

SUNKEN WRACK AND OOZE

Robert K. Edgar

Imaginations used to take us where our senses could not go.

Lord, Lord! methought what pain it was to drown:
What dreadful noise of water in mine ears!
What sights of ugly death within mine eyes!
Methought I saw a thousand fearful wracks;
A thousand men that fishes gnaw'd upon;
Wedges of gold, great anchors, heaps of pearl,
Inestimable stone, unvalu'd jewels,
All scattered in the bottom of the sea.
Some lay in dead men's skulls; and in those holes
Where eyes did once inhabit, there were crept,
As 'twere in scorn of eyes, reflecting gems,
That woo'd the slimy bottom of the deep,
And mock'd the dead bones that lay scattered by.

... Richard III

The Bard's mind's eye could see the deep.

And make your chronicle as rich with praise
As is the owse and bottom of the sea
With sunken wrack and sumless treasures.

... Henry V

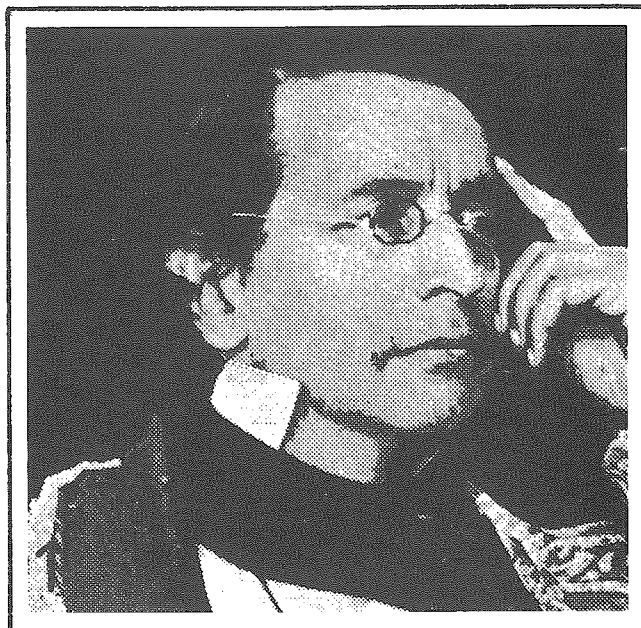
But the recent rediscovery of the Titanic has largely closed our mind's eye to the bottom of the sea, and for many of us it has flooded our senses. Now, for the first time, the deep is an object before it is an image. Yet, ironically, much of what we see has been imagined before.

The Titanic's treasures have been exhumed and tantalizingly displayed.

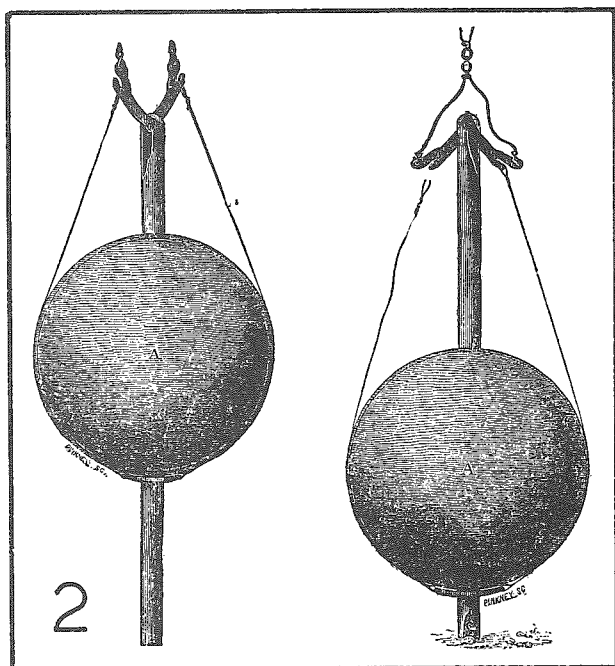
High technology, the depths of the sea, the artifacts of the wealthy - in an age of media shows, a marvelous show indeed! To be sure the technological feats are impressive. But what is the point of all this show? A few dusty trinkets? Is it really news? Or is it simply a clever alchemy that turns coffins into coffers?

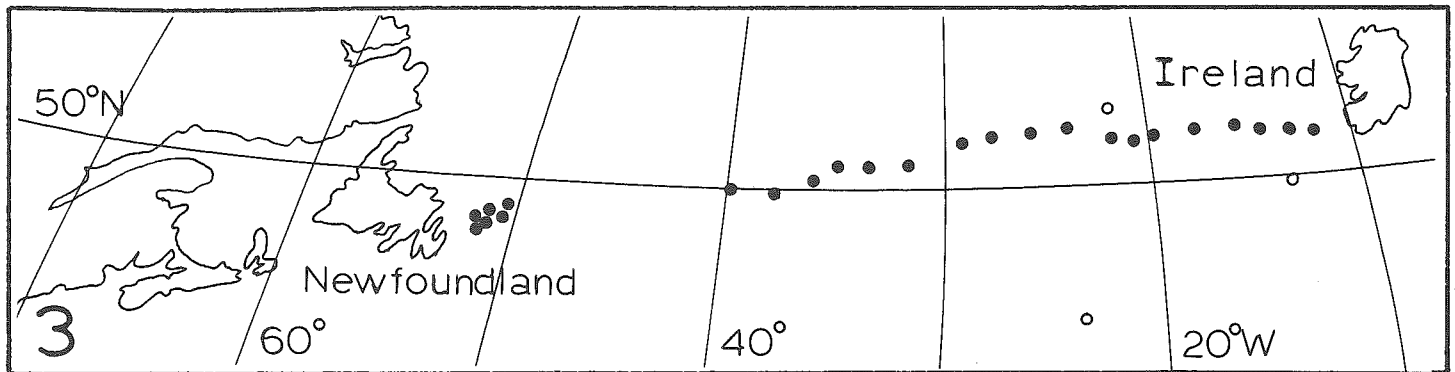
The murky pictures answer clearly. The dust of the deep blankets the booty. The oozes of the ocean floor dull and soil the treasures. Below "the slimy bottom of the deep" are "sumless treasures." But the seabed's dust that is now so incidentally cast aside was not too long ago itself the treasure. Neither gold nor gems, it is, simply, the countless corpses of microscopic plants and animals. To some this slimy treasure's value lay in what it did to a man's head, not to his pocketbook. The first collection of this ooze brought claims about the ocean floor for the first time face-to-face with their objects. Beliefs, not just profits, were on the line, and for many the excitement was high.

In the 1850's America could boast the pioneer in this microscopic exploration of the deep - Jacob Whitman Bailey, a professor at the U. S. Military Academy at West Point (Figure 1). Born in Massachusetts, reared in Rhode Island, married to a Virginian, Bailey took up residence at West Point in 1834. Over the next twenty-three years he would become America's preeminent authority on the algae and anything microscopic. Through the 1840's and early 1850's, he published observations on the remains of microscopic organisms found as fossils in various geological strata, in freshwater ponds, and especially in shallow-water, marine, coastal sediments at New Haven and Charleston, in the Hudson River and off the coast of Delaware. However, in 1853, Bailey focused his lenses on deep-ocean sediments, the first ones ever collected, thanks to the efforts of Matthew Fontaine Maury.



Maury, who had headed the U. S. Naval Observatory and Hydrographic Office since 1844, had made substantial contributions to nautical science and practical navigation with the publication of his seasonal charts of oceanic tide, wind and water currents. Such information permitted navigators to find the most efficient path from port to port. This information was initially culled from ship's logs stored at the Observatory and later from observations made at sea, under the prescription of Maury, by naval and merchant vessels. As part of his interest in better understanding ocean dynamics - both for practical reasons and its revelation about the work of the Creator - he undertook an ambitious ocean-floor sounding program between 1848 and 1853, which resulted in the first bathymetric map of the Atlantic. This map was published in 1855 in his classic The Physical Geography of the Sea, which set forth a new discipline with a new name, suggested to him by Humboldt. As part of the sounding program, Maury also instructed that seabed sediments be collected, but prior to 1853, for want of an adequate sampler, all such collections were confined to shallow water. By 1853, one of Maury's associates, John Mercer Brooke, invented the requisite "deep-sea sounding apparatus", which also captured a sample of sediment. The device, "Brooke's lead", was basically a cannon ball, through which a hole had been drilled permitting the insertion of a rod (Figure 2). The lower end of the rod had a small cavity, often coated with tallow, in which sediment would be forced when the device struck the sea floor. In striking the bottom the cannon ball was released from the toggle, and only the rod and its precious sediment were retrieved.





In the early 1850's Maury became interested in the feasibility of laying the first transatlantic telegraph cable on the sea floor from Newfoundland to Ireland. As a consequence, in 1853, he directed that a preliminary survey be made using Brooke's lead. As a result, the first deep-sea sediment samples were retrieved from 1000-2000 fathoms (see open circles in Figure 3) and sent to the eminent Bailey for microscopic analysis.

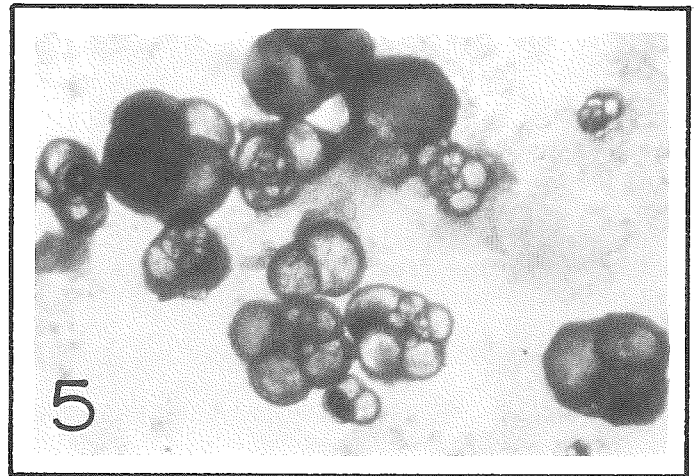
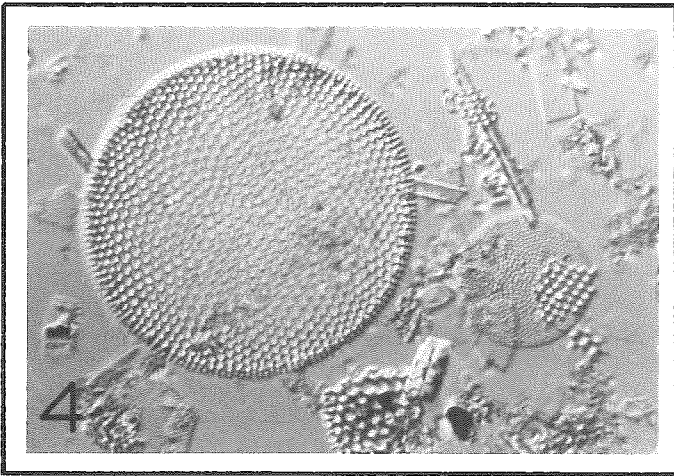
Maury knew from his sounding surveys that there was a plateau in mid-ocean along the proposed cable route, so depths were not a problem for the cable venture. But he feared that the seabed might be a mix of sand and gravel tossed about by strong currents and that it would be sufficiently abrasive that no cable could long endure. Bailey's analysis reassuringly revealed a benign region with no traces of sand or gravel, "literally nothing but a mass of microscopic shells." Bailey had discovered that the sea floor was littered with the corpses of microorganisms. On the plateau they were primarily the remains of foraminiferans (protozoans) and much less often those of diatoms (algae).

By 1856, the plans for the transoceanic cable were well along, and so Maury instructed Otto Berryman to return to the North Atlantic to resurvey and resample the proposed 1600-mile route. From this survey Bailey received 24 separate samples representing a west-to-east transect from the Grand Banks off Newfoundland to the Porcupine Bank off Ireland (see solid circles in Figure 3). At the western end of this transect Bailey found primarily fine siliceous deposits, containing the remains of diatoms (Figure 4), while in the middle - on the "Telegraphic Plateau" - and at the eastern end he found calcareous deposits, containing primarily the remains of foraminiferans (Figure 5). A few hundred miles east of Newfoundland, the diatomaceous ooze, which was derived from coastal and northern Labrador Current algae, sharply graded into the foraminiferan ooze, which was derived from the small planktonic animals that were strewn by the Gulf Stream.

In Physical Geography Maury had described the Gulf Stream as a "river in the ocean", and Bailey's results provided independent evidence of its course and its role in determining the distribution of sea-floor sediments. That distribution could no longer be seen as simply a function of depth. The results also stirred Maury to see the ocean's surface and bottom as connected - "it never occurred to us before to consider the surface of the sea as one wide nursery, its every ripple a cradle, and its bottom one vast burial place." Bailey had thought (correctly) that these small organisms had once lived at the surface and sunk to the depths only after their deaths. The eminent European microscopist, Christian Ehrenberg, thought they both lived and died on the bottom. He thought the diatoms were animals, and thus did not need light. This disagreement was not resolved until the famous Challenger Expedition of the early 1870's. Bailey also discovered in many of the samples volcanic ashes - "Plutonic tallies." This excited the American geologist James Dwight Dana, who had studied the emergent and submarine volcanoes of the Pacific and had suspicions of the existence of submarine volcanoes in the North Atlantic but no direct evidence until then. For these individuals and many others, the dust was dear.

It is striking that from barely 24 thimblesfull of sediment, so much excitement could have been generated. The dust might as well have been from the moon. This slimy ooze, this troublesome dust to some, was a treasure for Bailey and Maury and others, for in sympathy with Darwin, enraptured in the sights of the Brazilian rain forest, they found that their observations led them to "higher feelings of wonder, astonishment and devotion, which fill and elevate the mind."

Jacob Bailey's microscopic collection, including the first deep-ocean sediment samples, are housed in the Farlow.



The above photographs were taken from Bailey's 131-year-old slides of North Atlantic sediments. The diatom sediment on the left has been magnified 350 times; the foraminiferan sediment on the right has been magnified 100 times.

NEWS

LIBRARY ACQUIRES NEW BOUDIER

Through the generosity of the FOF the Farlow Library is the proud owner of the recent reprint of Emile Boudier's Icones Mycologicae. This work will save wear and tear on W. G. Farlow's copy of the original publication published in 1904-1910 (his name can be found among the 115 subscribers listed in volume four). Furthermore, the nomenclature of the six hundred species illustrated in Boudier's color plates is updated in a new fifth volume to the work. Professor Richard P. Korf, charter member of the FOF, as well as Prof.s J. van Brummelen, H. Cléménçon, W. Jülich and V. Demoulin author the taxonomic revision that add extra value to these superb volumes.

1987 BOOKSALE REVISITED

The Spring 1987 FOF Booksale offered over 200 items generously contributed by members of FOF and drawn as duplicates from the gift of Carroll W. Dodge. Forty-six members purchased 138 items resulting in \$1574 for FOF - and only about two-thirds of the books were sold! A list of the residual books has been compiled and is available from the Farlow Library. Books contributed for next year's sale have already begun to arrive. Please keep us in mind during the next several months.

FARLOW VISITORS

Recent visitors to the Farlow have included M. Blewitt (Boston), L. Colt (North Dartmouth), M. Dolan (Worcester), S. Ducker (Melbourne), D. Everleigh (New Brunswick, NJ), P. Gradstein (Utrecht), S. Hammer (San Francisco), S. Kim (Worcester), S. Masuda (Tokyo), D. Moore-Rykard (Hartsville, SC) J. Tanaka (Tokyo), B. Thiers (New York), and J. Trueheart (Cambridge).

FOF NEWSLETTER

This newsletter is published during October and April of each fiscal year. If you have news that involves the Farlow, the editor, R. Edgar, would like to hear from you.

MEMBERSHIP RENEWAL FOR 1987-88

Notices were mailed a few weeks ago. Have you remembered?

Dr. Sophie C. Ducker, retired Professor of Botany and currently Senior Associate in Botany at the University of Melbourne, visited the Farlow from September 19th to October 2nd as part of her continuing examination of the life and work of the nineteenth-century Irish phycologist William Henry Harvey. She has in press a book on Harvey's travels in Australia and the Pacific region based on his letters, many of which are located in the Farlow and Gray Herbaria. The book, The Contented Botanist, recounts the trip and presents and annotates about 150 letters that Harvey wrote primarily during the trip to such persons as Asa Gray, Jane Loring Gray, Jacob W. Bailey, and William Jackson Hooker. The book is being published by the University Press of Melbourne, Carlton, Victoria.

Anna M. M. Reid, a charter FOF member and currently the FOF secretary, has published in the most recent number of the Occasional Papers of the Farlow Herbarium (No. 19, April, 1987) a study of "Pioneer New England Bryologists - A Prosopography." Limited to deceased botanists, the work presents biographical sketches of "thirty-three bryologists and bryological collectors, who at some point in their lives contributed to our knowledge of New England mosses and hepatics." The collections of the New England Botanical Club Herbarium and the Farlow Herbarium and Library were used heavily in compiling the information. A bibliography of 226 references is included.

Robert K. Edgar, a Research Associate of the Farlow, has published through the Farlow a work entitled "Diatoms in Published Exsiccatae at the Farlow Herbarium: Indexes to Taxa, Geographical Localities and Diatomists." This 500-page, small-print catalog has been made available from the Farlow at \$15.00 per copy. From a detailed, sheet-by-sheet and slide-by-slide examination of specimen labels and indexes, over 13,000 records of the associations between diatom taxa and geographical localities were generated. The work is intended to promote the use of published exsiccatae in diatom studies at the Farlow and other herbaria.

Farlow staff member Jean Boise dug out of the closet her hammock, mosquito netting and passport to join plant collectors from Brazil's Instituto Nacional Pesquisas de Amazonia (INPA) and the New York Botanical Garden for collecting during March and April in the western Brazilian state of Rondonia. Jean was the sole fungus collector on this expedition that was part of Projeto Flora, an eight-year program to conduct a botanical inventory of the Amazon region. Rondonia is at the center of the controversy over tropical deforestation, and true to reports Jean and her colleagues spent many an hour scanning a landscape scarred by loggers, cattle ranchers and would-be farmers. Rondonia is also infamous for its high incidence of malaria and drug traffic from cocaine-rich Bolivia. So it was with great relief that the expedition returned to Manaus healthy and well-stocked with new and interesting species to deposit in their home herbaria.

FARLOW REPRESENTED AT BOTANICAL CONGRESS

Donald Pfister and Geraldine Kaye attended the Fourteenth International Botanical Congress, which was held in West Berlin in July 1987. The International Congresses are held every six years, and this year's attracted 4000 attendees.

Don was an official delegate of the Harvard University Herbaria and attended the "nomenclature sessions" held for several days before the main meetings. At these sessions the rules governing the naming of plants, including fungi, are examined and modified.

Gerry, a delegate of the Council of Botanical and Horticultural Libraries, was sent to run an informational meeting on CBHL and botanical literature for botanists and bibliophiles.

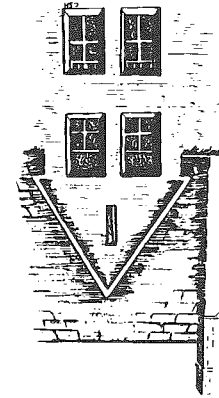
The Congress was a fine opportunity to meet botanists from all over the world, many of them regular Farlow correspondents, and some of them even Friends of the Farlow.

FIRST CLASS

20 Divinity Avenue • Cambridge • Massachusetts 02138 • U.S.A.

FRIENDS of the FARLOW

BOTANY • HARVARD UNIVERSITY



OF CRYPTOGRAMIC

FARLOW REFERENCE LIBRARY

ANNUAL MEETING

The 1987 FOF Annual Meeting will occur on Saturday, November 14th. This year an Open House will be held at the Farlow. From 1:00 to 4:30 p.m. we invite FOF members to explore their interests and the Farlow. Hosted by Farlow staff members and other professionals in various areas of cryptogamic botany, the Open House will provide an opportunity to gain an introduction to the identification of various cryptogams, or to pursue the more advanced aspects of identification of a group, or to learn technical skills, or to gather an overview of the spectrum of library and herbarium resources available for studying particular groups. We encourage you to contact us (warn us) should there be particular interests you would like to pursue, so that we can do our best to accommodate you. For those who wish a less active afternoon, displays will be available covering the library and the fungal, lichen and algal collections. The library will also be open should you wish to pursue your interests in it. At 4:45 a short business meeting will be conducted and will be followed by a reception for FOF members in the Farlow Library. We look forward to having you botanize and socialize with us for the afternoon.

Friends of the Farlow is an international group of amateur and professional botanists concerned with supporting the programs and resources of the Farlow Reference Library and Herbarium of Cryptogamic Botany of Harvard University. Membership categories are: Associate member, \$5-15; Full member, \$25; Sponsor, \$50-\$1000; Benefactor, over \$1000. Membership year runs from 1 July to 30 June. (To join, please make check payable to Friends of the Farlow and send to address below.) Members receive a discount on Farlow publications, and participate in book sales and other events. This Newsletter is published twice a year. For more information please contact the Editor at the Farlow Reference Library, 20 Divinity Avenue, Cambridge MA, U.S.A. (tel. 617 - 495-2369).