

NATIONAL ACADEMY OF SCIENCES

HENRY BRYANT BIGELOW

1879—1967

A Biographical Memoir by
ALFRED C. REDFIELD

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Biographical Memoir

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Henry B Byrd

HENRY BRYANT BIGELOW

October 3, 1879–December 11, 1967

BY ALFRED C. REDFIELD

HENRY BRYANT BIGELOW was an accomplished systematic zoologist, being a recognized authority on both the coelenterates and fishes. His 1911 paper on the siphonophores was considered to be the most useful report on this group that had ever been written. In recognition of his later work on the fishes of the western North Atlantic he was awarded the Daniel Giraud Elliot Medal by the National Academy of Sciences in 1948. Of wider impact on the development of marine science was his recognition of the interdependence of the physics, chemistry, and biology of the sea, as exemplified by his studies of the Gulf of Maine and his part in the creation of the Woods Hole Oceanographic Institution, of which he was the first director.

Seventy-five years ago, when Alexander Agassiz visited the Galdivie Islands with Henry Bigelow as his assistant, oceanography in America was an interest promoted from time to time through individual initiative and, when in line with their primary duties, by appropriate governmental agencies. Today it is a fully recognized division of science, complete with standard textbooks and special journals. Its work is implemented by many small-scale laboratories and research vessels, operated by university departments or independently. More important, it is a science in which a new viewpoint has developed. This has been the work of many men, but in the United States Henry Bigelow,

more than any other, provided the wise leadership that has insured success.

Henry Bryant Bigelow was born in Boston on October 3, 1879. He died on December 11, 1967, in the 89th year of his life, at Concord, Massachusetts, where he had resided for many years. His father was Joseph Smith Bigelow, a banker. On his mother's side his grandfather, Henry Bryant, was a physician, as were two of his uncles and a cousin. Dr. Henry Bryant was also an amateur naturalist, whose extensive collections of hummingbirds and birds' eggs were deposited in the Boston Museum of Natural History. Henry Bigelow was married in 1906 to Elizabeth Perkins Shattuck, who survives. They were saddened by the death of two of their children, Henry Bryant Bigelow Jr., in a mountaineering accident in 1931, and Elizabeth Perkins Bigelow, from an embolism while horseback riding in 1934. Two surviving children are Mary Cleveland Bigelow (Mrs. Lamar Soutter) and Frederick Shattuck Bigelow, M.D.

By good fortune Henry Bigelow was born into a New England community in which the tradition of plain living and high thinking was graced by the fruits of Yankee enterprise. Young men were expected to receive the best of education, supplied in his case by Milton Academy and Harvard College. Intellectual ambitions were not frowned upon and natural tastes for outdoor life were encouraged. Summers at Cohasset, on Massachusetts Bay, gave Henry an instinctive knowledge of seamanship and things of the sea. Hunting in autumn took him to other parts of the coast and the uplands. In his earlier years the mountains were explored, in winter on snow shoes and, in later life, on skis; the mountains were in fact the true love of this oceanographer. And in the spring there were trout in the New England brooks. Thus he became the best-informed naturalist that one could wish to go afield with. His outdoor life was a routine, fixed by the seasons and followed with the same insistence on knowing all that was to be known about any subject that marked his more professional interests.

In *Memories of a Long and Active Life*,* written a few years before his death, he recounts in greater detail than space will allow here his experiences as a youth and in later life, including many amusing incidents that he says so often brightened his life. The impression given is that he had hunted a greater variety of game, both in North America and in Ceylon, had fished in a greater variety of waters, and had climbed more mountains, from the Matterhorn on down, than is the lot of most sportsmen. The extent of these diversions from his scientific life, shared so far as could be with his wife and children, is indicated in the appended chronology.

Henry graduated from Harvard, A.B. *cum laude* in 1901. In the preceding summer he had gone on the Brown-Harvard expedition to Labrador in company with Reginald Daly and J. B. Delabarre. His first substantial publication, in 1902, was on the birds of the northeastern coast of Labrador. A later one, in 1907, was on hybrid ducks. A study under the guidance of J. H. Parker, published in 1904, on the sense of hearing in goldfish gave him acquaintance with experimental procedures. He received his A.M. in 1904 and Ph.D. in 1906, his doctoral thesis being on a study of the nuclear cycle of *Gonionemus vertens (murbachii)*, made under the supervision of E. L. Mark. He once told me that although he did not pursue cytological studies further this was a valued experience because he first learned from Mark the exacting requirements of scientific work. This was the source of the discipline to which his students were subjected, often to their immediate chagrin but ultimate profit.

It was inevitable that Henry should become a naturalist of some sort but it was not at all clear during his student days that he would become an oceanographer or even a marine biologist. The die was cast by the opportunity to accompany Alexander Agassiz to the Maldivé Islands in 1901-1902 and later to the

*Henry B. Bigelow, *Memories of a Long and Active Life* (Cambridge: Cosmos Press, 1964), p. 23.

eastern tropical Pacific and to the West Indies. His assignment was to care for the medusae and siphonophores collected on these expeditions. Thus he gained experience and competence in the classical disciplines of taxonomy which occupied the first decades of his mature career and made him an authority on the coelenterates. Perhaps more important was his introduction to the more general problems of oceanography and the detailed techniques of scientific research at sea.

According to his *Memories* the study of the Gulf of Maine, which established him as a foremost oceanographer, resulted from suggestions by Sir John Murray, who visited Harvard in 1910 and who had been a member of the Challenger Expedition. It followed that in 1912 the U.S. Bureau of Fisheries and the Museum of Comparative Zoology jointly undertook a general oceanographic exploration of the Gulf of Maine which continued under Bigelow's direction through 1924 when the fieldwork was terminated. These explorations resulted in the publication of three superb monographs: on the fishes, the plankton, and the hydrography of the Gulf. The preparation of the monograph on the fishes was far advanced when interrupted by the untimely death of W. W. Welsh, who had given special attention to this phase of the work, and was completed by Bigelow at the request of the Bureau. The other monographs are based entirely on his own work, not only in planning and direction but in the execution at sea, in fair weather and foul, in spite of seasickness and with ships and gear far from adequate.

It is difficult to appreciate today how primitive were the resources available for this work. Thus during 1912 and 1913 reversing thermometers were accurate to only $\pm 0.15^{\circ}$ C and the shortage of water bottles required repeated casts for all but the shoalest stations. Limited means were, however, more than compensated by the challenge of the unknown. He wrote:

"Few living zoologists have been as fortunately placed as were we on setting sail on the *Grampus* from Gloucester on our

st oceanographic cruise in the Gulf of Maine on July 9, 1912, for a veritable *mare incognitum* lay before us, so far as its floating life was concerned, though the bottom fauna can be described as fairly well-known. Not but what an extensive list of pelagic crustaceans, coelenterates and other planktonic animals had been recorded thence, but everything was yet to be learned as to what groups or species would prove predominant in the pelagic fauna; their relative importance in the natural economy of the Gulf; their geographic and bathymetric variations; their seasonal successions, migrations, and annual fluctuations; their temperature affinities, whether arctic, boreal, or tropic; and whether they were oceanic or creatures of the coastal zone. We even had no idea (incredible though it may seem at this place and day) what we should probably catch when we first lowered our tow nets into deeper strata of Massachusetts Bay, for, so far as we could learn, tows had never previously been tried more than a few fathoms below its surface.”*

The outcome was that the Gulf of Maine became perhaps the best known body of water of comparable size in the world, certainly the region most thoroughly explored by individual effort. Michael Graham has stated that the three monographs in the Gulf give a better and more coherent account than that one by many more hands in an area of comparable size. “For one man to have made such a clear and complete job of a relatively large area, . . . was a monumental job of which any man could be proud even if he had done nothing else in his whole life.” Graham considered that Henry Bigelow might be called 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 a full knowl-

*Henry B. Bigelow, “Plankton of the Offshore Waters of the Gulf of Maine,” *Bulletin of the Bureau of Fisheries* 40 (1924):16.

edge and the applications of other branches of science.”* His achievements as an oceanographer were recognized in 1931, when the National Academy of Sciences awarded him the Alexander Agassiz Medal.

The study of the Gulf of Maine naturally led to intimate contact with Canadians working in adjacent and often overlapping waters. One fruit of this was a close and continuing friendship with Professor A. G. Huntsman, for many years chairman of the Biological Board of Canada; another was Bigelow's association with the North American Council on Fisheries Investigations, in which Canada, Newfoundland, France, and the United States were associated. He attended the meetings of the committee regularly between 1921 and 1933 and served as chairman at all but a few of them.

During this period Henry Bigelow formed associations with the European leaders in oceanography, marine biology, and fisheries; such men as Johannes Schmidt, B. Helland-Hansen, Johan Hjort, Martin Knudsen, Paul Kramp, A. Vedel Tåning, Edouard Le Danois, D'Arcy Thompson, Stanley Gardiner, Michael Graham, E. S. Russell, F. S. Russell, Henry Maurice, C. T. Regan, and others. The esteem and affection that he won from these colleagues is shown by the records of the meeting of the International Council for the Exploration of the Sea, which he attended in March 1931, as a representative of the North American Council on Fisheries Investigations and where he reported on the newly founded Woods Hole Oceanographic Institution. They state that:

“The president . . . wished to take opportunity of his being actually present to express to him the satisfaction which his visit had caused to the Council. Dr. Bigelow . . . had attended many council meetings and had so impressed his personality on the

*Michael Graham, “Obituary of Henry Bryant Bigelow,” *Deep-Sea Research* 15 (1968):125 (hereafter cited as “Obituary of Henry Bryant Bigelow”).

members and experts that the Consultative Committee had passed a recommendation . . . so important that it ought to be specially treated. In effect it contained a standing invitation to the representatives of the Woods Hole Oceanographic Institution and the North American Council on Fisheries Investigations and he might add to Dr. Bigelow personally, whatever his future might be, to attend all meetings of the Council. The Council hoped in future to have many opportunities to consult them, to learn from them and to link up its own investigations with the work done on the western side of the Atlantic."

Henry Bigelow not only served as advisor to the government on fisheries, but also as Special Expert to the U.S. Shipping Board in 1917-1919 and during World War I as an instructor in navigation and as navigation officer on the U.S. Army transport *Amphion*.

He was a member of the National Research Council's Committees on Oceanography (1919-1923) and on Submarine Configuration and Oceanic Configuration (1925-1930), being vice-chairman of the latter in 1930-1932. He served on the National Academy of Sciences' Committees on Oceanography, as secretary (1928-1934) and chairman (1934-1938), on Long Range Weather Forecasting (1931-1935), and for the Murray Fund (1950-1953).

He was special consultant to the Commandant of the Coast Guard for the work of a board comprised of the heads of the agencies interested in the prosecution of scientific studies related to the International Ice Patrol, established in 1913 as a result of the tragic loss of life and property due to the collision of the steamship *Titanic* with an iceberg. During the early years of the patrol observations on plankton, as well as surface temperatures and salinities, were used to trace the drift of water carrying icebergs into the shipping lanes; later the techniques of dynamic oceanography were introduced to estimate on the spot the velocity of the movement. A succession of officers—

of the Coast Guard—came to Cambridge to receive indoctrination in oceanography from him. Largely as a result of his wisdom in guiding the scientific studies on which the work of the ice patrol was based, the hydrography of the northern seas became well understood and the patrol was enabled to discharge its duties with intelligence and success.

During World War II the use of amphibious craft and other small vessels required detailed knowledge of wave conditions for the use of the Armed Services. A popular book entitled *Wind Waves at Sea, Breakers and Surf* by Bigelow (in collaboration with W. T. Edwardson) was written to meet in part this need. In the preface to this book it is stated:

“We wish it expressly understood that we have made no contributions to the theory of waves. But we would not have dared to undertake the task if we had not observed the behavior of waves at sea, from large craft and from small, in various parts of the world, under various conditions of wind and weather; or if we had not had an opportunity to watch the development of breakers—and cope with the smaller sizes—off beaches of various shapes, off rocky coastlines, and over submerged ledges.” This insistence on personal experience as a prerequisite of scientific judgment (or any other judgment for that matter) was characteristic.

The establishment of an oceanographic institution on the east coast of the United States originated in conferences beginning in 1924 between Wickliffe Rose, then president of the General Education Board, and Frank R. Lillie, the director of the Marine Biological Laboratory at Woods Hole. The outcome was that the president of the National Academy of Sciences was requested to appoint a Committee on Oceanography to consider the share of the United States in a world-wide program of Oceanographic Research.* Dr. Lillie was the chairman of this

*Frank R. Lillie, *The Woods Hole Marine Biological Laboratory* (Chicago: University of Chicago Press, 1944), p. 177.

Committee and served as president of the Woods Hole Oceanographic Institution upon its establishment. Henry Bigelow was engaged by the Committee as its secretary to prepare its report. No one could have been found so well equipped by personal experience or general ability for the task. The greater part of the report, reviewing the scope, problems, and applications of oceanography, has been made public in a book entitled *Oceanography*, published under his name in 1931. It is in the unpublished sections of this report, however, in which are set forth the principles that should determine the type of organization which would best remedy the then-present handicaps to the development of oceanography, that his genius for striking directly at the heart of any question and his power of exposition are displayed. It is no wonder that this report was received with confidence, or that it led to the establishment of a new institution at Woods Hole and to substantial benefits to oceanography and marine biology through gifts to the Scripps Institution, the University of Washington, and the Bermuda Biological Station.

The principle of the ripeness of time, as applied to the appearance of prophets, is well illustrated by the history of oceanography during this period. Not only did a man emerge who had prepared himself, perhaps unwittingly, for leadership at a time when men of influence sensed that something should be done to improve the status of marine science in America, but new ideas were in the air, wafted across the ocean from a multitude of general scientific advances. Henry Bigelow, though trained in the classical tradition, was sensitive to these breezes, wise enough to grasp their implication, and bold enough to act on their meaning.

The following paragraphs express in his own words the need that was to guide his thinking:

"Oceanography has of late entered a new intellectual phase, to explain which a word of retrospect is necessary. . . . Students of the history of science may well date the birth of modern

oceanography from December 21, 1872, the day when the *Challenger* set sail from Portsmouth, England, on her memorable voyage. . . . One great deep-sea expedition led to another, and more was learned about the sea during the last thirty years of the nineteenth century than had been during the preceding three thousand. But after a time, as so often happens when some scientific discipline takes a sudden spurt, this fact-catching began to lose something of its freshness. . . .

"Students began, in short, to feel that the mere accumulation of facts from the sea, when there is an inexhaustible supply, may actually become a bit sterile, just as catching fish is to a sportsman where fish are too plentiful. . . . So it was natural that when persistence in the old methods no longer yielded startling discoveries, signs could be seen of the approach of a period of stagnation. . . . And oceanography would probably be in a moribund state in America today, just as the art of sailing a square-rigger is, but for the birth of the new idea that what is really interesting in sea science is the fitting of these facts together, and that enough facts had accumulated to make the time ripe for an attempt to lift the veil that had obscured (and still obscures) any real understanding of the marvelously complex and equally marvelously regulated cycle of events that takes place within the sea.

"The foundation for this conscious alteration in view-point, from the descriptive to the explanatory, was a growing realization . . . that in the further development of sea science the keynote must be physical, chemical and biological unity. . . .

"When one picks up a fish, one may be said, allegorically, to hold one of the knots in an endless web of netting of which the countless other knots represent other facts, whether of marine chemistry, physics or geology, or other animals or plants. And just as one can not make a fish-net until one has tied all the knots in their proper positions, so one can not hope to comprehend this web until one can see its internodes in their true

ationship. This is today the conscious aim of oceanographers."*

Henry Bigelow became the first director of the Woods Hole Oceanographic Institution in 1930, a position he held for ten years. His task in assembling a staff for the new institution 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 doubtlessly he could have assembled a respectable group of experts on special groups of marine organisms. A 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 recruiting from the universities a new generation of chemists, meteorologists, physiologists, bacteriologists—whoever could be persuaded that scope for their skills could be found in studies at sea. The practice grew that each would make at least one short voyage at sea each season. Daily the director made his rounds, instilling little by little something of his viewpoint and wisdom on the opportunities that lay beyond the tide line. Boldness was encouraged. We were told that an oceanographer, like a turtle, makes progress only by sticking his neck out.†

On retirement as director in 1939, Henry Bigelow became a regular member of the Board of Trustees, on which he had previously served *ex officio*. On reaching the statutory age of retirement in 1952 he became an honorary trustee, and in 1960, in recognition of his great services to the institution, was named Honorary Chairman of the Board. A chair in oceanography was founded in his name by the Woods Hole Oceanographic Institution in 1958, to which his former student, C. O'D. Iselin, was appointed.

Henry B. Bigelow, "A Developing Viewpoint in Oceanography," *Science* 71 (1950):85-86.

Personal impressions and recollections of Henry Bigelow by many of his associates are recorded in the July 1968 issue of *Oceanus*.

On the occasion of the twenty-fifth anniversary of the founding of the Woods Hole Oceanographic Institution, a festschrift entitled "Papers in Marine Biology and Oceanography" was dedicated to Henry Bryant Bigelow by his former students and associates. It was published as a supplement to volume 3 of *Deep-Sea Research* for 1955. In acknowledging my contribution and referring to the biographical foreword, he wrote "my only criticism of which is that it makes me out a more important personage than I really am."

Henry Bigelow's association with Harvard University was not interrupted by the interlude in which he was actively concerned with the Oceanographic Institution. He resided in Woods Hole only during the summers. It was his pride that he had been in active service to Harvard University for fifty-five years, a period he thought must have broken some sort of record. His *Memories* record that in recognition he was presented with a bottle of bourbon whiskey "with the compliments of the President and Fellows." He considered himself to be unique for no one else had ever before been presented with a bottle of whiskey by Harvard University.

His Harvard association was primarily with the Museum of Comparative Zoology, first as an assistant to Alexander Agassiz, then as curator of coelenterates (1913-1925), research curator (1925-1927), and curator of oceanography (1927-1950). He did not formally relinquish the last of these responsibilities until 1962 when he retired from the Museum faculty. He continued to work at the museum until his death. He was appointed Lecturer in Harvard University in 1921, Associate Professor of Zoology in 1927, Professor of Zoology in 1931, and Alexander Agassiz Professor of Zoology in 1944. He retired from the Harvard faculty in 1950, at which time he became emeritus.

During his service as assistant in the course in elementary zoology, Henry encountered a student who had drawn a tuni- cate fully equipped with a set of mammalian viscera, which the

dent accounted for as derived from "natural logic" rather than observation. Legend has it that Henry was so enraged by this heresy that he told off the unfortunate student in expletives so unambiguous that Henry was told he never again would be allowed contact with the students of Harvard College. Perhaps this explains why many years elapsed before he was to present a formal course of instruction in the university. Be that as it may, he gave a course in oceanic biology beginning in 1931, followed some years later by one in invertebrate zoology.

Among his advanced students were Columbus O'D. Iselin, who succeeded him as director of the Woods Hole Oceanographic Institution; Edward H. Smith, its third director; Mary Sears, for many years clerk of its corporation and an editor of *Deep-Sea Research*; and Oscar E. Sette, Robert A. Nesbit, William C. Schroeder, William C. Herrington, and Lionel A. Alford—all distinguished in the fisheries service.

In 1939 the Sears Foundation For Marine Research of Yale University sponsored an ambitious cooperative publication on the fishes of the western North Atlantic for which participation of ichthyologists from throughout the United States was invited. Henry Bigelow served as Editor in Chief and with his close associate, William C. Schroeder, contributed extensively. The first volume of the publication elicited the following comment by Carl Hubbs:

"The first volume of *FISHES OF THE WESTERN NORTH ATLANTIC* sets a very high standard—perhaps so high a standard as to render difficult the completion of subsequent volumes by authors as well equipped as Henry Bigelow and associates in courage, energy, time, meticulousness, experience, library facilities and willingness to sacrifice much else for this one grand task. . . . In several ways this volume has been successfully adapted, in accordance with the policy set for the series, for the use and interest of sportsmen and general naturalists as well as ichthyologists. Features that lead to this desirable end . . . include the excellent

summaries of natural history information, the limited treatment of internal and particularly microscopical anatomy, the simplified keys, the complete coverage of the species, in the clear-cut illustrations.”*

Henry Bigelow's achievements were recognized not only by the award of the Alexander Agassiz and the Daniel Giraud Elliot Medals of the National Academy of Sciences, but also by the award of the Bowie Medal of the American Geophysical Union (1944), the Johannes Schmidt Medal of the Carlsburg Foundation, Copenhagen (1947), and the Monaco Medal of the Institut Océanographique, Paris (1950). He was also the first recipient of the Henry Bryant Bigelow Medal established in his honor by the Woods Hole Oceanographic Institution in 1960.

He was elected to the National Academy of Sciences on April 28, 1931. He was also a member of the Norske Videnskaps Akademi, the Royal Geographical Society of London, the Zoological Society of London, the Marine Biological Association of the United Kingdom, the Russian State Geographical Society, the American Academy of Arts and Sciences, the American Philosophical Society, and the Academy of Natural Sciences Philadelphia. He held honorary degrees from the Universities of Oslo, Yale, Harvard, and Rhode Island.

While it is easy to recount the achievements for which Henry Bigelow was honored, it is impossible to give an adequate picture of the personality that made them possible. Michael Graham has written: "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." Referring to meetings of the International Council, Graham continued: "Throughout the proceedings the conference was richer whenever he was present. . . . One had the feeling that he was a man

*Carl L. Hubbs, "Fishes of the Western North Atlantic (a review)," *Copeia* (1949):155-57.

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."* Professor Huntsman once said of him: "Like all of us, he has his own peculiar personality, but his is more peculiar than that of anyone else I know—a queer combination of lively humor and deadly seriousness—his way is inimitable."

He was an utter realist in his respect for apparent facts. In considering any question he had a unique ability to strike through to the pertinent point. He appeared to be completely impersonal in his judgments and to never make a foolish decision or give unwise advice. If he were ever mistaken, it was because some needed facts were missing. Though his excitement was in the discovery of new facts, he was not one to be concerned primarily with learning more and more about less and less. He wanted to know more about the facts and to comprehend the relations between the primary considerations. Thus, he encouraged new fields of inquiry and broadened our conception of what marine science could be.

Among the facts he recognized was the diversity and frequently the folly of his fellow men. This was the theme of the humor with which he confronted the world. "Thinking fellows" and "silly clucks" were among the categories into which he put us. His daily rounds of the laboratory at Woods Hole, in which he assessed our capabilities and kindly corrected our follies, made him a great director. The proverbial uncle is an elder member of a family, detached from its petty turmoil, but kind and wise, to whom the youngsters turn for understanding and counsel. As such, he is remembered with affection and gratitude by his associates at the Museum of Comparative Zoology and the Woods Hole Oceanographic Institution, who knew him as Uncle Henry.

*Graham, "Obituary of Henry Bryant Bigelow," p. 125.

CHRONOLOGY*

- 1879 Born October 3
- 1895 Graduated from Milton Academy
- 1896 Studied at Boston Museum of Natural History
- 1897 Entered Harvard College
- 1898 Hunting in New Brunswick and Prince Edward Island
- 1900 Member, Brown-Harvard Expedition to Labrador
- 1901 A.B. *cum laude* Harvard College
Published note on the American eider in Virginia
- 1901-1902 Member, expedition to Maldive Islands with A. Agassiz
- 1902 Hunting in Ceylon
Published on the birds of Labrador
- 1903 Studied beach sands at Bermuda
- 1904 Hunting mountain sheep and goats in British Columbia
- 1904-1905 Member, expedition to Eastern Pacific with A. Agassiz
- 1905 Hunting moose in Quebec
- 1906 Ph.D. in Zoology, Harvard
Appointed Assistant, Museum of Comparative Zoology
Married Elizabeth Perkins Shattuck
Canoeing with Mrs. Bigelow in Newfoundland
- 1907 Elected Fellow, Royal Geographical Society, London
Member, expedition to West Indies with A. Agassiz
- 1908 Camping in New Brunswick
Moved to Concord, Massachusetts
- 1910-1943 Duck shooting yearly in North Carolina, Virginia and on Lake Erie
- 1911 Elected member, American Academy of Arts and Sciences
Salmon fishing in Quebec
- 1912-1924 Cruises in Gulf of Maine and adjacent waters
- 1913 Appointed Curator of Coelenterates, Museum of Comparative Zoology
Appointed Consultant on International Ice Patrol
Visited coast of Louisiana for Rockefeller Foundation to advise on land use for game preserves

*The dates of recreational activities, taken from Dr. Bigelow's *Memories of a Long and Active Life*, may be subject to some error in recollection.

- 1913-1964 Trout fishing yearly at Wareham, Massachusetts
- 1916 Hunting in Montana with Mrs. Bigelow
- 1917-1919 Served as Special Expert to U.S. Shipping Board
- 1918 Served as Acting Navigator, U.S. Army Transport, *Amphion*
- 1919-1923 Member, National Research Council Committee on Oceanography
- 1921 Appointed Lecturer, Harvard University
- 1921-1932 Member, North American Council on Fisheries Investigations
- 1925 Appointed Research Curator, Museum of Comparative Zoology
- Published "Fishes of Gulf of Maine"
- 1925-1932 Member, National Research Council Committee on Submarine Configuration and Oceanic Configuration
- 1926 Published "Plankton of Gulf of Maine"
- 1927 Published "Physical Oceanography of Gulf of Maine"
- Appointed Associate Professor of Zoology, Harvard University
- Appointed Curator of Oceanography, Museum of Comparative Zoology
- 1928-1938 Member, Committee on Oceanography of National Academy of Sciences
- 1928 Mountaineering in Canadian Rockies
- 1930 Appointed Director of Woods Hole Oceanographic Institution
- Mountaineering in Switzerland, climbed Matterhorn
- 1931 Elected member of National Academy of Sciences
- Awarded Agassiz Medal of National Academy of Sciences
- Appointed Professor of Zoology, Harvard University
- 1931-1935 Member, National Academy Committee on Long Range Weather Forecasting
- 1932 Elected corresponding member, Academy of Natural Sciences, Philadelphia
- Fishing in Nova Scotia
- 1933 Hunting in Nova Scotia
- Skiing at Innsbruck

- 1937 Elected foreign member, Norsk Videnskaps Akademi
Elected honorary member, Marine Biological Association of the United Kingdom
Elected member, American Philosophical Society
Fishing in southern Florida
- 1939 Resigned as Director of Woods Hole Oceanographic Institution and elected member and President of Board of Trustees
- 1939–1963 Became Editor in Chief and contributor to "Fishes of Western North Atlantic"
- 1941 Given Honorary Sc.D., Yale
- 1944 Awarded Bowie Medal of American Geophysical Union
- 1946 Given Honorary Ph.D., Oslo
Given Honorary Sc.D., Harvard
- 1947 Awarded Johannes Schmidt Medal, Copenhagen
Published "Wind Waves at Sea, Breakers and Surf"
- 1948 Published chapters of "Fishes of Western North Atlantic" on cyclostomes and sharks
- 1949 Awarded Elliot Medal of National Academy of Sciences
- 1950 Appointed Professor of Zoology Emeritus, Harvard University
Awarded Monaco Medal of Institut Océanographique, Paris
- 1950–1953 Member, Murray Fund Committee of National Academy of Sciences
- 1952 Retired as Trustee, Woods Hole Oceanographic Institution and elected Honorary Trustee
- 1953 Published chapters "Fishes of Western North Atlantic" on sawfishes, guitarfishes, skates, rays and chimeroids
- 1955 Presented festschrift by former students and associates
- 1956 Visited Northern Ontario with family
- 1958 Bigelow Professorship in Oceanography established by Woods Hole Oceanographic Institution
- 1960 Given Honorary Sc.D., University of Rhode Island
Awarded Henry Bryant Bigelow Medal of Woods Hole Oceanographic Institution
Appointed Founder Chairman of the Board of Trustees, Woods Hole Oceanographic Institution

- 62 Retired from Faculty of Museum of Comparative Zoology
Visited Puerto Rico with Mrs. Bigelow
- 63 Visited Jamaica with Mrs. Bigelow
Publication of "Fishes of Western North Atlantic" completed
- 66 Skiing in New Hampshire with daughter Mary
- 67 Died December 11
- 68 Last papers on fishes published

BIBLIOGRAPHY

KEY TO ABBREVIATIONS

Biol. Bull. = Biological Bulletin

Bull. U.S. Bur. Fish. = Bulletin of the United States Bureau of Fisheries

Bull. Mus. Comp. Zool. = Bulletin of the Museum of Comparative Zoology, Harvard College

Bull. Natl. Res. Council. = Bulletin of the National Research Council

Harv. Alumni Bull. = Harvard Alumni Bulletin

J. Wash. Acad. Sci. = Journal of the Washington Academy of Sciences

Mem. Mus. Comp. Zool. = Memoirs of the Museum of Comparative Zoology, Harvard College

Mem. Sears Found. Mar. Res. = Memoirs of the Sears Foundation of Marine Research

Pap. Phys. Oceanogr. Meteorol. = Papers in Physical Oceanography and Meteorology

Proc. Boston Soc. Nat. Hist. = Proceedings of the Boston Society of Natural History

Proc. New Engl. Zool. Club = Proceedings of the New England Zoological Club

Proc. U.S. Natl. Mus. = Proceedings of the United States National Museum

1901

A Virginia record for the American eider (*Somateria dresseri*). Auk, 16:189.

1902

Birds of the northeastern coast of Labrador. Auk, 19:24-31.

1904

Medusae from the Maldivé Islands. Bull. Mus. Comp. Zool., 39: 245-69.

The sense of hearing in the goldfish, *Carassius auratus* L. American Naturalist, 38:275-84.

1905

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