES OF WASHINGTON.

THE BIOLOGICAL SOCIETY.—The Society met in the Smithsonian Institution, Friday evening, March 11th, President Gill in the Chair. The discussion was renewed upon Mr. True's paper respecting suctorial organs. Mr. Seaman spoke of certain plants, such as the American Woodbine, which seem to mimic the suctorial organs of animals. Professor Riley drew attention to the suctorial anal pseudopod of caterpillars, and Mr. Goode to the peculiar provision for prehension in