

Newsletter of the **FRIENDS**
OF THE
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Deborah Smiley
Interim Editor

Rare Early Diatom Ambrotype Photographs
by Amasa Mason Eaton (1841-1914)

Wayne Barrar

Photographs are often added to archives for their content or because of their association with the photographer, but sometimes their individual significance becomes apparent years after their acquisition, emerging through a happy chance coincidence of factors.

Such a situation occurred recently when Robert Edgar of the Farlow Herbarium showed me a pair of images he knew I'd be keen to see. I was visiting to research historical diatom slide collec-

tions at the Farlow, but had indicated to him that I was also interested in early photomicrography – always hoping to view some of the early photographic outputs from Victorian microscopists.

I was excited to see what I immediately knew were exceedingly interesting images, a pair of glass media ambrotypes of diatom frustules. From the surname on the back, and the period in which ambrotypes were being produced, we were able to identify them as having been made



Microscopic images of diatoms, Amasa Mason Eaton ambrotypes, 1861

by Amasa Mason Eaton in 1861.

The images are products of a rich formative period, not only in regard to photomicrography, but for photography in general.

The fundamental link between microscopy and photography was established within months of the announcement of the “discovery” of photography in 1839. Léon Bernard Foucault and Alfred Donné were producing daguerreotypes with a solar microscope in France in 1840,¹ and in the same year photographic pioneer William Henry Fox Talbot made numerous photomicrographs in England, including of diatoms, using his renowned salted-paper print process. Others were independently creating some of the earliest photomicrographs ever made by attaching their cameras to a microscope. In the United States, daguerreotypes were made by W.H. Goode of Yale University in 1840,² and John William Draper, who had made the first photograph of the moon. Draper continued to experiment with the microscope, including producing a daguerreotype of algae in 1856.³

Many other early practitioners also experimented with techniques, processes and equipment in very fundamental ways. While by today's standards they were generalists with broad-based skills and very enquiring approaches, rather than specialists, they often attained high levels of expertise. They developed strong networks and often exchanged knowledge, equipment and samples. They also disseminated their findings generally through the delivery of papers or presentations. Microscopical societies were particularly strong in the nineteenth century.

It was in this context that Eaton contributed a paper on his ambrotypes for presentation at the Boston Society of Natural History in March 1861.⁴ The paper was read on his behalf by Loring Woart Bailey – son of eminent diatom authority Jacob Whitman Bailey– with whom Eaton was clearly associated. The younger Bailey was presumably the source of the microscope objective lens Eaton had used which was described in the paper as having “belonged formerly to Professor Bailey, of West Point,” and which had no doubt

been essential for resolving the detail of diatom structure.

In his paper Eaton outlines various experiments with lighting regimes, noting that he required direct sunlight rather than artificial sources to gain enough illumination to photograph through the microscope. Initially he used glass plates to make negatives, using these to print what he termed “common photographs in the usual way” (probably albumen prints) on paper he had hand-coated himself. He was clearly adaptive in his approach, even resorting to the use of a thin coating of milk on his focussing screen in order to be able to render the low-intensity microscope image clear enough to focus sharply. Despite his efforts, though, he was dissatisfied with the resolution and overall sharpness of his “paper prints.”

He indicates that he turned instead to another photographic methodology, the ambrotype. This is a direct positive process, with no need to utilise an intermediate negative. Eaton recognized that this was likely to have resulted in crisper images, given that paper prints were still bedevilled by issues such as managing contrast, artefacts left in processing, the effect of paper fibers on clarity, and even fairly unreliable light fastness (the dreaded fading image). By comparison, the use of a direct pathway from object (specimen on the slide) to a positive glass image (the ambrotype) was better suited to his desire for objective rendering of an

Rarest of the Rare

To celebrate the reissue of *The Rarest of the Rare: Stories Behind the Treasures at the Harvard Museum of Natural History* by Nancy Pick, the Museum asked several curators to show items from their collections. Don Pfister chose to talk about one item from the Farlow, the ambrotypes that are the subject of the feature article of this issue. His primary point was that these were discovered in the collections and very little was known about them or their significance until by a stroke of good luck we had Wayne Barrar using the collections. Our collections are full of rare and important items and some of them have yet to be discovered!

object intricately constructed as a diatom valve.

The ambrotype had its own drawbacks, however. One would have been the fact that each ambrotype is essentially a unique photographic artefact; in order to have multiple copies, perhaps to distribute to other interested microscopists, he would have needed either to make multiple ambrotypes of the same thing, or to try to rephotograph the original – both relatively complex operations compared with using a photographic negative/positive print process. Furthermore ambrotypes were made using the wet collodion process, whereby the glass plate needed to be coated with sensitizer reagents just before use, exposed while still “sticky” and developed almost straightaway. Eaton obviously decided that the potential advantages outweighed the complications.

The resulting ambrotype photomicrographs discussed in his paper are almost certainly those now held in the Farlow collection.

These images are fine examples of the ambrotype. Both have the classic dark tonality of the process, which essentially provides an underexposed negative photograph backed by balsam and, generally, black varnish to elicit an overall “from nature” veracity as a “positive.” Like most extant ambrotypes they are bordered by ornate protective Victorian metallic gilt frames and would generally have been housed in a similarly ornate hinged case. Most ambrotypes were commercial studio portraits; a smaller number were landscape views; while even fewer were of a scientific or specialized technical subject matter. These images are rare.

The fact that Eaton used diatoms to perfect his photomicrography is not surprising. One image shows a typical test diatom genus used by microscopists then and now to visualize the resolving power or resolution of the optics of the microscope, particularly the objective lens. At the time Eaton was making these images, the desire to maximize this resolution had reached almost fanatical levels among the technically minded users of the highly popular microscope. The finely delineated silica valve structure of diatoms such as *Pleurosigma formosum*, imaged by Eaton, were

ideal naturally engineered “micro rulings” for assessing optics (and in his case the actual resolution of the photographic image itself), and commercial slide mounters provided test plates in the form of arranged slides of such species.

However, while Eaton was no doubt interested in the diatom as an object for viewing, there is no evidence to suggest that Diatomaceae were of any interest to him in a taxonomic or more broadly biological sense. Despite the superb abilities he demonstrated in the production of these two fine examples, an initial survey of ambrotypes in collections has not yet located any others credited to him. Nor is there any indication to date of any photographs by him of other subject matter. How many ambrotypes he produced is unclear, but due to the slowness of the wet collodion process combined with the complexity of photographing via the microscope, it is likely to be a very conservative number.

As well as marking the date of his ambrotypes and accompanying paper, 1861 was also the year in which Eaton graduated from Brown University. While general accounts of his subsequent life make mention of his endeavours and success particularly with reference to his career in law, they do not appear to cite an ongoing interest in either microscopy or photography. The Farlow photomicrographs would seem to have been a focussed but fleeting pursuit of a young man moving in the academic, cultural and scientific circles that generated so much informal innovation in the nineteenth century. ■

Associate Professor Wayne Barrar
Whiti o Rehua School of Art
Massey University, New Zealand

¹ Thomas, Ann. *Beauty of Another Order: Photography and Science* (New Haven: Yale University Press and National Gallery of Canada, 1997), 99.

² Newhall, Beaumont. *The Daguerreotype in America* (Duell, Sloan and Pearce, 1961), 94.

³ Held in the collection of the National Museum of American History, Bering Center, Division of Information Technology and Communications, Photographic History Collection, Image No. AFS 146. Online at: <http://www.luminous-lint.com/app/image/392543361878039416281>.

⁴ Eaton, Amasa M. *Micro-photography, or the photographic delineation of microscopic objects*. *Proceedings of the Boston Society of Natural History* Vol. viii, 1862:105-7.

FoF Annual Meeting

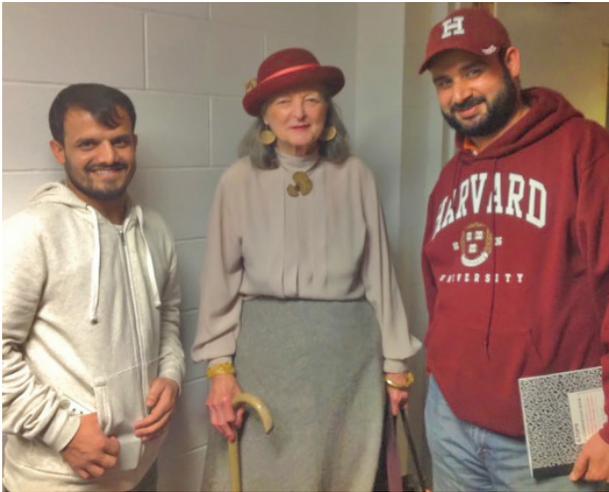
The FoF annual meeting took place on November 7, 2015 . Greg Mueller from the Chicago Botanic Garden was our speaker. His talk was titled: “Challenges and Opportunities for Fungal Conservation.” The gathering was well attended and the audience enjoyed socializing with each other and Greg following the lecture.



Gregory Muller presenting on “Challenges and Opportunities for Fungal Conservation”



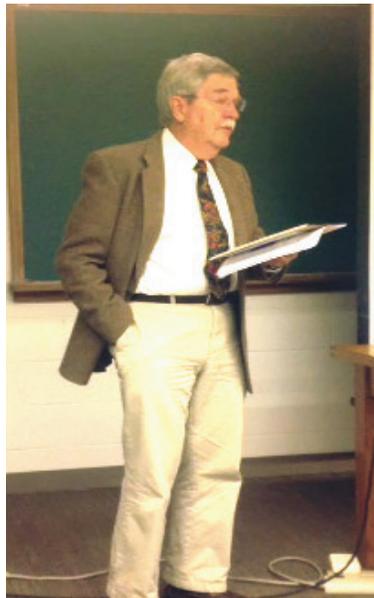
Don Pfister and George Davis



Martha Finta with visiting researchers from Pakistan, Shah Hussain and Ishtiaq Ahmad



Kathy LoBuglio, Scott LaGreca and Elizabeth Kneiper



George Davis



Jason Karakehian



Scott LaGreca



Celebrating with fungi

Revising Thaxter's Sequestrate Basidiomycetes

by Francisco Kuhar

In 1906 Roland Thaxter visited southern Patagonia and made invaluable collections of false truffles associated with southern beech forests. These collections are kept in the Farlow Herbarium and have been annotated and studied by many great mycologists. The collections consist of many dried specimens, slides and some materials maintained in liquid preservatives together with invaluable annotations made by specialists who studied them during the twentieth century. Some of these materials have received different names according to the accepted knowledge of each time and some others have served as reference materials for the description of new species.

Recent literature suggests that some of the taxa represented in these materials may be of ecologic importance due to their symbiotic associations to the southern beeches. Other studies report unusual variations within species related to Thaxter's findings.

During a visit supported by the FoF, all materials corresponding to hypogeous basidiomycetes from these collections, especially those related to the genus *Descomyces*, were revised in light of this

new information. The variation of anatomical features was studied by comparing fruit bodies from the same and different collections at the macro- and microscopic levels, and the results were statistically contrasted to, and compared with, available descriptions. Some collections showed a huge range of variation in the spore size and shape within the same fruit body suggesting that species delimited on these bases should be revised. The microscopic structure of the surface of the fruit bodies also showed different intra-specific configurations that could be interpreted as maturity stages or maybe even as preservation artifacts. These data will help us identify new collections of the fungi in the field, redefine the boundaries between species, and revise the taxonomic position of the described taxa according to modern phylogenetic systematics. ■

*Save the Date for
Clara Cummings Walk
Sunday, June 12th
Noanet Woodlands, Dover MA*

OEB 54 – Biology of the Fungi, An Introductory Course by Donald Pfister

In long standing mycological tradition, mycology courses are generally offered in the Fall when fungi are prominent in the field. OEB 54 had followed this pattern for many years but, for a variety of reasons, Don decided to give the course in the Spring. The result has been a revamped version of the course with an emphasis on laboratory work and particularly culturing fungi. We have also been able to bring in several mycologists to lecture and participate in the labs. We provide a list below. The students in the course not only have the opportunity to use the Farlow facilities

but they also benefit from instruction by a group of eminent specialists.

OEB 54 Spring 2016 Guest Lecturers:
David Hibbett, Clark University;
Meredith Blackwell, Louisiana State
University and University of
South Carolina;
Kabir Peay, Stanford University;
Cathie Aime, Purdue University;
Matt Smith, University of Florida;
Tim James, University of Michigan. ■

Visit by Ana Sofia Reboleira

Early in 2016 the Harvard University Herbaria sponsored the month-long visit of Ana Sofia Reboleira, a post-doctoral fellow from the Natural History Museum of Denmark at the University of Copenhagen, to the Farlow. Sofia's research is centered on cave biology with particular interest on millipedes, and she has discovered that some of these cave-dwelling creatures are hosts to members of the Laboulbeniales.

Several taxonomic questions have arisen from the study of these fungi. Working with graduate student Danny Haelewaters, Sofia began an investigation of several of these millipede-dwelling fungi to determine species delimitation involving two recently described species of the genus *Diplopodomycetes*. They are using molecular phylogenetic methods in their attempt to determine if these two species might be the same phylogenetic species with divergent divergent morphologies. Sofia gave a well-attended seminar entitled, "Unsafe sex and interesting facts about the biology of cave inhabitants," as part of the Harvard University Herbaria series. ■

FoF Book Sale Update

The selection of books for the 2016 book sale will begin in the next few weeks. We always welcome donations of books related to cryptogamic topics. Donors occasionally offer titles on broader topics but those do not usually sell so please consider giving works on mycology, bryology, lichenology, etc. only. Please contact Judy Warnement (warnement@oeb.harvard.edu) if you have questions or donations.

Recent visitor Ishtiaq Ahmad was very happy to accept a selection of general mycology titles from the FoF inventory. He assured us that the materials would be of great benefit to his laboratory colleagues and future students back home in Pakistan. ■

Digitizing Projects at the Farlow

We continue our reporting on the several projects underway to digitize collections at the Farlow.

iDigBio (Integrated Digitized Biocollections), the National Resource for Advancing Digitization of Biodiversity Collections (ADBC) is funded by the National Science Foundation. Michaela Schmull, Anne Marie Countie, and Don Pfister attended the iDigBio Summit, November 4-6, 2015. There they learned about various ongoing projects and were introduced to the project leadership team for the newest of the projects with which we will be involved. The new projects will include various groups of microfungi.

Don also presented the macrofungus project to the Boston Mycological Club on January 4, 2016. This presentation was aimed at encouraging members of the public to engage in these digital projects. Through crowd sourcing portals digitized labels can be further transcribed, thus helping to augment the data currently available. ■

Ascomycete.org Featured Richard Korf's Career

In honor of mycologist Richard P. Korf's 90th birthday a special issue of *Ascomycete.org* (volume 7, fascicle 6) was produced. This special volume was edited by Nicolas Van Vooren and Donald Pfister. Don was Dick's student at Cornell and many of Dick's students and associates joined in celebrating this milestone. Several new species are included that were named for Dick. Dick was one of our FoF speakers many years ago and has always been a Farlow supporter. ■

Teresa Iturriaga's Peru Trip: 15-18 October 2015

Teresa Iturriaga, a Research Associate at the Farlow Herbarium, was granted travel funds from the Friends of the Farlow to participate as an invited speaker in a symposium on Amazonian fungi (<http://andesamazonmeeting.org/symposium-04-amazonian-fungi>).

Symposium:

This symposium was part of the First International Andes-Amazon Biodiversity Conservation meeting that took place from October 15th to the 18th (2015) in Lima, Peru. The title of the congress was "Biodiversity and Conservation of the Tropical Andes and the Amazon Rainforest." Iturriaga's presentation, "Amazonian Collections at the Farlow Herbarium," presented the work that she has been conducting on the M. A. Gaillard's collections of fungi from the Venezuelan Amazon (part of the Patouillard herbarium at the Farlow Herbarium [FH]) in order to assess climate change.

M. A. Gaillard was a French botanist who collected fungi and plant specimens in Caracas and in southern Venezuela along the Orinoco River in 1887. His collections were studied by N. Patouillard in Paris and resulted in the description of a number of new genera and species. These specimens establish a baseline for environmental studies. A next step will be to search for critical species in fungal collections in Venezuelan herbaria, and in other herbaria in institutions that house Venezuelan collections. Many of these herbaria are digitized and their holdings are available on the Internet. Once all this information is processed, preliminary decisions may be made regarding localities in Venezuela to be explored for rare or locally extirpated species. This information will provide better knowledge of the current status of species, and hopefully will direct researchers to fungi that can be used as models for assessing change in the mycota due to climate and other factors.

Satellite meeting:

T. Iturriaga also participated in a satellite meeting attended by Magdalena Pavlich, next president of the Asociación Latinoamericana de Micología (ALM), and other mycologists from Peru, to plan the next congress and pre-congress courses that will take place there in 2017. Iturriaga will organize a symposium on Ascomycetes, as well as a field pre-congress course on Ascomycetes.



Magdalena Pavlich, President for the next Congress of the ALM (CLAM) in Peru, 22-25 August 2017, Teresa Iturriaga, and Eimy Rivas Plata- High Diversity of Graphidaceae in Amazonian Peru

Contacts with specialists working in biodiversity and conservation in Peru:

Many contacts were established, which will broaden the scope of the kinds of collaboration between researchers at FH and Peruvian and international specialists working in biodiversity and conservation in Peru.

The Friends of the Farlow assistance opened the door to collaboration between the Farlow Herbarium and Peruvian mycological researchers, while at the same time opening possibilities of exchange among colleagues. ■

Pressed Seaweed Albums on Exhibit in the Farlow

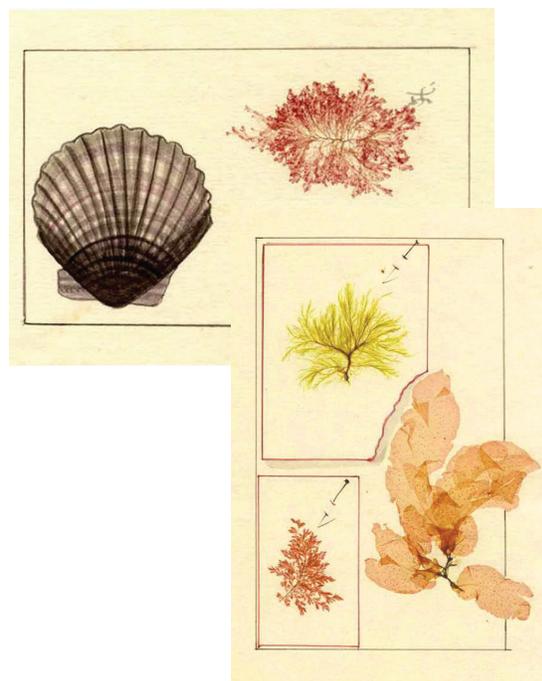
It was decided that the name should not be disclosed. Here is one suggestion to begin the article: “In the Spring of 2015, all algae albums at the Harvard University Herbaria were extensively studied.” Some were housed in the Farlow library and others in the herbarium. The library and curatorial staff decided to consolidate the materials in the library due to the varied formats and a lack of descriptive detail. The collection of pressed seaweed albums and monographs includes 16 titles dating from the mid-1800s when seaweed collection was at its height of popularity.

Seaweed collecting embodied a cross section of Victorian-era interests, allowing men and women alike to explore nature, improve their scientific knowledge, and create an attractive memento to decorate their homes. By the 1840s several books on identifying and preserving seaweed had been published, including the series *Photographs of British Algae* by Anna Atkins. Atkins’s guide is considered the first of these books illustrated with photographic images because she used cyanotype prints to document various species. The cyanotypes were created by placing seaweed onto photosensitive paper and exposed to light, resulting in a negative image of the plant. Amateurs everywhere were inspired by Atkins’s work and waded into tide pools to collect and preserve their own specimens.

In 1881, A.B. Hervey’s *Sea Mosses: A Collector’s Guide and an Introduction to the Study of Marine Algae* outlined how to properly press and mount various types of algae.

Hervey recommended a tool set that included scissors, a pair of pliers, a stick with a needle embedded in the end, at least two bowls for water, blotting paper, cotton cloth, and cards on which to mount the specimens.

Pliers and scissors were used to handle the specimens and cut away any extraneous branches, and the needle was used like a pencil so that the plant can be moved around with relative ease to show the finer details. With the seaweed in a bowl of salt



water, the pliers were used to handle the specimen and free it from excessive sand and shells. It was then re-submerged in salt water and the mounting paper was simultaneously maneuvered under the specimen until it rested on top. The drying and pressing process consisted of layering the mounting papers with various types of blotting cloth and additional paper topped with weights. Hervey recommended that about fifty pounds of rocks found by the seashore would serve as weights. Most types of seaweed emit a gelatinous substance that adhered them to the mounting board, but various types of gummed paper and adhesives were used if necessary.

Images shown above are examples from a sea moss album created by Mary Robinson on Martha’s Vineyard in the late nineteenth century.

In celebration of this accomplishment, a selection of the albums was on display in the Farlow library and lobby exhibit cases. The collection is permanently housed in the Farlow Library stacks, and records can be searched and viewed in Harvard’s online catalog, HOLLIS Classic. A full list can be viewed by searching “algae” in the “Other call number” field. The albums vary in size, style, and format and all are accessible to users. Contact the library staff with any questions about access (botref@oeb.harvard.edu). ■

Danny Haelewaters Collects in Panama

Graduate student Danny Haelewaters and his wife (and biologist!), Sarah Verhaeghen, went to Panama to collect insects in June and July of 2015. They explored Barro Colorado Island and visited the pinned insect collection at Tupper Center of the Smithsonian Tropical Research Institute (STRI).

The trip was also part of a new collaboration with researchers at the Universidad Autónoma de Chiriquí (UNACHI) in David, Chiriquí in western Panama. Haelewaters and Verhaeghen worked together with professors Rosa Villarreal and Juan Bernal-Vega and their students. The team searched in citrus plantations for ladybirds (or ladybugs or coccinellids) infected with *Laboulbeniales* fungi and succeeded in finding these and many other insects.

This successful collaboration resulted in a return trip by Haelewaters to Panama in January 2016 to work more closely with Villarreal and Bernal-Vega. He has been invited to return in July of 2016 to present a seminar and to collect additional specimens.

Finally, Haelewaters and Verhaeghen participated in two field trips at night, capturing bats in mist nets and plucking off their ectoparasitic bat flies, some with *Laboulbeniales* hyperparasites! One field trip was held in Gamboa, with researchers from the group of Dr. Rachel Page (Smithsonian Tropical Research Institute), the other field trip took place at Barro Colorado Island, with Thomas Hiller (University of Ulm, Germany).

To learn more about Danny's time in Panama, visit his blog post at: <http://www.dannyhaelewaters.com/bats-in-panama/>

The following grants have funded Danny's research:

- Term-Time Research Travel Grant, David Rockefeller Center for Latin American Studies (to support fieldwork in Panama)

- Summer Research Travel Grant, David Rockefeller Center for Latin American Studies

- Torrey Botanical Society Graduate Student Research Fellowship ■



Danny Haelewaters collecting insects from plant material using a mouth-operated aspirator.



Cutting off *Heliconia* flowers, which are micro-habitats for tiny Staphylinidae and other insects. Some of these actually carried *Laboulbeniales* fungi.



Sarah Verhaeghen just found an insect infected with *Laboulbeniales* fungi!



Artibeus phaeotis, the pygmy fruit-eating bat, a member of the Phyllostomidae. These bats are characterized by their nose leaf, hence their common name “New World leaf nosed bats.” The bats carry ectoparasitic flies, and those flies sometimes can bear ectoparasitic fungal “hyperparasites.”



A leaf nosed bat entangled in the net, ready to be un-entangled, leg by leg, wing by wing, sometimes tooth by tooth, while holding it with one hand not to be bitten (thumb at the head, index finger at the chest).



Feeding the Jamaican fruit bat, *Artibeus jamaicensis*, with sugar water.



Inspecting the right wing of the Jamaican fruit bat, *Artibeus jamaicensis*, for presence of bat flies.



In July 2015, Haelewaters and Verhaeghen, were joined by Prof. Dr. Juan Bernal-Vega, Prof. Rosa Villarreal, Maria Fuentes, and undergraduate student Leila Gonzalez during field trips to citrus plantations. On the picture, from left to right: Leila, Rosa, Danny, Sarah, Maria (and Juan was the photographer).



Haelewaters, surrounded by many tubes with insects on 95% ethanol, working in the lab at night.

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