end. When frenzied physiologists or chemists announce the solution of all mysteries of life and mind and soul in the motions of atoms or electrons I have sometimes proclaimed myself an "apostle of mystery" —not in the sense of the mystic who cherishes mystery and resists attempts at a scientific explanation of such phenomena, but rather in the spirit of one who recognizes that nature is infinite and that our science explores only the shores of the great ocean of truth.

In these days devout scientists do not generally proclaim their devoutness as they did a generation ago. Probably few if any modern laboratories exhibit the motto which Agassiz placed on the wall of his laboratory at Penikese: "The laboratory is to me a sanctuary. I would have nothing done in it unworthy of the Great Author." But in reverence for and devotion to truth, in admiration of the order and beauty and mystery of nature, modern laboratories are no less sanctuaries than those of any preceding age.

I often think of the fine faith of the founders of most of our colleges and universities—faith that the development of science and learning would serve only to confirm their religious creeds—and I wonder what they would think if they could revisit these institutions to-day. No doubt many of them would be shocked if they could know of the tremendous changes which science has wrought in those creeds. But for all those who seek truth above all things there is no cause for alarm. Truth is greater than creed or dogma, and the motto of science is the saying of Christ: "Ye shall know the truth and the truth shall make you free."

In closing I wish to congratulate the students and staff of the department of biology, and the trustees, the faculty, the alumni and friends of Wesleyan University upon the completion and endowment of the new Shanklin Biological Laboratory. May it through all the years to come be a center of teaching and research; may it contribute to the material welfare of men; most of all may it be a source of intellectual enlightenment and spiritual freedom, thus demonstrating the intimate relation between biology and human life!

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EXPEDITION OF U. S. COAST GUARD CUTTER MARION TO THE REGION OF DAVIS STRAIT IN 1928

THE Coast Guard cutter *Marion* returned to New London, Conn., September 28, 1928, after having spent ten weeks at sea investigating the physical character of the water masses between North America and Greenland, from St. Johns, Newfoundland, northward to the 70th parallel of latitude off Disko Island, Greenland.

The main object of the expedition was to learn the whole story regarding the wanderings of the icebergs from the time they break off the Greenland ice cap until they finally melt 1,800 miles southward in the warm waters of the North Atlantic. The direction and velocity of the ocean currents have been mapped by the *Marion* expedition according to the so-called Bjerknes' methods of dynamic hydrography. The fundamental values necessary for substitution in Bjerknes' formulae are those of temperature and salinity of water from frequent depths, surface to bottom, and similar data from such stations scattered net-like over the ocean area as it is desired to include. The resulting maps show the contour in dynamic meters of the chosen decibar surface relative to that of a deep decibar plane, which is the one usually employed as a bench mark. For practical purposes the contour lines connecting equal dynamic values will be stream lines of the water current in a similar fashion as the direction of the wind tends to parallel the direction of the isobars on an ordinary weather map.

Here is a case where physical oceanography is employed to solve an economic problem of practical importance. Icebergs form a distinct menace as evidenced by the *Titanic* disaster of 1912. The U. S. Coast Guard is the bureau under our government which has been charged with the responsibility of maintaining a patrol of the ice regions every spring for the protection of transatlantic shipping. Although the United States actually carries out the work, our country is, nevertheless, reimbursed by about fourteen maritime nations, thus giving this humanitarian work a true international character.

The International Ice Patrol ships (two Coast Guard cutters) have since 1921 been carrying out a systematic program of scientific investigation mostly centered on physical oceanography. The field of observation has been confined to the waters around the Grand Banks, especially where the Labrador current discharges its freight of ice into the easterly moving masses of the Gulf Stream. In the summer of 1914 the Coast Guard attempted to send a research vessel, the *Seneca,* northward of Newfoundland, but unusually bad ice conditions that year caused the cruise to be abandoned. It has remained until this summer for the Coast Guard to undertake a major exploration northward into the region between Greenland and North America—practically unknown waters. The *Marion's* survey, therefore, covering the ocean from the iceberg-producing glaciers to the Grand Banks constructs an uninterrupted story of the life history of the iceberg.

The *Marion* cruised a total of 8,100 miles, or the distance from New York to Sydney, Australia, from July 7 to September 18. The vessel was stopped at 191 stations where over 2,000 serial sub-surface observations were made with the oceanographic instruments. A fathometer, for recording the depths by means of submarine echo, took over 2,500 measurements, thus developing a detailed bathymetrical map of a region where formerly areas of 50,000 square miles contained not a sounding.

The *Marion* expedition marks a departure from former oceanographic voyages in that 2,000 odd samples of sea-water taken from the depths were tested for salinity immediately on board instead of conducting such tests months afterwards in a laboratory on shore. The salinity-testing machine measures the dissolved chemical salts in the water in grams per thousand by means of the electrical conductivity of the water itself.

For those unfamiliar with the waters investigated, it may be said that the *Marion* expedition covered a region as extensive as that from Cape Cod to Key West and having a mean width off shore of 500 miles. The amount of physical data collected exceeds that of any recent oceanographic work with the exception of the three-year German *Meteor* expedition in the South Atlantic. In fact, the frequency of stations and the location of the observation points at right angles to general trend of the circulation are the main features of the *Marion's* work.

Although it is early as yet to state definite and final results, there are certain outstanding features which are of much interest.

(a) A surface layer of water 100 meters thick, covering most of the oceanic basin between Labrador and Greenland, was found to be about five degrees Centigrade warmer than normal. This represents an additional heat reservoir of tremendous proportions and one that is bound to have far-reaching climatic effects. The presence of this mass lends support to the assertion of many that the Arctic climate has undergone recent temporary amelioration.

(b) The bottom water found in the trough between Greenland and North America had a temperature of 2.6° C. and a salinity of 34.90. The observations show that this water was not produced on the surface, either as a result of winter cooling as suggested by Nansen, or by melting ice as claimed by Pettersson. The observations indicate, on the contrary, that the bottom water even in this extreme northwestern corner of the North Atlantic has its source as a slow creep from the Antarctic.

(c) The depth survey reveals the west Greenland half as much narrower and its slope a smuch steeper than shown on the present-day maps. The Labrador shelf is reliefed by a depression about forty miles out which extends as a trough along the entire coastal length.

(d) Three headlands in southern Baffin Land were accurately located by the *Marion,* showing discrepancies between present charts of as much as 20 miles.

(e) Arctic waters were unusually open this summer. There were about a thousand icebergs counted in Disko Bay near the glaciers; about two hundred bergs on the Labrador coast near Cape Harrison, but other places than these were featured by a remarkable absence of icebergs. The Arctic pack during August was shrunk to an outer edge thirty miles off Cape Dier, Baffin Land, and no field extended south of Cumberland Sound. Cape Farewell was sighted on September 1 but here there was not a piece of ice in the famous East Greenland current.

The scientific report of the *Marion* expedition will be published some time within the next year by the U. S. Coast Guard as one of its series of Ice Patrol Bulletins.

EDWARD H. SMITH,
Lieutenant-Commander U. S. Coast Guard
Commander Marion Expedition

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

GRANTS FOR RESEARCH IN 1929

THE American Association Grants are not unfamiliar to most of its members. Yet, if, each year, the opportunities and conditions relative to these grants are brought to the attention of investigators needing aid in their respective fields, experience indicates that a good end is being served.

The sum available each year is derived from the income from endowment and varies somewhat. Last year it was $3,000 and it is reasonable to expect that a sum approximating this will be available next January. Out of this, allotments are to be made to individuals who make application before December 1. The amounts are necessarily small. They have rarely exceeded $500 and usually they have been considerably smaller. It is expected that the work contemplated, which may be partly finished or about to be begun, would not be possible without financial aid such as this. Grants are usually for apparatus, for assistance or for necessary travel; they are seldom for publication.

Applications for grants should be addressed to the permanent secretary of the association, at the Washington office. From him may be obtained special