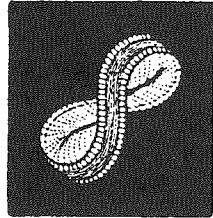


Newsletter of the



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Geraldine C. Kaye, Editor

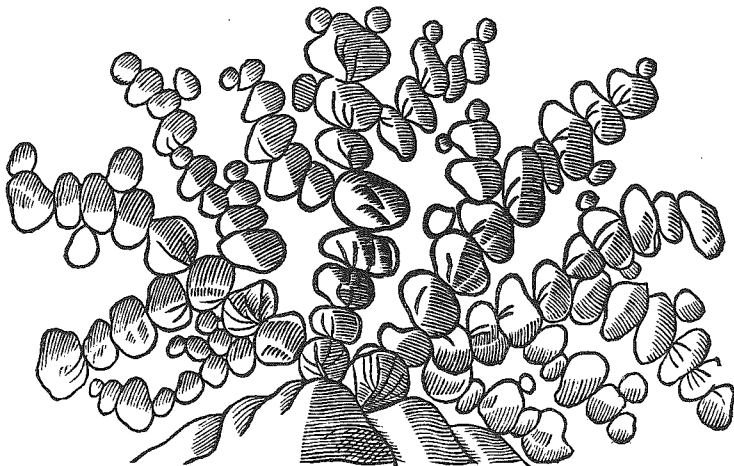
HALIMEDA AND CORAL REEF RESEARCH AT THE FARLOW

As a Science Scholar at the Bunting Institute of Radcliffe College I base my current research program on the tropical marine green alga *Halimeda* at the Farlow Herbarium. The algal marine focus complements the broad range of tropical research activities of the Harvard botany department.

Although *Halimeda*, as a tropical alga, is not part of the local flora, like many other marine algae it was known to both W.G. Farlow and Asa Gray. In the Farlow Herbarium today there are about 300 numbered collections of the genus. Included are specimens collected by Alexander Agassiz during his three Albatross expeditions to tropical areas of the Pacific at the turn of the century, and plants associated with the work of prominent 20th century phycologists F.S. Collins, M.A. Howe, and W.R. Taylor. This strong early representation of the genus at the Farlow reflected W.G. Farlow's own involvement in phycology. It is therefore a special pleasure to build on some of this early North American interest.

Halimeda belongs to the order Bryopsidales (formerly Siphonales) which are the largest and most complex of the Chlorophyta, if one excludes the Charales. In the

12. *Opuntia marina*. The Sea Garland.



An early illustration of *Halimeda tuna*, a Mediterranean species, from John Parkinson's 1640 *Theatrum Botanicum*. The first description of the genus in English appeared in this work.

genus, as in most cryptogams, micro-architecture is based on the filament. But it is a filament which lacks cross walls or septa: it is coenocytic. Another unusual feature is that the filament is sheathed in calcium carbonate. By branching, rebranching and cohesion of the filaments a vegetative body of considerable size is formed, one that can occupy several square meters of coral reef terrain. (If we were to assume this to be a single cell, it would surely set a record for size!) Even so, as with the majority of cryptogams, most of the diagnostic characters are microscopic, and taxonomic studies involve decalcification, dissection, examination of filament patterns, and measurement of their diameters.

The earliest description in English, that provided by John Parkinson (*Theatrum Botanicum*) in 1640, eloquently portrays the essence of the macroscopic form:

This dainty plant groweth up from some Rockes or stones, in or neere the Sea, spreading sundry flat, thicke, short and round leaves, one set on the toppe of another...each being as it were strung on a thred which yet is scarce to be discerned, like as a Country Garland...so that the whole plant seemeth to be made of nothing but strung leaves.

Confusion persisted for many years about whether *Halimeda* was a plant or an animal related to the corals, with Linnaeus sitting firmly on the fence and placing it in his "Zoophyta." Its plant nature was not generally recognized until the mid-Nineteenth Century. The first modern monograph was written in 1901 by Ethel S. Barton of the British Museum (Natural History), who retained 7 species out of the more than 25 that had been recognized hitherto. Work since then has added previously undiscovered species for a present total of 32 species worldwide.

A 1986 circumscription of the genus can go further and include some definition of the alga's ecological role or niche. This aspect could hardly be considered before the introduction of two important research tools, scuba diving gear and submersible vehicles. Yet the first glimmer, and it was quietly revolutionary, appeared in the 1904 report of an expedition by the Royal Society and the government of New South Wales to Funafuti Atoll in the Ellice Islands of the South Pacific. In a project that was an unrealized dream of Charles Darwin, this expedition obtained the first long cores bored through the carbonate cap of a coral reef, and demonstrated that organisms other than corals are important in making reefs. The geological

and biological team of the Funafuti project ranked the organisms found according to their perceived importance. Corals were assigned to fourth place; foraminifera were placed third. Calcareous red and green algae, with *Halimeda* the principal representative of the latter for many reef systems, were tied for first place. (In the final ranking calcareous red algae were listed first, because earth-bound scientists equated their more conspicuous appearance with greater importance.)

But even with the insights provided by this very successful project, algal contributions to reef formation and especially those of green calcareous algae have been ignored by most workers. In the showy reef world green algae are relatively inconspicuous, and even today zoologists and geologists, who are the writers of many of the papers on tropical reef ecosystems, often are unaware of their presence, let alone their importance.

In the past two decades, however, research using scuba and submersibles has greatly substantiated the abundance of *Halimeda* in many reefs and reemphasized its importance for the reef system. My research has taken me to Bermuda, Jamaica, the Eastern Indian Ocean (as a member of the International Indian Ocean Expedition), the Great Barrier Reef of Australia, Enewetak Atoll, and most recently to Hainan Island in China. Direct observations have revealed an 80% and higher *Halimeda* "ground" cover on shallow back-reef rock platforms, expanses of *Halimeda* meadows over lagoonal sands, and draperies and festoonings of *Halimeda* on fore-reef rock walls.

These new and now direct observations of abundance have also established that the tropical habitat of this alga is remarkably diverse. Unlike most attached algae *Halimeda* grows successfully on both soft and hard substrates. It also grows over a broad range of depths, extending from the intertidal zone to about 150 meters deep, that is, into regions where light is restricted to the blue portion of the spectrum, and intensity is of the order of 0.08% that on the surface of the ocean. Two special pigments promote success at these depths--depths that once were considered too extreme for the growth of green plants.

I have also followed the growth of *Halimeda* in laboratory culture by regularly photographing the changes in hundreds of plants growing in aquaria filled with artificial seawater. The basic growth pattern includes the regular loss as well as the addition of cal-

careous units called segments--Parkinson's "leaves." The shed portions, lost somewhat like the leaves of a tree, have contributed to reef structure for more than 100 million years, according to the geological record. The deposited segments form a coarse sand which fills in lagoons and contributes filling for coral frameworks. Sometimes they become cemented into a type of rock called wackstone. The dead fragments of *Halimeda* may also produce impressive carbonate banks, such as the recently discovered *Halimeda* bioherms, that can be as thick and as large as adjacent "coral" reefs and that accrete carbonate at comparable rates. Rates at which slow- and fast-growing *Halimeda* species contribute carbonate to the reef environment range from about 0.2 meters per 1000 years (a conservative estimate) to 14 meters per 1000 years.

Clearly *Halimeda* is an important producer of carbonate. Although this green alga

with relatively simple anatomy does not command the attention captured by the architecturally prominent corals or the colorful reef fish, a very significant part of its niche is the building and maintenance of a tropical "coral" reef. This aspect of green algae was unknown when Parkinson wrote his description. Agassiz made his Pacific collections of *Halimeda*, and Farlow added them to his herbarium. Yet, the contributions of these workers to the body of information about the genus provide data that are important to my study of the taxonomy, ecology, and distribution of *Halimeda* in the coral reefs of the world.

Llewellyn Hillis-Colinvaux
Bunting Fellow, Radcliffe College
Associate Professor, Zoology Dept.
Ohio State University

NEWS NEWS NEWS

Annual Meeting

Our Fourth Annual Meeting took place at Harvard on Saturday, November 9, 1985. Outgoing president Moselio Schaechter said his farewells and turned the imaginary gavel over to Robert Edgar. Treasurer Harvey Pofcher reported on the good health of our finances. Farlow Director Donald Pfister reported on Farlow activities for the year, and expressed appreciation for the significant contributions of the Friends of the Farlow.

Don introduced Dr. Meredith Blackwell of Louisiana State University, who presented an enjoyable and thought-provoking talk on her work on Slime Molds of the Sonoran Desert (yes, Virginia, even in the desert!). She illustrated her remarks with memorable slides of this striking environment. Dr. Blackwell thanked FoF for making it possible for her to visit and to study the Farlow collections.

The reception in the Farlow Library was once again the gastronomic and social event of the year, with the renewal of old friendships and establishment of new ones.



C.W. Dodge gift

The staff has begun processing the large gift of books, manuscripts, and lichen specimens given to the Farlow by Professor Carroll W. Dodge. The herbarium specimens must be recorded and cared for to preserve them for future study. The books and reprints are being sorted, listed and compared with the Farlow's holdings. Manuscript material also requires much special treatment. The Dodge Lichen Collection is especially rich in tropical and Antarctic specimens.

Other gifts include a beautiful Nineteenth Century book of pressed seaweeds bearing the whimsical title "Mossoleum" (seaweeds were called "sea mosses" in those days). It was assembled by F. P. Abbot, a young dentist, about 1849 as he travelled about trying to find a climate suited to his delicate health. An example of his artistry is reproduced on the mailing panel. We are most grateful for the thoughtfulness of the donors.

Mycological Literature Project

Don Pfister and Jean Boise are continuing work on the index to fungal names in publications between 1753 and 1821. They have also been working with a graduate student in the Classics Department to translate the introduction to Elias Fries's *Systema Mycologicum*.

Visitors' Log

The Annual Meeting drew such faraway people as W.B. Cooke from Cincinnati and Sam Ristich from Maine. Winter visitors David J. Galloway of New Zealand and the British Museum (Natural History); C.X. Ling and H.R. Wang from China; James Adaskaveg of Tucson, Arizona; and Christine Manville from the Academy of Natural Sciences, Philadelphia are recorded. On March 6, fifty members of the Library Club of Harvard visited ("A mushroom library? How quaint!") On March 27 Judith Diment, Botany Librarian of the British Museum (Natural History), gave a talk on an ambitious project now going on to publish, after 200 years, the copperplate illustrations of plants from Sir Joseph Banks' 1768-1771 voyage to the South Pacific with Captain Cook.

Former student Brent Mishler (now of Duke University), wife Carol, and new son Ben visited this spring.

We hope that any of you who are attending the AIBS Annual Meetings, to be held in Amherst, MA this August, will plan to visit us while you're in the neighborhood.

Farlowpeople

Jean Boise spent the month of January in French Guiana collecting Ascomycetes as part of the Flora of the Guianas Project. The expedition, organized by ORSTOM (Office de la Recherche Scientifique et Technique Outre-Mer), consisted of three French and four American botanists. Jean doesn't recommend the wet season for collecting mushrooms in the tropics--they worked in pouring rain most of the month--but she harvested a fine crop of her "small black dots on vegetation." She also took some beautiful slides which she showed to the Boston Mycological Club on March 3.

Geneva Sayre's many friends will be pleased to know that she is continuing her work at the Farlow on a part-time basis. Her current subject is Thomas Taylor, 1786-1848, Irish botanist and physician.

Donald Pfister will be on sabbatical leave from July 1986 to January 1987. His sabbatical plans include visits to herbaria and libraries in England.

Membership report: We have now, for the first time, topped the 200-member mark!

From the Library



The Library scene is both lively and uncertain this term. Gerry Kaye and four dedicated students have been operating both the Farlow and the Economic Botany Libraries. So far we've succeeded in providing at least an adequate level of service. We apologize if your requests are being answered more slowly than in the good old days last year.

Our Leading Edge computer joined the staff in November. We're getting acquainted with it, and expect it to take over many of our tasks in both correspondence and record-keeping. (It can't answer the phone, though--yet.)

Our share of the work on the C.W. Dodge collection has occupied us for several weeks. One result is a first list of available reprints and books by Dr. Dodge, mostly on lichens and medical mycology. If you'd like a copy of this list, please send us a card with your name and address, marked "DODGE--PUBLICATIONS."

In January Gerry Kaye became Acting President of the Council on Botanical and Horticultural Libraries, upon the unexpected resignation of the incumbent President. CBHL's purpose is to encourage communication among individuals and institutions concerned with libraries of botanical and horticultural literature. To this end it promotes activities and programs of mutual interest and benefit. It has some 250 members in 33 states and 12 other countries.

Gerry is starting work on the second edition of Wild & Exotic Mushroom Cultivation in North America. She is on the very brink of sending out questionnaires to organizations in this field. If you know of any new developments or businesses in this growing area, would you please send her particulars?

Fourth Annual Book Sale

Once again we've asked everyone to weed your bookshelves of outgrown botany/natural history books and send them in to the FoF Booksale. We need to receive them by May 9 at the latest. This year's proceeds will support the new Graduate Fellowship described above--so please make an extra effort to send along any books you can spare!

FUTURE EVENTS

Send a Student to Harvard!

Friends of the Farlow are offering a new Graduate Fellowship. The Fellowship is envisioned as short-term supplemental support for a graduate student visiting the Farlow to do research using the herbarium and library collections. The award, in the amount of \$500 to \$1000, will help with travel and living expenses. Notices were sent to active herbaria and botany departments for the first year's fellowship; application deadline was 15 April. We anticipate another such fellowship next year. This year's Book Sale will be devoted to this fund.

Herbaria Open House

On May 8, from 5:30 to 8:30 p.m., the Harvard University Herbaria, 22 Divinity Avenue, Cambridge, will hold an Open House to display the extensive plant collections and associated historical materials of the botanical institutes. There'll be talks, demonstrations, and exhibits; there'll be botanical hors d'oeuvres; box suppers will be available for \$6. The evening is being organized by Friends of the Arnold Arboretum. The Farlow will participate in this event by having both the Herbarium and the Library open. Friends of the Farlow are most welcome to come and see how we--and our neighbors in the vascular business--spend our days.

Preview--1986 Annual Meeting

This year's Annual Meeting is scheduled for Saturday, Nov. 8. We're thrilled to announce that Dr. Sylvia A. Earle will be our special guest and will speak about her underwater cryptogamic adventures. Dr. Earle, Fellow and Curator at California Academy of Sciences and longtime Research Associate of the Farlow, is an internationally renowned aquanaut/phytologist and an articulate advocate for global conservation projects.

Sayre Scholar

The first Sayre Scholar will be Dr. Helene Bischler, bryologist from Museum National d'Histoire Naturelle, Paris. Dr. Bischler will be at the Farlow in May. A specialist on hepatics of the desert and the order Marchantiales, Dr. Bischler will study the Farlow's collections of *Marchantia*. We anticipate that while here she will give a special seminar on her research. If you'd like to receive an announcement of her seminar, drop us a card (before May 1, if possible).

Algae for Amateurs

Barry Wulff and Bob Edgar will conduct a one-day *phytological* foray (that's right--a non-mycological foray!) to the southern New England coast on Saturday, June 21st. The excursion is designed as an introduction to the diversity, natural history and ecology of seaweeds and other algae of the Buzzards Bay region. Field work will be conducted in the Massachusetts towns of Dartmouth and Westport; laboratory work will follow in facilities at Southeastern Massachusetts University near New Bedford. Participation in this excursion is free. Reservations are required, however, and may be made by contacting the Farlow Herbarium by mail or phone (617-495-2368, ask for Carolyn). The deadline for registration is May 15th. A second notification with voluminous details will be mailed to registrants on May 16th.

Our Vice-President, Barry Wulff, will be teaching a *lichen workshop* at Pinkham Notch NH, June 7 and 8, along with Dick Homola (University of Maine, Orono) and Alan Bessette (Utica College of Syracuse University). The sponsor is Appalachian Mountain Club. For more information write Education Department, AMC Pinkham Notch Camp, Gorham NH 03581.

PUBLICATIONS AVAILABLE

Don't forget that Friends of the Farlow get 10% discount on the numerous publications we have available for sale. Also, we have for distribution many reprints that don't cost anything. Send for our 1986 "Publications Available" list...and you'll also be put on the mailing list for special lists that come out, such as the "Dodge Publications" mentioned earlier.

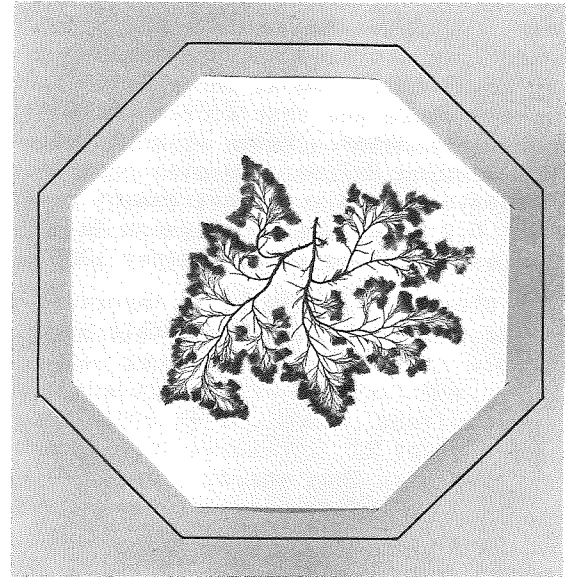
On the lighter side, we still have a few of the mushroom postcards which were so popular last year. (The mushroom lady should be our mascot!) Packet contains 2 each of 3 designs and costs \$2.

Notecards available include Oyster Mushroom, Pholiota Mushroom, and Ramalina (lichen); they also are 6 for \$2.

FIRST CLASS

THE FARLOW REFERENCE LIBRARY AND HERBARIUM
OF CRYPTOGAMIC BOTANY, HARVARD UNIVERSITY
20 Divinity Avenue • Cambridge • Massachusetts 02138 • U.S.A.

FRIENDS of the FARLOW



CALENDAR OF EVENTS--1986

- April 15 Graduate Fellowship applications due.
- May 8 Herbaria Open House.
- May 9 Book Sale: deadline for receipt of books at Farlow.
- May ?? Seminar by Dr. Helene Bischler.
- May 15 Book Sale: mail lists of books available.
- June 15 Book Sale: deadline for receipt of orders at Farlow.
- June 20 Book Sale: books mailed to lucky recipients.
- June 21 Algae workshop.
- July 1 Beginning of fiscal year--membership dues due.
- November 8 Fifth Annual Meeting at the Farlow with Sylvia Earle.

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).