UNCHARTED WATERS

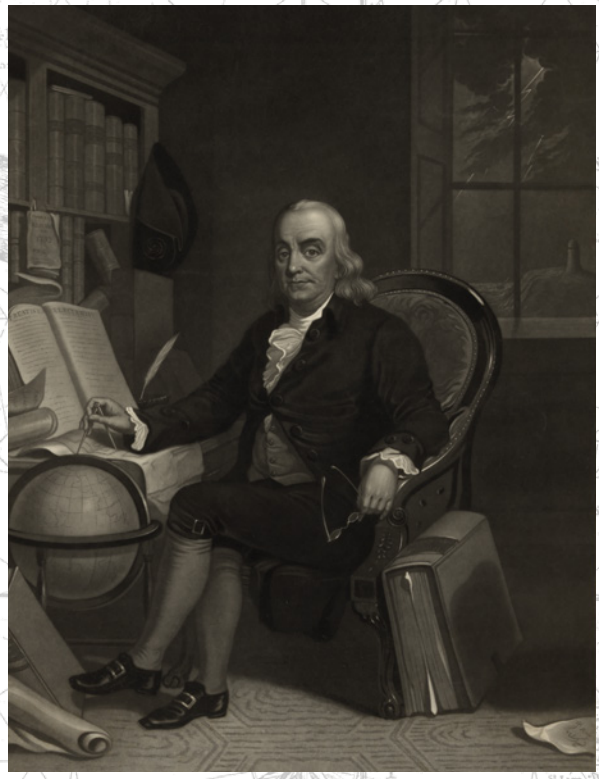
NANTUCKET WHALERS AND THE FRANKLIN-FOLGER CHART OF THE GULF STREAM

By Philip L. Richardson and Nathan T. Adams

In 1672, Nantucketers contracted with Cape Cod whaleman James Loper (also appearing as Lopar) to begin whaling operations and teach the islanders the process of hunting the leviathan we now know as the North Atlantic right whale. For the next two centuries, the whalers who set forth from the island acquired a vast store of knowledge about whales, the ocean environment, and the natural world in general. A whaling voyage would entail long periods of inactivity, the whalemen keeping a constant watch for whales. Like other colonial New Englanders, some whalemen were prodigious record keepers. Whaling logbooks contain a vast record of wind, weather, and whale sightings. Other records, such as journals and letters, show that whalemen gained remarkable insight into whale behavior and anatomy through their observations of the ocean and the processing of whales into oil. By gaining an understanding of whales and their behavior, Nantucket whalemen were able to expand their range of operations from near the island to the whole Atlantic Ocean, and by the end of the eighteenth century into the Pacific. Knowledge of whale morphology and anatomy allowed for identification of whales at a distance and made the processing of blubber more efficient. Although this knowledge was principally used to further efforts at catching and killing whales, whalemen also

EDITOR'S NOTE:

A previous article on the Franklin-Folger Chart of the Gulf Stream appeared in the Fall 1995 issue of *Historic Nantucket,* Vol. 44, No. 2, pp. 82–86, written by Captain John Lacouture. Much of the information included in that article was based on original research conducted by Philip L. Richardson of the Woods Hole Oceanographic Institution. The following article provides Richardson the opportunity to tell the story of his finding of the "lost" 1769 chart and to compare and contrast the different versions. It also includes additional discussion of the role of Nantucket whalers in the charting of the Gulf Stream and their knowledge of the northern Atlantic, provided by historian Nathan T. Adams. It should also be noted that two of the figures in Lacouture's 1995 article were misidentified. The chart on page 83 is captioned as the 1769 version of the chart when in fact it depicts the version published in 1786 as part of Franklin's "Maritime Observations." Likewise, the figure on page 84 is captioned as the 1786 version, although the image shown is the first version published in 1769 in London.



Portrait of Benjamin Franklin, engraved ca. 1847 by Henry S. Sadd for the *Albion* (New York), after a painting by T.H. Matteson
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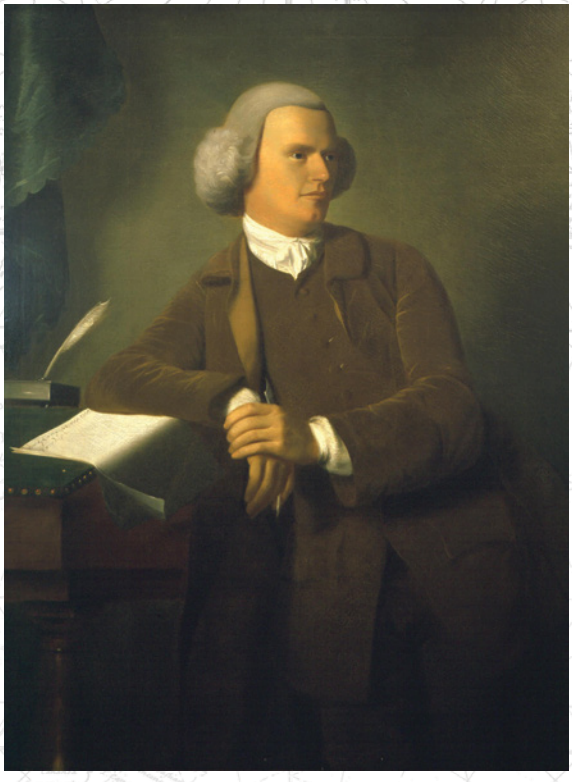

Portrait of Captain Timothy Folger by John Singleton Copley, 1764
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acted as sources for numerous scientific journals in the eighteenth and nineteenth centuries. For instance, Paul Dudley's 1725 *Essay upon the Natural History of Whales* relied heavily on the accounts of a former New England whaleman regarding the origin of ambergris, which was long-known but little understood at that time and quickly becoming a valuable product of the whaling trade. These sources disseminated the vast store of knowledge acquired by whalemen to the scientific community and the general public.

The knowledge of Nantucket whalers made its way to the public in other ways, too. During a stint in London as Deputy Postmaster General for the American colonies between 1764 and 1775, Benjamin Franklin was consulted as to why mail packets sailing from Falmouth, England, to New York took two weeks longer than merchant ships traveling from London to Rhode Island. In October 1768, Franklin presented the problem to his cousin and friend, Timothy Folger (1732–1814), a Nantucket ship captain recently arrived in London on business. Franklin's mother, Abiah Folger (1667–1752), was born on Nantucket and her brother, Eleazar Folger (1648–1716), was Timothy Folger's great-grandfather. Although Franklin referred to him simply as "Cousin Folger" in correspondence, they were in actuality first cousins twice removed.

As captain of a Nantucket merchant ship and longtime whaler, Timothy Folger possessed an intimate knowledge of the Gulf Stream. By 1768, Nantucket whalers had collectively accumulated a considerable body of information about the Gulf Stream. Of the nearly 150 Nantucket vessels employed in the whale fishery in the mid- to late-eighteenth century, nearly half plied their trade in the waters around the Gulf Stream. Whalers were acutely observant of currents, since their livelihood was partially dependent upon them, and observations of ocean cur-

rents, water depths, sand bars, and other elements of the marine environment were frequently exchanged, both at sea and at home.

As Franklin stated in *The American Mariner* in 1789, "Nantucket whalemen [are] well acquainted with the gulf stream, its course, strength, and extent by their constant practice of whaling on the edges of it, from their island quite down to the Bahamas." The Nantucket whalemen's process of observing the natural world, recording that information, and making sense of it allowed them to identify environmental knowledge that others had overlooked.

As with most oral traditions, the oceanographic knowledge of the Nantucket whalemen was seldom written down and much has been lost. While logbooks provide a record of whaling voyages, they offer only a small glimpse of the environmental knowledge that whalemen possessed. Furthermore, understanding that knowledge requires considerable effort. The first Franklin-Folger chart of the Gulf Stream provides another way this knowledge could be accessed: through an actual whaleman who, through his lived experience synthesized with the knowledge of others, could make sense out of a vast sea of information.

During their discussion, and at Franklin's request, Folger sketched the path of the Gulf Stream onto an existing chart of the Atlantic, providing additional written instructions on how to avoid the northeastward-flowing current when sailing west from England to America. Franklin then forwarded the chart to Anthony Todd, Postmaster General, with an accompanying letter describing Folger's navigational instructions, to be disseminated to the captains of British mail packets, who largely ignored the advice.

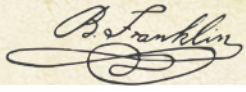
Letter from Benjamin Franklin to Anthony Todd, 29 October 1768

Craven Street October 29th [1768]

Sir

Discoursing with Captain Folger a very intelligent Mariner of the Island of Nantuckett in New England concerning the long passages made by some Ships bound from England to New York I received from him the following Information. Viz:

That the Island in which he lives is Inhabited Chiefly by people concerned in the Whale Fishery, in which they employ near 150 Sail of Vessels, that the Whales are found generally near the Edges of the Gulph Stream, a strong Current so called which comes out of the Gulph of Florida, passing Northeasterly along the Coast of America, and then turning off most Easterly running at the rate of 4, 3½, 3 and 2½ Miles an Hour; that the Whaling Business leading these people to Cruise along the Edges of the Stream in quest of Whales, they are become better acquainted with the Course, Breadth, Strength and extent of the same, than those Navigators can well be who only cross it in their Voyages to and from America, that they have opportunities of discovering the Strength of it when their Boats are out in pursuit of this Fish, and happen to get into the stream while the Ship is out of it, or out of the Stream while the Ship is in it, for then they are separated very fast, and would soon lose sight of each other if care were not taken, that in Crossing the Stream, to and fro, they frequently in the same meet and speak with Ships bound from England to New York Virginia &ca, who have passages of 8, 9, and 10 weeks, and are still far from Land, and not likely to be in with it for some time, being engaged in that part of the Stream that sets directly against them, and it is supposed that their fear of Cape Sable Shoals, Georges Banks or Nantuckett Shoals, hath induced them to keep so far to the Southward as unavoidably to engage them in the said Gulph Stream, which occasions the length of their Voyage, since in a Calm it carries them directly back, and tho' they may have fair Winds, yet the Current being 60, or 70 Miles a day, is so much Subtracted from the way they make thro' the Water. At my request Captain Folger hath been so obliging as to mark for me on a Chart, the Dimentions Course and Swiftness of the Stream from its first coming out of the Gulph, where it is narrowest and strongest; till it turns away to go to the Southward of the Western Islands, where it is Broader and weaker, and to give me withall some Written directions whereby Ships bound from the Banks of Newfoundland to New York may avoid the said Stream, and yet be free of danger from the Banks and Shoals abovemention'd. As I apprehend that such Chart and directions may be of use to our Packets in Shortning their Voyages, I send them to you that if their Lordships should think fit, so much of the Chart as is contain'd within the red Lines may be engraved and printed, together with the remarks at the Charge of the Office; or at least that Manuscript Copies may be made of the Same for the use of the Packets. The expence of the former would not much exceed the latter, and would besides be of general Service, with much esteem I am &c



The Franklin-Folger Charts

Before 1769, charts of the Atlantic indicated only the most rudimentary and notable features, such as major surface currents crossing in mid-ocean or ending abruptly near the coast. Franklin's and Folger's chart is widely considered to be the first accurate depiction of the Gulf Stream, showing its path, average width of the stream in various locations, and typical speeds near its center. Though the original sketch no longer survives, three printed versions of the Franklin-Folger chart of the Gulf Stream were published in the late eighteenth century. The first version appeared as an overprint on a portion of a larger map titled, *A new and exact chart of Mr. E. Wrights projection, rut. Mercators chart, con. ye sea coast of Europe, Africa & America, from ye Isles of Orkney to Cape Bona Esperance & Hudsons Bay to ye straits of Magellan,* printed in London in 1769 by Mount and Page. On this chart, the Gulf Stream is depicted as a series of short dashed lines, perhaps the quick modification of an earlier plate, superimposed with arrows showing the direction and current speeds that generally match those listed in Franklin's letter to Todd. (In the letter, speed is given as miles per hour, while the chart gives speeds in minutes. One minute of latitude is equal to one nautical mile.) The illustration of a sailing vessel taking advantage of the favorable current is also superimposed on the Gulf Stream. On a portion of the chart, just east of Newfoundland, are instructions on how to avoid it and the nearby banks and shoals when sailing westward, as mentioned in Franklin's letter to Todd. Specific instructions for navigating around Nantucket were given thus:

> *[...]. in passing Nantucket, you may Sail in any Lattd between 38.30 & 40.45. [The] South part of Nantucket Shoals lies in Lattd 40.45. & [the] Northern Edge of the Gulf Stream lies in 38.30 So from Nantuckett [...]*

In March 1775, Franklin left London and sailed for home. The following year, he was sent as an envoy to Paris to negotiate a treaty with the French government. During those two crossings, Franklin measured the temperature of the Gulf Stream and discovered that it was warmer than the water on either side, rekindled his enthusiasm for the Gulf Stream chart, and sometime between September 1780 and April 1783 had it copied and printed by Le Rouge in Paris. Research conducted by Ellen R. Cohn, chief editor of Yale University's collaborative project, *The Papers of Benjamin Franklin,* concluded that this second version of the Gulf Stream chart was produced for French merchant and packet ships in the months following the end of the American War of Independence.

The Le Rouge version is an exact copy of the northwestern part of the original Mount and Page chart, published more than a decade before. The two are on the same scale, and when overlaid, the main features—coastlines, islands, the Gulf Stream itself—coincide exactly. In fact, the details are identical down to the placement of arrows, current speeds, and decorative illustrations of ships. In addition, the "Remarks" on the Le Rouge chart are similar to those found on the Mount and Page chart, although translated into French. The only significant change is the elimination of the words "Gulf Stream" and their replacement by the French word "Courrant."

In 1785, Franklin, then seventy-nine years old, sailed back to America on the London packet. The following year, "A Letter from Dr. Benjamin Franklin, to Mr. Alphonsus le Roy, Member of Several Academies, at Paris. Containing Sundry Maritime Observations" (commonly referred to as "Maritime Observations") was published in the *Transactions of the American Philosophical Society in Philadelphia.* Within "Maritime Observations," a third version of the Franklin-Folger Chart appeared as a figure engraved by James Poupard.

Close up of the 1769 Chart of the Gulf Stream, Mount and Page, London.

Detail of the Gulf Stream, depicting the area around Nantucket.

Library of Congress, Prints & Photographs Collection

This version, often referred to as Franklin's Gulf Stream chart, is the most widely known and reproduced of the three. Although at first glance the Gulf Stream has much the same appearance as in the two earlier versions, a close examination reveals some important differences.

Most prominently, it is based on a different projection, and therefore the path of the Gulf Stream varies from that depicted on the 1769 and 1780–83 versions. Since the chart employs a different projection, meridians are not parallel, and in many places in North America they are several degrees in error, even after adding a 5.2° longitude offset to account for the location of the Prime Meridian. (For example, Bermuda is depicted south of Long Island rather than south of Nova Scotia.) Due to the different projection, Poupard was not able to simply trace the Le Rouge chart of the Gulf Stream. Subsequently, in transferring the Gulf Stream to his own version of the chart, he made several changes. The stream is 400 km at its widest point, narrower than shown on the earlier versions, and it flows within 20–25 kilometers of Georges Bank. This small passage between the shoals and the Gulf Stream may have discouraged navigators from trying to thread the needle between them.

Because of the modifications to the chart of the Gulf Stream made by Poupard, the first version, printed in London in 1769, is generally considered to be a better representation of Folger's extensive knowledge of the Atlantic current and surrounding environment.

Another notable difference in the third version is the inclusion of additional information in the "Remarks" printed on the left side of the chart. Franklin repeats his description of how the map came into existence, much as in the letter to Todd and in the accompanying text in "Marine Observations," mentioning for the first time an "eddy current, which moves contrary to the Gulf Stream," located between the stream on the south and the shoals to the north.

It should also be noted that the third version includes an inset in the upper left corner depicting the migration pattern of herring in the North Atlantic, an illustration for a paper by John Gilpin, which has frequently been misinterpreted as a large-scale illustration of the North Atlantic currents and has occasionally been superimposed on the Gulf Stream.

The third version of the Franklin-Folger Chart of the Gulf Stream, published in 1786 as part of Franklin's "Maritime Observations." At right, "Remarks" accompanying the third version.

Library of Congress, Prints & Photographs Collection.

AFTER you have paſſed the Banks of Newfoundland in about the 44th degree of latitude, you will meet with nothing, till you draw near the Iſle of Sables, which we commonly paſs in latitude 43. Southward of this iſle, the current is found to extend itſelf as far North as 41° 20′ or 30′, then it turns towards the E. S. E. or S. E. ¼ E.

Having paſſed the Iſle of Sables, ſhape your courſe for the St. George's Banks, ſo as to paſs them in about latitude 40°, becauſe the current ſouthward of thoſe banks reaches as far North as 39°. The ſhoals of thoſe banks lie in 41° 35′.

After having paſſed St. George's Banks, you muſt, to clear Nantucket, form your courſe ſo as to paſs between the latitudes 38° 30′ and 40° 45′.

The moſt ſouthern part of the ſhoals of Nantucket lie in about 40° 45′. The northern part of the current directly to the ſouth of Nantucket is felt in about latitude 38° 30′.

By obſerving theſe directions and keeping between the ſtream and the ſhoals, the paſſage from the Banks of Newfoundland to New-York, Delaware, or Virginia, may be conſiderably ſhortened; for ſo you will have the advantage of the eddy current, which moves contrary to the Gulph Stream. Whereas if to avoid the ſhoals you keep too far to the ſouthward, and get into that ſtream, you will be retarded by it at the rate of 60 or 70 miles a day.

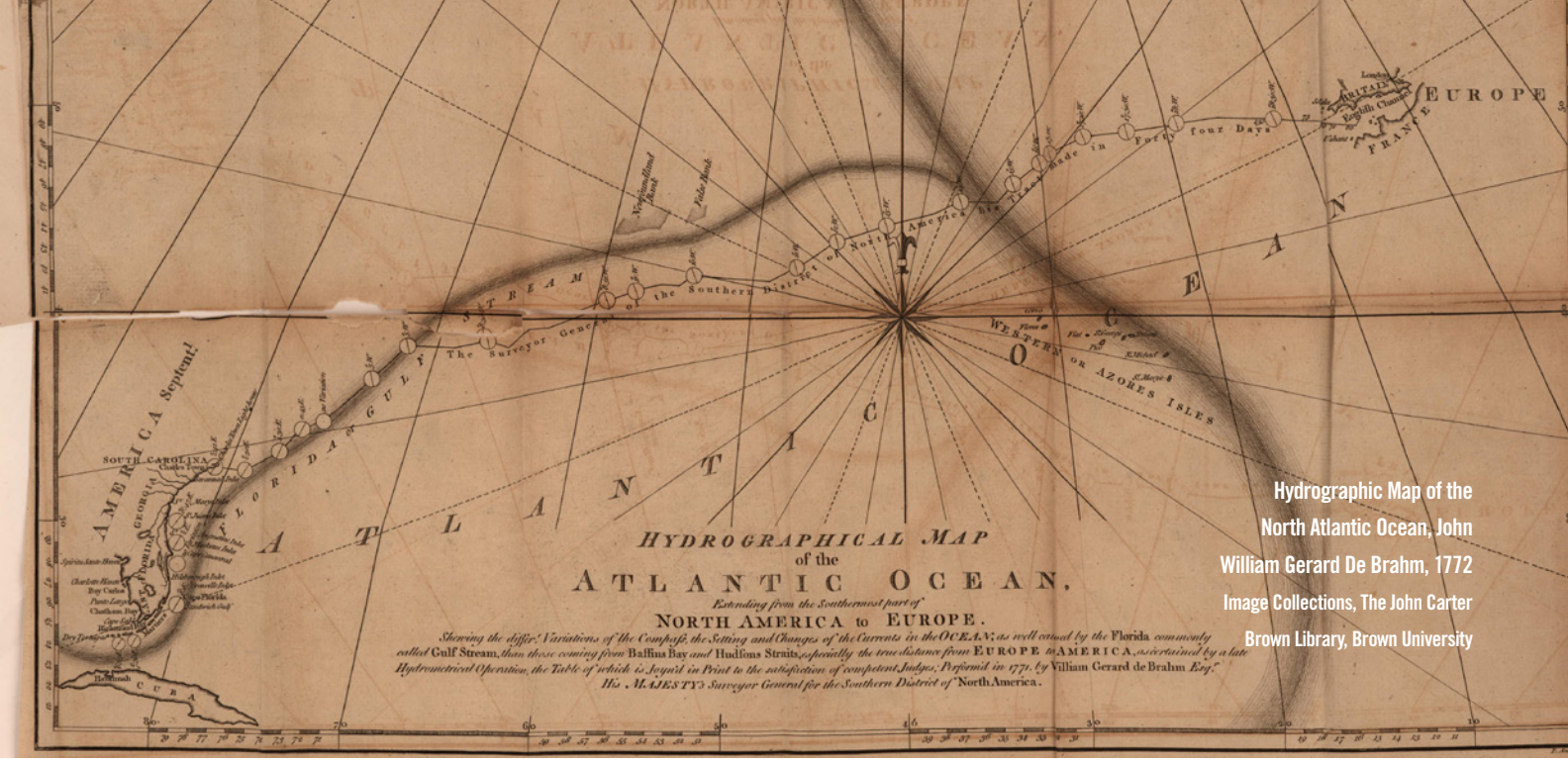
The Nantucket whale-men being extremely well acquainted with the Gulph Stream, its courſe, ſtrength and extent, by their conſtant practice of whaling on the edges of it, from their iſland quite down to the Bahamas, this draft of that ſtream was obtained from one of them, Capt. Folger, and cauſed to be engraved on the old chart in London, for the benefit of navigators, by

B. FRANKLIN.

Note, The Nantucket captains who are acquainted with this ſtream, make their voyages from England to Boſton in as ſhort a time generally as others take in going from Boſton to England, viz. from 20 to 30 days.

A ſtranger may know when he is in the Gulph Stream, by the warmth of the water, which is much greater than that of the water on each ſide of it. If then he is bound to the weſtward, he ſhould croſs the ſtream to get out of it as ſoon as poſſible.

B. F.



Hydrographic Map of the North Atlantic Ocean, John William Gerard De Brahm, 1772
Image Collections, The John Carter Brown Library, Brown University

Other Early Charts of the Gulf Stream

The Franklin-Folger Gulf Stream chart was a major improvement in Atlantic navigation and served as a basis for all but one subsequent eighteenth-century chart. In his *Hydraulic and Nautical Observations* (1787), Thomas Pownall clearly acknowledged the contributions of Franklin, incorporating several of his notes and corrections in his own paper and chart. Pownall's depiction of the Gulf Stream is similar to Franklin's but continues southeastward, extending across the entire Atlantic toward the African coast. Current arrows show the main circulation of the Atlantic so as to almost vanish as it approaches northwest Africa. Jonathan Williams (grand-nephew to Franklin) and Captain Thomas Truxtun, both of whom accompanied Franklin on his last cruise in 1785 and worked under his direction, also published charts depicting the familiar Franklin-Folger Gulf Stream.

The only Gulf Stream chart made independently of Franklin and Folger during this period was published by John William Gerard De Brahm in 1772. During a trip to England in 1771, De Brahm tracked the current from off the coast of Charleston, South Carolina, north to Delaware Bay (39°N), a distance of around 1,000 kilometers. From 39°N, he extrapolated the stream northeastward until it joined another current flowing to the southeast near 46°N 35°W. De Brahm's chart was the first recorded attempt to follow and plot the path of the steam along the North American coast; however, his attempt at extrapolating the Gulf Stream incorrectly plotted the current too far to the north, where it is shown crossing Georges Bank and the Grand Banks of Newfoundland. De Brahm also mistakenly shows the Gulf Stream running along the southern edge of the Newfoundland Banks, which is plotted nearly 9° west and 1° north of its actual position. The inaccurate depiction of the Gulf Stream on De Brahm's chart may have misled mariners and inadvertently caused those sailing westward to deviate their course too far to the south and into the real position of the current.

The Franklin-Folger chart of the Gulf Stream was a major step forward in accurately recording and depicting a complicated ocean current and illustrates the vast collective knowledge Nantucket ship captains gained during their decades of experience in the Atlantic whale fishery. Even today, the chart continues to provide a good overview of the main features of the stream, although obviously we now have a much more detailed understanding of its movement, variability, and subsurface features. As our scientific knowledge of the stream has increased, however, it has become difficult to represent all of this detail in one printed schematic. Although created nearly two and a half centuries ago, the Franklin-Folger chart of the Gulf Stream has relevance today. ↬

Philip L. Richardson is a Scientist Emeritus at the Woods Hole Oceanographic Institution, where he has studied the physical characteristics of the Gulf Stream and other ocean currents for many years. He became interested in oceanography in the 1960s when he worked in the Coast and Geodetic Survey producing nautical charts.

Nathan T. Adams is a shipwright and historian at Mystic Seaport. He completed a master's degree in the environmental history of the ocean at the University of British Columbia, writing his thesis on eighteenth-century whalemen's knowledge. At Mystic Seaport, he took part in the restoration of the *Charles W. Morgan,* the last American whaleship still afloat, and is currently working on the restoration of the *Mayflower II*.

The Search for the "Lost" Franklin-Folger Chart

By Philip L. Richardson

In the 1970s, I wrote my PhD dissertation on the Gulf Stream. At the time, colleague and Gulf Stream expert Fritz Fuglister advised me that Benjamin Franklin's 1786 chart of the Gulf Stream included in his "Maritime Observations" was still the best for showing the general location, speed, and overall width of the current. I was later astonished to learn that there were actually three versions of Franklin's Gulf Stream chart printed sequentially in London, Paris, and Philadelphia, with later versions being copies of the earlier, although with some notable differences. I surmised that the 1786 version of the Franklin-Folger chart, depicted in many oceanography books, could be very different from the sketch of the Gulf Stream Franklin originally obtained from his cousin, Timothy Folger, in 1768. Although this chart was mentioned by Franklin in 1786, all copies of it had been "lost" for many years.

Intrigued, I wrote letters of inquiry to various libraries and museums and discovered that although the Paris version was relatively well known and accessible, no surviving copies of the earlier London version were known to exist. I remember thinking that if I ever found myself in Paris, I would search for a surviving copy of that earlier chart, assuming that the French, ardent admirers of Franklin, may have archived earlier copies.

In 1978–79, I spent a sabbatical year in Paris working at the Museum of Natural History. The director, Henri Lacombe, suggested that if a copy of the first chart was anywhere to be found in that city, it would most likely be located in the Bibliothèque Nationale. After fruitlessly scouring the library's index, I asked the librarians if it would be possible to look through a folder containing historical charts of the Atlantic in the off chance that Franklin's chart was among them. There followed an intense discussion with the librarians, but I was eventually permitted to examine the restricted holdings where I quickly found not one but two copies of the London version. Even the librarians had been unaware of the existence of the "lost" chart in their collection.

After conducting additional research on Franklin, Folger, and the three different versions of their Gulf Stream chart, I published my findings in 1980. News of the discovery, along with a copy of the chart, was published on the front page of the *New York Times* on February 6, 1980, and replicas of the chart were printed and widely distributed. In 1979, a third copy of the 1769 chart was discovered by Louis de Vorsey in the Naval Library in London. One of the two prints in the Bibliothèque Nationale was obtained by the United States Library of Congress in 1988, although the copy held in Paris is in better condition.

It is unclear why someone did not earlier find a copy of the first London chart. I suspect that before World War II, the copies in France were in the naval library in Brest, perhaps with limited accessibility. It seems possible that historical charts were transferred to the Bibliothèque Nationale in Paris for safe keeping during the war; by then, the few people who had known about the London version had died, or forgotten about the chart, or given up looking for a copy. For me, the lucky find inspired me to pursue further research on the historical aspects of oceanography and science. These projects have been rewarding and have deepened my appreciation and understanding of the significant discoveries made by scientists in the past.