



H. B. BIGELOW ISSUE

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OCEANUS

HENRY BRYANT BIGELOW

1879



1967

Leader in the Study of the Sea. Worthy Exemplar of the Agassiz tradition. Biologist. Distinguished Teacher. Judicious Advisor. Humanist. Sportsman.

Author of "Oceanography, its Scope, Problems and Economic Importance", which led to the establishment of the Woods Hole Oceanographic Institution in 1930 and laid the foundation of modern oceanography.

Director 1930-1940. President 1940-1950. Chairman of the Board of Trustees 1950-1960. Founder Chairman 1960-1967.



Jan Hahn, *Editor*

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Chairman, Board of Trustees
Paul M. Fye
President and Director
Columbus O'D. Iselin
H. B. Bigelow Oceanographer
Bostwick H. Ketchum
Associate Director
Arthur E. Maxwell
Associate Director

"OCEANOGRAPHY has been aptly defined as the study of the world below the surface of the sea; it should include the contact zone between sea and atmosphere. According to present-day acceptance it has to do with all the characteristics of the bottom and margins of the sea, of the sea water, and of the inhabitants of the latter. Thus widely combining geophysics, geochemistry, and biology, it is inclusive, as is, of course, characteristic of any 'young' science: and modern oceanography is in its youth. But in this case it is not so much immaturity that is responsible for the fact that these several sub-sciences are still grouped together, but rather the realization that the physics, chemistry, and biology of the sea water are not only important *per se*, but that in most of the basic problems of the sea all three of these subdivisions have a part. And with every advance in our knowledge of the sea making this interdependence more and more apparent, it is not likely that we shall soon see any general abandonment of this concept of oceanography as a mother science, the branches of which, though necessarily attacked by different disciplines, are intertwined too closely to be torn apart. Every oceanic biologist should, therefore, be grounded in the principles of geophysics and geochemistry; every chemical or physical oceanographer in some of the oceanic aspects of biology."

HENRY BRYANT BIGELOW

THIS definition of oceanography was written so well, with such vision that I would challenge anyone to find or submit a better one, even to-day.

In April 1927, the President of the National Academy of Sciences, Professor A. A. Michelson, appointed a committee with Frank R. Lillie as the Chairman, to consider the share of the United States of America in a world-wide program of oceanographic research and report to the Academy. Subsequently, Dr. Bigelow was invited to make investigations and prepare a report. The report led the Academy to recommend the establishment of a well-equipped oceanographic institution on the east coast. The result was that our Institution was established almost full blown in the course of a year, with Dr. Bigelow as director.* I urge anyone who has not done so to read the book "*Oceanography, its Scope, Problems and Economic Importance*", Houghton Mifflin, 1931 which contains parts of the original report. Many of Dr. Bigelow's recommendations are as valid in 1968 as they were in 1929.

Paul M. Fye
Director

Most books tell what their authors know or think they know. Henry B. Bigelow's "Oceanography" (Houghton, Mifflin) is devoted to telling what Mr. Bigelow does not know, to what, in fact, no one knows.

Lewis Gannett
(Book Review, N. Y. Times, 1931)

*For a full account of the developments see Chapter IX in: "*The Woods Hole Marine Biological Laboratory*" by Frank R. Lillie. The Univ. of Chicago Press. 1944.



HENRY BRYANT BIGELOW

3 October 1879 — 11 December 1967

An Appreciation . . .

HENRY BRYANT BIGELOW died on December 11th, 1967, aged 88 years. The world seemed suddenly to have become appreciably poorer. When I first met Henry Bigelow he had recently lost a son in a mountaineering accident, and the impression that I gained was of a stricken saint. Saintliness was a quality that he would have disclaimed. He was a many-sided, warm and human person, loving the open air and the occupations that go with it. I have not previously heard of a saint who so much enjoyed partridge shooting. Nevertheless, my first impression was to be borne out by my later experience of him. From his boyhood and for the whole of his life Henry loved the outdoors and every facet of natural life. At the age of 26 he married Elizabeth Perkins Shattuck, who shared this love and accompanied him on many journeys. It was indeed tragic that they should lose not only a son in the outdoors, but shortly afterwards their elder daughter in an accident with a horse.

They always treated their many friends with great generosity. In the early years of the Second World War we lived in Lowestoft, which was rather too near the enemy and rather often lightly bombarded. It was characteristic of the Bigelows to offer to take our children and, as it were, adopt them for the duration of the war. This seemed to us a very sensible action to take, so much so that it was; I think, three days before we decided to decline it. After the war we did not decline but joyfully accepted an equally generous offer to take one of our children, who had suffered a serious illness, and treat her as a Bigelow daughter for a year. These kindnesses were only examples, though large ones, of the way that the Bigelows treated their friends who visited them. There was in their behaviour as hosts not only the utmost consideration but also a determination to take trouble to make the visits exceedingly interesting for their guests. They remain as vivid memories.

There must have been a score or more sayings of Henry Bigelow that should be down on paper. Two have stayed with me over the decades. One was the reminder of Mark Twain's definition of ignorance; "not so much not knowing things, as knowing things that ain't so." The other was a dirge of woe about the mistake of ever becoming a Director. "I can't think why anybody tries for it." I was often to think of that later when I learned from my own experience that the staff bring to the Director only the problems to which there is no good solution. They solve all the easy and pleasant ones themselves; and there is almost no limit to the kind of problem that crops up among a staff of any reasonable size.

Looking over the list of Henry Bigelow's associates from Europe, I feel that one of his great qualities was that he had a definite effect on everybody who worked near him or dealt with him in any way. I remember myself the impact he made on the International Council for the Exploration of the Sea when he came to see us in Europe in March 1931 as representative of the North American Committee on Fishery Investigation. Throughout the proceedings the conference was richer whenever he was present. I am sure that it was the same when European workers came to work in association with him. One had the feeling that he was a man of such excellence and such exceeding pleasantness that not for a moment would one relax in the effort to do one's very best in order to support him as far as possible. That was my personal feeling and it is clear and to me at least, very remarkable, that he must have had the same effect on the eleven or so people whose names are in front of me: Hjort, Helland-Hansen, Schmidt, Knudsen, Maurice, Stanley Gardiner, D'Arcy Thompson, Vedel Tåning, F. S. Russell and le Danois. A. G. Huntsman of Canada and Bigelow were, as I saw during the Passamaquoddy Investigations, close colleagues and joint venturers in many an enterprise. Out of

the friendship with Hjort came their joint fishing for prawns in U.S. deep water similar to that of the Norwegian fjords and so—I have always supposed—the development of this fishery in the Gulf of Maine and elsewhere.

I remember D'Arcy Thompson, who at that time was by no means recognized as he deserved to be, holding forth on the subject of professors who took all the limelight for themselves, and those others whose chief monument was a series of very distinguished students. On the latter score Bigelow ranks high. We have not only Herrington, Nesbit, Schroeder, Sette and Walford, all of whom are recognized as being of the first rank in fishery and marine research, but also Smith, Ricketts, Hoyle and Graves of the International Ice Patrol, whose work is known all over the world, and one who became his colleague—George L. Clarke. Two students were to succeed him in the directorship at Woods Hole: Columbus O'D. Iselin and Edward H. Smith.

That is not to say that Bigelow put teaching before research. He did not seek the limelight but his record is one of absolutely steady and painstaking research from contact with the field. Always he put the importance of field observations high. There is a story that once he was so angry with a student who drew the insides of an animal from his imagination that his outburst disqualified him from being allowed near any student for quite some years.

As a young man, between the ages of 23 and 28, Bigelow published papers on various biological subjects, but already at the age of 25 he was working on coelenterates including medusae from the Maldiv Islands, where he had been on an expedition with Alexander Agassiz. This was the beginning of what I am inclined to call the coelenterate period of Bigelow's biological work, and it continued as his main interest for 16 years. It really ran on for much longer than that with isolated papers, as his bibliography shows. There was a paper on medusae as late as 1940.

Sir Frederick Russell writes to me—“Throughout his career Bigelow had a lasting interest in the systematics and biology of the pelagic cnidarians on which

group he was an acknowledged master. His report in 1909 on the medusae of the eastern tropical Pacific collected by the *Albatross* is a classic and set the standard for his many succeeding papers. It is sufficient surely to say that his name stands among the few who have laid the foundations of our knowledge of this group. Bigelow studied also the siphonophores, the group in which in his latter years he collaborated with Mary Sears. His report in 1911 on the *Albatross* siphonophores was of the same standard as that on the medusae. It is said by Totton in his 1965 Synopsis of the Siphonophora that the 1911 report is ‘the most useful systematic report on the Siphonophora that has ever been written.’ Bigelow thus undoubtedly ranks as a great systematic zoologist.”

The life of the young man up to the age of 33 was based on the Museum of Comparative Zoology at Harvard where Bigelow had graduated in 1901. The Museum life was broken by expeditions with Agassiz, the one to the Maldiv Islands already mentioned and others to the east and tropical Pacific and the West Indies.

Following a meeting with Sir John Murray in the Museum, there began in 1912 what must be considered as the second and major work of Bigelow's life, the cruises in the Gulf of Maine. The schooner *Grampus* was made available for a joint expedition by the Museum and the United States Bureau of Fisheries, and was conducted by Henry Bigelow for 12 years. Although he suffered from seasickness he spent the greater part of every year in making observations in the Gulf of Maine with very primitive resources and mainly as a “one-man band.” This is where the patient determination of the good field observer was called upon to a degree that cannot fail to arouse our admiration. The three book-size monographs that resulted were respectively on the fishes, the plankton and the hydrography of the Gulf. And each is a classic because the completeness derives from close observation at sea. On the fishes he had the help of W. W. Welsh until his untimely death, thereafter he had to complete it himself. It has always seemed to me that these monographs, since I first

encountered them in 1930 on joining the Passamaquoddy Commission, gave a better and more coherent account than that work done by so many more hands in an area of comparable size, namely the North Sea. I found in the highly uncertain and difficult area of the Bay of Fundy that there was at least this firm and reliable basis on the parent sea, namely the Gulf of Maine.

That had not been so in 1912. Until Bigelow started, there was virtually no knowledge of the biology of the off-shore waters, and for one man to have made such a clear and complete job of a relatively large area, which has a wide mouth open to the ocean, was a monumental job of which any man could be proud even if he had done nothing else in his whole life. I think that we can fairly call this phase of the work by the name 'oceanography,' and just as Henry Bigelow sailed as assistant to one of the original founders of oceanography, we might call him one of the founders of the new oceanography, that is oceanography with an ecological aim, so that instead of the mere description of what there was in the sea, there should be an explanation of the interconnections based on full knowledge and the applications of other branches of science.

He developed this idea from 1927 onwards as secretary of the Committee on Oceanography of the National Academy of Sciences. His report to the Academy on the United States contribution to the study of the oceans resulted in the founding of the Woods Hole Oceanographic Institution, of which he was the first Director. Later he was President and then Chairman of the Board of Trustees and his association with the Institution lasted for 30 years.

On the staffing of the new institution I quote the account in the preface to "Bigelow Volume" of this journal in 1955—"The task of assembling a staff for the new oceanographic institution at Woods Hole was not an easy one for there was little raw material with which to work. There were a few young men with some experience at sea and by combing the museums of the country doubtless he could have assembled a respectable group of experts on special groups of marine

organisms. The primary objective however was to give impetus to oceanographic studies in the universities and there was the developing viewpoint to be fostered. He chose the bolder course of educating a new generation drawn from the universities: physical chemists, meteorologists, physiologists, bacteriologists, whoever could be persuaded that scope for their skills could be found in studies at sea."

That quotation, I think, substantiates my view that Henry Bigelow was a founder of modern oceanography. From this group of men of diverse skills and knowledge that he formed at Woods Hole has grown one of the world's most famed oceanographic institutes and one that continues to lead in many branches of marine science.

Already in 1927, Henry Bigelow had begun a collaboration with William C. Schroeder, which was the beginning of the third phase in his biological work, that of writing systematic treatises on the fish of the North Atlantic, including the Gulf of Maine. This was the work that continued until his death. It was clear even in 1930 when I was in contact with that side of the North Atlantic, that the systematics of the fish was by no means complete in spite of the excellent work that had been done by Bigelow's predecessors. Year by year, and sometime more than once a year, the gap was filled in, brick by brick as it were, including his monumental work as Part 1 of the *Fishes of the Western North Atlantic* in 1948, Part 2 in 1953 and in collaboration with others, Parts 3 and 4 in 1963 and 1964. As lately as 1965, there appeared *A further account of batoid fishes from the Western Atlantic and Notes on a small collection of rajids from the sub-Antarctic region*. A paper in 1956 had announced even a new family of Batoid fish. I will hazard the opinion that a great many biologists have gone to their graves without adding as much in their lifetime to knowledge as Henry Bigelow did in this, his third department of professional work.

Bigelow's progress from the position of a comparatively obscure assistant in the Museum of Comparative Zoology to full professorship at Harvard in 1931 could not be called very rapid academic promotion, but nevertheless, he felt strongly his obligation to his students and maintained

his teaching for many years, not only in oceanography, but also in invertebrate zoology. He maintained his professorship until the age of 70, and I have heard of him attending at the Museum until very much later, indeed he was still studying the fishes there to within a very short while of his death. His last paper is "in press" at the present writing.

Bigelow's work was generally recognized. He was granted an honorary degree by Yale University and then by Harvard and by the University of Oslo. He received the Johannes Schmidt Medal, the Agassiz Medal, the Elliot Medal, the Bowie Medal, the Monaco Medal and was the first recipient of the Henry Bryant Bigelow Medal for Oceanography, established in his honour in 1966 by the trustees of the Woods Hole Oceanographic Institution. He was elected to membership of the National Academy of Sciences, the American Academy of Arts and Sciences and the American Philosophical Society. He was affiliated with the Norske Videnskaps Akademi, the Royal Geographical Society of London, the Zoological Society of London and the Marine Biological Association of the United Kingdom.

In spite of all these notable achievements, I feel sure that Henry Bigelow himself would be more pleased than anything else that we had noted his remarkably long record. It would please him I am sure to think that his published papers should extend over 68 years, from 1901-1968. We know that he was quite proud that he had been on the staff at Harvard for longer than any other person had been, in the whole of the long and distinguished history of that university. Technically Henry Bigelow can be described as having bridged the period from the original oceanography to modern oceanography and the present day. Truly, however, his character seems timeless. He would have delighted the people of the Elizabethan period, or those of early New England or, I steadfastly believe, those of the times that lie ahead.

He is survived by his widow Elizabeth, a son Frederick Shattuck Bigelow and daughter Mary, Mrs. Lamar Soutter.

MICHAEL GRAHAM

*Rivington
Bolton
England*

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THE HARVARD CRIMSON

WEDNESDAY, DECEMBER 10, 1930.

Professor Bigelow Heads Oceanographic Institute Begun by \$2,500,000 Rockefeller Foundation Gift

Harvard Staff Will Assist in
New Enterprise at
Woods Hole

Undergraduates Will be Able
to Participate in
Informal Study



C. M. WEISS

Dr. Bigelow at a departure of the 'Atlantis'. At left is Columbus O'D. Iselin. At right the late Captain Henry Mandley, Jr., second mate on the vessel and one of the last of the American whalemén. The lady is unidentified.

TO attempt to write adequately about Henry Bryant Bigelow is extremely difficult, especially for one who had the privilege of being one of his students. I discovered Dr. Bigelow when I was 21. Thus, I have known him and have sought out his advice during all of my mature life. His advice was always good.

I was a junior at Harvard before I was smart enough to discover that Harvard had Dr. Bigelow. I had a terrible time finding him, but I finally located him on the top floor of the Museum of Cooperative Zoology in a much cluttered room, bending over a very dead fish with William Schroeder. In ten minutes my entire career was changed. I was supposed to be a banker.

I told him about my growing interest in marine science and hardly looking up from his little fish he told me that I was reading in the wrong library. For anything having to do with oceanography, the library at the Museum was much the better one. I still have the notes which I made while reading in those days and they

include Dr. Bigelow's recommendations for what he considered the more important aspects of marine science on which one should focus attention.

Dr. Bigelow and several of his student friends, each of whom became a full professor at Harvard, had made a summer's cruise along the coast of Labrador. Twenty years later, I essentially retraced their steps. He and his associates had certainly skimmed off the scientific cream. We found in 1928 poor pickings, although we had much fun.

The next winter, when I returned to the Museum, Dr. Bigelow was in the midst of two mammoth projects: he had just about finished his classical studies of all aspects of the Gulf of Maine and at the same time he was serving as the secretary for a National Academy of Sciences Committee on Oceanography. I was able to help him some on his writings about the Gulf of Maine, but in his thinking about the future of oceanography he was so much ahead of me that I gave up. The book that he wrote remains to this day

the bible of marine science. He outlined all the problems that have kept his many students busy during the subsequent 40 odd years. It will require many more years to complete the job that he so clearly outlined.

As I came to know Dr. Bigelow as a man, rather than just as a scientist, I began to realize how much of an outdoor man he really was. He was a dead shot all his days, he could sail a racing sloop about as well as his friend and neighbor, Charles Francis Adams; he could paddle a canoe or row a boat a great deal better; he enjoyed mountain climbing and he seriously took up skiing at the age of 60. His one physical weakness was that in the open ocean he was often seasick.

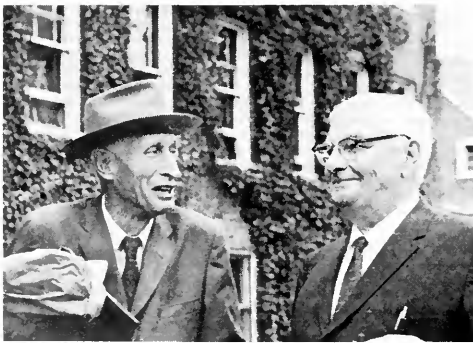
On his daily trips to Cambridge, he continued to grind out important science. Many of the references are of book length.

He leaves behind a daughter and a son, and an especially lovely wife. His privileged students, such as I, stand in amazement at how much the man accomplished. While one can resort to claiming that he worked dilligently at it for at least 68 years, I doubt that anyone has ever accomplished more for the general welfare of marine science than Henry Bryant Bigelow. You will find more complete accounts of his remarkable achievements, but I choose to be brief because I doubt that any of his other students ever had the chance that I had to know the whole man.

C. O'D. Iselin

H. B. Bigelow Oceanographer

WHOI ARCHIVES



Dr. Bigelow and Mr. W. C. Schroeder, lifelong collaborators, on "Bigelow Day", August 19, 1960.

MY first meeting with Dr. Henry B. Bigelow was in the spring of 1923 in Washington, D. C. at the U.S. Bureau of Fisheries. His visit concerned a cod tagging project to which I had been assigned. I invited him to lunch and he, being a New Englander, I selected a restaurant noted for its seafoods. However, seafood was not his dish. Also, he insisted on paying for his meal inasmuch as the Government was paying him four dollars a day for hotel and meals. So that was that.

Little did I know how fortunate I was to have joined up with Dr. Bigelow, for my close association with him lasted without interruption until his death in December 1967. Never was there a cross word between us. Any job he tackled was sure to be a success and one has only to read his "Memories of a Long and Active Life", published in 1964, to realize how truly active he was. Pessimism certainly was not a part of his life whereas humor was. Languages, French, German, Spanish, etc. he could handle well and I was amused one day when he was paid a visit by a French colleague with whom he carried out an animated conversation in the native tongue. I say I was amused because it was the only time in our life long association that I was to hear Dr. Bigelow speak French.

W. C. Schroeder

For many years Dr. Bigelow was President of the Tihonet Club, a fishing club at Wareham, Mass., and for the last two years, until his death, he was Honorary Club President.

I HAVE fished with Henry a good many times over quite a good many years. Our fishing acquaintance started by Henry showing me all the little known spots where trout are apt to hide, especially in hot weather. He knew a half dozen or so of such spots which I think at that time nobody else had found. Probably on account of that, in all the years I have fished Tihonet I have so far never failed to catch at least one trout per day.

Three times Henry and I arranged a fishing party at Tihonet with James B. Conant and James Phinney Baxter. We would split our guests between us for fishing, and assemble at meals, where the conversation was most stimulating. Baxter's limitless memory would start Conant off, and Henry and I put in an occasional remark, either to keep the two going, or to shift them to another subject. I remember that on one of these occasions Henry had complained that Harvard had retired him too early. Both Conant and I maintained that, if it were not for his distinction, he would have been retired earlier. At the time of his retirement I had commissioned Henry to use his vast knowledge about fish and their habitat, plus his increased leisure, to find out why our best fishing pond, the Frogfoot Reservoir, became so murky in the summer months of each year that fly fishing was totally unproductive. As far as I could see, Henry did nothing about it, but the Reservoir did clear just before this particular trip with Conant and Baxter. Henry and Conant had a lengthy discussion about why it had cleared, and decided that the copper in the natural gas pipeline which had recently been laid under the Reservoir had done the trick. I am not sure that they were right, because the Reservoir has reverted to its murkiness.

As recently as two years ago, Henry and I went on our last Tihonet fishing expedition together. In spite of his age, he insisted on helping me lift the canoe on and off the car, and on carrying one end of it from the road to the water. He complained about his casting, saying his wrists had lost their spring; but he handled a line of proper length, and when we fished a narrow, winding stream running through a cranberry bog, with a strong wind, Henry caught his fly on the cranberry bushes less than I did.

While Henry's conversation was always interesting, I do not remember any "bon mots" as good as the one Parker Perry has contributed. It was Henry's obvious enjoyment of the fishing, the decisions of where to go and what fly to use, the anecdotes of his early fishing experiences, and above all his friendly companionship, that made our trips together so memorable for me.

Charles A. Coolidge

FOUR of us were chatting after supper, and I asked Dr. Bigelow a question.

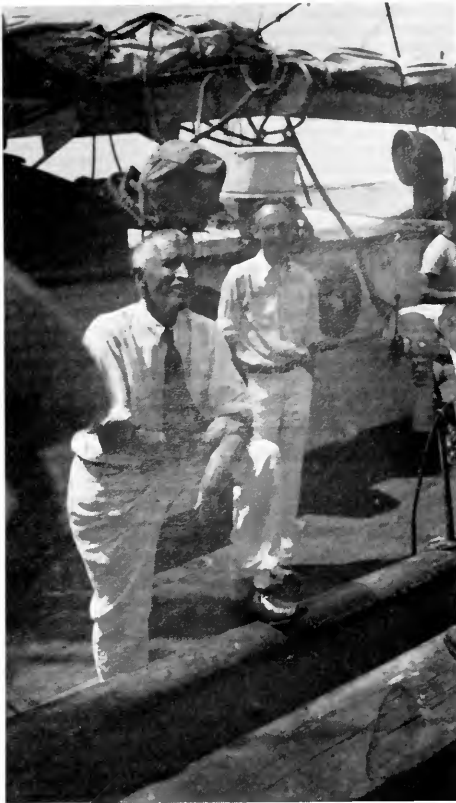
"Dr. Bigelow, you are one of the world's most prominent authorities on ichthyology, and I believe you have perhaps fished for trout and salmon in more rivers and streams throughout the world than any other living American. As you know, I too love the sport and I have tested many of the more popular theories for successful fishing. Would you pass on to me your own formula for success?"

Dr. Bigelow replied: "Well, Parker, I have known you since you were a little boy and yes, I will share with you my secret of successful fishing."

I waited with bated breath, for this pearl of wisdom from such a great authority.

And then, Dr. Bigelow with his quizzical smile said: "Be there when the fish are biting!"

Parker D. Perry



H.B.B. on board the 'Atlantis'
with T. Greenwood.

THE summer months I spent at Woods Hole, between 1931 and 1941, were always a sheer delight to me, scientifically speaking, largely due to the genius of Henry Bigelow, who never missed an opportunity to come to my laboratory on the second floor of the main building. He usually brought with him a visiting scientist or just dropped in for a few minutes chat. His humor and genial manner were highly stimulating and gave me a much broader outlook of the problems dealing with the sea.

Dr. Bigelow's first question to me when I met him in the spring of 1931, at the home of Professor Conklin in Princeton,* after I had been informed of the plans for the Woods Hole Institution, was: "Do you think that we should also consider marine bacteria"? The twinkle in his eye and my appreciation of his profound knowledge of marine processes, as shown in his classical book on "oceanography"

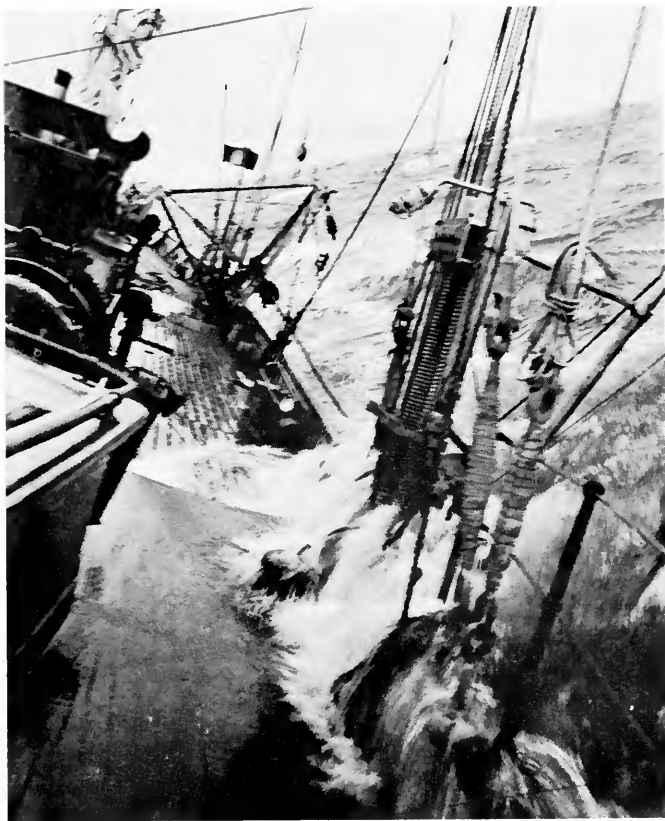
*See my paper on "Marine bacteria" in the 1955 volume of *Deep Sea Research* dedicated to Dr. Bigelow.

that led to the establishment of the Institute, convinced me that he was testing me for my own knowledge of the problems involved. Without hesitation, my answer was in the affirmative. When, at the end of the month's stay in 1931 at Woods Hole, I presented to him a plan for organizing a marine bacteriology program, he asked me again: "Would you like to do it"? There was again only one answer, namely, a positive one.

Henry Bigelow's humor was well expressed in his talks at the weekly meetings of the staff. He addressed the first meeting in 1931, on the subject: "The seas that I vomited in." Thus he set the tone for others to follow. I believe that it was my turn the following week. I remember bringing with me, for illustrating my talk, a few Petri plates and Erlenmeyer flasks. He did not fail to ask pertinent questions and make comments. These were most illuminating and highly stimulating. The following morning he came down to what he liked to refer to jokingly as my "harem"* to talk further about the role of bacteria in marine processes.

One day, I believe it was in 1932, he brought with him the eminent Norwegian algologist and oceanographer, Professor H. Gran, who spent that summer at the Institution. When Gran saw the autoclave in my laboratory, he turned to Bigelow and exclaimed: "That is exactly the equipment that I will need for my work." When I asked Gran the purpose of the autoclave in algal studies, he replied: "To prepare soil extract. I cannot grow my algae in sea water without it." Both Bigelow and I were amazed by this statement. I suggested that perhaps the soil extract provided the necessary iron in proper combinations for algal growth and photosynthesis. Gran replied: "No, I do not believe it since we have tested various organic compounds of iron without any success." I proceeded then to prepare a synthetic ferrolignoprotein complex. Gran tested it, and to both Bigelow's and my delight, it worked just as well as the soil extract.

*He coined this term because of the fact that most of my assistants then and in subsequent summers were women.



"The ship was rocking in her usual manner."

Who can ever forget my first trip on the 'Atlantis' in 1932. In addition to myself and my first assistant, there were on the ship, Bigelow, Rakestraw, Gran, and I believe also Redfield, and one or two other scientists. Rakestraw shared the cabin with me. The ship was rocking in her usual manner. After I laid down on my bunk, I could not get up for more than 24 hours. Rakestraw apparently felt as bad as I did, but he managed to get up every few hours, rush to the toilet, then for an hour or so to the laboratory, and then to the bunk again. I felt so miserable that any courage that I may have had when I went on the ship left me. I well remember Bigelow, opening the door of the cabin, taking one good look at me, and announcing that: "All food would be wasted on him." Finally, the sun was up, and I felt somewhat better, I went outside and sat down on the deck of the ship, with Bigelow and Gran, listening to their stories about seasickness. They spoke of various seas, ranging from Lofoten Islands off the Norwegian coast, to the west coast of South Africa. I listened

but was completely unable to go into the lab or even return to the cabin. The Captain (McMurray) brought me a glass of rum toddy, which tasted rather good. Finally, Bigelow turned to me and said: "You better stay on shore and have your assistant go to sea and collect the water and bottom samples that you require for your work." Unfortunately, my assistant (Reuszer) was also sick at that time and I did not see him until four days later, when we were returning to port. It was only when Charlie Renn became my second assistant the following year, that I could follow Bigelow's advice.

One more story. Although this does not involve Bigelow himself, it is too good a story not to be told here. It was my last summer (1942) in Woods Hole. We were in the midst of World War II, and the Institution was completely occupied with naval projects. A room was rented for me at the Marine Biological Laboratory where I spent exactly one month. My only collaborators were Dr. Cornelia Carey and one graduate as-

sistant. Since I was at that time busily engaged in the search for antibiotics,[†] I made an attempt to determine whether marine bacteria also include antibiotic-producing organisms. We enriched, daily, flasks containing fresh water with living cultures of *Escherichia coli*.^{*} The latter were rapidly disappearing when added to the water. There appeared to be developing in the water something (I still do not know whether it was a living organism or a chemical agent) that killed the bacteria. Since our time at Woods Hole was soon coming to an end, I decided to take the flasks with the enriched water to New Brunswick and try to do the isolation work in my laboratory at Rutgers. When it was time for us to leave, Dr. Carey and I discovered to our complete disgust that our assistant, in an effort to leave a clean laboratory, washed up all the valuable flasks with the enriched water. There went our whole summer's work literally down the sink. I was glad that Dr. Bigelow was not there, to look upon my discouraged face.

That was the end of my active scientific connection with the Oceanographic Institution, and well it might be, since it was also the end of the directorship of Dr. Bigelow. Without his constant guidance and encouragement, any further work in the field of oceanography on my part would have lacked the luster and perspective that only the master could inspire, and the master was Henry B. Bigelow.

Selmon A. Waksman
 Professor Emeritus
 Rutgers—The State University

^{*}This was a method that I often used at that time in an attempt to isolate antibiotic-producing organisms from the soil.

[†]Dr. Waksman modestly omits that he received the Nobel Prize in Medicine in 1952. We believe that he and Professor August Krogh of Copenhagen were the only two Nobel Prize winners who have been connected with our Institution. (Ed.)



The Anderson Sampler, used to obtain sediments for bacteriological studies.

"Finally, the sun was up, and I felt somewhat better. I went outside and sat on the deck". Dr. Waksman ahead of the pilot house of the 'Atlantis'.



RENN

“Watch out Archie . . .

You’re sitting on your cigar”

NO one would have called Dr. Bigelow an organization man. Yet, he did produce an organization, and a peculiarly effective one, out of some of the world’s most unorganizable people. He did it by being more of an individual than any of them, and they became docile and momentarily cooperative.

The most useful administrative principle in Dr. Bigelow’s system was his “open door policy.” Early in the Institution’s first meetings, Dr. Bigelow announced that he liked to see what was going on, and he liked to feel welcome to drop in. He said that he deplored the cellular pattern of the new biological labs at Harvard where every professor was protected by an innocent girl or an old battle axe in the front office. It frightened off the students who should have the benefit of a full paid professor now and then. He did not want that in his Institution, he said.

He made this seem selfish, but what he really had in mind was that those of us who were groping around for ideas in oceanography could visit and learn from one another. He knew that most worthwhile people were shy, but that their curiosity could overcome shyness, and this could lead to learning something new just by dropping in to investigate a smell or a buzzing noise.

Dr. Bigelow used to drop in to visit in Dr. Selman Waksman’s old microbiological laboratory on the second floor of the old building. The smells always challenged him. He said that we smelled like a menhaden plant. Then he would ask a few questions, say one or two words, and you had something to chew on for the rest of the summer.

Dr. Bigelow liked to watch things happen. Now and then he would stop by to glance at the races in the Hole. He knew exactly when a boat would go aground or get caught in an eddy. I do not think that he especially liked small boat racing; it was too slow and ritualistic. He called it turtle racing.

Dr. Bigelow’s eyes were always out ahead of his conversation. That gave him an edge. He liked people to use their eyes as well as their heads, and he was especially disappointed that few used the big cast concrete aquarium tables that were installed in all laboratories. He would roam around the building and mention this. He had hoped that everyone would have an aquarium to stimulate his ocean thinking. It let him down that they boxed those tables in with plywood, made storage space of them, and committed other inanities.

His own sharp lookout convinced him that everybody around the Institution was accident prone, and he was concerned about poles leaning on tables, flasks and bottles too close to the edge, and unattended flames. Once this helped me out of a difficult spot.

In my first few years at the Oceanographic I worked on the parasite of eel grass disease and Dr. Bigelow was so pleased with the project that he used to bring notables in the laboratory so that he could tell them about its progress. Word came that Dr. A. G. Huntsman of the Canadian Fisheries Board was going to be brought up to see what we were doing. I was scared to death. My Canadian friends had told me about Dr. Huntsman — A. G. stood for Almighty God. Dr. Huntsman was supposed to converse with migrating herring in classical Greek. Although I could make small talk on composts and fertilizers, Greek of any kind was impossible, and I was headed for humiliation. (Later, when I got to know Dr. Huntsman better, I found him most humane. But it is good for the young to have a severe model, now and then.)

Dr. Bigelow arrived with Dr. Huntsman and introductions were finished in two seconds. Then there was a long awkward pause, Dr. Huntsman lit a cigar, walked about a bit, came back to my corner, backed away, and began to sit down on a window table, passing up the chair that I moved to him.

Suddenly, Dr. Bigelow said, “Watch out Archie, you’re sitting on your cigar.”



Dr. Waksman seated on the rail chats with Professor H. Gran.

Dr. Charles E. Renn at Woods Hole in 1934.



Dr. Huntsman was an inch off the table when the idea connected, and he went up two feet without touching the floor. It was superb levitation and physically impossible. Dr. Bigelow broke up in stitches, Dr. Huntsman turned a lovely pink, and I was relieved. I do not believe that Dr. Bigelow created the situation, but I am certain that he saw it as a way of breaking the ice and getting me unfrozen. I liked Dr. Huntsman from that moment on.

This sort of physical alertness touched everything that Dr. Bigelow managed. His eyes told you before the words came. During the Friday night seminars, in which we all groped our way to basic ideas about oceanography—and especially the Gulf of Maine—Dr. Bigelow extracted, edited, summarized, and clarified with the most economical mixture of finished and unfinished short sentences, encouraging nods, leaps to the chart, and groans that could be produced for the benefit of the young. He would tell about what he had seen and you saw it.

You knew that he was looking—and that he cared a lot. He didn't tell you that. But this sense made you do more, and I will bet that more lazy biologists and dilatory intellectuals achieved twice their expected quota and at least half their stated aims because of it.

Dr. Bigelow could assess character and potential quicker and more reliably than any computer or promotion board that I ever saw. In the early spring meetings of the fellows were held at the Museum of Comparative Zoology to review applications for fellowships at Woods Hole. Letters and recommendations were in order and Dr. Bigelow would review and comment from the top of the stack down. A word or sentence would catch his fancy and a minute analysis would follow—later, when we met the successful candidate in the fleshpots of the Cape, we found the analysis profoundly correct.

Among other strong beliefs, Dr. Bigelow believed that incipient oceanographers should go out on the 'Atlantis' before they made elaborate plans. One of my first trips was in the company of Dr. Bigelow, Dr. Waksman and Dr. Gran. Dr. Waksman

had used his thumb on a small scale map of the Gulf of Maine to indicate areas where we were to pull up bacteriological samples, and after that he took to his bunk and stayed there. Everybody was seasick, it was gray, miserable and pure diesel exhaust—the 'Atlantis' at her worst in the worst water in the world, the Gulf of Maine.

And I can remember Dr. Bigelow, pale green, making rounds to Dr. Waksman with whom he was much concerned. "I never heard of anyone dying of seasickness," he said, "but then I never saw anyone this sick."

I have an old photograph of Dr. Bigelow, Dr. Waksman, and Dr. Gran, sitting in the sun and talking by the locker aft of the deck laboratory on the first bright calm day following the bout. I have never dared show it.

When Dr. Bigelow broke into the laboratory on an impulse visit, he would

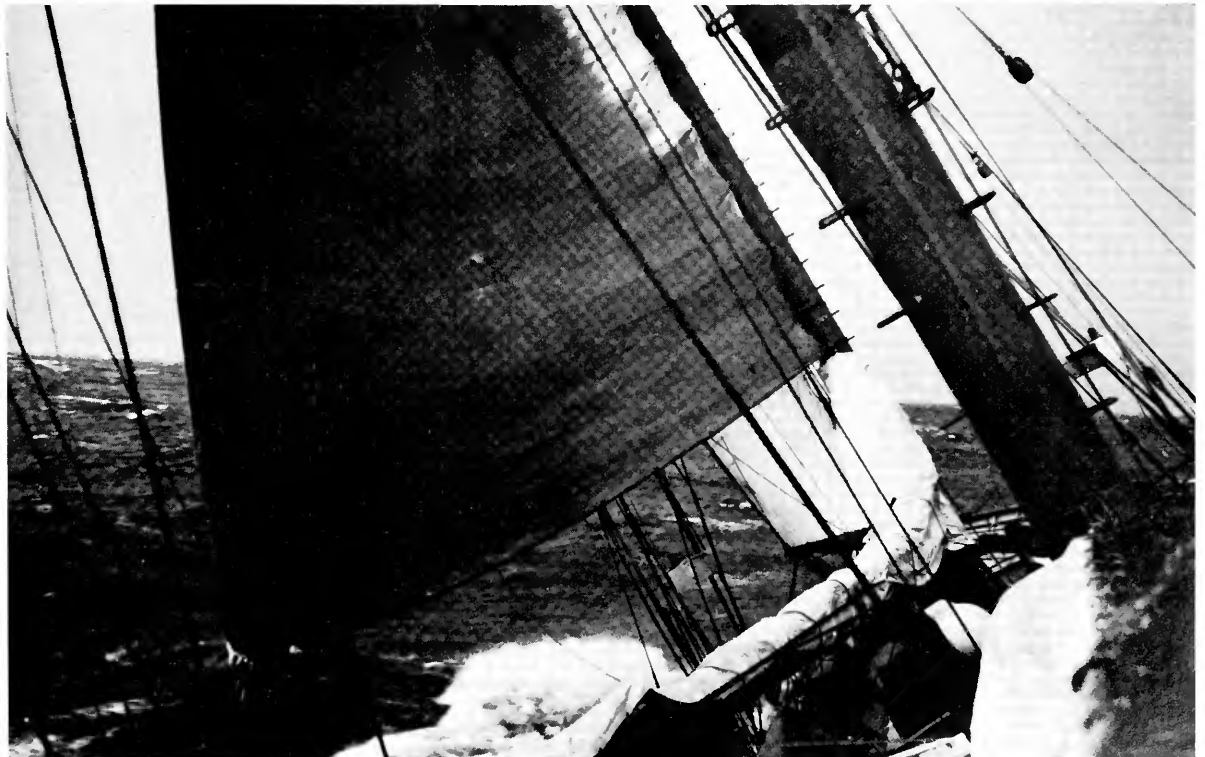
sometimes find his way into his theme with an exploration of the wonderful ways of people. Once he introduced his request that we change a cruise schedule with a tale about the odd things that went on in the then new Coonamessett Ranch where he was staying temporarily.

"I don't understand it," he said, "they give you two face cloths every day, but no plug for the tub. You know, I think that the maid hoards bathtub plugs and leaves an extra face cloth to clear her conscience. Anyway, I plug the bathtub with a face cloth."

This put us so far off base that we were happy to accede to his request that we fit in with the new arrangement that he had thought up.

Charles E. Renn
Professor, Dept. of
Environmental Engineering
Science, The Johns Hopkins
University

"The 'Atlantis' at her worst in the worst water of the world". The unknown photographer of this fine illustration must have been standing on the top of the upper laboratory to show the vessel rolling under storm trysail.





Dr. Bigelow on the wheel of the 'Grampus' in 1912.



Charles Francis Adams on the wheel of the 'Yankee'.

CORRESPONDENCE WITH C.F.A.

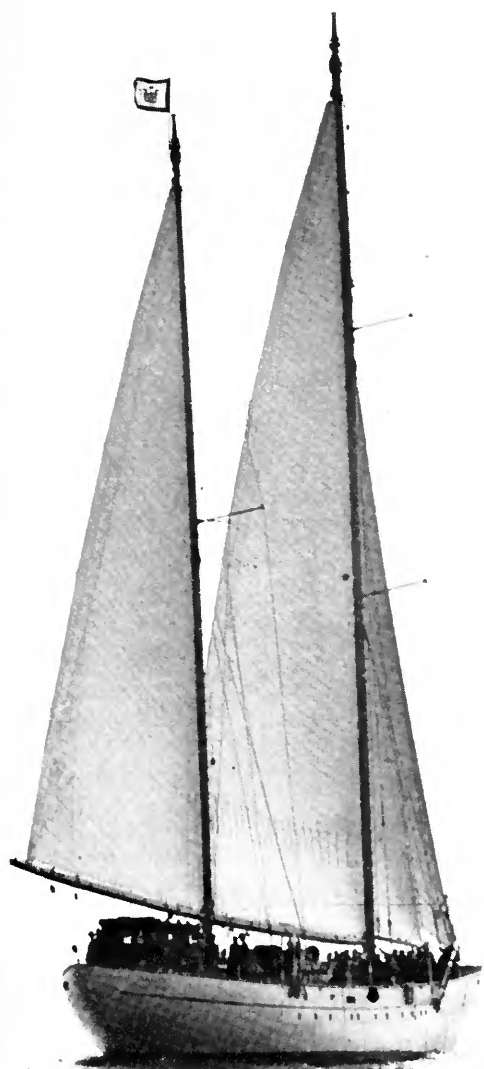
DR. BIGELOW carried on a lively correspondence with his friend Charles Francis Adams, then Secretary of the Navy, which provides an insight in their personalities as well as Dr. Bigelow's foresight. Interesting also was the fact that although they addressed each other as "Dear Henry" and "Dear Charlie", or "Charles", they signed their letters generally as: "C.F.A." and "H.B.B." and sometimes with their full names.

Dear Charles:

July 2, 1930

I don't know if you have heard the news of the establishment of the new institution for Oceanography at Woods Hole. At any rate it's happened, as an outcome of the general survey that the Committee on Oceanography of the National Academy carried out; perhaps you'll remember that you and I talked a little about this. The Rockefeller Foundation has given two and one half millions and it's my fate to be the first director (of course, this doesn't mean any loosening of my ties here). The enclosed announcement (if you read any of it) gives an idea what it's all about.

We are to have a laboratory at Woods Hole on which work has already been started, and you will be glad to hear that we are to build a fine oceanographic ship. She is 149 ft. long on top, gross tonnage 350-360, 300 Hp Diesel engine, rigged as a ketch with a pretty fair sail plan. She is intended to be able to go anywhere at any time and for cruises of any length, carrying half a dozen scientists; fitted for every kind of deep sea work. We have just let the contract to Burmeister & Wain in Copenhagen who bid \$147,000, as against the \$258,000, by the lowest American bidder. We hope she'll be in commission next June. George Owen and Frank Minot drew the plans and they are working out the details of the machinery, which are quite complex and, of course, the most important thing about her. If you would be interested to see the plans, I'll bring them down the next time I come to Washington.



"Columbus Iselin is to be the first captain——"

Columbus Iselin is to be the first captain and we think it will be a great advantage to have a scientific captain as was done on the "Carnegie" and this brings me around to the immediate matter of this letter. Columbus plans to join the Naval Reserve, and when we were talking it over the other day, it occurred to me that it might be a good idea for the director to do so likewise, i.e. for the director always to be in the Naval Reserve—so as to strengthen the liaison between the Navy and the Institution. With its endowment and the prestige it has behind it, the institution is bound to occupy a decidedly important position in the scientific world, unless I turn out to be a fizzle as a director, and many occasions are bound to arise when cooperation with the Hydrographic Office will be helpful to both. I am thinking of such things as soundings, exploration of currents, etc. to which we will devote much attention with the best and most modern methods. We also plan some work on the meteorological side.

If the Navy and the new Institution should decide that it would be wise to have some connection more definite than simple friendship, I suppose the present director (being me) would be appropriate enough for the Naval Reserve on the basis of sea experience, etc. However, when my successor comes along, he may

not be a seaman, but is sure to be a leading oceanographer. Therefore, it might be better, from the beginning, to establish a precedent of associating him with the Navy on the basis of eminence in a profession (namely oceanography) in which the Navy is concerned. I wish you would think all this over and let me know how it strikes you. I could come down to Washington to talk it over with you if you think it worth while, or perhaps can see you sometime when you are in Boston. There is no hurry about it for the institution won't be in active operation until next spring.

Elizabeth and three of the children departed for Norway, via England, last Wednesday. I expect to follow with Betty on the twentieth of this month, to meet them in Switzerland for three weeks climbing, to be home about September twentieth. Somehow I must have a paper sent over now and then to tell me how you are getting on with the 'Yankee'. We were all delighted to hear that you are to sail her.

Yours,

PART FOUR
Books—Features

Boston Evening Transcript

WEDNESDAY, SEPT. 16, 1931
Travel—Fashions

Woods Hole for Orders: Atlantis Seeks a Cargo of Scientists

Dear Charlie:

. . . Congratulations on the way you're pushing the "Yankee"* through the water. We're all much excited.

July 3, 1930

My dear Henry:

. . . It's nice of you to take an interest in YANKEE, but I am afraid that she is too big and is not the horse to bet on.

*Four yachts had been built for the 1930 America's Cup, challenged by Sir Thomas Lipton with 'Shamrock V'. After hard trials

'Enterprise' was selected over 'Weetamoe', 'Whirlwind' and 'Yankee', the latter skippered by Charles Francis Adams. (Ed.)

April 30, 1931

Dear Charlie:

Here is the thing that I have on my mind: We are planning to start at Woods Hole next summer some observations on wind velocities in relation to the actual stress exerted on the surface of the water. To do this, we need a ship theodolite. But we find that, not only are these instruments very expensive, but that we cannot possibly have one built in time to use this summer. So I have had Gardner Emmons, who is to work on this problem, write to the Navy Bureau of Aeronautics to see if we could perhaps borrow one.

I gather from Lt. Lockhart's reply that one can be spared, but that it would be rather contrary to rule to loan it to any person or institution not connected with the Navy. He suggests that I could sign for it as a member of the Naval Reserve, if the loan were approved.

As long as there is an instrument that can be spared, it seems to me entirely appropriate for the Navy to loan it to the Woods Hole Institution, for all the data that we get as to pilot balloons will be of interest to the Bureau of Aeronautics. So won't you approve the loan so it can be made? Of course I'll sign for it and we would be responsible for replacement if anything happened to it. As I said, it is an expensive little gadget costing about \$1,000:—technical name—ship theodolite.

Yours,

My dear Henry:

May 2, 1931

That theodolite has been shipped to you or shipped to the Naval Reserve for you. If it does not appear in due season let me know.

I don't know just what you are about, but yachtsmen would be interested if your observations included the retardation of air movement by the surface of the water. In other words, we would like to know, how much less rapidly the wind moves; say 10 feet up, than it does; say 50 feet up. Obviously, this is a pretty vague subject, as retardation must vary with the strength of the wind and the roughness of the sea. I know you are not observing for the benefit of yachtsmen, but it is possible you might produce a by-product of some value without extra effort.

Affectionately,

Dear Charlie:

May 4, 1931

It's good news that the theodolite is starting to travel our way. Many thanks.

You brought up an interesting problem with regard to the retardation of air movement by the surface of the water at small distances above the land. I confess I hadn't thought of this, but I can see how observations taken, say 10 and 50 feet up, might bear very directly on the matter of interaction between sea surface and air. Next time I see Rossby I'll consult him as to how observations to this end can be taken. I don't know how one controls the height at which balloons float or whether one can put up kites and register the pull on their strings, but will look into it. If we get something out of it that will be of help to yachtsmen, so much the better.

Anyhow I am not sure that it isn't rather a duty to tackle any job that seems to have a direct practical bearing—there are few enough of them that do.

Affectionately,

"Anyhow I am not sure that it isn't rather a duty to tackle a job that seems to have a practical bearing—there are few enough of them that do."

The 'scrounged' theodolite on board the 'Atlantis' in October 1931. C.O'D. Iselin in the background.





H.B.B. as director.

Sept. 26, 1932

Dear Henry:

In reply to your letter of 8 September in which you suggest that an officer from the U.S.S. HANNIBAL make a trip of about a week's duration in the Gulf of Maine aboard the ATLANTIS, I am glad to inform you that arrangements have been made for Commander C. C. Slayton, the commanding officer of the U.S.S. HANNIBAL to make the trip.

I have forwarded your letter to Admiral Gherardi in the Hydrographic Office and he has noted your recommendations for acquainting the personnel of the HANNIBAL with the instruments and methods in use on the ATLANTIS for obtaining deep sea observations.

The Navy hopes to be able to continue its oceanographic work in the future and especially on its surveying vessels when such work will not interfere with their regular surveying program.

Sincerely yours,

My dear Henry:

August 3, 1933

To my regret bordering on despair, I find that your annual meeting is right in the middle of the New York Yacht Club cruise. That is my only period of real vacation, and as you know, my most sacred one. I had really looked forward to coming to your annual meeting this year, but I just can't find it in my soul to desert and do so. Perhaps you will show me over the situation some other time.

Ever sincerely yours,

*C.F.A. as Secretary
of the Navy.*



WHAT Dr. Bigelow has meant to oceanography has been the result of a vision, and you know how difficult it is to communicate visions. He communicated parts of it to various people. The word "exciting" typified the atmosphere that H.B.B. created.

The list of his publications does not provide an idea of their importance. A publication is extremely cheap now compared to former times; it is easier to get things published. The wealth of material, of pertinent material, and the thoroughness with which he and his associates made sure that they put in real facts is what counted.

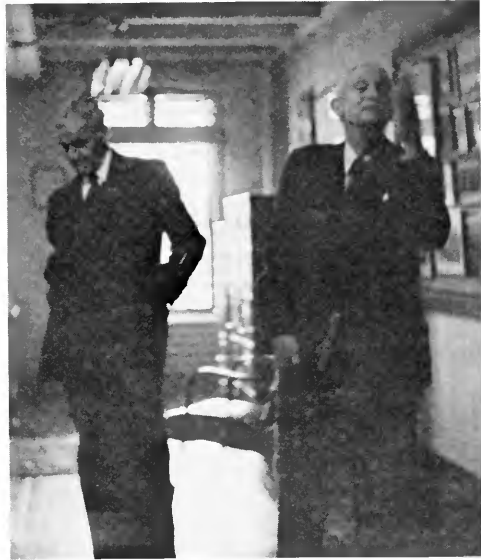
Dr. Bigelow created an exciting atmosphere and had an enormous effect on stimulating people. I saw him occasionally and have been much affected by his personality. His conduct of a meeting was inimitable. Somehow he had a queer combination of lively humor and dead seriousness. I knew him for some 50 years and learned that he saw a job that no one was doing. You have to go out on the ocean and ask: why?

One of his first pieces of work—I am relying on memory—was on Bermuda and find out, as I put it, how land is made out of water. He found evidence that the Bermuda Rock was made out of hard skeletons. Probably that was a demonstration of the importance of life in making things.

When I first met Henry he had been in contact with Johann Hjort and had told Hjort about the redfish being taken at Eastport, Maine. Hjort opined that "that fish does not behave that way at all". Henry said: "It does". The arresting fact is that he brought this to Hjort's attention.

Bigelow had that spirit of discovery and when he went after something you knew it was not just a passing whim. He went after it with vigor and did a thorough job. No one else so fully deserves recognition for what he has done for oceanography.

A. G. Huntsman
Professor Emeritus
Univ. of Toronto



Dr. Huntsman with Dr. Bigelow at the presentation of the "Bigelow Volume". January 24, 1956.

. . . Il était considéré comme "le Père de L'Océanographie américaine". . . .
. . . Comblé d'honneurs et d'années, il disparaît, laissant dans la tristesse toute la Communauté des Océanographes.

H. L.

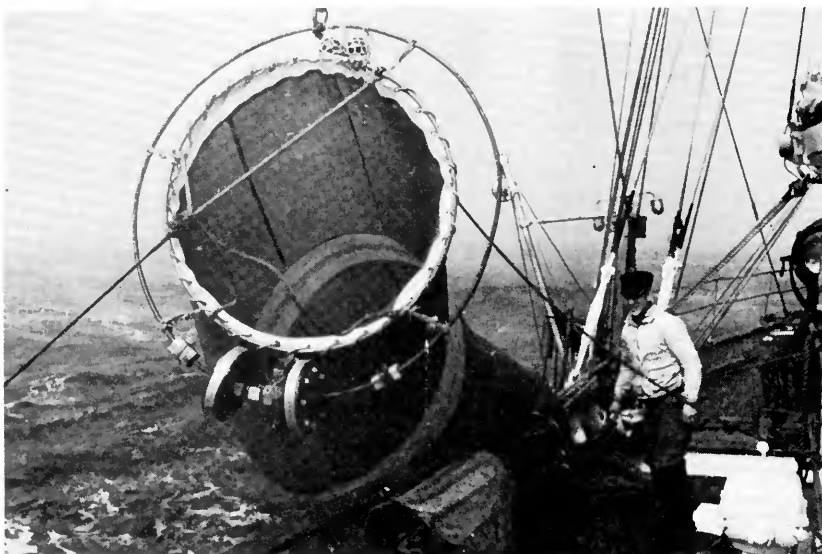
(Cahiers Océanographique, 20(3))

REPEATEDLY, I urged him to employ a secretary to help him with his publications. His reply was: "No scientist should ever have a secretary. If he has one, he would answer his mail and if he answers his mail, he has no time for scientific work."

H.B.B. used to say at election time that he was going to vote against them all.

When asked why he preferred the crooked politician to the reform candidate he replied that the crooked politician would not kill the goose that laid the golden egg.

George C. Shattuck, M.D.



PROPERTY OF G. L. CLARKE

Dean Bumpus o/b the 'Atlantis' with a Bumpus-Clarke stramin net, the "Chariot", equipped with wheels to keep the net opening away from the ocean bottom.

JOHN ARMSTRONG and I shared a lab one winter in George Clarke's suite at the Biological Laboratories at Harvard. John was studying for his Ph.D. He had passed his written exams but with some reservation. He knew a lot about marine animals but had a minimum to offer about terrestrial ones. Bigelow's comment was "Better study up on the land animals. You don't want your knowledge to rise and fall with the tide."

When Armstrong turned in his thesis, Bigelow was busy so he laid it on the corner of the desk. A week later Dr. Bigelow called him over to his office and told him to rewrite the thesis. Armstrong was not certain whether Bigelow had read it or not, as the paper was exactly where Armstrong had left it on the desk. When Armstrong commenced to remonstrate Bigelow said "Rewrite it, every paper needs to be rewritten!" So poor uncertain John rewrote it, much to his own benefit.

Dean F. Bumpus
Senior Scientist
on our staff.

THERE are two items concerning Dr. Bigelow that I would like to mention, just in case others have not already done so.* In the early years of the Institution, when most of us were University staff members who inhabited the Institution only in the summer time, he encouraged each of us to feel that our work was of interest to every one else in the building. Following his example, every one kept the door or lab open as an invitation to others to come in, and indeed the Director was a frequent and welcome visitor. His New England manner of getting directly to the crux of a matter was always delightful and at the same time inspiring.

Each year in the early spring the research staff of the Institution would come together for a meeting at Harvard. The purpose of this was to prepare a budget for the expenses of the Institution for the coming season, earmarking or sanctioning definite amounts to individuals with projects or apparatus being prepared. The procedure was always referred to by Dr. Bigelow as "slicing the melon" — a delightful word picture which has become almost a password between Dr. George Clarke and myself for evoking pleasant memories of those days.

*This aspect of the Institution was mentioned by many of the contributors. Obviously it made a deep and lasting impression. (Ed.)

Edmond E. Watson
Acting Head, Dept. of Physics.
Queen's University, Ontario.

Dr. Watson with the Watson current meter. A. C. Woodcock at right.



Dr. Bigelow's course in Oceanic Biology was really "marine biology" and inspired me to go on and establish ecology as a subject at Harvard, and to expand the course into two courses, one on the principles of ecology* and the other in biological oceanography. Thus, H. B. B. was an ecologist without knowing it!

One day members of the staff were discussing what to do about the behaviour of another staff member, when H. B. Bigelow showed his tolerance of the foibles of others by urging us to give the offender another chance and saying "Well, we're all basically _____'s, you know."

George L. Clarke
Professor of Biology
Harvard University

*Which led to the publication of my book: "Elements of Ecology", John Wiley & Sons, 1954.



Dr. Clarke at Woods Hole in 1933.

J. P. SCOTT

I SPENT most of the winter of 1931 at sea on the trawler 'Kingfisher' under Captain Sylvester Dunn out of Groton, Connecticut. This followed some previous months in the company's loft learning how to make and repair nets (14¢ an hour); now the business at hand was to weigh each haul as it was spilled on deck in an attempt to assess the loss in weight at landing several days to two weeks later, and, ultimately to have a hand in an improved design of storage bins for iced fish on board ship.

In a way and by a means then and now conveniently obscure to me, H.B.B. was instrumental in landing me that job with the Portland Trawling Company.

Came spring and I found myself en route to England, where I spent several months on trawlers, herring drifters, and the research vessel 'George Bligh' under Captain Stewart out of Lowestoft. Then to Copenhagen to join the 'Atlantis' as a so-called "able seaman" on her memorable maiden voyage to Plymouth (England), Boston, and Woods Hole. H.B.B.'s fine Italian hand again.

He and his life-long friend, Archibald G. Huntsman, the latter under wholly different circumstances, started me on a course I have never regretted for a single second.

Now the times come full circle. One of the main architects and author-in-chief of the first volumes of the *Fishes of the Western North Atlantic*, Sears Foundation for Marine Research, Yale University, was Harvardian Bigelow (Yale Sc.D., 1941).

May it be given to a whole company of us in many areas of marine research collectively to fill H.B.B.'s gargantuan shoes.

Daniel Merriman
Director

Sears Foundation for Marine Research.



On the 'Atlantis' maiden voyage. Left—Knut Nielsen, a Danish sailor who remained on board for several years. Right—Ona McClunen, second engineer. Background, looking up—John Churchill, supercargo. Behind McClunen—Terence Keough, sailor.

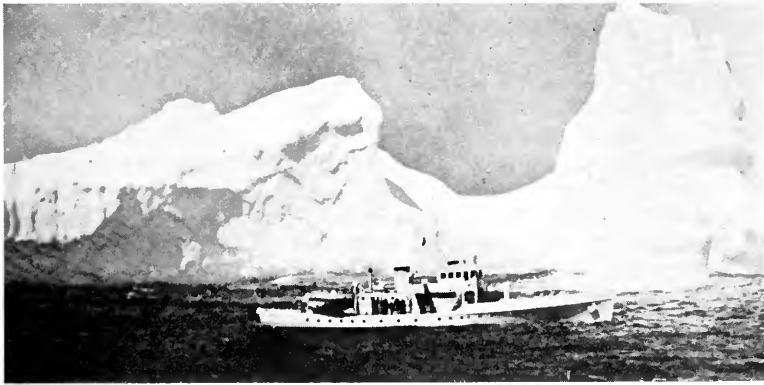


H.B.B. in 1932.



Many scientists were laid low by the movements of the gimbaled mess table on the 'Atlantis'.

"... as the architect of the scientific program of the International Ice Patrol."



A DAY or two before I was to make my first trip on the 'Atlantis' on a one week cruise across the Gulf Stream, about two-thirds of the way to Bermuda and return, Dr. Bigelow called me into his office in his inimitable manner asked whether I got seasick. I had to confess that I really did not know since I had never been to sea. Whether he actually believed in the principle or not, he then went on to assure me that seasickness was 50% psychological. For the most part, the subsequent voyage was quite smooth and no real test arose until the 'Atlantis' made an "anchor station" in the Gulf Stream to attempt current measurement. The roll of the ship and the consequent movement of the gimbaled mess table plus the evening meal that day of liver and bacon shortly sent me to the rail in spite of a strong application of Dr. Bigelow's remedy.

Charles M. Weiss
Professor, Dept. of
Environmental Sciences and
Engineering, The Univ. of
North Carolina.

Dr. Bigelow was a great believer in observations. As the architect of the scientific program of the International Ice Patrol, he urged me to "go out and take a look at the icebergs for yourself." Indeed, while flying over the bergs, I observed details which I hadn't noticed on photographs but after personal observations was able to identify.

Dr. Bigelow was able to get to the heart of a problem quickly, omitting no important details. When I told him of my studies of upwelling, he recounted that when he was with Alexander Agassiz on the 'Albatross' expedition to the eastern tropical Pacific (1904), their ship was becalmed off Peru. It was his way of saying that upwelling was not a continuous process.

In the years I have shared an office with him in his beloved Museum of Comparative Zoology at Harvard, I came to know him as a special kind of man—knowing, friendly, and plain spoken."

Irving I. Schell
Ocean-Atmosphere Research
Institute
Cambridge, Massachusetts

"Only H. B. B. would have thought of such a contraption"

IT is somewhat difficult to adjust to the idea that I am considered an "old timer" in the Museum of Comparative Zoology, but the fact is that I am of the few remaining who worked with H.B.B. as a graduate student. In those days T. Barbour was Director of the Museum, and the situation could best be described as "broke, but happy". The Museum endowment was totally inadequate to pay the staff, and T. Barbour had collected a devoted group of volunteers, many with little or no previous training in zoology, who kept the collections in order and the Museum going. Looking back on it, the Museum was a remarkable combination at that time, for heading the staff were outstanding scientists, and perhaps greatest among them was H.B.B.

In the meaning of the present day, to call a scientist an "amateur" is derogatory, for it implies lack of serious application to the work at hand in comparison to the professional. Actually the word is "love", and the amateur is the person who works at something because he loves it. The men who gathered at T. Barbour's "eteria" for lunch were amateurs in the finest sense and it was a joy for a graduate student to sit in a corner and listen to them. H.B.B. and T.B. made a fascinating contrast. The former, lean, slightly stooped, with a thin face and bright blue eyes that are seen only in those that make their business about the great waters. The latter a huge man, with a deep voice, a great laugh, and a habit of curling his forelock between thumb and forefinger when in deep thought. The conversation covered many subjects and almost always it had its basis in natural history. Both men were great sportsmen and had travelled widely, but the thing that made it exciting was their remarkable power of observation and their ability to ask imaginative questions, and even derive some fascinating answers. Their enthusiasm permeated the place, and it was contagious.

In spite of his love of sport, H.B.B. was a rigorous scientist, and was brought up in the strict scientific discipline of the turn of the century. He once told me that his sponsor, E. L. Mark, allowed him to work on a thesis problem for a year before suggesting that he look up the work of some German published years before. As Mark knew he would, H.B.B. found that he had been thoroughly "scooped", and thus the lesson was learned that you must know the "literature" before embarking on the problem. This kind of discipline would start a riot among our present day graduate body, but H.B.B. swallowed the pill and even ended up by being fond of E. L. Mark.

It was this scientific rigor, plus a willingness to work unstintingly and an ability to put his finger on the nub of the question that made H.B.B. the great scientist he was. In the mid-thirties he gave a course with George Clarke in marine biology which was outstandingly good. As we took notes, it seemed that H.B.B. was giving his lectures with effortless ease, yet they were packed with information and masterpieces of clarity. Behind the smooth performance was weeks of hard work, plus a touch of genius. He attended every laboratory, and it was here that his enthusiasm, clarity of thought, and ingenuity really shone. The students loved him, for he was completely natural with them, and his gentle Yankee wit kept them on their toes. He hated scientific jargon, and his simple, uncluttered approach to a problem was the best of training for all of us. His "Fishes of the Gulf of Maine" is a prime example of exact scientific writing, made readable and interesting by omitting artificiality.

I never fished or hunted with him, though we used to talk about it a lot. Here too, his inquiring mind was always working. No one knows why a salmon rises to a fly, but H.B.B. rose one in Grande Pool on a burnt match tied to a bare line. Only

H.B.B. would have thought of such a contraption, let alone being able to cast it. He and my Uncle Ted went up to Grande River in the early forties and had a splendid season, though it was the last time for both of them. Both were great amateurs, one Professor of Physics and founder of the laboratory that bears his name, the other Alexander Agassiz Professor of Zoology and founder of the Woods Hole Oceanographic Institution. I like to think of them at that most beautiful pool, with the clear water swirling, twenty feet deep through the Jaws and spreading silently below. H.B.B. is trying to raise one of the long grey shadows lying along the Ledge with a dry fly of his own tying, and T. L. is in the shade watching him, smoking his pipe.

Charles P. Lyman
 Assoc. Professor of Anatomy
 Harvard Medical School

Oceanographer

He plumbs the secret depths of ocean
 Past canyon walls and jagged peaks,
 His fancy is intrigued by motion
 Of tides and currents, while he seeks

The final answers to defeating
 Sea-mysteries resolved by none.
 He hears the heart of sea-life beating
 Fathoms below his hydrophone,

Yet he can never hope to plunder
 The sea as men have robbed the land,
 For always she will make him wonder
 But never let him understand.

Louise Crenshaw Ray
 Dec. 16, 1953

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*Chief Backus in the early days,
 wearing cap and badge.*

SAILOR, scientist and gentleman, Dr. Bigelow was all of these. I was shipmates with him several times on the old 'Atlantis' and I never saw him suffer from mal de mer, and he really enjoyed a cruise. He was a Lt. Commander in the First World War with the Navy, and had a lot of sea-going experience on the 'Albatross' belonging to the Fisheries. As a young biologist, I remember he and Captain Carlson gabbing about the old days, and when Henry Bigelow got fresh with the skipper and cussed him, Carlson chased him around the deck with a halibut maul. Another time on the 'Atlantis', I was fishing over the side with an underwater light and caught a huge squid, which I put in a large wooden tub on deck and called Doc and Dr. A. Redfield (this was I think in 1932) and they were looking at it and moving it around, when the squid let go a blast of ink, and blew half the water out of the tub all over them. They were a mess, and I laughed at them, and they chased me, and were going to dip me in that gorey mess but I disappeared below. Dr. Bigelow was always interested in the scientific work on the ship. Ashore, whether talking to any of the scientists or the other people working around the buildings or ship, he always had our interests at heart, and was a perfect host at any of the parties, or cocktail get-togethers, which we used to have in the good old days of the Institution. Yes, he was truly a gentleman.

Harold Backus

*Chief Backus 'came on board' during the building of the 'Atlantis'. One of the oldest hands at Woods Hole, he was Chief Engineer of the 'Atlantis' for 25 years.

We deeply regret to announce the sudden death of Chief Backus on July 21. He also was part and parcel of our Institution's beginning and traditions.

IN 1955, a group of Dr. Bigelow's former students and associates decided to honor him for his contributions to marine biology and oceanography. The twenty-fifth anniversary of the Institution's founding appeared to be a fitting occasion. A volume, containing 48 scientific contributions was completed by the end of the anniversary year and a leather bound copy was presented to Dr. Bigelow at a gathering in the Director's Room at the Museum of Comparative Zoology, Harvard University on January 24, 1956.

In the foreword, Dr. A. C. Redfield explained succinctly how much one man can do to motivate others to do their best.

We quote: "Henry Bryant Bigelow, you have broadened the vision, sharpened the perception, fortified the determination, simplified the outlook, improved the standards, and corrected the folly of each of us."

In his reply, Dr. Bigelow mentioned that years ago he was invited to dinner at Copenhagen. "An old Danish custom demands that the host gives you a speech. Now, all the Danish I knew were the words for thanks, butter and Skol, which everyone knows. So, instead of returning the speech I just said: Tak and Skol, and sat down. This is what I want to do now; Tak and Skol, friends. I just want to add this: I was in a very lucky position in oceanography, there just weren't enough oceanographers around and so there was no opposition. There were lots of medals for oceanography and if you stayed alive long enough and out of trouble you had to get the medals since they had nowhere else to go. But this book is different. No one has to do it. Nobody has to take all this trouble to sit down and write papers and print them. No one needs to take the trouble to tell a fellow how nice he is. Tak and Skol again, friends. This is the end."

BIGELOW, THE MAN, was so versatile and remarkable that one might go on endlessly paying tribute. His "Memories of a Long and Active Life", The Cosmos Press, Cambridge, 1964, provides a great deal of information. What struck me most were his repeated references to "one of the amusing incidents which seem (automatically) to come my way." "One of those amusing experiences with which my life has been "peppered". Difficulties and hardships are glossed over; his ship being torpedoed by a German submarine in World War I is made amusing.

A typical account went ". . . in Naples (1901) we climbed Mount Vesuvius and visited Pompeii: I also had an unexpected adventure, for while I was walking across the open square in front of the famous Naples Aquarium, a man, who emerged from a roadway across the square, began shooting at me with a revolver, without endangering me, however, for he was aiming far above my head! When his gun was empty a policeman appeared upon the scene and arrested him. Fortunately, the policeman understood French, and on my inquiring what all the trouble was about, he replied, "I think, sir, he mistook you for his friend!"

How a man who, at the drop of a hat, went off shooting or fishing, "acting on the principal that one should never allow business to interfere with pleasure", accomplished as much as he did, was explained by his long time associate, Wm. C. Schroeder. "H. B. never wasted a moment — when he worked, he worked hard."

Little has been said in this volume about his dear wife Elizabeth Perkins Shattuck whom he married in 1906 and promptly took on a honeymoon canoe trip to Newfoundland. His wife's canoe capsized in rapids of the swollen Loyds River and she lost her toilet articles. Since she was wearing an old pair of sneakers full of holes: "Obviously, then our first job was to make her a serviceable pair of shoes!" Whereupon Dr. Bigelow described how he walked a mile or two to shoot a caribou and explained how to make a serviceable shoe from the legskin of a caribou and how to tan the skin by boiling some cherry and maple bark in a solution of baking powder and soak the shoes so that the inside part would not continue "disgustingly slimy". Nothing seems to have fazed him. Nothing seems to have daunted him.

Jan Hahn

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The editor apologizes if any of the illustrations in this issue are not properly identified and credited. In our search for old photographs it turned out only too often that negatives or prints had no identification whatsoever. Corrections from readers will be appreciated. We thank the many persons who helped us, particularly Mr. Norman T. Allen, archivist of the Institution, whose files and memory are a goldmine of information; also Mr. Dean F. Bumpus, Mr. Harold Backus and Dr. George L. Clarke.

Other memorabilia connected with Dr. Bigelow appeared in "Oceanus":

Dedication of Bigelow Volume, Vol. IV, No. 2

"On Fish and Fisheries", by H. B. Bigelow, Vol. IV, No. 2

H. B. Bigelow Medal Editorial, Vol. VII, No. 1

Photograph of the four directors, Vol. VII, No. 1

"A Medal for Dr. Bigelow", Vol. VII, No. 4

"Of H. B. Bigelow and Fishes", by W. C. Schroeder, Vol. VII, No. 2

"He hated to have his picture taken, and had a decided repugnance for cameras and candid camera people, especially."

The Board of Trustees has voted to name the original building of our Institution the Henry Bryant Bigelow Building.

A bronze plaque will be designed and placed in a prominent position.



John Donne's

Devotions: 17



Samuel A. Waksman 10

Irving I. Schell 25

George C. Smith

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