search program of both the museum and the university in the Pacific Ocean region. The museum was founded in 1889 and is devoted to the study of anthropology and natural history of the Pacific Islands, comprising some 25,000 scattered over an area equal to about one fourth of the earth's surface. Under the terms of affiliation the director of the museum is a member of the Yale faculty, and the university provides annual fellowships, available to advanced students for research in this region. In addition the museum sends to Yale a visiting lecturer to give instruction and direct research in the problems of the Pacific area. Dr. Edward S. C. Handy is this year's visiting lecturer.

Dr. Gregory, who has been a member of the faculty of the university since 1896 when he received the B.A. degree, was appointed Silliman professor of geology in 1904. In 1919 he went to Hawaii to assist in formulating plans for the development of scientific work in the museum, was made director in 1920, and has since spent the greater part of his time in Hawaii. He has been an associate editor of the *American Journal of Science,* and is a fellow of the Geological Society of America, the Association of American Geographers, of which he was president in 1920, and the American Academy of Arts and Sciences.

At different times he has spent the summer working for the U. S. Geological Survey in various parts of this country. He devoted several summers to improving the living conditions of the Navaho and Hopi Indians in the desert regions of Arizona and Utah. In 1923 he organized and directed the Pacific Science Congress which met in Australia.

Under his directorship, many expeditions have gone out to remote islands and have collected hitherto unknown materials in the field of ethnology. The first was the Dominick Expedition, made possible through the generosity of Bayard Dominick, '94, which spent two years in the field with a view to ascertaining the origin of the Polynesian race. Later, through a cooperative arrangement with the American Museum of Natural History, the Bishop Museum participated in the Whitney South Seas Expedition.

A major project planned by Dr. Gregory was the Mangarevan Expedition, which explored the eastern border of Polynesia. This expedition completed the reconnaissance survey of the ethnology and natural history of this area, which has been the chief interest of the museum since he became director.

AWARD OF THE CHANDLER MEDAL TO PROFESSOR GIAUQUE

THE Chandler Medal of Columbia University for 1935 has been awarded to Dr. William Francis Giauque, professor of chemistry at the University of California, for his work in thermochemistry. The medal was instituted in 1910 by friends of the late Charles Frederick Chandler, pioneer in industrial chemistry, a founder of the American Chemical Society and professor at Columbia University for more than half a century. The award was established with a gift which constitutes the Chandler Foundation. Previous medalists include Irving Langmuir, James Bryant Conant, George O. Curme, Jr., Leo H. Baekeland, W. F. Hillebrand, W. R. Whitney, R. E. Swain, E. F. Smith, E. C. Kendall, S. W. Parr, Moses Gomberg and J. A. Wilson.

The announcement of the Medal Committee, of which Professor Arthur W. Thomas, of Columbia University, is chairman, reads:

Professor Giauque, in collaboration with Professor H. L. Johnson, of the Ohio State University, reported, in 1929, their discovery of the new isotopes of oxygen having masses of 17 and 18, respectively. Up to that time it was supposed that the lighter elements such as oxygen, nitrogen and carbon consisted of single varieties. The only isotope of oxygen then known had a mass of 16.

Following their research it was discovered that nitrogen had more than one isotope, and then that carbon had more than one. Due to the fact that oxygen is the standard for atomic weights, it became evident that the atomic weight of hydrogen was not correct.

Prediction of an isotope of "heavy hydrogen" having a mass of 2 was made by Birge and Menzel on the basis of Professor Giauque's work, but evidence was lacking. This prediction led Professor Urey, Dr. F. G. Brickwedde and Dr. George M. Murphy to look for the new isotope, resulting in the discovery for which Professor Urey received the Nobel Prize in 1934.

Professor Giauque has made many significant contributions to experimental methods in thermodynamics. His most extensive investigations have consisted in the extremely accurate determination, from 0.24 degrees absolute, to room temperature, about 300 degrees absolute or 27 degrees centigrade, of the specific heats and heats of transition of hydrogen chloride, hydrogen bromide, hydrogen iodide, oxygen, nitric oxide and hydrogen. From these determinations he has calculated the entropy, or amount of heat energy not available in reactions, of each of these gases. Entropy values are of particular importance to the chemist because with them he can determine the maximum energy to be secured from a given reaction.

Professor Giauque has measured the heat, or energy capacity of each gas from the lowest temperature obtainable all the way up to room temperature. He has also been the first to calculate from spectroscopic data for the same gases entropy values which are even more accurate than those based on the measurements of specific heats.

By Professor Giauque's method of obtaining low temperatures through the use of a magnetic engine, a temperature of a few thousandths of a degree absolute can be reached, while the lowest reached by other methods

was 0.7 degrees absolute. While thermodynamic theory, to which Professor Giauque has contributed extensively, indicates that it is impossible to reach absolute zero, Professor Giauque's method has enabled scientists to come closer to it. These low temperature data are of great significance in supplying data for the calculation of chemical equilibria.

Professor Giauque also demonstrated the predicted existence of the ortho and para forms of hydrogen by finding a change in the melting points of hydrogen, after standing for a long time in the form of liquid hydrogen. This research deals with the rotational energy levels of hydrogen and indicates that hydrogen in different rotational states can be partially separated and has different properties.

In 1929 Professor Giauque shared with Professor H. L. Johnson the prize of the Pacific Division of the American Association for the Advancement of Science for the most important scientific contribution reported by a resident of the Pacific Division for their discovery of the two new isotopes of oxygen announced at the meeting.

GRANTS OF THE GEOLOGICAL SOCIETY OF AMERICA

RECENT grants made by the Geological Society of America in furtherance of research are as follows:

$450, to George W. Bain, Amherst, Mass., field expenses connected with the measurement of the strains of recently exposed quarry floors.

$165, to G. O. Raasch, Madison, Wis., office and field expenses connected with completion of manuscript on Cambrian Merostomata of the Upper Mississippi Valley.

$400, to William F. Jones, Nantucket, Mass., field and office expenses in completing an investigation into the post-Glacial coastal evolution of the southeastern New England province from Boston to Narragansett Bay.

$3,500, to a committee headed by T. S. Lovering, Ann Arbor, Mich., investigation of the physical chemistry of the two-component volatile system, carbon dioxide and water, under varying pressures in equilibrium with a silicate melt at a constant temperature of 1000°.

$975, to Eleanora B. Knopf, New Haven, Conn., field and laboratory expenses connected with an intensive study of structure, stratigraphy and metamorphic geology of the Clove-Millbrook quadrangles, New York and Connecticut, by the methods of structural petrology (petrofabrics).

$900, to Horace G. Richards, Trenton, N. J., field and laboratory expenses connected with a study of marine Pleistocene deposits of the Gulf Coastal Plain from Alabama to Texas and correlation with the loess deposits of the lower Mississippi Valley.

$300, to Lloyd W. Fisher, Lewiston, Me., laboratory expenses of study of certain problems of the Lewiston quadrangle.

$2,500, to Alfred C. Lane, Cambridge, Mass., chemical analyses covering studies of the age of rocks by the helium method.

$450, to B. L. Miller and Maurice D. Ewing, Bethlehem, Pa., additional grant to cover field expenses, equipment, assistance and supplies connected with seismic work on the eastern Continental Shelf.

$1,475, to G. H. Anderson and J. H. Maxon, Pasadena, Calif., field and laboratory expenses connected with study of the structure and petrology of the Northern Inyo Range, California and Nevada.

$500, to Harrison Schmitt, Hanover, N. Mex., laboratory expenses connected with study of the geology of the central mining district, Hanover, N. Mex.

$975, to A. C. Waters, Stanford University, Calif., field and office expenses connected with study of plutonic and metamorphic rocks in the Chelan and Okanogan regions of central Washington.

$1,000, to Herman Schlundt, Columbia, Mo., field expenses of investigations of radioactivity of spring deposits and spring waters in some of the national parks.

$600, to Francis P. Shepard, Urbana, Ill., field and office expenses connected with the compilation of a map of submarine topography of the Continental Shelf and slope off the California coast.

$200, to Bohumil Shimek, Iowa City, Ia., office expenses connected with the preparation of a manuscript on the fauna of the Mississippi Valley loess and its significance as an indicator of conditions during deposition of the loess.

$800, to G. A. Cooper, Washington, D. C., photographic expenses connected with monograph of the Chazyan brachiopods of North America, by E. O. Ulrich and G. A. Cooper.

$300, to Guy Campbell, New Albany, Ind., field and office expenses connected with study of the New Albany and related black shales of Indiana and Kentucky.

$1,500, to Frank F. Grout, Minneapolis, Minn., to guarantee part of the expenses for a petrographic-chemical laboratory at the University of Minnesota.

$810, to H. B. Washburn, Jr., Cambridge, Mass., traveling and field expenses connected with study of movement of glacier ice (South Crillon Glacier, Alaska).

$209, to Alonzo Quinn, Providence, R. I., covering analyses of igneous rocks from Red Hill, New Hampshire.

$250, to Charles H. Behre, Jr., Evanston, Ill., additional grant to cover traveling, field and laboratory expenses, examination of the geologic setting of the great depression of the South Park, Colorado.

$2,500, to the Board of Trustees of *Biological Abstracts*, Philadelphia, Pa., editorial expenses work on paleontology.

$1,740, to T. Wayland Vaughan, La Jolla, Calif., assistance, traveling and office expenses, connected with completion of a revision of the madreporarian Hexacoralla.

$1,200, to Robert T. Hill, Dallas, Tex., additional grant, covering expenses connected with history of geologic investigation in the Southwest.

$450, to Frank D. Adams and F. F. Osborne, chemical