

Marine Sciences

by Jennifer Stone Gaines

Out of an impulse to learn everything about the natural world, people of the Victorian age became avid collectors of natural artifacts. Every well-to-do Victorian parlor had a small collection of fossils, minerals, butterflies, stuffed birds – whatever struck its owner's fancy. Some people acquired training in natural history, becoming observers and scientists of the natural world. Spencer Fullerton Baird came from this background. He was influenced by Audubon and became a superb naturalist, identifying most of the birds, reptiles and mammals of eastern North America, including several new species. When he came to New England in 1863, he was ready to investigate fish.

Baird was the first to come to Woods Hole specifically to “do science.” He arrived on behalf of the recently created Smithsonian Institution, where he had been named Assistant Secretary. He came to identify fish because he was “fascinated with the great variety of locally available fish species... due to the mingling of fishes and other animals in the warm waters of the Gulf Stream.” Here the warm southern waters collided with the colder water from the north side of the Cape, and there were no large rivers to dilute the sea water. Baird reported to the U.S. Fish Commission that “the water is exceptionally pure and free from sediment, and a strong tide rushing through Woods Hole passage keeps the water in a state of healthy oxygenation specially

favorable for biological research of every kind and description.”

Baird returned in 1871 as the head of the new U. S. Commission of Fish and Fisheries. With the help of Woods Hole native Vinal Edwards and Yale professor A. E. Verrill, he compiled a catalogue of 121 species, mostly collected from commercial fishermen. Baird set up a laboratory in Lighthouse Service buildings on Little Harbor and continued collecting with his assistants.



Marine Sciences Plaque by Sarah Peters. Photograph by Jacki Forbes.

Late in 1871 he said, “During my visit of last summer to the Vineyard Sound and other maritime portions of New England, I was much impressed by the great diminution in the numbers of fish which furnish the

summer food supply to the coast... as compared with their great abundance during a previous visit in 1863; & I found the same impression to be almost universal on the part of those with whom I conversed on the subject. The belief is everywhere loudly expressed that unless some remedy be applied – whatever that may be – the time is not far distant when we shall lose, almost entirely, this source of subsistence and support – a calamity which would involve a vast number of evils in its train.” For five years Baird collected along the coast of New England, becoming increasingly concerned about dwindling fish populations. This was during the hey-day of the Pacific Guano Company, which was using 10,000 tons of



Temporary laboratory at Little Harbor established by Baird in 1875 on the grounds of the Light-House Board. NEFSC Historical Collection.

fish a year, primarily menhaden. The fish were caught mostly in weirs and in newly devised "pound nets" that captured fish as they migrated along the coast. A pound net had two parts: a long straight net leading the fish into the circular "pound," which was then pulled tight and hauled up into the boat. Baird said he saw 100,000 pounds of fish caught in one night. Baird's vision of a research and teaching institution now expanded to include fish propagation.

By 1883 Baird convinced Congress to appropriate money for a new Woods Hole facility. With help from Joseph Story Fay, and donations from other institutions and individuals, he acquired a convenient site at the westerly end of the main street at the water's edge. There he constructed two large shingle structures: one for laboratories, the other for residences. (Until that time, he and his wife and child had stayed on the third floor of The Church of the Messiah's rectory on the corner of Woods Hole Road and Church Street, conveniently close to Little Harbor, and also in other summers they had rented rooms in the Fish House, now the headquarters of

the Penikese Island School, at the head of Little Harbor.) The new Fisheries buildings featured a sea water pumping system powered by a windmill and pulled through locust-wood pipes, a seal pool of granite blocks with fresh sea water filtering through the stone walls, and an aquarium which has always, with the exception of World War II, been open to the public.

As scientists and Congress became more concerned about the decline of fish populations, they set up hatcheries in the Woods Hole labs. Scientists developed special tanks to raise the fry (young fish) and tried different ways to transport them. First they used a ship, *Fish Hawk*, to carry the fry as far as the Chesapeake for release and later they used a special railroad car for faster, more dependable transport.



Spencer Baird pushes off the *Sarah Ford*, filled with scientists and seining nets for a collecting trip. Little Harbor, ca. 1870s. Courtesy WHHC.

The Fish Commission thrived under Baird's leadership. Scientists flooded in during the summers, collecting along the shore and at sea and undertaking basic research in taxonomy, embryology, physiology and parasitism. Because of Congress's tight purse strings, Baird's plans for a school were dropped.

Henry Bigelow, the most persistent and illustrious researcher at the Fisheries, was able to carry out many of Baird's goals. Bigelow's publication *The Fishes of the Gulf of Maine*, originally published in the 1920s and still used as a reference today, expanded on Baird's early research goals. From his positions at Harvard and the Museum of Comparative Zoology, Bigelow was able to help the Fisheries through difficult times by opening Harvard's labs and libraries to Fisheries scientists.

Simultaneously with Baird's early efforts to set up a research station in Woods Hole, his friend Louis Agassiz, a charismatic naturalist and lecturer at Harvard, was organizing a summer field school on Penikese Island, at the western end of the Elizabeth Islands, entirely funded by the island's wealthy owner, New York merchant John Anderson. It was featured as a summer seaside natural history school and was

primarily aimed at teachers from the Boston area. Although Agassiz lived only long enough to teach one year at Penikese and his son was able to keep it going only one additional year, the school served as the inspiration for many scientists. It was the direct model for the Marine Biological Laboratory, started in 1888. Alpheus Hyatt, an alumnus of Penikese and a friend of Baird's, was the driving force in creating the

new lab at Woods Hole, having run a successful summer field school at Annisquam for six years. Hyatt served the first two years as president of the trustees.

C.O. Whitman, the first director of MBL, had also attended the Penikese school and became hooked on marine science. At the MBL opening he said, "The Marine Biological Laboratory

traces its roots to Penikese... Our minds naturally revert to the old Penikese School." He went on to state the ideals for the new lab: "Such a laboratory should not be merely a collecting station, nor a summer school, nor a scientific workshop, nor a congress of biologists, but all of these." MBL has certainly fulfilled Whitman's ideals. Especially in the summer, students and researchers swarm from all around the globe to teach and study. There is an almost electric excitement in the air as all these bright and eager people exchange ideas. As a measure of the MBL



Students from the Marine Biological Laboratory collect specimens on the beach at Cuttyhunk Island, ca. 1896. Courtesy MBL Archives.

experience, more than 40 Nobel winners spent time in this humming intellectual hive.

And yet, life at MBL in the early days was not all work. Over the years quite a lot of fun, even romance, has occurred here. In the early 1900s cookouts, beach parties and sing-alongs were popular. Lobsters were steamed in the end-of-the-day steam from the trains at the Woods Hole station. As described in *Woods Hole Reflections*, "The students had a large galvanized ash can modified – i.e. an inlet pipe placed at the side near the bottom. A few large stones were placed in the bottom of the can, and then the live lobsters were added. Fresh seaweed was placed on top of the lobsters. When the last train came into Woods Hole, this lobster can was wheeled down to the R.R. depot in a large two wheeled cart, and the agreeable engineer would let out all the engine's steam through the pipe connection to the can. Behold, about 30-40 lobsters were beautifully cooked in the record time of 15 minutes, and soon consumed!"

Lively sports competitions occurred between the Fisheries and MBL scientists, most notably distance diving off the old Pacific Guano Company piers. A popular musical diversion of the day was to take well known songs and change the words to fit the group's interests. One such song from Lucena Barth in 1938 was sung to the tune of "Tipperary" of which we print here only the first verse and chorus:

*A fish-like thing appeared among the Annelids
one day.
It hadn't any parapods or setae to display.
It hadn't any eyes or jaws or ventral nervous
chord.
But it had a lot of gill slits and it had a noto-
chord.*



Marine Sciences are not limited to the prestigious adult institutions. The Woods Hole Children's School of Science has been a summer school for kids since 1914. Shown here is a class collecting on the rocks at Nobska beach. Courtesy WHHC.

Chorus

*It's a long way from Amphioxus.
It's a long way to us.
It's a long way from Amphioxus,
To the meanest human cuss.
Good-bye fins and gill slits,
Welcome lungs and hair.
It's a long, long way from Amphioxus
But we came from there.*

Young people coveted jobs on MBL's collecting boat which went out early each morning to harvest sea animals for research or teaching in the labs. Many in town today met their spouses while they were either studying or teaching at MBL. An early romance was caught in a class photograph of the 1890s. There the instructor is gazing across the group to a dark eyed intense female student. The instructor, Frank Rat-tray Lillie, went on to become director of MBL. The student, Frances Crane, soon to become Mrs. Lillie,



O.E. Sette and R.A. Goffin measuring mackerel in Eel Pond as part of the long-running population studies at the Fisheries Laboratory, Woods Hole. Summer 1936 by Paul Galtsoff. NEFSC historical collection.

was the best match the organization ever made, for she brought her brother Charles R. Crane to Woods Hole, and he became the lab's best benefactor. (It was she who, many decades later, converted to Catholicism and had the Bell Tower built on the shores of Eel Pond. She named the bells Pasteur and Mendel, after two world famous Catholic scientists.)

F.R. Lillie had a direct influence on the foundation of yet another new institution, one devoted specifically to the study of oceanography: the physics, chemistry, geology and currents of the world's oceans. Lillie headed a study by the National Academy of Science to determine the need to set up such a center. Not surprisingly, it was determined that the institution should be formed in Woods Hole. Lillie enticed the Rockefeller Foundation to contribute funds; thus the Woods Hole Oceanographic Institution was established in 1930. Henry Bigelow, a superb ichthyologist and administrator, was named director; Lillie was president of the corporation. Very soon the ketch *Atlantis* was commissioned in Denmark as WHOI's first ocean going vessel specifically designed for research. She was built in 1931. During World War II, WHOI did much work for the U. S. Navy, particularly with underwater sound. (Since then, much of WHOI's work has been funded by the Navy.) The bathythermograph, a device for measuring ocean temperature in relation to ocean depth, was developed here. The early advances in instrumentation for measuring features of the sea have continued through the following seventy-five years.



The three major scientific institutions in Woods Hole today, from left to right, U.S. Fisheries, Marine Biological Laboratory and Woods Hole Oceanographic Institution with its research vessels. Photo by Jackie Forbes, September, 2006.

WHOI, this “johnny-come-lately” institution, has since become the best known of the local scientific organizations. The submersible *Alvin*, designed here, hit the international news with the discovery of the *Titanic*, although that was far from *Alvin*’s most important scientific accomplishment. Both the discovery of hydro-thermal vents in the Pacific and discovery of other features of plate tectonics have done much to change our understanding of the very structure of the earth.

These three institutions have evolved through the years, yet their basic character still remains. Fisheries still studies the still dwindling fish populations and its budget is still approved by Congress. Its scientists still use vessels built for open sea research. The Marine Biological Laboratory still offers many of its basic summer science courses to graduate students from around the globe. Researchers still arrive en masse every summer for the intense experience of MBL, though a larger portion of these now do biomedical research. Wood Hole Oceanographic Institution continues basic research in the oceans. WHOI now runs three large oceangoing research vessels: *Atlantis* and *Knorr*, owned by the Navy and *Oceanus*, owned by the National Science Foundation. *Alvin* and a herd of submersibles expand the possibilities of deep sea research, while their most recent vessel, *Tioga*, owned by WHOI, is specifically designed for near-shore work. WHOI still receives government funds, but also relies on private grants and contracts.

All three institutions have grown since the early days, making their mark on world science. They have been joined by other smaller institutions including a branch of the United States Geological Service. The



Lowering a plankton net over the side of *R.V. Atlantis* in 1932. Photograph by O.E. Sette, 1932. NEFSC Historical Collection.

Woods Hole Research Center studies climate change. The education-at-sea school The Sea Education Association is centered here with her schooner *Corwith Cramer*. And the Falmouth landscape is peppered with private spin-off companies created by scientists at WHOI. All these together tell us that science is not only the past and present of Woods Hole, but clearly, our future.