I.—REPORT ON THE WORK OF THE UNITED STATES FISH COMMISSION STEAMER ALBATROSS FOR THE YEAR ENDING DECEMBER 31, 1885.

By Lieut.-Commander Z. L. Tanner, U. S. N., Commanding.

The Albatross was at the navy-yard, Norfolk, Va., at the close of my last annual report, December 31, 1884. All preparations for sea had been completed, and we were waiting the arrival of the naturalists who were to join us for the winter's cruise. They arrived on the morning of January 3, 1885, the party being composed of Messrs. Benedict, Bean, Collins, and Lee.

We left the navy-yard at 2.25 p. m., and proceeded to sea under the following orders:

U. S. Commission of Fish and Fisheries,
Washington, D. C., December 20, 1884.

Capt. Z. L. Tanner,
Commanding steamer Albatross,
Navy-Yard, Washington, D. C.

Sir: After making the necessary preliminary arrangements, you will start from Washington, in the Albatross, on or about January 5, 1885, and proceed to the Gulf of Mexico, for the purpose of making a careful investigation into the food-fishes and the fisheries of that body of water.

If circumstances favor, you will make a trial of the trawl-line at Cape Hatteras for the tile-fish, selecting the most suitable region known to you.

In proceeding to the Gulf of Mexico, you are at liberty to touch at any of the principal Atlantic or Gulf ports for supplies, or for such other purposes as you may deem expedient. On all such occasions you will report, by telegraph, your arrival, probable length of stay, and time of departure.

Letters will be sent to you at Key West and New Orleans, at which points inquiry should be made for them.

The general plan of the service in question is left to your discretion. When you touch at Pensacola, you will call upon Mr. Silas Stearns, of the fishing firm of Warren & Co., and ask suggestions from him in regard to the best points for exploration. This gentleman has kindly agreed to accompany the vessel on one of its cruises, and you will accordingly make the necessary arrangements.

You will endeavor to ascertain the reasons why the various food-fishes affect particular localities, so as to obtain data for deducing the probable occurrence of certain fishes on grounds ascertained to possess

the appropriate food or physical characteristics. You will locate on the charts the known banks where the fish are found, as well as the new ones that may be discovered.

The fullest information as to the habits and characteristics of the fish met with should be gathered and recorded.

You will make New Orleans, in the vicinity of the Exposition building, a special point of resort, coming in from time to time, and landing such of the collections as it is considered expedient to display in the Government building or to send at once to Washington. Arrangements will be made, if possible, for a specialist connected with the Commission to be on hand at New Orleans and take charge of these collections.

Unless for special reasons, it is not desired to have the cruise occupy a longer period than three or three and a half months. Suggestions, however, from you as to curtailing or extending this time will receive attention; much will necessarily depend upon the cost of coal and other elements of maintenance chargeable to the Commission.

The scientific staff for the cruise will consist, as heretofore, of Mr. Benedict as chief naturalist, who will be assisted by Mr. Thomas Lee. Captain Collins will probably start with you and aid in the experiments as to the methods of fishing, and you will ask his advice in such matters, as already intimated. Mr. Silas Stearns, of Pensacola, may be able to accompany you on one or more of your trips, as may be convenient to him and yourself; and it is not impossible that for part of the cruise the services of Dr. Bean may be substituted for those of Captain Collins. This special service will not include, however, more than four persons.

Should there be any other points in regard to which you desire instructions or suggestions, I shall be pleased to have you call attention to them.

Respectfully,

SPENCER F. BAIRD,
Commissioner.

U. S. COMMISSION OF FISH AND FISHERIES,
Washington, D. C., December 19, 1884.

Capt. Z. L. TANNER,
Commanding steamer Albatross,
Navy-Yard, Washington, D. C.

SIR: If it can be done during any part of your cruise, without in any way interfering with the service or increasing the expense, I should be glad to have you make a special examination of the food-fishes and mollusks in the vicinity of the island of Cozumel, off the coast of Yucatan, and which is said to be very rich in such products.

Should it be convenient to do so, without in any way interfering with the proper service of the vessel, I wish also to have a careful exploration made of the natural history of the island, especially of the birds, mammals, and reptiles, which will probably furnish a field of interesting research.

Respectfully,

SPENCER F. BAIRD,
Commissioner.

The wind was moderate from the eastward, with cloudy weather, clearing during the evening; the barometer was unusually high, touching 31.10 at noon, the highest point I recollect ever having seen it on the

Atlantic coast. It began falling early on the 4th and the wind veered to SE., increasing to a strong wind, moderating, however, during the afternoon, when it veered to the northward and westward. We passed Cape Hatteras at 5 a. m., and entered the Gulf Stream at 7 a. m., intending to set the trawl-line for tile-fish and try the dredge and trawl, but the sea was too rough for boat work, so we hauled inshore out of the Stream and continued our course to the southward until the following morning, when, the wind having moderated, we set a trawl-line in 79 fathoms, latitude 32° 55′ N., longitude 77° 54′ W. No tile-fish were taken—in fact, nothing except an eel and two small hake. Four hauls of the trawl, with wing-nets and mud-bag attached, were made during the day, with good results. We found many familiar species, which seemed to be at home along the whole coast, besides others which were new to us. Large numbers of *Munidas* of a rare species were found, somewhat like those so plentiful on the tile-fish grounds off the New England coast. Several sea-urchins, new to the Albatross, were taken, besides crabs, cephalopods, worms, small sponges, shells, foraminifera, and a variety of fish.

The wind, which was light in the morning, increased steadily during the day, ending with a moderate gale, and, being in the Gulf Stream, an exceedingly uncomfortable sea. We kept on the edge of the Stream with the intention of continuing our work on the 6th, but the gale still held from the southward, making it impracticable. It hauled to the westward on the 7th, still blowing a gale, with every appearance of holding for days, while we were laboring in a regular Gulf Stream sea, which must be experienced to be appreciated, holding on in hopes of getting an opportunity of continuing our work. The prospect, however, was so discouraging that we squared away on the above date, and under steam and sail ran out of the Stream to the southward and eastward, then laid a course for the Straits of Florida, wind and sea moderating.

At 2.50 p. m., January 9, we arrived at Key West and anchored off the naval station, going to the wharf later in the day. While steaming along the Florida reefs from 9 to 10 knots per hour, several kingfish were captured with a trolling-line. The larger fish succeeded in tearing themselves from the hook, those of moderate size only being landed on deck.

At 6.10 a. m. on the 10th we left the wharf, steamed out clear of the reefs, and swung ship under steam, observing azimuths of the sun on every point of the compass to ascertain the local deviation. The work being completed, we returned to port, and at 11.45 a. m. made fast to the wharf. At 1.15 p. m. we commenced coaling and finished the following day, having received 81½ tons. The naturalists were collecting during our stay, giving most of their attention to birds. Captain Collins gained valuable information among the fishermen and took several hauls of the seine with good results.

At 1 p. m. on the 15th we cast off from the wharf and steamed out of the main ship channel *en route* for Havana. At 2.15 p. m. we cast the

trawl in 37 fathoms, sand and broken coral bottom, latitude 24° 26′ N., longitude 81° 48′ 15″ W. It soon caught on the rough bottom and came up tail first, but there were several good specimens in the folds of the net. The ground was very thickly strewn with coral fragments and dotted with growing coral, making it wholly unfit for trawling; but we used an old net of very little value, and succeeded in making three interesting and successful hauls. Fish were represented by several species, some being new to us, and the invertebrates included many species of crabs, echinoderms, cephalopods, shells, corals, &c., a better variety probably than would be obtained by going over the ground again, as we could not expect to make the same number of hauls without sacrificing the net. After working until dark we started for Havana, arriving at 8.30 a. m. the following morning, making fast to mooring buoy No. 3. We received the usual visits from the authorities on shore, and from the French ram Bouvét, all of which were returned during the day. At 10 a. m. I called on the United States consul-general, Robert Williams, esq., who accompanied me to the office of the captain of the port, he being, in the absence of the admiral, in command of the station. Upon being informed of our mission to Cuba he offered his services and expressed a hope that we would meet with success.

At 6.15 a. m. the following morning, January 17, we left the port and lowered the tangles outside the entrance as near as possible in the spot where we found the *Pentacrinus* last winter. Thirteen hauls were made during the day in from 114 to 230 fathoms, rough coral bottom; the losses amounting to one tangle, 50 fathoms of dredge-rope, and two sounding-shot used as tangle-weights. The result of the day's work was 85 specimens of *Pentacrinus* in good condition, and a large number of small crabs, echinoderms, shrimp, sponges, small fish, &c. We returned to port and made fast to the buoy at 6.15 p. m. The next day, being Sunday, we remained in port receiving visits from the United States consul-general, captain of the port, Capt. J. Romero y Moreno, Spanish navy, and others.

We were under way again the following morning, making thirteen hauls during the day without loss, taking 187 sea-lilies in good condition, and a single specimen of what was said to be a new genus.

Preparations for our final departure were made Tuesday morning, and we left the harbor at noon. Six hauls were made during the afternoon; five with the tangles resulting in the capture of 106 sea-lilies, and one, the last, with the small beam-trawl over the same ground. We hardly expected to see the net again, although thinking it worth the trial. Strange to say, there was not a single specimen of *Pentacrinus* brought up; in other respects the haul was an excellent one. Among the many things in the net were a variety of cup sponges, ophiurans, corals, and a rare fish, a fine specimen of Astrophyton, and several remarkable sea-urchins having very long spines. Many of the specimens were unique, and had daylight permitted we would have made another attempt with the

trawl. The result of the 32 hauls was 379 sea-lilies in good condition, besides other specimens too numerous to mention.

At 5.20 p. m. we started ahead for the island of Cozumel, off the east coast of Yucatan. The engines were slowed for half an hour soon after dark for surface towing, but to our surprise very little life was found.

At 9.02 a. m., January 21, we cast the trawl in 426 fathoms, white coral sand, latitude 22° 41′ N., longitude 84° 16′ 30″ W., and again at 11.13 a. m., in 463 fathoms, same character of bottom, latitude 22° 35′ N., longitude 84° 23′ W. Coral patches were encountered both times and caught the net; but we succeeded in getting it on board with a few good specimens of ophiurans, sponges, corals, fish, &c. The weather was squally during the day with frequent showers, clearing during the evening. Our course for many hours lay parallel with the Colorado reefs, on which we saw two wrecks, one of them being a Spanish man-of-war.

Shortly after dark the engines were slowed half an hour for surface towing, and, although a few good specimens were obtained, we found comparatively little life.

Cape San Antonio light was sighted at dark and passed out of sight at 9 p. m. At 9.38 a. m. the following morning we put the tangles over in 167 fathoms, sand, sponge, and coral bottom, latitude 20° 59′ N., longitude 86° 23′ W., off the eastern edge of Arrowsmith Banks. A few free crinoids, crabs, sponges, &c., were taken, and finding the bottom smoother than was anticipated the small beam-trawl was put over in 130 fathoms, near the first position, making an excellent haul. Among the various forms were some fine gorgonian corals, an echinoderm, sponges, corals, &c. This success induced us to make another trial, when we fouled the bottom and lost the trawl-net.

We sighted the island of Cozumel at 3.10 p. m., January 22, and anchored on the bank at 4.55 p. m. in 5½ fathoms, sandy bottom. The situation was exposed to northerly winds and the holding ground was not good; but we passed a comfortable night, and at 6.10 a. m., on the following day, we got under way and steamed along the western side of the island to the anchorage off the village of San Miguel, about 4 miles from the northwest end, where we anchored in 4½ fathoms, sandy bottom, about one-fourth of a mile from the beach.

Visits were received from the authorities on shore and returned; our object in visiting the island was made known, and in the afternoon a hunting party was sent on shore to commence collecting, giving their attention principally to birds. They were very successful, returning before dark with large numbers, many more than they were able to skin during the night. Those that could not be otherwise cared for were, however, preserved in alcohol, so that none were lost.

The 24th was a busy day with the naturalists, some of whom were traversing the jungle in search of birds, and others, assisted by a working party from the crew, hauling the seine along the beach. Both were

successful, bringing in many valuable specimens. Seining, however, can be carried on to a limited extent only, owing to the character of the bottom, which, if not rocky, is usually dotted with coral patches or fragments of dead coral washed up by the sea. The lot of the hunter is not altogether a happy one, for the moment he penetrates the dense undergrowth he is literally covered with wood-ticks, which are unpleasant at all times, and often prove a serious nuisance.

We remained at our anchorage off San Miguel until the morning of January 29, the work of collecting being carried on vigorously by the naturalists, assisted by the officers and working parties detailed from the crew. Large numbers of birds and fishes were obtained, besides some fine specimens of mammals.

The photographer succeeded in taking views of two of the principal ruins, one an old church near San Miguel, and the other a large building near the southern end of the island. The following interesting report of his trip is submitted:

"I left the ship on the 24th of January, with Mr. J. B. Anduze, in the steam-launch for a trip to his plantation, located on the southern end of the island, about 12 miles distant. In passing down the coast we stopped off the mouth of a small creek, which empties into the sea about 5 miles from the village of San Miguel, and took a photograph of the entrance. I learned that this creek is about 60 feet wide at its mouth, which has high rocks on each side, and has an average of 6 feet of water on the bar. On the inside there is a basin of about 300 yards in circumference, the banks of which are perpendicular rocks about 6 feet in height. The water in this basin is so deep that vessels of 80 tons can lay alongside the shore and take in their cargo. From this place to the landing the shore was very low, except one point which was quite rocky; all the rest presented the appearance of being fine sandy beaches and good places for hauling seine. When we reached the landing the surf was so heavy that we were landed from the boat on the backs of natives. The plantation being about three miles in the interior, we were compelled to make the rest of our journey on small ponies that are used in all tropical countries. The road, or rather a narrow bridle-path, led through a dense forest of small twisted knotty trees whose trunks and limbs were covered with creeping vines, so that it was almost impossible to distinguish the leaves of the tree from those of the vine. Many of these vines bore some remarkably beautiful flowers which made a very pretty scene; the foliage meeting overhead completely shut out the rays of the sun, and the total absence of buzzing insects made the ride a very pleasant one. I saw a large number of birds both large and small, some of which were very beautiful, also butterflies of every color imaginable.

"We reached the plantation at 5 o'clock in the evening, too late to take photographs. This plantation consists of a farm of half a league square, around which is a high stone wall, the fields being divided

off by rail fences. There were large fields of bananas, and plantain trees, pineapples, corn, and ginger, with immense groves of orange and lemon trees, but all seemed neglected entirely or very poorly cultivated. Farming implements of the crudest kind, no modern appliances being used, may account for the appearance of the fields. The houses were five large thatched structures arranged in a square. These are used for servants to live in and also to store the products of the plantation as they are gathered. In the center of this square is a large stone building with a thatched roof, which is the residence of Mr. Anduze. This must have been a beautiful place once, but is now sadly out of repair. While waiting for supper we went to an Indian village which is located on this plantation. Here I found a collection of about fifty houses occupied by thirty families. They were much neater in their general appearance and more intelligent than the Indians of San Miguel. Our appearance excited so much curiosity that the entire village turned out, so that I had a good view of them. I found their complexion to be that of a bright mulatto, very dark eyes, and with long, straight, coarse, black hair. The men had scanty black beards, and were in height about 5 feet 4 inches, with features blunt and short. I entered several of their houses, which were huts made of poles, with thatched roofs, the floors being made of cement, raised a foot or more above the ground, and kept very clean. In each case I found but one room in a hut where the entire family lived, cooked, and slept, their hammocks being triced up to the rafters during the day. But everything was very clean, all the women were dressed in loose, comfortable white gowns and the children the same—those that had anything on. Some were engaged in making cigars, some curing tobacco, and others making baskets. The occupation of the men at this time is that of wood-chopping, all being engaged in cutting cross-ties for railroad companies in Yucatan.

"Unlike the other villages of the island, the cattle here are not allowed to run at large about the houses, but are kept in big pens with high stone walls around them. I saw some old Indians that were unable to converse in Spanish, and who knew no language but the original Indian tongue. They all speak the Indian language somewhat. They have a small Catholic church in the village, but there having occurred several remarkable spiritualistic exhibitions among the inhabitants on the island, they have in consequence all turned spiritualists, and their church is neglected and about to fall down. Just on the edge of the village is an old ruin, which, these Indians say, was here at the time of the Spanish conquest, but they know nothing definite about it. The next morning we went out to the ruins on the other side of the plantation, and the undergrowth, having been cut away the evening before from around them, gave us a good view. I found what had once been a very large temple, covering about half an acre of ground, the walls of which had fallen in such a way as to form a large mound, on which grass, trees, and undergrowth had grown so thick that it was only

with careful search that we could make out the size of the building. The central tower, or part of it, is the only thing left standing. There is but one entrance to this tower, which opens into a very narrow vaulted room. On the left of the entrance I found some markings on the wall. I detached the plaster on which they were and brought it to the ship. I also found what at first appeared to be iron staples driven into the wall on each side of the entrance, but by a blow of the hand they were broken off and proved to be made of stone and cemented to the wall. These were also brought to the ship. I found within a radius of half a mile of this tower the ruins of a large number of stone arches, beneath which, the Indians say, are buried all kinds of beautiful pottery; but they will not dig for it as they have a belief that at one time the island of Cozumel was one vast cemetery for the inhabitants of the main land. Both Indians and Spaniards claim that these ruins were here at the time of the conquest of Mexico, and that Cortez landed on this island in 1519 before going to the main land. I took three views of this ruin, and then went back to the Indian village and made two photographs of the ruin there, two of the village and its inhabitants, one of the interior of a dwelling, two of Mr. Auduze's plantation, and in the evening returned to the ship.

"A few days later I went ashore at San Miguel and made a photograph of the center of the town, including an old Spanish church, now used as a guard-house. I then went to the ruins of an old Indian church, about a mile north of the village of San Miguel, of which there was so little left standing that it was only here and there that a small portion of the walls could be seen. I had the undergrowth cut away, and took three views of the graves and parts of the wall that were visible. I found that around the church, under the soil, was a pavement of flat, smooth stones, regularly laid down with cement. I was told that it extended for half a mile around the church, and that there was a broad pavement leading from the front of the church to the water's edge, a mile away. I traced the pavement a short distance towards the water by digging up the loose earth with a pointed stick."

At 7.35 a. m. on the 29th we got under way and steamed to the southwestern extremity of the island. A gunning party was sent ashore for birds and a seining party for fish. The Albatross, standing a little off shore, in the mean time made two hauls with the tangles and two with the small beam-trawl. The depth was from 137 fathoms to 231 fathoms, coral sand and occasional coral patches, which made it rough work for a trawl. We were not successful with the tangles, but the trawl brought up some valuable specimens, a portion of which were new to us. We stood in shore a little before sunset and picked up the collecting parties, who reported nothing new in this locality.

Mr. Benedict thought we could not spend more time here advantageously. We had, he said, a large number of every species of bird seen on the island, besides other specimens, and, although we might get a

few more species by remaining, he thought the chances too remote to compensate us for the delay. Being of the same opinion myself, we started for the Campeche banks, with the intention of making an examination of the character of the bottom, its fauna, &c.

At 7.42 the following morning we sounded and put the tangles over in 26 fathoms, sand and coral, on the Campeche banks, in latitude 22° 08′ 30″ N., longitude 86° 49′ W. Fishing with hand-lines was also tried, but without success. Seven hauls of the beam-trawl were made at various intervals during the day, resulting in the capture of a large number of specimens, many of them new to us, besides quite a number of red groupers with hook and line, some of them very large. The bottom where fish were taken was covered with live coral, sponges, a vegetable growth resembling sea-lettuce (*Ulva lactuca*), and was of course swarming with life.

It was our intention to spend several days in the examination of this region, particularly as to its fish products, and then proceed to New Orleans; but it became necessary to change the program. One of our seamen was very sick with typhoid fever, which took an unfavorable turn during the day, the patient failing very rapidly. The surgeon finally stated that the only chance of saving his life was to get him into a hospital as soon as possible; and as Pensacola was our nearest port, we made the best of our way there, arriving at the navy-yard at 2.30 p. m. on February 2, when the patient was transferred to the hospital for treatment.

We went to the coal-wharf on the morning of the 3d and made preparations for coaling; the fires were hauled, boilers blown down, and the water-line painted where it had been scraped off by the ice when leaving Washington. Coaling was commenced on the morning of the 4th and finished a little before dark on the 5th. The boilers were filled with rain-water from the yard tanks and fires started under the starboard boiler for heating and lighting the vessel.

At 4.10 p. m. we left the yard for the fishing banks off Cape San Blas, purposing to investigate the character of the bottom, the marine fauna, and the methods of taking the red snapper. A resident fisherman was engaged for the trip. While steaming out of the harbor, near Fort Pickens, we found the three-masted schooner Fanny Whitmore, of Rockland, Me., on shore in a dangerous position, with signals of distress flying. We went to her assistance, got her afloat, and proceeded on our course.

At 8.11 a. m. on the 7th we sounded in 27 fathoms, gray and black sand and broken shells, about latitude 29° 15′ N., longitude 85° 32′ W., put over the fishing lines, and took 117 red snappers, the largest weighing 27½ pounds, 4 groupers, 3 gags, and 32 porgies. All the fish taken were examined externally and internally for parasites, and the contents of their stomachs were noted. Many of the fish were females with partially developed roe, none being ripe.

Having taken as many fish as desirable, we commenced an investigation of the character of the bottom with tangles and trawl. Eight hauls

were made during the day with very satisfactory results. The chart gives the bottom as gray sand and broken shells, but the trawl developed the fact that where fish were found live coral, sponges, &c., were very abundant, and living among them were vast numbers of shell-fish, crabs, annelids, and various minute forms which furnish unlimited food supplies to the fish.

We continued work until dark, then started for Pensacola, arriving at 11.10 a. m. the following day. Preparations were made for sea on the 9th, and at 4 p. m. on the 10th we left for New Orleans, intending to investigate a reported bank *en route*. All sail was made after leaving the channel. At 12.35 the next morning we sounded in 43 fathoms, coarse gray sand, latitude 29° 27′ N., longitude 87° 44′ W., and ran a line SSW. to latitude 28° 54′ N., longitude 88° 02′ W., in 698 fathoms, sounding every five miles. We then ran lines in various directions both east and west of the position given without developing anything that would lead us to expect the existence of a bank in that locality; in fact our soundings corresponded closely with those on the Coast Survey chart. Three hauls were made with the trawl in from 68 to 324 fathoms, in about latitude 29° 10′ N., longitude 88° 15′ W., with excellent results; many specimens were obtained which we were unable to identify, and others exceedingly rare. The last haul was made a little after dark, and another line of soundings run which occupied the time until 9 p. m., when we started for Pass à Loutre light, in order to verify our position, making it at 11.50 p. m.; then stood for South Pass, making it at 1 a. m. It was blowing a moderate gale from SE. at the time and soon shut in very thick, so that we did not succeed in passing inside the jetties until 11.40 a. m. Forts Jackson and Saint Philip were passed at 3.45 p. m., and at 8.45 we anchored below Poverty Point for the night, the weather being too thick to run with safety. We were under way again at 5.25 a. m. on the 13th, and anchored off Algiers at 9.45. I then took the pilot with me as a guide and called on the chief harbor-master, who assigned us a berth at a wharf where we would not be molested by vessels coming alongside. Returning to the ship, we got under way again at 1.15 p. m. and reached the berth assigned us at 1.55 p. m.

I telegraphed Mr. Earll at once and met him the following morning, when the subject of placing the vessel on exhibition was discussed. We visited the grounds, examined the wharf, and attempted to see Major Burke, the director-general; but failing in this, the following letter was written:

[United States Commission of Fish and Fisheries, steamer Albatross, wharf foot of Terpsichore street.]

NEW ORLEANS, LA., *February* 14, 1885.

Maj. E. A. BURKE,
235 Camp Street, City.

DEAR SIR: I have the honor to inform you that the United States Fish Commission steamer Albatross, under my command, is in port, and by direction of Prof. Spencer F. Baird, U. S. Commissioner of Fish and

Fisheries, I take this means of placing myself in communication with you, and beg leave to say that I will place the vessel and her scientific appliances on exhibition for one week from Wednesday next, as part of the U. S. Fish Commission exhibit, if you will furnish wharfage. I have examined your wharf to-day, and would say that from 75 to 100 feet at either end (the upper preferred) would give this vessel a practicable berth.

Very respectfully,

Z. L. TANNER,
Lieut.-Commander, U. S. N., Commanding.

The following letter was received in reply:

[The World's Industrial and Cotton Centennial Exposition, Office of the Director-General.]

NEW ORLEANS, *February* 14, 1885.

Captain TANNER,
Commanding Steamer Albatross,
(Care Pim, Forwood & Co.).

DEAR SIR: Thanking you for your kind offer to place your ship and contents on exhibition, we find that we can give you 75 or more feet of the lower end of the wharf, though we fear that the six steamers running constantly between the city and this wharf might subject your ship to some injury; of this you must be the judge.

Please command us if you need our assistance in this matter.

Very respectfully,

S. H. BUCK,
Director-General pro tem.

Upon my expressing a preference for a berth at the upper end of the wharf, as being more out of the way of the steamers which were constantly coming and going, I received the following letter:

[The World's Industrial and Cotton Centennial Exposition, Office of the Director-General.]

NEW ORLEANS, *February* 18, 1885.

Z. L. TANNER,
Lieutenant-Commander, commanding F. C. Steamer Albatross,
(Care Pim, Forwood & Co., New Orleans, La.).

DEAR SIR: Your communication of the 14th received. Please accept thanks of the management, and beg to state that I have instructed Captain Harrison, wharf-master, to allow you 75 feet at the upper end of the wharf for your purpose.

When located I shall do myself the pleasure of paying you a visit.

Respectfully,

S. H. BUCK,
Director-General pro tem.

We cleaned and painted ship, and, in fact, did everything we could in the few days at our command to improve the appearance of the vessel. We dressed ship on the 18th and 19th in honor of the Mardi-Gras festival. On the morning of the 20th we went to the Exposition wharf, had everything prepared as for work at sea, and at meridian opened

the vessel to visitors. A detail of officers and men was on duty during visiting hours to show them over the vessel, one naturalist, at least, being in the laboratory.

We remained at the wharf until March 1. Many thousands of people from all parts of the country visited and examined the vessel, her scientific appliances, and such specimens of marine fauna as we could exhibit, with evident wonder and interest. All were received with courtesy, and it is worthy of remark that the officers took particular pleasure in explaining the various appliances in use for deep-sea exploration, the object of that work, and the operations of the U. S. Fish Commission in general. The crew also entered into the matter with commendable spirit, and were of great service. Our visitors almost invariably expressed great interest in what they saw and appreciation of the courtesy shown them.

At 9.15 a. m., March 1, we left the Exhibition wharf and steamed down the river, passing Fort Jackson at 3 p. m. We entered the South Pass at 4.20 p. m., left the jetties at 5.20, and laid a course to the southward and eastward for the night. The surface temperature of the water, which had been 40° in the river, rose to 68° soon after leaving the jetties.

At 5.30 a. m., March 2, we sounded in 1,467 fathoms, yellow ooze, latitude 28° 00′ 15″ N., longitude 87° 42′ W., and at 6.27 lowered the trawl, with wing-nets and mud-bag attached, and veered 2,300 fathoms on the dredge-rope. It was landed on deck at 10.06 a. m. with several species of bottom fish, shrimp, sea-anemones, holothurians, ophiurans, annelids, echinoderms, sponges, &c. The bottom was very slimy, and the numbers of the various species were much smaller than would have been found in the same depth in the Atlantic.

Another haul was made in 1,430 fathoms, brown mud, latitude 28° 02′ 30″ N., longitude 87° 43′ 45″ W., and a third one in 1,330 fathoms, light brown mud, latitude 28° 05′ N., longitude 87° 56′ 15″ W. The general character of the specimens taken in the last two hauls was much the same as that of the first. A feature of all the hauls was the predominance of soft jelly-like forms.

At 5.35 a. m., March 3, we sounded in 1,255 fathoms, gray mud, latitude 28° 19′ 45″ N., longitude 88° 01′ 30″ W., and at 6.09 lowered the trawl. It was landed on deck at 9.30—being a mere "water haul." It was lowered again at 10.51 a. m. in 1,181 fathoms, brown and green mud, latitude 28° 32′ N., longitude 88° 06′ W., and landed on deck at 2.08 p. m. with a heavy load of mud, which yielded considerable foraminifera, but little else. Another cast was made at 3.24 in 940 fathoms, gray and brown mud, latitude 28° 45′ N., longitude 88° 15′ 30″ W. A heavy load of mud was brought up as before, with several bottom fish, one of which we did not recognize. The last haul of the day was made at 7 p. m. in 730 fathoms, gray mud, latitude 28° 51′ N., longitude 88°

18′ W. The trawl was landed on deck at 8.45 p. m., and contained a number of fine fish, as well as a variety of other specimens, among them being an enormous isopod, 8½ inches in length and about 4 inches broad—a remarkable specimen.

At 5.36 a. m., March 4, we cast the trawl in 60 fathoms, blue mud, latitude 29° 15′ N., longitude 88° 06′ W., and while heaving in it caught on some obstruction, probably a coral patch, parting the bridle stops and rending the net. The trawl-frame and wing-nets were lost. Six hauls were made during the day between the position given above and 25 fathoms, latitude 29° 32′ N., longitude 87° 45′ W., and a large number of shoal-water specimens taken. Fishing lines were put over at each dredging station; also at six stations when the trawl was not lowered, trying for fish, but with no success, although we crossed the inner edge of what was at one time a favorite fishing ground.

The weather, which had been moderately good since leaving the jetties, changed for the worse during the day, and at night, when we ceased work, there was a moderate sea from NE. We made Pensacola light at 10.50 p. m., and hove to for the night, as we did not wish to enter before the following morning. At 6.58 a. m., March 5, we arrived at the navy-yard coal wharf, and commenced coaling at 1 p. m. Mr. Silas Stearns, of Pensacola, visited the ship, and arrangements were made with him to go with us to the snapper banks, in the vicinity of Cape San Blas.

We finished coaling at 4.50 p. m., March 6, having taken on board 117½ tons, and at 5.15 cast off from the wharf and proceeded to sea. At 5.48 the following morning we tried for fish in 30 fathoms of water, gray sand, black specks, and broken shells, latitude 29° 16′ 19″ N., longitude 85° 49′ 30″ W., a single red grouper being the only fish taken. We made trials in thirty stations during the day, in from 25 to 33 fathoms, and succeeded in taking fish in the following:

Latitude N.	Longitude W.	Fathoms.	Kinds of fish taken.
° ′ ″	° ′ ″		
29 16 00	85 47 30	29	9 red snappers, 10 others.
29 16 45	85 39 30	28	5 red snappers, 6 red groupers, 1 porgie.
29 16 00	85 38 45	31	2 red snappers, 5 red groupers, 1 porgie.
29 19 00	85 43 15	28	11 red snappers, 8 red groupers, 2 black groupers.

The last station was occupied just before dark, and, keeping as near it as possible, we set two gill-nets, but failed to take any fish. They are found on narrow ridges, and it is probable that in setting the nets we missed the ground.

The submarine electric light was used with good results for surface collecting while the fishing party was away, large numbers of minute forms being taken. The fishermen returned at 12.15 a. m., March 8,

and at daylight we resumed the examination of the grounds in the vicinity. Eight stations were occupied, fish being taken at the following:

Latitude N.	Longitude W.	Fathoms.	Kinds of fish taken.
° ′ ″	° ′ ″		
29 16 45	85 41 00	29	1 red snapper, 10 other fish.
29 15 30	85 40 15	29	1 red snapper, 4 red groupers.
29 20 15	85 45 40	29	2 red snappers, 6 red groupers.

We met with such poor success that we concluded to change ground to the southward and eastward about 45 miles. Here we made four trials, finding fish finally in latitude 28° 54′ N., longitude 85° 08′ W., in 28 fathoms. Forty-two red snappers and two black groupers were taken in a few minutes. Thinking this would be the most favorable opportunity for trying the trawl-line, which had been baited for the purpose, it was set as nearly as possible on the spot where the fish were taken, but without success. The ridges on which snappers are taken are so narrow that it is difficult to set the line in exactly the right spot, particularly in the strong currents prevalent in this region. The breeze was quite fresh also, which served to drift the fishermen off the ridge.

At 5.45 p. m. we started for port, the wind then blowing a moderate gale from NNW., continuing until the following morning, when it gradually died out. We reached Pensacola navy-yard at 3.15 p. m. on March 9, and made fast to the wharf. On March 12, preparations having been completed for our final departure from Pensacola, we cast off from the wharf at 5.10 p. m., and proceeded to sea.

We had already made extensive explorations in the western Gulf about the meridian of Mobile and as far south as latitude 28° N. When in 1,467 fathoms of water we commenced a line of dredgings, which were carried into a depth of 25 fathoms off Pensacola. In order to continue the exploration we stood to the southward during the night, and at 5.28 the following morning cast the trawl in 724 fathoms, brown and gray mud, latitude 28° 47′ 30″ N., longitude 87° 27′ W. Five hauls were made during the day between the above position and latitude 28° 34′ N., longitude 86° 48′ W., in 335 fathoms, in a direction about E. by S., and at nearly equal intervals.

The hauls were all successful, bringing up a great variety of specimens: many holothurians, several species of mollusca, a naked mollusk which was remarkable for its size, a large red crab (*Geryon quinquedens*), several species of shrimp and deep-sea fish, two or three of which we did not recognize. There were also several very large tubes of the worm *Hyalinacea artifex* (?), compound ascidians, cup-corals, *Acanella*, a variety of starfish, sponges, sea-anemones, and the usual number of minute crustacea, many of them being taken in the wing-nets.

A set of serial temperatures and specific gravities was taken during the forenoon to a depth of 500 fathoms, latitude 28° 43′ N., longitude

87° 14′ 30″ W. The new water-bottle, intended to retain the gases in water specimens, was tried at 500 fathoms, but the upper valve failed to close, and when a slight pressure was subsequently put on it the joints were found to leak so badly that it was of no use for the purpose for which it was designed. We did what we could to repair the fault when further experiments were made.

At 5.30 a. m., March 14, we cast the trawl in 280 fathoms, gray mud, latitude 28° 42′ N., longitude 86° 36′ W., making five hauls during the day from the above position to latitude 28° 36′ N., longitude 85° 33′ 30″ W., in 111 fathoms. The general features of the catch were much the same as on the preceding day, with the addition of shoal-water forms.

A curious parasitic worm, genus *Nothria*, was found on a holothurian. Several gallons of foraminifera were washed from the contents of the mud-bag and saved, and during the evening a live paper nautilus (*Argonauta argo*) was taken in a large surface towing-net and secured in perfect condition.

The submarine electric light was used for surface collecting as usual when the ship is hove to at night. Trial lines were put over for fish at the last two stations, but without success.

At 5.30 the following morning the trawl was lowered in 88 fathoms, latitude 28° 42′ 30″ N., longitude 85° 29′ W. The bottom indicated by the lead was gray mud, but the trawl brought up a large quantity of shells, mostly dead. There were also several varieties of fish, shrimp, and crabs. Four other hauls were made between the above position and latitude 28° 48′ 30″ N., longitude 84° 37′ W., in 24 fathoms, with practically the same results, with the addition of sponges, bryozoa, starfish, cephalopods, worms, &c. Trials were made with hand-lines at each station before the trawl was lowered, and the remainder of the day was given up entirely to that work, 15 stations being occupied between latitude 28° 48′ N., longitude 84° 36′ W., and latitude 28° 44′ N., longitude 84° 26′ W., in from 27 to 21 fathoms. Although we crossed a recently-discovered bank, we caught but one red snapper and six groupers during the day.

The sky was overcast with drizzling rain in the morning, and in the afternoon there was constant heavy rain, with occasional distant thunder. March 16 was also overcast, the sun appearing only at intervals and for a few moments. It was entirely obscured during the eclipse.

Work was resumed at daylight the next day, and five stations occupied at intervals of five miles without taking any fish. The trawl was lowered in 21 fathoms, coral and sponge bottom, latitude 28° 28′ N., longitude 84° 25′ W., and brought up several sponges—one being a sponge of commerce—several sea-urchins, hydroids, one gastropod shell (*Murex*), and a variety of small fish. Ten snappers and one grouper were taken at this station. The search for fish was continued without success until the fourth station was reached, in latitude 28° 15′ 45″ N., longitude 84° 02′ 35″ W., in 21 fathoms, when two snappers and ten

groupers were taken. The next five stations were occupied without finding fish, and it now being too dark for that work, we steamed toward Tampa Bay, continuing the line of soundings for hydrographic purposes, filling a blank on the chart, until within the range of Egmont Key light, where we hove to until daylight.

At 9.30 a. m., March 17, we anchored in Tampa Bay, and sent the steam-cutter to town with the mail and for provisions, and the dingby with a seining party to the Little Manatee River. The fishermen returned before dark, having met with good success. Among the edible fish taken were sheepshead, mullet, sea-trout, big-eyed herring, crevalle, and several other species.

March 18 opened clear and pleasant, with a light to moderate breeze from the northward and westward. We were under way at 5.30 a. m., crossed the bar at 8.15, and stood to the southward and westward. A small boat was seen adrift about 11 a. m. and picked up. It proved to be a sharpie, with the remnant of a painter hanging over the bow. It had no oars or rowlocks, but lying on the bottom in the water which filled it nearly to the thwarts were several large live clams, and a few conch and clam shells. While taking up the skiff we sounded in 18 fathoms, trying for fish, without success.

At 12.32 p. m., latitude 27° 08′ 30″ N., longitude 83° 19′ 30″ W, in 25 fathoms, coarse gray and black sand, we commenced sounding and trying for fish at intervals of five miles in a S. by W. direction. The trawl was put over at the second trial (station 2409) and brought up a quantity of cup sponges (the largest being a foot in diameter), which were valuable for the annelids and crustaceans they contained. Several species of fish were taken, as well as shells, crabs, bryozoa, &c. A haul of the Chester rake dredge was made at station 2410 with small results, only a few shells and sponges being taken. Another haul of the trawl was made at station 2411, bringing up a heavy load of sponges, some of them 18 inches in diameter, and filled with worms and crustaceans. Several large holothurians were also taken, besides the usual variety of small forms occurring in this region. It might be called a sponge bottom. The trawl was lowered again and towed at the rate of 5 knots, just clear of the bottom, for the purpose of catching fish, but without results. It was after dark, but the net "fired" so much that it was quite as visible as though it had been broad daylight.

Nine stations were occupied during the day, and fish were taken at the following:

Latitude N.	Longitude W.	Fathoms.	Kinds of fish taken.
° ′ ″	° ′ ″		
27 04 00	83 21 15	25	1 red snapper, 1 porgie, 2 red groupers.
26 58 00	83 22 30	25	2 red snappers, 1 black grouper, 4 red groupers.
26 33 30	83 15 30	27	1 red snapper.

A trial was made during the evening with a hook and line, having a submarine electric light attached a few fathoms from the end. The water was illuminated for at least 20 yards in every direction, but we failed to get a bite.

The vessel was hove to during the night and resumed work at daylight the following morning in 26 fathoms, latitude 26° 28′ 15″ N., longitude 83° 11′ W. Eighteen stations, at intervals of five miles, were occupied, three of them, Nos. 2412, 2413, and 2414, being dredging stations, at which were taken many sponges, some of them very large, a variety of small fish, crustacea, and other shoal-water forms found along these shores.

Fish were taken at the following stations:

Latitude N.	Longitude W.	Fathoms.	Kinds of fish taken.
° ′ ″	° ′ ″		
26 18 30	83 04 45	27	12 red snappers, 1 red grouper.
26 12 30	83 06 30	27	1 red grouper.
26 08 30	83 03 45	26	1 scamp, 1 porgie, 3 red groupers.
25 44 30	83 02 30	27	3 red snappers.
25 39 30	83 01 30	27	3 red snappers, 1 black grouper.

We ceased work at 6.40 p. m., and started for Key West, arriving and making fast to the Government wharf at 8.25 a. m., March 20.

A peculiar atmospheric condition was observed while passing the Tortugas, which, although not particularly rare, is worthy of mention as illustrative of the cause leading to the grounding of the American steamer Alamo on that shoal during the night of March 7. We knew the position of the ship within a mile when we reached the ordinary limit of visibility of the light, but steamed on mile after mile without seeing it, although the stars were shining brightly and the atmosphere was apparently clear. We did not see it, in fact, until we were eight miles within its ordinary range, and even then only with the aid of a glass. Just at this moment the setting moon disappeared in a low-lying mist, which had not been observed before. Had we been doubtful of our position before making the light, and had we made it before detecting the presence of the mist, we should, without doubt, have considered ourselves nineteen miles distant, whereas we were only eleven miles from it.

We began coaling at 9.30 a. m., all preparations having been made before our arrival. We finished the following day, having received on board 97¾ tons. A few necessary repairs in the engineer's department were made by our own people.

At 5.45 a. m. on March 30, we got under way and proceeded to sea. The weather was partly cloudy during the day, with light northerly winds and smooth sea. In the evening it became squally, with frequent lightning to the northward and eastward, a heavy rain-squall passing over us during the last hour. At daylight the following morning it was

blowing a moderate gale from NE., with rough sea, and at 9 a. m. the engines were slowed to half-speed, not only for the purpose of easing the vessel, but to avoid passing ground on which we wished to try the trawl. Many flying-fish, a large school of porpoises, and a couple of huge sharks were seen during the day. Well-defined brown streaks in the water were noticed by the officer of the deck during the evening, which, upon examination, proved to be masses of small medusæ.

The wind and sea moderated during the night, and on the following morning, April 1, two hauls of the trawl were made: No. 2415 in 440 fathoms, sand, shells, and foraminifera; and No. 2416 in 276 fathoms, coral and broken shells. A large quantity of coral was brought up in the first haul, enough to fill the table-sieve. Although there were many gorgonians, the bulk was true corals. Sponges, ophiurans, sea-anemones, annelids, living shells, and small crustacea were found in abundance. There were also a few starfish and several deep-sea fish. A notable feature of the haul was a portion of a stalked crinoid, which we did not recognize. There was also a bright-red fish, somewhat resembling the Norway haddock, which was not recognized, although it may be a well-known species. The second haul brought up a large number of glass sponges, from which some fine specimens were obtained, a number of gorgonian corals, small crustacea, fish, and a few starfish.

Later in the day we stood inshore, and at 6 p. m. sounded in 86 fathoms, gray sand and broken shells, latitude 31° 54′ 45″ N., longitude 79° 17′ W., and tried the hand-lines, baited with salt mackerel, for tilefish, but without success. Serial temperatures were taken, and at 6.45 p. m. we steamed ahead on our course to the eastward.

The following day was clear and pleasant, with moderate easterly winds and smooth sea. We cast the trawl at 12.13 p. m., station 2417, in 95 fathoms, fine gray sand, but it came up empty. It was lowered again immediately in 90 fathoms, gray sand, station 2418, and brought up a few skates and flounders, several flat sea-urchins, crabs, small fish, starfish, &c. It was our intention to try the hand-lines for tilefish, but the bottom was so barren that we did not consider it worth while. We stood on until 5.25 p. m., when we lowered the trawl in 107 fathoms, fine gray sand and black specks, station 2419. It brought up several sea-urchins, starfish, small crustacea, and three species of fish. Trial lines were put over for tilefish, but none were taken. We hardly expected to find fish of large size on a bottom so barren, but made the trial, as we had steamed so far out of our course for the purpose.

At 6.30 p. m. we stood to the eastward, keeping in the Gulf Stream, and at 10 p. m., April 3, sounded in 2340 fathoms, blue ooze, latitude 36° 30′ N., longitude 73° 14′ W., and took serial temperatures. At 11.45 p. m. we started ahead, steaming to the westward. The wind, which was moderate in the morning, increased during the night, the barometer falling steadily. At 2 a. m., April 4, sounding and serial temperatures were taken in 1646 fathoms, No. 703, latitude 36° 45′ N., longi-

tude 73° 28′ W., and another at 5.40 a. m., in 1436 fathoms, No. 704, latitude 36° 57′ 30″ N., longitude 73° 47′ W. A water specimen was taken at 1,000 fathoms, in a new water-bottle, intended to retain the free gases in sea-water, and, as far as we could judge, with complete success. The specimen was retained in the bottle for transportation to the Smithsonian Institution.

Wind and sea increased rapidly during the forenoon, making the temperature work exceedingly difficult. Another sounding and serial temperatures were taken at 10.25 a. m. in 1208 fathoms, latitude 37° 01′ 08″ N., longitude 74° 10′ W., and at 12.25 p. m. the course to the westward was resumed until 2.30 p. m., when the vessel was hove to under steam, head to wind, which at the time was blowing a fresh westerly gale, with rough sea. At 6.20 p. m. a sounding was taken with serial temperatures in 336 fathoms, latitude 37° 09′ 23″ N., longitude 74° 30′ 30″ W., and at 10.40 p. m. the engines were stopped and the vessel allowed to drift, as we were near our intended working ground.

At 6.20 a. m., April 5, we cast the trawl in 104 fathoms, sand, mud, and gravel, latitude 37° 03′ 20″ N., longitude 74° 31′ 40″ W., and took large numbers of *Munidas*, several species of fish, ophiurans, starfish, &c. After the haul was finished, we made an unsuccessful trial with hand-lines for tile-fish. Dogfish were plentiful, however, and several were taken. A change of position brought no better success, dogfish only being taken. We made the trial in this particular spot from the fact that it corresponded more nearly with the region off Martha's Vineyard, where tile-fish have been taken, than any other locality on the Atlantic coast. The fauna is much the same, the character of the bottom is similar, and the temperature of the water corresponds with that off the New England coast later in the season. This trial, though failing to show any indications of the presence of these fish, should not be considered conclusive. They may be migratory in their habits, and as none were ever taken earlier than August, they may not as yet have reached that locality; even if they were there it is not at all certain that they would take a hook so early in the season. The presence of dogfish in such large numbers would of itself account to fishermen for their failure to take other fish.

Having finished the trials above mentioned, we started for Washington, continuing the line of soundings and serial temperatures to the Capes, up Chesapeake Bay, and to Piney Point in the Potomac, observations being made at intervals of 20 miles or less.

This series of temperatures from the middle of the Gulf Stream to the coast, taken at this particular season of the year, when so many of the migratory fishes are making their appearance in our waters, will prove of great value in the study of the movements of these fish. The question of water temperatures must enter largely into the investigation of this important subject, and, although its influence has to a certain extent been recognized, it seems probable that it will be given greater consideration by future investigators.

A lookout was kept for mackerel and other schooling fish between the Gulf Stream and the Capes, but none except porpoises were seen. We passed Cape Henry at 6 p. m.; Smith's Point, at 1.20 a. m., April 6, Mount Vernon at meridian, and arrived at the navy-yard at 1.40 p. m.

The late cruise of this vessel was made without accident or loss, except a couple of trawls, and one or two deep-sea thermometers. The vessel has, as usual, inspired confidence in her sea-worthy qualities, which have frequently been put to the test by boisterous weather encountered during nearly every trip. The engines have worked satisfactorily, but the boilers have, as usual, been a source of anxiety, although we have been delayed but little on their account, and repairs have been made by our own people. The sounding and dredging apparatus has worked admirably; so well, in fact, that no improvements have suggested themselves. The new water-bottle designed to retain the free gases in sea-water will require some modifications to make it thoroughly reliable.

We remained at the navy-yard engaged in overhauling and refitting the vessel until May 25 at 10 a. m., when we left for Baltimore, where we arrived at 8 a. m. the following day. At 1.30 p. m. we began hauling the vessel out on Skinner & Son's marine railway to scrape and paint her bottom. She was out of water at 3.40 p. m., and the scrapers commenced work.

There was a noticeable absence of barnacles on the ship's bottom, and very little grass or other growth which would tend to retard her speed, a casual inspection leaving the impression that the bottom was in excellent condition. A critical examination revealed the fact, however, that serious oxidation had taken place on several parts of the submerged surface, particularly wherever the dredge-rope had come in contact with it, where the paint had been scraped off by ice, and on the exposed surfaces of the propeller shafts.

The vessel was last docked at the Norfolk navy-yard, July 14, 1884, about ten and one-half months since, and went immediately on her summer's cruise, when she was at sea most of the time. The steel-wire dredge-rope was in constant use until October 23, when she entered the fresh waters of the Potomac, where she remained for two months, long enough to kill the barnacles and other marine growths that might have formed during the cruise. We left Washington on December 24, 1884, and were obliged to force our way through from 2½ to 3 inches of ice in the Eastern Branch, and encountered more or less of it in the Potomac, scraping the paint off the bottom from the water-line to 3 or 4 feet below it, leaving the surface of the metal entirely exposed.

Leaving the Capes of the Chesapeake on the 3d of January, 1885, we went to the Gulf of Mexico and Western Caribbean Sea, where we spent almost a month, nearly half of the time at anchor. We had an opportunity in the mean time of renewing the paint on the water-line and

about 18 inches below it, but there was still left a belt of 2 feet or more in width entirely exposed to the corroding influence of sea-water.

The vessel then spent two weeks in the Mississippi River, thus for a second time removing the barnacles, grass, &c., from the bottom. Leaving the Mississippi, she was about six weeks in the waters of the Gulf and Atlantic, when she again reached the Potomac, where she remained for seven weeks, removing all marine growths from the bottom for a third time since docking.

Had the paint remained unbroken on the wetted surface, the condition of the bottom would have been remarkably good; but unfortunately there was quite a large surface almost entirely devoid of paint, on which oxidation was taking place very rapidly, notably so on surfaces which have been in contact with the dredge-rope. Contact of the sounding-wire with the ship's bottom produced results hardly to be contemplated from a surface so minute. In fact, the contact of these hardened steel surfaces with the softer metal of the ship's bottom not only removed the paint, but actually abraded the surface to a small extent, leaving it in the most favorable condition for rapid corrosion.

The excessive oxidation on the exposed surfaces of the propeller shafts is doubtless due to the friction incident to their rapid revolution in addition to the ordinary friction of progression, to which other portions of the submerged body are subject, all combining to wear quickly the paint from their surfaces, leaving them exposed to the corroding influence of salt water.

In view of the peculiar character of the work in which the vessel is engaged, I consider it absolutely essential to scrape and paint her bottom twice a year.

We were delayed by rainy weather, and did not finish painting until Friday, May 29. A priming coat of red lead was put on, and a coat of white zinc (one-tenth red lead) put on over it. The ship was put into the water at 10 a. m. on the 30th, and left for Norfolk at 2 p. m., arriving at the navy-yard at 8 a. m. the following morning. We forwarded requisitions for coal from Baltimore, and on our arrival found a portion of it on the wharf ready for us. We commenced taking it on board at 8 a. m. on Monday, June 1, and finished at 7 p. m. the same day, having taken $134\frac{545}{2240}$ tons. This is a fact worthy of notice, considering that it was shoveled from the wharf into baskets, passed on board over the rail, put into the bunkers, and stowed by our own small crew.

Mr. James E. Benedict arrived on the morning of June 2, and at 1 p. m. everything was ready for sea, with the exception of fresh bait, which we had been unable to procure in Norfolk or the vicinity, notwithstanding our vigorous efforts in that direction. Our only remaining resource being the fishermen of the Chesapeake, or the fish factories on its shores, we left the navy-yard at 1.20 p. m. and at 4 p. m. anchored off Back River, and sent the steam-cutter in for menhaden, but they had none at the factory and had seen none for several days.

On her way out, however, a sloop was boarded which had made a haul during the day, and 2,500 menhaden in fine condition were procured from her. They were iced as soon as we received them on board. The boat returned at 6 p. m., and at 6.15 we got under way and proceeded to sea. The weather was clear and pleasant, with a smooth sea.

Two trawl-lines were baited during the night and preparations made for prosecuting our investigations in the morning, and at 5.53 a. m., June 3, we lowered the trawl in latitude 37° 07′ N., longitude 74° 34′ 30″ W., in 64 fathoms, fine gray sand and pebbles, bottom temperature 54°. It came up at 6.33 a. m. with large numbers of *Munidas*, many crabs, hermit-crabs, starfish, and several small fish, among them four pole-flounders. It was emphatically a "live bottom," where tile-fish should be found, if they inhabit this region. As soon as the trawl was landed on deck, and the favorable nature of its contents observed, the trawl-line, having 1,000 baited hooks, was set on the same ground over which the trawl had passed, the weather buoy being planted in 61 fathoms, coarse gray sand and pebbles, latitude 37° 08′ N., longitude 74° 34′ 45″ W., bottom temperature 54°. The line was taken up at 9.25 a. m. without a single fish, and, what was more remarkable, none of the baits had been touched. Even the hake, skate, and dogfish seemed to have abandoned the ground. It will be remembered that on April 5 this locality was swarming with dogfish, which took the hooks as fast as they could be put over.

We stood off shore a little to deepen the water, and put the beam-trawl over again at 9.55 a. m. in 82 fathoms, the same character of bottom, latitude 37° 08′ 30″ N., longitude 74° 33′ 30″ W., and the catch was practically the same, with the addition of four small spotted sharks. The trawl-line was set again as soon as the beam-trawl was up in 75 fathoms, same character of bottom, and the bottom temperature 52.5°, agreeing very nearly with the so-called tile-fish ground off Martha's Vineyard. There were no fish of any kind taken on this set, but the baits were nearly all gone, having been eaten probably by crabs.

Another haul of the beam-trawl was made at 3.04 p. m. in 143 fathoms, green mud and fine sand, latitude 37° 10′ 15″ N., longitude 74° 32′ W., bottom temperature 51.5°. Large numbers of *Munidas*, crabs, worm-tubes, hermit-crabs, pole-flounders, corals, sea-anemones, &c., were taken, marking the locality as an excellent feeding ground for fish. We trawled inshore to 103 fathoms, green mud, sand, and black specks, latitude 37° 11′ 30″ N., longitude 74° 32′ 30″ W., when we commenced laying out the trawl line again, standing in the direction of the position given for the last trawling station and in fact covering practically the same ground. Four hake were caught on the line during this set, the baits being nearly all taken as before.

Two large sharks were taken with a hook during the day; one of them measured 10 feet 4 inches in length, and weighed 400 pounds. They were both preserved, one skinned and the hide salted, and the other placed on ice.

Just at dusk we sent a boat for what we supposed was a huge turtle asleep on the water, but it turned out to be a large sunfish, which the men succeeded in striking, but the iron drew out and the fish sunk.

We steamed slowly to the southward during the night, and at 4.37 a. m. the following day cast the trawl in 85 fathoms, black mud, bottom temperature 52.5°, latitude 36° 41′ 37″ N., longitude 74° 42′ 15″ W. A variety of crustaceans were brought up, also a few minor forms of mollusca, fish, &c.; but a marked decrease in numbers and variety was observable as we went to the southward.

At 5.15 the trawl line was set between 135 and 160 fathoms, black mud, the weather buoy being in latitude 36° 43′ N., longitude 74° 41′ W., bottom temperature 48.8°. No fish of any kind were taken on the line, although the baits were many of them gone.

An unsuccessful trial was made with hand-lines in 78 fathoms, latitude 36° 43′ N., longitude 74° 42′ 20″ W., after which we ran to the southward until 11.49 a. m., when we set the trawl line in 119 fathoms, green mud and fine sand, bottom temperature 51.5°, latitude 36° 20′ 24″ N., longitude 74° 46′ 30″ W. As soon as the fishing party was clear of the ship we put the trawl over, taking a large number of crabs, a few *Munidas* and a variety of other crustaceans, a few sponges, hydroids, echinoderms, annelids, mollusca, and four common species of fish. Judging from the fauna captured it would be considered good feeding ground for many species of fish, yet the trawlers returned with only half a dozen hake and one large skate. As the ground here promised nothing we changed our location again and at 4.49 p. m. set the trawl line in 93 fathoms, coarse gray sand, black specks, and broken shells, bottom temperature 52°, latitude 36° 01′ 30″ N., longitude 74° 47′ 30″ W. As soon as the trawlers were away the beam-trawl was put over at the same station, taking large numbers of crabs, a few shrimp, eight specimens of *Octopus Bairdii*, several starfish, and four common species of fish. There were no fish taken on the trawl line, although most of the baits were gone from the hooks.

Three porpoises were taken with the harpoon during the day. Two of them were placed on ice and the skin of the other salted. Three blackfish with large rectangular white spots on their bodies were seen about the ship for a few minutes, but left before any attempt could be made to capture one. They were all marked alike, and as well as I can recollect had four spots each, although I may be mistaken in the number. This peculiar marking may be common, but I never before saw anything of the kind myself. The large surface tow-net was dragged for two hours or more during the evening with very satisfactory results; many minute forms, including several species of small fish, were taken, also one perfect specimen of *Argonauta argo* alive and in its shell.

The tow-net referred to has a ring four feet in diameter, the net itself being about 10 feet in length, made of strong netting and lined with cheese-cloth for 2 feet or more from the tail. Towing this net at the

rate of 3 knots or more an hour, either partially or wholly submerged, as occasion requires, we secure many specimens that would elude the ordinary surface towing-net and are too minute to be captured in the trawl. We have seen no birds thus far except petrels, which have been quite numerous about the ship. We heard the cries of a sea-bird at night, but did not see the bird itself.

Having finished the surface towing referred to, we steamed to the southward slowly to change our ground, and at 6.27 a. m. the following day, June 5, set the trawl line in 69 fathoms, black mud, surface temperature 74°, bottom 54°, latitude 35° 27′ 15″ N., longitude 74° 47′ 30″ W., on the northern verge of the Gulf Stream, meeting with the usual results, although a large proportion of the baits were gone. A school of porpoises passed the vessel during the morning, having among them a large number with their bodies thickly dotted with white spots. They were reported to me as "spotted porpoises." They are certainly not common on the Atlantic coast; in fact I do not recollect ever having seen any before. Every effort was made to capture one, but they kept out of reach of the harpoon. We lowered a boat and sent it out among the school, but they gave it a wide berth. We tried also to shoot one with heavy rifles, but failed again, much to our surprise, for we have some excellent shots on board.

A curious accident happened while laying out the trawl line, which might have resulted in the loss of a portion of our gear. After planting the weather buoy they proceeded to pay out the line and plant the lee buoy in the usual manner, but when they attempted to find the weather one it was nowhere to be seen, neither could we see it from the vessel, so we concluded it had sunk. On taking up the lee one, however, we found the trawl line had parted while being laid out, and the boat had drifted out of sight of the weather buoy. Calling the boat alongside we hoisted it on board, and the vessel steamed SSW. 3 miles, where we found the other buoy and recovered it with the anchor and line attached.

The wind, which was light during the morning, increased rapidly, getting up an uncomfortable sea, too heavy for boat work, so we were obliged to resort to hand-lines. An unsuccessful trial was made at 2.11 p. m., in 50 fathoms, fine gray and black sand, broken shells, surface temperature 76°, bottom 63°, latitude 35° 12′ 15″ N., longitude 75° 05′ W. Another trial at 2.36 p. m. in 72 fathoms, coarse gray sand, broken shells, surface temperature 76°, bottom 60°, latitude 35° 12′ 30″ N., longitude 75° 03′ 30″ W., resulted in taking one sea-bass. The next trial at 2.46 p. m., in 68 fathoms, coral, temperatures the same, latitude 35° 12′ 45″ N., longitude 75° 02′ W., was more successful; two sea-bass, two large red groupers, and two specimens of *Caulolatilus chrysops* Gill, were taken, the latter being more nearly related to the tile-fish than anything we have seen during the trip. Specimens of each species were preserved for examination.

An unsuccessful attempt was made at 4.03 p. m. in 123 fathoms, gray sand, black specks, and broken shells, surface temperature 76°, bottom 60°, latitude 35° 13′ N., longitude 75° 01′ W.; and still another at 6.42 p. m. in 52 fathoms, coarse gray sand and broken shells, surface temperature 75°, bottom 65°, latitude 35° 11′ N., longitude 75° 01′ W. We then stood inshore and sighted Hatteras light, keeping it in sight until 3 a. m. on the 6th, when we stood off shore again, and at 5.38 a. m. tried the hand-lines in 66 fathoms, fine gray sand, black specks, surface temperature 75°, bottom 58°, latitude 34° 58′ N., longitude 75° 12′ W., but found no indications of fish. Another unsuccessful trial was made at 6.15 a. m. in 54 fathoms, same character of bottom and the same surface temperature, the bottom temperature being 61°, latitude 34° 59′ N., longitude 75° 13′ W. The wind was blowing strong from the northward at this time, with a heavy swell, making it impracticable to carry on the work satisfactorily, and as we had almost reached the limit of time set apart for this cruise, the vessel was headed for the Chesapeake.

The information gained, although negative as far as the main object of the cruise was concerned, is valuable as demonstrating the total absence of tile-fish in the region examined. We procured valuable specimens of various kinds, which were sent to the Smithsonian Institution for examination.

We arrived at the navy-yard, Washington, D. C., at 3.55 p. m. on June 7, without incident worthy of remark, and moored to the coal wharf.

We remained at the navy-yard making preparations for the summer cruise until noon of June 13, when we sailed for the Newfoundland Banks, *via* Newport, R. I., under the following orders:

U. S. COMMISSION OF FISH AND FISHERIES,
Washington, D. C., June 8, 1885.

Lieutenant-Commander Z. L. TANNER,
Commanding steamer Albatross, Navy-Yard, Washington.

SIR: As soon as you have completed any necessary repairs, and have taken coal and other supplies on board, which I understand will probably be on Saturday, June 13, you will proceed to Newport for the purpose of taking on board the torpedo apparatus which the Chief of Ordnance has promised to have ready for you. You will also receive there, as scientific members of the corps, Capt. J. W. Collins, Mr. Sanderson Smith, and Mr. Willard Nye, jr., and extend to them such courtesies as may be in your power. Their mess account will be charged to, and be paid by, the Commission.

As soon as you are ready, you will leave Newport for a survey of the fishing banks to the eastward, if possible extending your researches to the Grand Banks. You will visit as many of the known fishing banks as practicable in the period of your cruise, and will take the usual soundings, dredgings, trawlings, temperature records, &c., in sufficient quantity to determine the physical and biological condition of the grounds. It may be better to proceed to the most distant locality first, so as to make sure of satisfactory investigation. Those nearest to the United States can be left for the last, or for a subsequent exploration.

You will oblige me by conferring with Captain Collins in regard to the points to be visited, and accept his suggestions as far as you may consider proper.

I am desirous of obtaining as nearly as I can the contour lines, as well as the outlines, of the fishing banks, and the maximum depths of water between them, so as to furnish the data for a relief model of the fishery sea bottom. Should there be any suggestions of available localities for fishing not yet examined, it will be well to investigate these as far as convenient.

The determination of the depths off the slopes of the banks will be of interest both in a scientific and practical point of view.

You will obtain at Newport and carry with you a sufficient supply of bait to use the trawl line to a convenient extent, purchasing such quantity of ice as may be necessary to keep it in the best condition.

As stated, the period of time for this survey is left to your discretion; it may occupy a month if you think proper. You will take in your supplies of coal at the most convenient points. It is suggested that three or four hauls of the trawl be made on the slope between the banks and the Gulf Stream, somewhere between hauls 2,076 and 2,084.

Respectfully yours,

SPENCER F. BAIRD,
Commissioner.

P. S.—I am in receipt of a letter from the Bureau of Navigation asking that if not interfering with the work of the Fish Commission, the commander of the Albatross be instructed to make an examination of Hope Bank and Watson's Rock. You will do what you can to carry out this request so far as it may be done without seriously interfering with the program above indicated.

S. F. B.

We arrived at Newport at 9.50 p. m. on the 15th, and spent the following day adjusting compasses in Narragansett Bay. On the 17th we took on board $42\frac{1}{2}\frac{6}{4}\frac{4}{0}\frac{8}{0}$ tons of coal, two Cape Ann dories with fittings, and a number of torpedoes from the torpedo station. These torpedoes were taken on board for the purpose of experimenting on the banks as to the effect the explosion would have on marine life. At 3.50 p. m. we got under way and proceeded to sea. Numerous menhaden steamers and mackerel schooners were seen between Beaver Tail, Block Island, and No Man's Land. Several schools of small mackerel were observed the following day south of George's Bank.

On the morning of the 19th we commenced a line of soundings to the westward of Hope Bank, and continued it over and to the eastward of its position as given on H. O. chart 21*a*, finding from 1,915 to 2,995 fathoms, demonstrating beyond doubt that no bank exists in that immediate locality.

We then stood in the direction of Watson's Rock, sounding at intervals, and when we were in the vicinity of the reported danger sounded every few miles, finding depths between 2,863 and 3,103 fathoms. The depth found at the position of the rock as given on the chart was 2,882 fathoms. As the weather was clear during this time and the observa-

tions reliable, it was proved beyond all question that there is no such danger in that locality.

Leaving the reported position of Watson's Rock, we stood for the southern end of the Newfoundland Banks, taking soundings at intervals, and on the morning of the 23d, a few miles to the southward of the banks, we found 1,070, 523, 826, 970, and 471 fathoms, respectively, thus developing a ridge. The trawl was put over at each of these soundings, but failed to reach the bottom on account of the water unexpectedly deepening. Eleven hauls of the trawl were made during the 23d, the principal results being numerous specimens of Ophioglypha, Pentacta, and Bryozoa. Haul No. 2434 contained several specimens of the Norway haddock and 26 pole-flounders, their aggregate weight reaching 106 pounds.

We then stood to the northward and eastward with the intention of examining the slough in the Grand Banks, reported* by the schooner Augusta H. Johnson, of Gloucester, Mass., and also to verify the existence or non-existence of the Nile Rocks, reported as a little north of the slough above-mentioned. Arriving in the supposed vicinity of Nile Rocks on the morning of the 24th, we took a number of hauls with the trawl, but a dense fog prevailed, making it impossible to ascertain the ship's position with sufficient accuracy for hydrographic purposes. A strong wind then springing up, followed by a heavy bank swell, obliged us to cease trawling, and being unable to afford the time to wait for clear weather, we stood to the northward under low speed, and at daylight on the 25th began trawling again.

Ten hauls were made during the day, the results being mainly numerous sea-urchins, sand-dollars, starfish, hermit-crabs, and dead shells. We communicated with two fishing schooners during the day—the Garland, of St. John's, Newfoundland, and the Keewatin, of Lockport, Nova Scotia, both reporting good fishing. In the afternoon we sounded and trawled over the position assigned to Jesse Ryder Rock, H. O. chart 21*a*. We found 40 fathoms, which corresponded with the depth marked for the vicinity on the chart, and dragged the trawl over the reported position. The weather being clear and the observations reliable, we do not hesitate to say that there is nothing of the kind existing in that locality. Fishermen who had their trawl lines laid around the position said they knew nothing of such a rock. Five hauls of the trawl were made the following morning, June 26, the results obtained being about the same as on the previous day. At 8.40 a. m., August Peterssen, seaman, fell overboard while taking in the trawl, and was drowned; the ship was stopped, a life-buoy thrown within a few feet of him, and the dinghy and whale-boat lowered, the former reaching the spot in less than two minutes from the time he fell overboard, but being unable to swim, he sunk before it reached him.

*See F. C. Bulletin, 1885, p. 291.

At 1 p. m. we started for St. John's, Newfoundland, arriving there at 6.20 the same evening. Several icebergs were passed outside the harbor, a few of which were photographed. A boat was sent ashore with an officer to call on the American consul, who returned with the boat and paid an official visit to the ship.

Several Norway haddock taken in haul No. 2434, on June 23, contained large numbers of young about three-eighths of an inch in length.

Unsuccessful attempts were made to catch cod with the menhaden bait procured in Newport, R. I. The Grand Banks fishermen use capelin at this season of the year, followed by squid a month later. A few of the former were procured from the Keewatim on June 25, and the results were all that could be desired.

During the 29th and 30th we coaled ship, taking on board 100 tons of anthracite. On July 1 we procured two barrels of capelin bait, and at 5.35 a. m., July 2, got under way and steamed out of St. John's, Newfoundland, in a dense fog.

But four hauls were made during the day, the results obtained being numerous starfish, hermit-crabs, and shells. A line of soundings and dredgings was run along the deeper waters between the Grand Banks and the Newfoundland coast. It was continued across Green Bank, the southern end of St. Peter's Bank, and the gully between St. Peter's and the southern end of Banquereau. An extended examination at the east end of the latter bank was made for coral, but we were able to procure only a few small fragments with the apparatus we had on board. The line was then carried the whole length of Misaine Bank, across the gully between the latter and the west end of Banquereau, thence across the Middle Ground, the Northwest Prong, and then to Halifax, Nova Scotia, where we arrived at 4 p. m., July 8. We encountered dense fogs during the entire trip, with the exception of a few hours' sunshine on two or three occasions.

Trials were made for cod on the various banks. None were taken on Green Bank, but they were caught plentifully on the south end of St. Peter's, east end of Banquereau, along the entire length of Misaine, the west end of Banquereau, the Middle Ground, and on the Northwest Prong. Capelin bait was used.

On July 3 nine hauls were made, with results about the same as on the 2d. Nine hauls were also made on the 4th, one containing 19 polar flounders. During the day 11 specimens of Goode's cup-coral, 1 large and 30 or 40 small *Macrurus Bairdii* were obtained. On the 5th twelve hauls were made, with results about the same as on the two previous days. We tried hand-lines in the evening, using capelin bait, taking 33 cod and 4 flounders. On the 6th we made ten hauls, containing numerous sea-urchins, hermit-crabs, sea-anemones, starfish, and shells. Twenty-six cod were caught with hand-lines during the day, capelin bait being used, as before. Six hauls were made on the 7th, with practically the same results, with the addition of several shrimp. Two 8-

pound torpedoes were exploded during the forenoon on the Middle Ground. The first explosion resulted in floating to the surface 1 cod and 1 haddock; the second, 1 haddock only. These results show that the explosion sends nothing to the surface except fish with large swimming bladders, and that flat-fish, squid, and other marine forms with small bladders remain on the bottom if killed.

During the forenoon of the 8th four hauls were made, containing numerous starfish, sea-anemones, sea-urchins, and shells, and in one 15 Norway haddock, 6 flounders, 1 goose-fish, and a number of sponges.

An officer was sent ashore to visit the United States consul-general, M. H. Phelan, immediately upon our arrival at Halifax. Arrangements for coaling were completed on the 9th, and 50 tons of anthracite coal were taken on board on the 10th, at a cost of $6 per ton delivered on the rail, the vessel being at the wharf.

We left Halifax at 8 a. m. on July 11, and at 10.51 a. m. put the dredge over in 68 fathoms on Sambro Ledge. The lead indicated a bottom of black mud and broken shells, but the dredge encountered a rocky bottom, in which it became entangled and was lost, with about 80 fathoms of rope. But four hauls were made during the remainder of the day, two with the dredge and two with the small beam-trawl. The dredge contained a few worms and dead shells. The trawl brought up numerous specimens of *Schizaster fragilis*, sea-anemones, shrimp, shells, ten Norway haddock, and four hake.

The following day eight hauls were made, seven with the dredge and one with the small beam-trawl. At 5.35 a. m. the dredge was lowered, remaining on the bottom but five minutes, when, the bridle parting, it was lost. The results of the day were mainly small quantities of starfish, sea-anemones, shells, and worms. At 12.15 p. m. one 10-pound torpedo was exploded in about 60 fathoms of water, but no fish floated to the surface. During the 13th five hauls were made, one at 6.29 p. m., which contained several pole-flounders, a rare species of sea-anemone, a few sprays of gold-banded coral, and a large quantity of *Primnoa*. At 1.30 p. m. we lowered the dories and engaged in dragging for coral with grapnels. The boats returned at 4.30 p. m. with a few small sprays. Numerous schools of finback whales, swordfish, and porpoises were passed continually during the day feeding in the strong current between George's and Brown's Banks.

On the 14th there were but four hauls taken, containing numerous holothurians, ophiurans, shells, and a few pole-flounders. At 11.30 a. m., on reaching the surface, the net of the large beam-trawl began parting from the frame, occasioned by the heavy weight of mud and stones with which it was loaded. It was finally secured and hoisted on board without loss. Several schools of finback whales were seen during the day.

Three hauls of the large beam-trawl were made on the 15th in 828, 1,234, and 1,149 fathoms, respectively, with about the same results as

on the previous day. At 3.45 p. m. the experimental water-bottle was lowered to 500 fathoms and a water specimen procured for analysis.

We started for Wood's Holl, Mass., at 4.30 p. m., and arrived at 12.45 p. m. on July 16.

The details of the scientific explorations during the cruise are left to the various specialists; this report aiming simply to record the movements of the vessel, and general mention of the work performed.

We were detained until August 6, making necessary repairs to machinery, coaling ship, &c. At 6.25 p. m. on that day we left port with the intention of visiting the grounds where tile-fish were formerly found, and to secure, if possible, specimens of that fish, having obtained a quantity of fresh menhaden bait for the purpose. Messrs. W. Libbey, jr., Sanderson Smith, and L. A. Lee came on board as naturalists for the trip, in addition to Mr. James E. Benedict, resident naturalist, and Mr. Thomas Lee, assistant.

The weather was clear and pleasant during the night with light southerly breeze and smooth sea. We arrived on the ground at daylight the following morning and cast the trawl in order to find a favorable "live" bottom. At 8.30 the trawl lines were set in 133 fathoms, green mud and sand, latitude 39° 59′ 45″ N., longitude 70° 53′ W.; 49 hake, 7 whiting, and 5 skate were taken, but no tile-fish. The lines were set again at 3 p. m. in 129 fathoms, sand and broken shells, latitude 40° 00′ 15″ N., longitude 70° 42′ 20″ W.; 34 hake, 9 whiting, and 1 haddock were taken, but, as before, no tile-fish. Eight hauls of the beam-trawl were made during the 7th, near where the trawl lines were set, the results being mainly large numbers of sea-anemones, sea-pens, starfish, shells, and fish. There was a noticeable absence of specimens which were found abundantly in the same locality during the summers of 1880 and 1881. The large surface tow-net was successfully used during the evening and several squid were taken with the aid of the electric light. A porpoise was caught, the brain taken out and preserved, and the remainder thrown overboard.

At 6.15 on the morning of the 8th the trawl lines were set in 131 fathoms, green sand, black specks, latitude 40° 01′ 45″ N., longitude 70° 24′ W. Thirty-seven hake, 6 whiting, 2 skate, and 5 *Sebastes* were taken, but no tile-fish. A brisk easterly breeze and heavy swell prevented our resetting the trawl lines, and the day was passed in dredging. Six hauls of the trawl were made in from 130 to 570 fathoms. The results of the day's work were numerous starfish, sea-pens, shells, a few shrimp and sponges, 8 large spider-crabs, and a quantity of *Acanella*. Several cephalopods (*Alloposus mollis*) were seen on the surface, two of which were captured, one being quite perfect. A few porpoises, one shark, and occasionally a petrel were the only life seen during the day.

The easterly wind continued during the night, making the sea too rough the following morning to set the trawl lines. Five hauls of the

trawl were made during the day in from 445 to 1,081 fathoms. Numerous starfish, brittle-stars, crabs, shrimp, shells, and a small quantity of *Acanella* were the results. During the second haul the trawl buried, parting the rope at 1,510 fathoms. The trawl with everything attached was lost. The rope parted at the engine, an unusual occurrence, the kinks in the working end usually insuring its parting near the trawl, thus resulting in the loss of but little rope. A set of serial temperatures to 300 fathoms was taken in the evening; the large surface tow-net used with excellent results, and the submarine electric light was brought into requisition to aid in the capture of squid.

At 6 a. m. on the 10th, the wind and sea having moderated, the trawl lines were set in 136 fathoms, green mud and sand, latitude 39° 53′ N., longitude 71° 32′ W. Twelve hake and 6 skate were taken. The lines were again set at 1.05 p. m in 120 fathoms, brown mud and sand, latitude 39° 48′ N., longitude 71° 48′ 30″ W. Six hake, 1 goose-fish, and 4 skate were taken, but no tile-fish. Seven hauls of the trawl were made during the day in from 143 to 500 fathoms, numerous starfish, shrimp, and shells being taken. A set of serial temperatures was taken in the evening to 300 fathoms. The surface tow-net and the submarine electric light were used with good results. An enormous school of porpoises passed near the ship during the evening, and a couple of dolphins were seen swimming about at intervals through the day. As our bait was exhausted we stood into deeper water, and at 5.50 a. m. on the morning of the 11th cast the trawl in 1,434 fathoms, gray ooze, latitude 39° 15′ 30″ N., longitude 71° 25′ W. Three hauls were made during the day in about the same locality, the results being numerous starfish, shrimp, shells, and a great quantity of *Benthodytes*. A fine dolphin was caught with hook and line, and an unsuccessful attempt made to strike a porpoise. In the evening a set of serial temperatures was taken to 1,000 fathoms. The second haul brought up a quantity of diatomaceous earth, nearly white in color.

At 9 p. m. we started for Wood's Holl, and on the morning of the 12th stopped on Cox's Ledge and tried for codfish without success. At 4.10 p. m. we arrived and moored to the Fish Commission wharf.

We reeled 1,500 fathoms of new dredge-rope on the drum, making the total length of the rope 4,610 fathoms. At 6.50 a. m. on the 17th we commenced to coal, taking on board 53 tons. We remained in port taking in laboratory stores, fitting trawl nets, and making general repairs until 1.10 p. m. on August 27, when we cast off from the Fish Commission wharf and stood out to sea. The weather was clear and pleasant, with a light NW. breeze. At 12.19 p. m. on the 28th we sounded in 2,069 fathoms, latitude 38° 19′ 20″ N., longitude 69° 02′ 30″ W., and put over the large beam-trawl. It came up comparatively empty, containing only shrimp and small fish, it probably having skipped along the bottom, touching only now and then, owing to the current of the Gulf Stream. Serial temperatures were taken in the evening to 1,000

fathoms, and the large surface tow-net was used with good results. The submarine electric light was also used, quite a number of flying squid being captured.

A gull and a swallow were the only birds seen, even the petrels having disappeared for the day. The officer of the deck reported a large fish on the surface early in the morning, which he failed to recognize. According to his report, it had barnacles on its back, was propelled by side fins, and seemed to have a pouch under its mouth. This unrecognized fish was undoubtedly a large turtle floating on the surface, not an unusual sight in the Atlantic.

At 4 a. m. the following day we sounded in 2,620 fathoms, latitude 37° 23′ N., longitude 68° 08′ W., and put over the large beam-trawl, several starfish, shells, shrimp, hermit-crabs, and foraminifera being taken. We took serial temperatures to 1,000 fathoms, and, as on the previous day, the large surface tow-net and submarine electric light were advantageously used. Two dolphins (*Coryphæna*) were caught during the day, one with a hook and line, the other with the grains.

At 5.27 a. m. on the 30th, the large beam-trawl was cast in 2,721 fathoms, latitude 37° 45′ N., longitude 66° 56′ W., and while heaving in, the dredge-rope parted, losing the trawl and its appurtenances, beside 3,030 fathoms of rope. The fracture occurred at a splice where the experimental rope was attached to the standard dredge-rope, the tension being between 3,500 and 4,000 pounds. It should have stood twice that strain with safety. The experimental rope referred to was 1,000 fathoms, having a lower tensile strength and greater pliability than the standard rope. It was supposed to be less likely to kink, therefore more reliable than a rope of higher tensile strength in which kinks cannot be avoided, particularly near the end. We reeled on 1,500 fathoms of new rope, this being all we had, and as we were then left with only 3,000 fathoms on the drum, the remainder of the cruise was necessarily confined to depths under 2,000 fathoms. The vessel was at once headed to the northward and eastward to reach the desired locality. The weather remained clear and pleasant during the forenoon with light to moderate breeze from the southward and eastward, becoming overcast with frequent rain-squalls in the afternoon, falling calm at 8.45 p. m. At 9.45 p. m. the wind came out suddenly from northeast, blowing a moderate gale, which increased to a fresh gale at midnight. It gradually decreased to a light breeze at meridian on the 31st, and was cloudy and rainy the whole day. Two hauls of the beam-trawl were made, one in 1,781 fathoms, latitude 39° 15′ N., longitude 68° 08′ W., and the other in 1,782 fathoms, latitude 39° 26′ N., longitude 68° 03′ 30″ W. Numerous starfish, shrimp, hermit-crabs, 15 species of shells, several species of coral, and a quantity of foraminifera were the results.

On September 1st two hauls were made with the beam-trawl, the first in 1,813 fathoms latitude 39° 54′ N., longitude 67° 05′ 30″ W.; the second in 1,356 fathoms, latitude 40° 09′ 30″ N., longitude 67° 09′ W. Large

numbers of grenadiers, starfish, sea-urchins, *Acanella*, a few small nautilus, several shrimp, and a quantity of foraminifera were procured. Serial temperatures were taken to 1,000 fathoms in the evening, and the large surface tow-net and submarine electric light used, as usual, with excellent results. The weather continued overcast and rainy during the forenoon, but cleared later in the day.

During the morning of the 2d instant the large beam-trawl was put over in 1,769 fathoms, latitude 40° 29′ N., longitude 66° 04′ W., and on being landed on deck it was found to be badly torn. A few shrimp, a lump of red clay, some heavy stones, and a large amount of foraminiferous ooze were found in the net. The small beam-trawl was put over in the afternoon in 1,742 fathoms, latitude 40° 34′ 18″ N., longitude 66° 09′ W., and a number of starfish, sea-urchins, sponges, and a quantity of foraminifera were brought up. We took a set of serial temperatures to 1,000 fathoms in the evening, and the large surface tow-net and submarine electric light were used with good results.

At 7.19 a. m., on the 3d, we put the large beam-trawl over in 1,791 fathoms, latitude 41° 02′ 30″ N., longitude 65° 08′ 15″ W. While dragging on the bottom it caught on some obstruction and parted the rope near the end, the trawl and its appurtenances being lost. The small beam-trawl was lowered at 1.43 p. m. in 1,710 fathoms, latitude 41° 07′ N., longitude 65° 26′ 20″ W., and brought up several grenadiers, brittle-stars, holothurians, one large red shrimp, and a few specimens of coral. Serial temperatures were then taken to 1,000 fathoms. The large surface tow-net and the electric light were used during the evening. Three large steamers were seen during the day, two bound to the eastward and one to the westward. We exchanged colors with one of the former, a German.

We worked well within the limits of the Gulf Stream after the 28th, and it is worthy of remark that with the exception of the haul made on that date, we experienced no easterly current. On the contrary we at times observed a slight set to the southward and westward. The Stream was probably affected by the cyclone of the 25th and 26th of August.

Five hauls of the small beam-trawl were made during the afternoon of September 4, in from 18 to 85 fathoms, along the southern and western part of George's Bank, numerous starfish, a large quantity of bryozoa, shells, scallops, sand-dollars, shrimp, sea-anemones, sea-urchins, pole-flounders, and sculpins being the result.

At 10 p. m. we started for Wood's Holl, where we arrived at 9.05 a. m., September 5th, and made fast to the Fish Commission wharf. The specimens procured during the trip were transferred to the laboratory. We coaled ship on the 7th, taking on board $92\frac{800}{2240}$ tons, and were engaged in overhauling rigging, making trawl-nets, renewing splices on the dredge-rope, and making general preparations for a trip, until 4 p. m., September 17th, when we cast off from the wharf and proceeded to sea.

We were to search for tile-fish in the vicinity of 39° N. latitude, and 72° W. longitude, in from 100 to 600 fathoms, and were provided with 3 barrels of fresh menhaden bait for the purpose.

The weather was clear and pleasant during the night, with moderate SW. breeze and smooth sea. At 7.10 a. m. on the 18th, we cast the trawl in 394 fathoms, green mud, latitude 39° 43′ N., longitude 71° 34′ W. A fishing party left the ship and set a trawl line in the position above indicated. Three hauls of the beam-trawl were made during the day between this position and latitude 39° 50′ 45″ N., longitude 71° 43′ W., in 131 fathoms, green mud and sand, and although the bottom was not particularly rich, many ophiurans, archasters, and worm-tubes were taken, besides hermit-crabs, *Epizoanthus americanus*, shells, sea-anemones, *Salpæ*, and single specimens of *Geryon quinquedens*, *Lophius piscatorius*, and *Octopus Bairdii*.

The fishermen returned at noon, having taken but 1 hake, 1 skate, 1 dogfish, 1 whiting, and 3 eels. The trawl line was set again at 2.15 p. m. in 137 fathoms, green mud, latitude 39° 50′ N., longitude 71° 43′ W., and taken up at 6.25 p. m., with 26 hake and 6 skate. Chester's fish-trap was set near the trawl line, taking a single specimen of eel (*Myxine glutinosa*). This trap does not differ in principle from the ordinary lobster-pot, except that it is made of wire gauze instead of wood, and is intended for use in deep water. The large surface net and submarine electric light were used during the evening with fair success.

At 7 a. m., the following morning, the trawl was lowered in 541 fathoms, gray mud, latitude 39° 05′ 30″ N., longitude 72° 23′ 20″ W. A few ophiurans, archasters, shells, a large number of deep-sea fish, and a squid being taken. The trawl line was set at 10 a. m. in 519 fathoms, green mud, latitude 39° 05′ 30″ N., longitude 72° 25′ 30″ W., and was taken up at 4.20 p. m. with no fish. But few of the baits had been disturbed, although fish of various kinds were plentiful on the bottom, as indicated by the number taken in the beam-trawl.

Chester's fish-trap was set soon after the fishermen left in the morning, and was not recovered, the buoy having sunk. At 4.29 p. m. we cast the trawl in 542 fathoms, gray mud, latitude 39° 08′ 30″ N., longitude 72° 17′ W. The rope parted at 321 fathoms while heaving in, the trawl and its appurtenances being lost. The rope broke at an indicated strain of 1,700 pounds, which we always consider well within the limit of safety; in fact, the bridle-stops are intended to part at nothing less than 3,000 pounds.

Three sharks were taken with hook and line, two of them unusually large, and one of moderate size. The latter had been feeding on squid, nearly two deck-buckets full being found in its stomach.

The large surface net and the submarine electric light were used successfully during the evening and just before daybreak the following day. The trawl line was set again at 9.25 a. m. on the 20th, in 328 fathoms, gray mud, latitude 39° 02′ 40″ N., longitude 72° 40′ W., and taken up

at 2.55 p. m. There were no fish caught and most of the baits remained untouched. Three hauls of the trawl were made between the above position and latitude 39° 02′ N., longitude 72° 36′ W., in 479 fathoms, green mud, and, although the forms were generally well known, some were exceedingly rare and a few new to us. Among the invertebrates star-fish, sea-anemones, shrimp, &c., were the most abundant; several kinds of shells were found also, and sixteen species of fish, the most numerous being *Macrurus Bairdii*, *Glyptocephalus cynoglossus*, and *Phycis Chesteri*. During the last haul the trawl buried, and the net was torn from the frame before it could be released from the bottom. It was blowing a fresh breeze at the time with considerable swell, but the vessel rode for over an hour by the dredge rope after it was hove short, without parting it or breaking out the trawl.

The surface net and submarine light were used during the evening and before daylight on the morning of the 21st. At 8.37 a. m. the trawl line was set in 231 fathoms, green mud, latitude 38° 55′ N., longitude 72° 50′ 30″ W. It was taken up at 3.20 p. m. with one wry-mouth, eight hake, four skate, and one whiting. Three hauls of the trawl were made during the day between the above position and latitude 38° 53′ 30″ N., longitude 72° 52′ W., in 138 fathoms, green mud and sand. Life was found more abundant and the hauls were all successful. Among the many forms taken may be mentioned *Ophioglypha Sarsii*, *Octopus Bairdii*, *Asterias Tanneri*, archasters, sea-anemones, shrimp, *Calistoma Bairdii*, hermit-crabs, &c., beside fourteen species of fish.

At 3.25 p. m. we started ahead S. ½ E. (p. c.) to change our working ground. The barometer was falling steadily with every appearance of bad weather. At 8 p. m. the engines were slowed and the surface net and submarine light used till 10 p. m., when the course was resumed. We entered the Gulf Stream at 4 a. m. on the 22d, in latitude 37° 40′ N., longitude 72° 40′ W., and hove to until 8 a. m., when, the wind having increased to a moderate gale, we ran to the northward about 16 miles to avoid the confused sea of the Stream, and hove to under the fore storm-staysail, bringing the wind and sea a little abaft the starboard beam. The barometer fell to 29.58 about 2 p. m., then began to rise slowly, the wind backing to the northward and increasing to a fresh gale. The ship rode very comfortably until 9 a. m. on the 23d, when we wore to the northward and started ahead about 5 knots per hour to increase our distance from the Gulf Stream, which had been driven to the northward by the gale of the previous days. We had a moderate to fresh gale during the 23d from NW., increasing to a strong gale in the evening with a very heavy sea, which began to come on board in the weather gangway, doing no damage, however, except breaking a pane of glass in the pilot-house and another in the wardroom skylight. At 7 p. m. we slowed to 2½ knots and passed a very comfortable night. The wind and sea moderated during the morning of the 24th, and as

we had reached the limit of time assigned for the trip, the speed was increased and the ship headed for Wood's Holl, under steam and sail.

The surface net and submarine light were used during the gale until the naturalists became discouraged by their failure to procure specimens. All of the various forms usually taken in vast numbers on the surface, particularly in the mornings and evenings, seemed to have disappeared; even the Gulf weed sunk below the surface, being seen a few fathoms under water. We have always noted a marked diminution in the surface forms taken in rough weather, but in this instance there was almost a total disappearance.

We arrived in port at 6.30 a. m., September 25, and moored to the Fish Commission wharf. The specimens were sent to the laboratory during the day.

The boilers required some slight repairs, which were completed about October 1, when preparations were made for leaving the station for the season, and all articles of equipment and scientific outfit which were not to be left at Wood's Holl for the winter were taken on board. Ninety tons of coal were taken in on the 6th, and at 9.30 a. m., October 8, we cast off from the wharf and started for Newport, R. I., where we arrived at 3.20 p. m., and anchored in the inner harbor. The electric torpedo apparatus borrowed from the torpedo station for use on our Newfoundland trip was returned and proper acknowledgments made to the commandant.

At 7.30 a. m. on the 9th we got under way and steamed out of the harbor bound for New York *via* Long Island Sound. Fresh northerly winds were encountered during the day with cool weather. We anchored off Great Captain's Island at 9 p. m., got under way at daylight the following morning, and anchored off 23d street, North River, at 10.25 a. m. The Albatross was among the last vessels to pass through Hell Gate previous to the explosion of Flood Rock, which occurred at 11.14 a. m. The explosion was not noticed on board, and we did not know that it had taken place until information to that effect was received from shore.

An officer came on board from the French flagship Floré soon after we anchored, with the admiral's compliments, and tendered the usual civilities. The call was returned on the 12th.

We called at New York for stores and various articles of equipment which could be procured to better advantage there than in Washington. An ample supply of fresh menhaden bait was taken on board for use in our search for tile-fish, which was to be extended to the southward of Cape Hatteras.

We remained at our anchorage until 11.10 a. m. on the 15th, when we got under way and proceeded to sea. The weather was pleasant, with moderate westerly winds. We were under steam and sail till the following morning, when the engines were slowed down to allow of surface towing, which has recently been a marked feature in our investi-

gations, the improvements in towing-nets having practically opened a new field to us. The surface-nets were put over again in the evening, with gratifying results.

At 10.54 a. m. on the 17th we set the trawl line in 120 fathoms, fine gray sand, latitude 35° 02′ 20″ N., longitude 75° 12′ W., and after the fishermen left the ship the trawl was lowered, taking a few fish, dead shells, worms, a single hydroid, &c., the bottom being exceedingly barren. The trawl line was taken up at 3.30 p. m., a single dogfish being the only catch. The weather buoy sunk, and while hauling in from the leeward the line parted, the weather buoy, anchor, and line, and a portion of the trawl line being lost.

Five hauls of the trawl were made in the vicinity during the day, resulting in the capture of many starfish, crustacea, fish, corals, and a great variety of shells, mostly minute forms. Surface towing was carried on both in the morning and evening with excellent results.

At 6 a. m. on the following day, we cast the trawl in 15 fathoms, gray sand, latitude 34° 57′ N., longitude 75° 43′ 30″ W., and ran a line of dredgings off shore until 11.40 a. m., when the trawl line was set in 124 fathoms, sand and rock, latitude 34° 38′ 30″ N., longitude 75° 33′ 30″ W. When taken up at 4 p. m., there were only two small sharks found on the hooks, although many of the baits were gone. The strong current of the Gulf Stream towed the weather buoy under, and the line parting while heaving in, the remaining portion of the gear was lost.

The rock referred to was a sandstone, fragments of which, from a few inches to 2 feet in diameter, and from 2 to 4 inches in thickness, came up in the trawl. It was perforated in all directions with holes, from half an inch to an inch in diameter, and closely resembled the clay or rottenstone formation referred to in previous reports found off the capes of the Delaware.

After the fishermen returned we continued the line of dredgings, ten hauls being made during the day, and many interesting specimens taken. The bottom was, as a rule, clean sand, washed by the sea during every gale, and a portion of it swept by the action of the Gulf Stream, which in that locality extends to the bottom. Among the many forms taken were several varieties of starfish, brittle-stars, shrimp, sea-anemones, small squid, holothurians, rare and beautiful sea-urchins, a few Cephalopods, Astrophytons, sand-dollars, *Munidas*, and a variety of shells, both large and small, the minute forms in particular being taken in great numbers. There were also a variety of fish taken, among them large numbers of young scup, which were subsequently used for bait, a few file-fish, and a number of shoal-water species. A large spotted porpoise was harpooned during the evening, and preserved for examination. It is a rare species in the Atlantic, and was first seen by us off Cape Hatteras in June last. The large surface-nets were used in the morning and evening, and at intervals during the day, with excellent results.

After finishing work in the evening we stood slowly to the westward, and at 6 a. m. on the 19th the trawl was cast in 18 fathoms, fine gray sand, latitude 34° 38′ N., longitude 76° 12′ W. Eight hauls were made during the day between the above position and latitude 34° 09′ N., longitude 76° 02′ W., the results being practically the same as on the previous day.

A trawl line was set at 1.10 p. m. in 168 fathoms, gray sand and black specks, latitude 34° 09′ N., longitude 76° 02′ W., and was taken up at 5.50 p. m. with no fish. The surface tow-nets were used with good results both in the morning and evening. At 6.17 a. m. on the 20th we cast the trawl in 18 fathoms, gray sand, latitude 33° 45′ N., longitude 77° 25′ W., and made nine hauls during the day between the above position and latitude 33° 37′ 15″ N., longitude 77° 35′ 30″ W., on the northeast extremity of Frying-Pan Shoals, where numerous coral patches were found abounding in marine life. Several species of coral and shells, both dead and alive, were taken, besides sponges, hydroids, crustacea of many forms, and a variety of shoal-water fish.

A trawl line was set at 3 p. m. in 15 fathoms, gray sand and broken coral, latitude 33° 38′ N., longitude 77° 36′ W., and taken up at 5.20 p. m., with 12 black bass, 2 scup, 1 dogfish, 1 grunt, and 1 bluefish. Hand-lines were used at intervals during the day, taking 138 black bass, 1 scup, 1 dogfish, and 1 grunt. The vessel was not anchored, but allowed to drift, the fish being taken while passing over coral patches or *live bottom*. The surface-net was used in the evening with good success, and the submarine electric light was tried, but contrary to our usual experience we obtained very few specimens.

We steamed off shore during the night, and at 6.27 a. m. on the 21st cast the trawl in 258 fathoms, gray sand and black specks, latitude 32° 36′ N., longitude 77° 29′ 15″ W. Five hauls were made during the day between the above position and latitude 32° 21′ 30″ N., longitude 76° 55′ 30″ W., in 528 fathoms, yellow mud. We were within the limits of the Gulf Stream, but experienced little or no current during the first two hauls; a light but perceptible drift during the third, and the last two were made in the full strength of the Stream. The results of the day's work were very satisfactory, many rare and valuable specimens being taken, some entirely new to us. Among the numerous forms were many soft sea-urchins, hermit-crabs, long-spined sea-urchins, corals, cephalopods, crabs, and a variety of fish. The surface-nets were used in the early morning, and after the last haul serial temperatures were taken. The weather changed during the night of the 20th, and rain-squalls with variable winds were encountered on the 21st, the wind increasing until at dark we had quite a heavy sea.

Our supply of alcohol being exhausted, we started for port at 7.14 p. m., as soon as the work of the day was finished. The wind continued fresh from northeast during the night, and being in the Stream a

heavy head sea was encountered. Cape Hatteras light was sighted at 5.19 p. m. on the 22d, and at 6 a. m. on the 23d we made Cape Henry light, passing it at 7 a. m. The wind moderated as we approached the coast, and after entering the Chesapeake we had a light northerly breeze and clear weather.

At 2.30 p. m., off Point Lookout, we swung ship under steam to ascertain compass errors, and at 4.35 p. m. resumed our course up the river, anchoring off Blakistone's Island for the night. We were under way again at 6.15 a. m. on the 24th, and arrived at the navy-yard, Washington, D. C., at 3.10 p. m., mooring at our usual berth off the east shiphouse.

The specimens on board were transferred to the Smithsonian Institution, and the work of refitting commenced. The vessel was painted, the rigging refitted, holds and store-rooms broken out, whitewashed or painted, and restowed, and the bilges cleaned. The dredging apparatus was overhauled, and 2,000 fathoms of new dredge-rope procured. New trawl and dredge frames were provided, the dredging-block repaired, and a cast-brass hood added to prevent the rope from flying out of the score when, from any cause, it is slackened.

We have taken a new departure in surface collecting, and instead of the old form of net, with a hoop 1 foot in diameter, we have enlarged it to 4 feet, and strengthened the parts so that it can be towed at the rate of 5 knots an hour. It has a pocket similar to the trawl, which prevents the escape of fish. This development of the surface net has opened a new and interesting field of investigation, in which we have made many additions to the surface fauna.

The table of fishing stations appended to this report shows the extent to which we have prosecuted the search for tile-fish. They were discovered by Captain Kirby, in May, 1879, in latitude 40° 04′ N., longitude 70° 59′ W., at a depth of 80 fathoms, and were taken again, in July, 1879, by Captain Dempsey, in 87 fathoms, latitude 40° 02′ N., longitude 70° 07′ W. We took them in considerable numbers during the seasons of 1880 and 1881, previous to the unprecedented destruction of the species in March and April of the following year. As they were a fish of great commercial value, we have made diligent search for them from year to year since 1882 in the region where they were first found, extending the search as far as the coast of North Carolina in 1883 and 1884, and to Newfoundland and the Gulf of Mexico in 1885, without discovering the least trace of their existence.

Our experience seems to confirm the belief that they were entirely exterminated or that the survivors abandoned our coast. The table referred to shows also the investigations carried on with reference to other edible fish in widely separated localities.

Two attempts further to investigate the tile-fish grounds by means of chartered fishing schooners should be mentioned as properly belonging

to the records of search by the U. S. Fish Commission. The first in 1880, in which the vessel failed to reach the grounds, and the second in 1882, after the destruction and disappearance of the fish from their former haunts. The vessel reached the grounds and carried on the investigations for several days, but failed to find any trace of tile-fish.

In the engineer's department the principal work was on the boilers, which required several new patches, renewal of old ones, &c. Counterbalances were put on the main engines, which make them run more smoothly and enables us to turn them over much slower while dredging, thus bringing the speed of the vessel down to the desired limit for deep-water work.

The most important improvement in the engineer's department during the year was the introduction of "Baird's annunciators," which are fully described in his report. They are designed to show the action of the engines to the officer on the bridge or the quartermaster in the pilot-house. It is desirable at all times to know whether engine signals have been rightly understood and answered, but doubly so when sounding or dredging. The annunciators show at a glance what the engines are doing.

Personnel.—Many changes have occurred among the officers during the year. Ensigns R. H. Miner and L. M. Garrett were detached on the 22d of April; Lieut. H. S. Waring reported for duty October 11; Ensign Franklin Swift was detached on November 4; Lieut. A. C. Baker on November 10; Lieut. C. J. Boush on December 12; and Lieut. B. O. Scott reported for duty on December 21.

At the close of this report, December 31, the Albatross was practically ready for sea.

The following officers were attached to the vessel at the end of the year:

Z. L. Tanner, lieutenant-commander, U. S. N., commanding.

Seaton Schroeder, lieutenant, U. S. N., executive officer and navigator.

H. S. Waring, lieutenant, U. S. N.

Bernard O. Scott, lieutenant, U. S. N.

J. M. Flint, surgeon, U. S. N.

C. D. Mansfield, paymaster, U. S. N.

G. W. Baird, passed assistant engineer, U. S. N.

NAVIGATION REPORT OF LIEUT. SEATON SCHROEDER, U. S. N., NAVIGATOR.

During the year 1885 the cruising of the Albatross has been comprised between the parallels of 20° and 48° north latitude, and the meridians of 49° and 90° 30′ west longitude.

The following table gives the number of days under way, together with the distances run and the object of each trip:

Date.	Object.	Distance.
		Miles.
January 4 to 10	Sounding and dredging	1,069.6
January 12	Swinging ship	30.0
January 16	Key West, Fla., to Havana, Cuba	114.0
January 17 to 20	Sounding and dredging	80.0
January 21 to 23	do	393.0
January 29 to February 3	do	774.4
February 7 to 8	Sounding, dredging, and fishing	267.0
February 11 to 14	Sounding and dredging	320.0
February 20	Shifting berth	4.0
March 1 to 5	Sounding and dredging	404.0
March 7 to 9	Sounding, dredging, and fishing	347.0
March 18 to 18	do	521.0
March 19 to 20	do	233.1
March 30 to April 7	do	1,109.3
May 25 to 26	Washington, D. C., to Baltimore, Md	180.0
May 31	Baltimore, Md., to Norfolk, Va	163.0
June 3 to 8	Sounding, dredging, and fishing	658.2
June 14 to 16	Washington, D. C., to Narragansett Bay	527.6
June 17	Swinging ship	25.0
June 18 to 27	Sounding, dredging, and fishing	1,433.5
July 2 to 9	do	746.0
July 11 to 17	do	653.0
August 7 to 13	do	495.0
August 28 to September 5	Sounding and dredging	1,014.0
September 18 to 25	Sounding, dredging, and fishing	713.3
October 8 to 10	Wood's Holl, Mass., to New York	172.0
October 15 to 25	Sounding, dredging, and fishing	1,249.4
Total, 130 days		13,705.4

During the year 625 sounding stations have been occupied, of which 318 were also dredging stations. A large number were located with sufficient accuracy to be of hydrographic value, and lists of such were sent to the Bureau of Navigation, Navy Department. Lists of those near the United States coasts were also sent to the Coast Survey Office, Treasury Department.

Following is a table of reported banks and shoals over or near which the depths were found in the positions given:

Name.	Latitude N.	Longitude W.	Depth.
	° ′ ″	° ′ ″	*Fathoms.*
Hope Bank	41 26 15	63 15 00	2,020
Do	41 22 00	63 10 00	2,094
Hamilton Bank	40 24 30	54 24 00	2,057
Watson's Rock	40 18 30	53 39 30	2,863
Do	40 16 00	53 16 30	2,882
Jesse Ryder Rock	46 28 00	49 39 30	40
Do	46 29 00	49 39 30	39
Five Fathoms (Green Bank)	45 45 30	54 20 30	41

Other soundings than those quoted were taken on each side of these dangers, conclusively proving their non-existence. The trawl-net was also dragged over the vicinity of the Jesse Ryder Rock without discovering any sign of an elevation of the bottom.

While at anchor off the village of San Miguel, island of Cozumel, Yucatan, a reconnaissance was made of the bay, and forwarded to the Bureau of Navigation, Navy Department. The longitude of the plaza, established by equal altitudes of the sun with sextant, artificial horizon, and four chronometers, was found to be 86° 57′ 59.6″ W.; the latitude was found by thirteen ex-meridian altitudes of the sun, with artificial horizon, to be 20° 30′ 46″ N., and the compass variation 6° 24′ E.

The shore line was run in, and houses and other landmarks located by compass, sextant, and micrometer telescope, a man 6 feet tall serving as staff for the latter. The anchorage was also sounded out and sailing directions prepared.

While working in the Gulf of Mexico the opportunity was taken of furnishing the Navy Department with remarks on the landfall of Pensacola, Fla., steamer beacons in Tampa Bay, the entrance to the South Pass of the Mississippi River, and currents in the Gulf. Special soundings were also taken eastward of the Mississippi delta, which proved the non-existence of a 30 to 40 fathom bank, represented on old charts as extending eastward about 30 miles from longitude 88° 10′ on the parallel of 29° 05′. Fishermen seeking new grounds have sought for this bank and wasted money in the search.

A short line of soundings run out southeastward into the Gulf Stream from between Capes Fear and Romain, South Carolina, showed that the bottom is rather flatter there than is indicated by the negative soundings given on the charts to the northeastward and southwestward.

Opportunity was taken to make a slight examination of the bottom near the 100-fathom line south of Nantucket Island, where indications had been found in 1884 of an inward sweep of the 200 to 600 fathom curves. This was found to be the case, a marked pocket making in on the meridian of 75° 15′ W., latitude 39° 50′ to 40°.

The phenomenon of semi-diurnal tidal currents was again observed in latitude 39° 40′ to 40°, between the meridians of 70° and 71°, where it had been noticed in previous seasons. Their directions seem to be nearly east and west, but it was not practicable while dredging to ascertain with any accuracy the time of turning.

The position, as given on the charts, of the southeast end of Banquereau was found to be erroneous. With favorable circumstances for accurate work, the 100-fathom curve was found to be 10 miles farther to WNW. than represented.

While sounding in the vicinity of Watson's Rock and farther west, the northern edge of the Gulf Stream was found to be in about latitude 40° 20′ between the meridians of 53° and 60°; and while running along that line, on the 19th to 21st of June, on an easterly course (true), the

vessel would alternately be in water of 76° and of 63°, and frequent observations, under favorable circumstances, day and night, showed that when in the warm water a moderate ENE. set was experienced; on emerging into cooler water the ship was immediately set to the southward, the wind being east to northeast, and on reaching warmer water again the same easterly current was found.

The table of hydrographic soundings and record of dredgings and trawlings give the position and depth of all soundings taken during the year. The numbers above 2,000 indicate dredging stations.

The ship was swung for deviations in different latitudes three times during the year. At Key West, Fla., latitude 23° 30′, in January; in Narragansett Bay, latitude 41° 30′, in June; and at the mouth of the Potomac River, latitude 38°, in October. In each case the ship was swung on even keel once with starboard and once with port helm, the object observed being the sun. From the mean deviation curves thus obtained, the accompanying steering-cards were constructed, in which the points of the inner circle represent the magnetic courses to be made, the radial lines from them showing on the outer circle the corresponding courses to be steered by the standard compass.

The deviations are nearly the same now as in the spring of 1883 for the same latitude. At the time of swinging ship in the Chesapeake then, there were three spare pieces of iron railing lashed fore and aft to the hand-rail on the port side abreast of the compass, and 8 feet from it; these were removed shortly afterwards, and the change in the magnetic conditions affected the compass somewhat, the greatest westerly deviations (on the ESE. course) becoming ¼ point greater than the greatest easterly deviation on the west course, while previously they had been practically equal. All subsequent swingings were performed under the same circumstances, mutually, as regards movable metal masses.

There has been observed a noticeable illustration of the well-known reciprocally inductive influences of magnetic needles and masses of iron in certain positions relative to each other and to the magnetic meridian. Immediately abreast of the center of the standard compass, 12 feet 7 inches from it on the starboard side, is the forward vertical iron davit of the seine boat. When swung in, the head of this curved davit is 7 feet 9 inches laterally and 4 feet vertically from the center of the card; when rigged out it is 17 feet 5 inches off laterally and 4 feet vertically, the body of the davit remaining stationary. It has been noticed for a long time that the compass is markedly affected by the latter position of the davit, but it is usually kept rigged in when at sea, in the same position as when the ship is being swung on even beam. There has been neither occasion nor opportunity to prepare a separate curve of deviations with it rigged out. Isolated observations show that the greatest disturbance occurs on the northerly and southerly courses. In latitude 35° to 40°, swinging the davits out changes the deviation about one point to the westward on a N. by E. course, and about the

same amount to the eastward on a S. by W. course, the disturbance decreasing eastward and westward from those points to nothing at east and west, where the needle points to or from the disturbing element, and when the two are in approximately the plane of the same magnetic meridian.

The davit in question is in metallic connection with the hull of the ship, and through it with the earth. The upper part, beginning about on a level with the compass card, curves with a radius of about five feet, and when swung outboard has a general direction pointing exactly from the compass; when rigged in its general trend is not far from normal to the line of shortest distance to the compass. In the latter position, although so much nearer to the needle, it has apparently no special influence upon it, the deviations making a fair curve.

The methods employed in navigating were as described and illustrated in preceding reports.

REPORT OF PASSED ASSISTANT ENGINEER G. W. BAIRD, U. S. N.

MAIN ENGINES.

During the year the ship has steamed 13,240.26 miles on her course, besides the time the engines have been worked for sounding and dredging. The ship has been at sea one hundred and thirty days, and has not been detained in port through any mishap or accident to steam machinery. The casualties have been few. The out-board blow-valve chamber was found to be corroded through in April; we put a pine plug

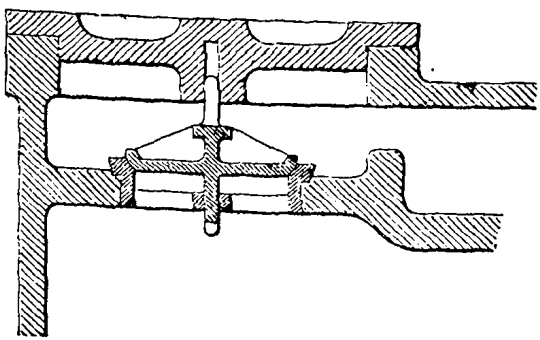


FIG. 1.

in the opening while at Key West, and after our return to Washington we listed the ship to bring the valve above water, when we put in a new valve. To prevent further corrosion, we placed a zinc ferrule in the neck. The soft-rubber valves in the air-pump were found to curl up from

great heat in the water discharged into the hot-well from the heaters; they have been replaced by vulcanized hard-rubber valves. The feed-pump valves, from faulty design and excessive weight, used to batter out their stops and would cockbill and stick up in their seats. I therefore designed a set of valves with better guides (Fig. 1), having greater diameter and less lift and containing much less metal. They were made and fitted at the Washington navy-yard. During the year we have overhauled the valve-gear, and have set out the piston-springs twice. While the ship was in dry-dock in May we examined that portion of the line shafts which we had covered with Edison's tape a year before, and found the metal bright and clean, the corrosion having been completely arrested. These corroded places are directly behind the bronze covering of the shaft which is placed there for a bearing. We have had new set-screws fitted to the nuts on themain valve-stems; the original ones were not tight enough, and have sometimes backed out. We have always found great difficulty in moving the engines by hand, owing to the great lack of counterbalancing, as well as to the inaccessibility of the jacking-wheels.

I therefore designed a pair of counterbalances (Fig. 2) for the low pressure cranks, which are being built at the Washington navy-yard. By

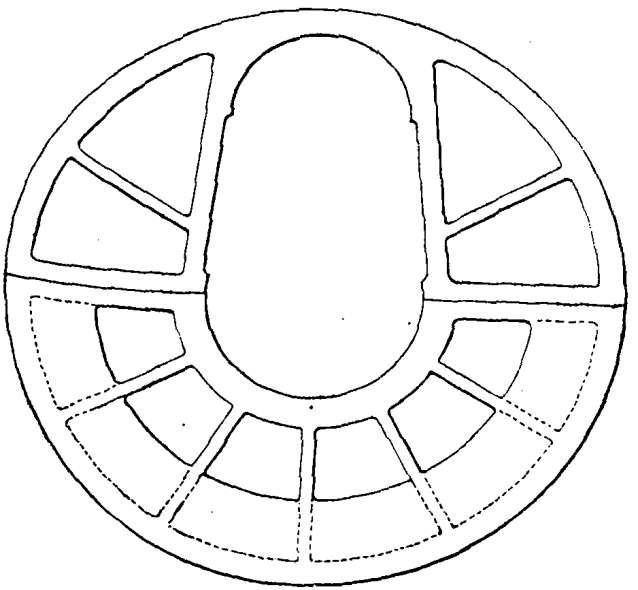


FIG. 2.

making them in halves they can be put on without disturbing the crank-shafts, and by providing teeth in their peripheries they can be utilized as auxiliary pinching-wheels.

Synopsis of the steam log of the U. S. Fish Commission steamer Albatross during the year 1885, the vessel during that period being employed in deep-sea exploration.

[KIND OF ENGINE.—Twin screw, compound engine, surface condenser; inclined.]

Number of cylinders:	
High pressure	2
Low pressure	2
Diameter of cylinders, in inches:	
High pressure	18
Low pressure	34
Stroke of pistons, in feet	2½
Mean point of cutting off the steam, from commencement of stroke of pistons, in inches:	
High pressure	18.34
Low pressure	16.45
Mean number of holes of throttle-valve open	2.9
Mean vacuum in condenser, in inches of mercury	23.07
Mean steam pressure per square inch, above the atmosphere:	
Boiler pressure, pounds	48.17
Receiver pressure, do	8.37
Mean temperature, in degrees, Fahrenheit:	
Engine room	100.8
On deck	65.1
Injection-water	67.68
Discharge-water	96.91
Feed-water	74.15
Total time the fires were lighted, hours	8,514
Total time the engines were in operation, the ship being on her course, in free route, hours	1,584$\frac{45}{60}$
Total number of revolutions:	
Starboard engine	6,213,850
Port engine	6,199,567
Mean number of revolutions per minute:	
Starboard engine	65.37
Port engine	65.23
Total number of knots	13,240.26
Mean number of knots per hour	8.35
Total coal consumed, tons	1,531$\frac{1448}{2240}$
Total weight of refuse from coal, do	329$\frac{1344}{2240}$
Total weight of coal consumed while the engines were in operation, tons	836$\frac{1456}{2240}$
Mean quantity of coal consumed per hour while the engines were in operation, pounds	1,182
Total oil consumed:	
Red M engine oil, gallons	442
600 W. cylinder oil, do	169
Electric oil, do	36
Lard oil, do	350
Tallow consumed, pounds	69
Wiping stuff consumed, do	419
Greatest draught forward and aft, feet	11½ & 13$\frac{7}{12}$
Least draught forward and aft, do	9⅛ & 10$\frac{1}{12}$
Average draught for the whole steaming, do	10$\frac{9}{48}$ & 12$\frac{5}{12}$
Helicoidal area of each screw, square feet	42.02
Diameter, feet	9
Pitch (mean), do	14$\frac{9}{12}$

BOILERS.

The boilers continue to give trouble, and have reached that point where the loss of speed and length of voyage of the ship, and the cost of repairs make it a matter of economy to build new boilers of a proper design. A boiler built from the design already submitted by the writer will enable the ship to carry 80 tons more coal, which will enable the ship to cross the Atlantic Ocean at the rate of 10 knots per hour, uninfluenced by wind or wave. As the proposed boilers will carry a higher pressure, a greater economy will be insured. In the present boilers the flues cannot be swept unless the fires be hauled, and it would be impossible to replace a flue without cutting a hole through the end of the boiler. To accomplish this renewal of a flue, it would be necessary either to cut a hole through a bulkhead to pass the flue through, or else to tear up the deck and take the boilers out for the purpose. Though we never exceed a pressure of 50 pounds, we have repeated leaks around seams and socket-bolts, and are kept making soft patches, calking seams, and replacing leaky socket-bolts and rivets whenever we have a chance. Fires have been kept in the boilers 295¼ days during the year, so our chances to repair the boilers have been limited. The crown sheets are so inaccessible—from close bracing—that the men cannot reach all parts of them with their scaling tools; the steel of which these crowns are made tempers and cracks and is sometimes so hard that chisels require the hardest temper to cut them. We have renewed the hard patches on crown sheets of Nos. 1, 2, and 3 furnaces; have put a new hard patch on side of No. 3 furnace, and one on the side of No. 4 furnace; we have renewed eighteen socket-bolts and six soft patches during the year.

To get at the hard patches we were obliged to cut from the boilers 18 stays (Fig. 3), 24 sockets (Fig. 4), and 36 braces (Fig. 5), all of which had to be replaced. We took advantage of this to cram our smallest man into the boilers to scale them as much as possible. We cut one 1⅞-inch hole in the port and six in the starboard boiler, through which we scaled the hitherto inaccessible parts, and afterwards closed the holes with 1½-inch pipe plugs; these holes are better than hand-holes, in that they do not cut so much iron out of the boilers. We tested the boilers by cold-water pressure (after replacing the braces) to 64 pounds.

In repairing at the Washington yard we have been permitted to select their best two boiler makers, and have utilized our firemen as helpers; at New Bedford, the contractors, for some reason, refused to do this, and, in order to get our repairs made, we were obliged to employ a helper with each skilled boiler-maker. The quality of the repairs done by the navy-yard was better, and, by utilizing our men as helpers, was also cheaper. I beg to recommend that new boilers be built at the Washington navy-yard, from the plans I have already submitted, and estimate $20,000 as the sum necessary to build and connect the boilers,

and make the necessary alteration in the bunkers and deck-house, as indicated in the drawings already submitted.

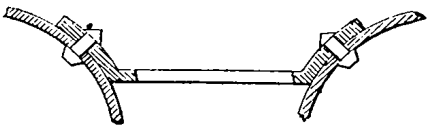


FIG. 3.

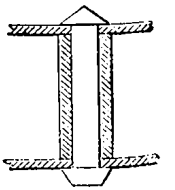


FIG. 4.

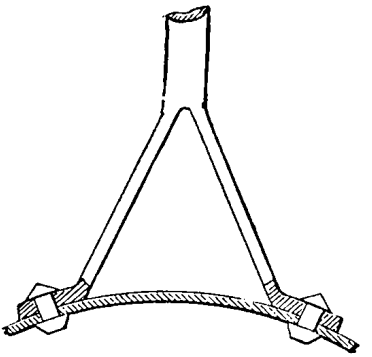


FIG. 5.

MARINE GOVERNORS.

The Svedberg governors continue to work admirably. Stormy weather on the 7th, 15th, and 16th of January, the 12th of February, the 9th and 31st of March compelled the use of the governors, on all of which occasions they worked very well. I consider them indispensable. Experience has demonstrated that the relative direction and force of the gale requires a different height of mercury in the cups; I have therefore tapped iron cocks into the bottoms of the mercury-cups for diminishing the height of mercury.

DREDGING ENGINE.

This engine continues to do its work well, giving but little trouble. We have reset the steam-valves, and the engine now runs more smoothly than formerly. On one occasion the cast-iron chamber of the throttle-valve was broken, probably from water in the pipe; the engine was not in motion at the time. To prevent detaining the ship in port we substituted a smaller valve, which was used during one dredging voyage in the Gulf Stream, and when the ship returned to port we put in a duplicate of the original valve. We have overhauled this engine during the year, adjusted the bearings, lined up the roller-guide, &c., and have polished some of the rough, unfinished parts.

REELING ENGINE.

We have overhauled this engine and have had the lower journals of the connecting-rods turned down and brasses refitted; they were $\frac{1}{32}$ of an inch "out of round." We have stopped the leaks under the valve-bonnets, adjusted the bearings, &c.

SOUNDING ENGINE.

We have put a new piston-ring in this engine, to replace a broken one, and we have draw-filed the trunk to make its sides parallel, since which time the engine has worked better. I recommend that the cylinder be rebored and that a new and much lighter piston and trunk be made, with a view to increasing the speed of the engine. The steam-hose which has been used on this engine for the past three years is much deteriorated and must soon be replaced.

STEERING ENGINE.

This engine continues to do its work well, and gives no trouble except to diminish the vacuum by its air-leaks.

STEAM WINDLASS.

This machine continues to give great satisfaction; its convenience in enabling us to hoist, cat, and fish the anchors, or to veer one while hoisting the other, merits a special mention. It is also used to hoist boats, and, in reeling off wire rope, the capstan is utilized as a drum.

We have put a new key in the rock-shaft to replace a loose one; we have reset the valves, and have divided the lead equally. On examination we find the cylinders, valve faces, and journals all wearing smoothly.

STEAM PUMPS.

The cast-iron piston in the water end of the circulating pump has corroded considerably, and we have been obliged to have the hole for the rod counterbored, and have a composition collar let in, for the shoulder of the rod to press squarely against. This piston is heavy, and the two leather collars (packing) wear away quite fast. We will ask for a bronze piston, with hemp packing, during the coming year.

We have put a new set of rubber valves in the boiler feed-pump, and have put a safety feed-valve on that pump. The hydrant pump has required no further attention than repacking and cleaning during the year.

STEAM ASH HOIST.

The engine and chute continue to give satisfaction. The engine has not been overhauled during the year, and does not appear to need it. It is in a hot, dark, and dusty place, and does not receive much attention, and does not require much.

STEAM CUTTERS.

The steam cutter and steam gig continue to give great satisfaction. During the year we have taken out the boilers twice, and have overhauled the machinery. We have put a new high-pressure steam-valve in the cutter, to replace one worn away to a knife-edge on one side. We have had the line-shafts out, and have lined them up; we straightened that of the cutter; it had been bent by the screw striking something. We have fitted a new follower to the piston of the low-pressure cylinder of the cutter. We have provided new air-pump rods for both boats, which has resulted in better vacuum. We have put new steel bushings in the air-pump connections of the cutter, and provided a new casing for the smoke-pipe. We have provided the gig with a new smoke-pipe with brass casing; it replaced the old one, which was burned out. We have put a new feed-pump rod and a new plunger on the hand bilge-pump of the cutter.

While the engine was out of the cutter, a man, in getting into the boat, jumped on and broke the flange off the bottom blow connection; this was the only break that occurred to the boat during the year that would have detained her an hour from her work. We replaced the flange at the Washington yard.

SIGNALS.

The number of signals struck upon our engine-room gongs during the process of sounding and dredging is so great that mistakes both in striking and answering must be expected; when such a mistake occurs, great mischief sometimes follows before it is discovered. To obviate this I have devised an annunciator, which has been built and attached, and which has worked quite well. I append a copy of the report of a board of U. S. naval engineer officers, which describes the machine. The Navy Department has adopted this machine for their new ships.

FRESH-WATER DISTILLING APPARATUS.

During the year we have distilled 51,320½ gallons of water, which has been used for drinking, cooking, and washing, and sometimes for the steam cutter and steam gig. A leak occurred in a coil, during the summer months, which caused brackish water; this was promptly stopped with soft solder. Organic matter was found in the water in September, but this was traced to the dirty tanks. With these two exceptions the water has been clean, sweet, sharp, and pure. The tanks are now cleaned as soon as empty, and are whitewashed inside before refilling.

ELECTRIC LIGHT.

The Edison incandescent light continues satisfactory, and still excites admiration. The dynamo (Fig. 6) has run three years without failure,

and though the commutator has worn considerably I think it will last a year yet. The set-screw in the pulley on the armature had a habit

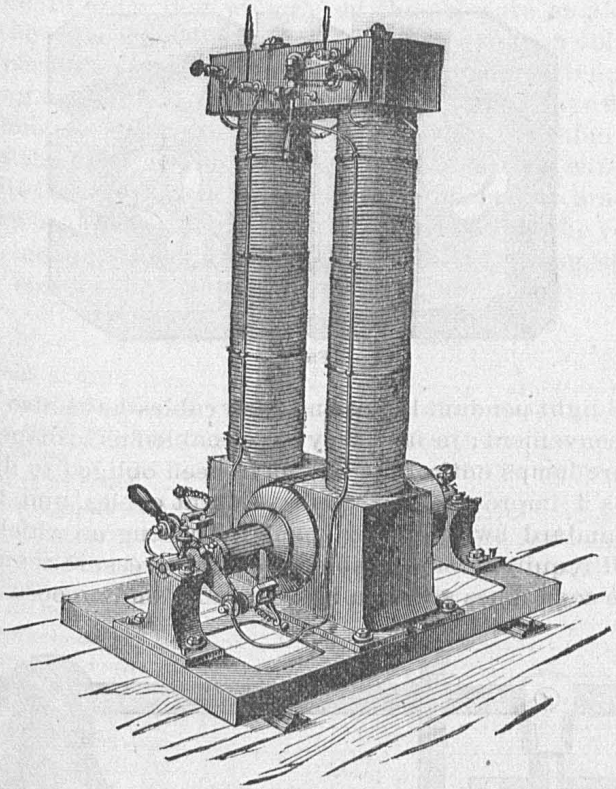


FIG. 6.

of slipping at times, causing annoyance; we had a "feather" fitted to the shaft at Washington, which obviates that trouble. Occasional breaks in the flexible cords, branch wires, lamp-sockets, &c., have occurred; they have been due partly to short circuits through sea-water which leaked through the decks, and partly to accidents; they have always been repaired by men in the engineer's department. But two breaks have occurred in the main wires. As an additional safety we have put large double-pole cut-out blocks (Fig. 7) in the forward circuit, next the dynamo. We have placed switches in the upper laboratory, by which four lamps on each side—overhead—in the lower laboratory are lighted, which is an additional convenience to the naturalists. We have placed a portable state-room sliding lamp-fixture in the chart-room for the convenience of the navigator, and a similar one in the laboratory over the microscope table of the surgeon. We have provided two 25-foot cables and fitted submarine lamps and attachment plugs to them for the use of the naturalists; these cables are made up of seven strands (double

circuit) of small wire, equal in aggregate area of cross-section to a single No. 16 wire, and are well insulated in gutta-percha; they have been much used and are more convenient than the old ones.

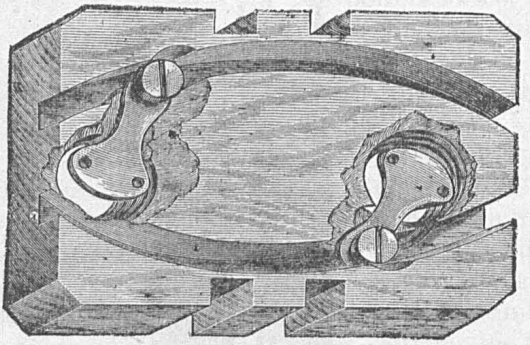


FIG. 7.

The two 3-light pendant lamps and their cables have also proved very useful and convenient; in fact, they have enabled us to dispense with the use of the arc lamps entirely. We have been obliged to dispense with the switches I improvised for these pendant cables, and to substitute Edison's standard switches for them. The engine which drives the dynamo still requires considerable care; the pressure-regulating valve (Fig. 8.) has sometimes stuck in its seat, and, on one occasion, delayed

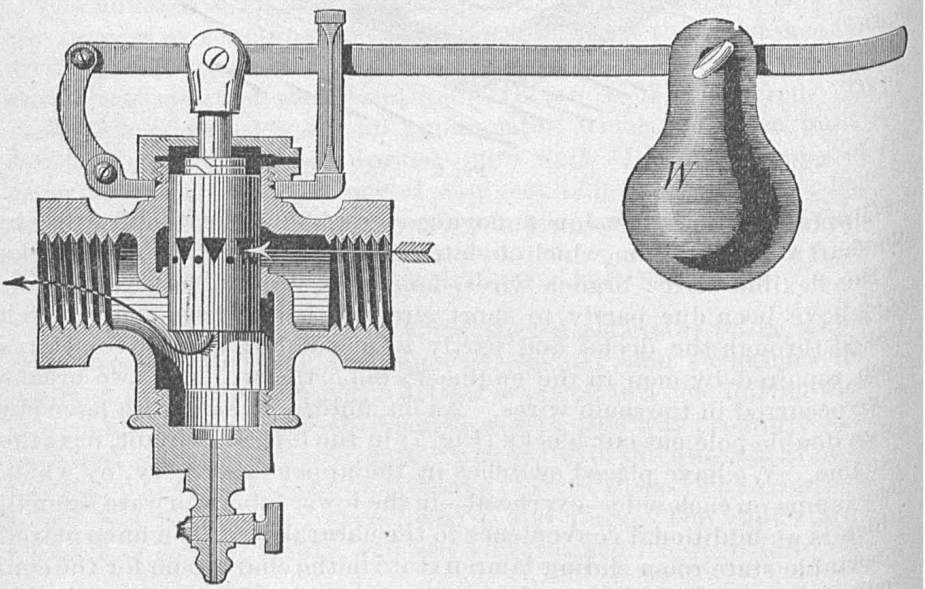


FIG. 8.

starting the dynamo half an hour. We have provided a steam-gauge, which we have attached to the steam-pipe between this regulating-valve

key to the fly-wheel of the dynamo engine, the old one having worked loose. We have had the commutator turned down and polished. We have removed the submarine lamp from the deep-sea cable to make place and the engine, in order that we may set the pressure at pleasure, and also know if the valve is working properly. We have been obliged to substitute a copper for an iron steam-pipe on the dynamo engine; as the continuous jarring caused leaks in the iron fittings. We have fitted a new for the photometer. In a gale of wind the guys of the cabin chandelier broke, and as the lamp swung it sheared off the electric wires. We restored the wires and replaced the rope guys with proper brass ones.

The dynamo has been in operation 1,623 hours during the year, during which time a mean of about 47½ lamps have been burning, aggregating the following cost:

Essential expenses of illumination.

15 $\frac{663}{2240}$ tons of coal, at $5.02	$76 56
192 lamps, at 61.8 cents*	118 65
36 gallons of oil, at 60 cents	21 60
3 brushes, at 60 cents	1 80
3 cut-out blocks, at 32 cents	96
32 3-light safety-plugs, at 8 cents	2 56
25 6-light safety-plugs, at 8 cents	2 00
7 key-sockets, at 90 cents	6 30
Refitting cross-head journal of dynamo engine	8 00
2 plain sockets, at 46 cents	92
Shortening dynamo belt	3 95
1 pound No. 12 insulated wire, at 40 cents	40
50 feet of flexible cord, at 15 cents	7 50
1 pound No. 18 insulated wire, at 40 cents	40
2 cigar-lighter plugs, at 55 cents	1 10

Additional expenses.

4 double-pole cut out blocks, at $1.10	4 40
5 80-light safety-plugs, at 17 cents	85
5 plain sockets, at 46 cents	2 30
2 pounds of insulation compound	24
5 attachment plugs, at 25 cents	1 25
50 feet of submarine cable, at 12 cents	6 00
2 P. B. sliding fixtures, at $6.50	13 00
2 P. B. standard switches, at $3.75	7 50
2 P. B. standard switches, at $2.35	4 70
Total expenses	292 94

Deducting the cost of the fixtures added to the plant during the year, and of the submarine cables, sockets, and attachment plugs used in building and repairing the submarine cables, there remains an expenditure of $252.80 for the legitimate illumination of the ship.

*The price of lamps during 1885 has been 85 cents apiece, but the Edison company, finding they had delivered us a bad lot of lamps, gave us an equal number of good ones without charge. This brought the price of lamps to 61.8 cents.

In calculating the number of lamp-hours I estimate a 16 candle-power lamp as taking a current double that of an 8 candle-power lamp. It then appears that the mean cost per candle power per hour is $(\frac{25.280}{1623\times47.6\times8}=)$ 0.041 cents.

The coal-gas company of Washington supplies gas of 17 candle-power used from a 4-foot bat-wing burner, at $1.75 per 1,000 cubic feet. The cost of such a jet becomes $(\frac{1.75\times4}{1000\times17}=)$ 0.041176 cents per candle-power per hour, or somewhat more than our light is costing us on board this ship.

I have purposely omitted the cost of labor, as the dynamo is run by a coal-heaver, who performs other than this duty.

VENTILATION.

The quantity of air induced by the fan remains practically constant, *ceteris paribus*, and the efficiency is the same as recorded in my last report. We have put new throttles on the motor, and have led the drain-pipe to the ash-pans. Owing to the humming of the fan somewhat resembling the sound of a large steam-whistle, its speed was purposely limited during our cruise in the foggy latitudes of the Grand Banks last summer. The fan has been used only a few hours during each night, as the enormous inefficiency of the Wise motor (which drives it) causes an expenditure of about 50 pounds of coal per hour. We manage, however, to keep the sleeping apartments tolerably free of bad air during the night.

STEAM HEATERS.

The steam radiators appear to be deficient in surface in very cold weather. The drainage of the cabin heaters, and also the lower labora-

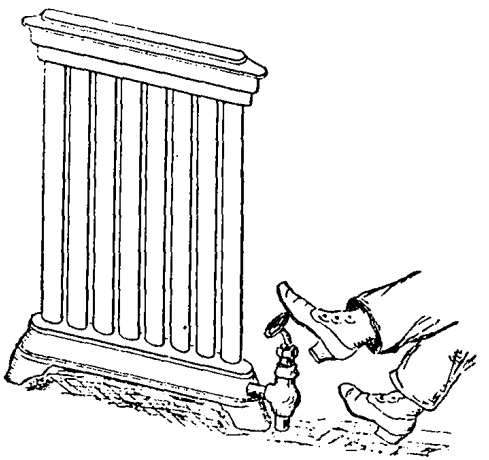


FIG. 9.

tory heater, has been improved by substituting three-fourths for one half inch pipe. The number of leaks in the heater pipes has dimin-

ished since we began to put in the ground unions. There continues to be trouble with leaky valves, due to bent stems. We have replaced several during the year. We have put new soapstone floats in the heater traps, and have provided an additional blow-through for the forward trap.

One of the two heaters on the berth-deck was removed in December by order of the commanding officer.

COAL.

All the coal consumed (excepting a small amount of semi-bituminous coal for the gig) during the year has been Pennsylvania anthracite, mostly from the Lackawanna mine, but partly from Scranton and the Lehigh Valley. The quality has been generally good, except that obtained from the navy-yard, Norfolk, which had deteriorated from absorption of moisture from exposure. The following are the amounts charged to different purposes, as nearly as I am able to divide them:

Coal consumed to propel the ship while on her course, to warm the ship, pump bilges, wash decks, and hoist ashes while the main engines were in operation	tons..	836$\frac{487}{2240}$
Coal consumed for lighting the ship by electricity	do...	16$\frac{1063}{2240}$
Coal consumed for ventilating the ship	do...	23$\frac{1120}{2240}$
Coal consumed for distilling water	do...	23$\frac{800}{2240}$
Coal consumed by the steam cutters	do...	91$\frac{530}{2240}$
Coal consumed for driving the hoisting engine, reeling engine, steam windlass, washing decks, warming the ship, and keeping fires banked when the main engines were not in operation	tons..	622$\frac{1736}{2240}$
Total number of tons of coal used for and by the engineer's department	do...	1,531$\frac{1736}{2240}$
Coal used for the equipment department (cooking)	do...	37$\frac{1457}{2240}$

CASUALTIES.

We have put additional cement in the bottoms of the shaft alleys, in order to give the floors a pitch and to improve the drainage, and have cleaned and painted the iron part of the hull in the alleys above the cement. We have substituted a $\frac{1}{2}$-inch for a $\frac{3}{8}$-inch drain-pipe from the main escape-pipe; we have soldered a new nipple on the water-tank in the cabin; drilled a broken bolt out of a hawse-pipe shutter; cut threads on dredging shackle-pins; repaired a broken photometer spring; riveted up a lot of brackets for specimen bottles in the laboratory. We have provided a bronze shoe and have fitted it under the bottom of the sheave in the heel of the dredging-boom; the object of this shoe is to prevent the wire from jamming between the sheave and its frame when the wire rope is slacked, runs off, or breaks. We have provided a bushing for the guide-stem of the dredge-rope governor to make it work smoothly. We have cleaned and painted the floor frames under the boilers. We have straightened awning stanchions; put new screws in guide of accumulator on the foremast; riveted a new hinge to a port-shutter on the side of the ship; forged new iron work for foremast-head; and have done such other mechanical work about the ship as was required.

APPENDIX.

CHIEF ENGINEER'S OFFICE, U. S. NAVY-YARD,
Washington, D. C., December 19, 1885.

SIR: In compliance with instructions of the Bureau of Steam Engineering, dated the 15th, and your order dated the 16th instant, the Board appointed to examine the device described as "Baird's Annunciator," have examined the apparatus, observed its operation, and beg leave to report as follows:

The object of the device is to indicate upon deck, to the easy inspection of the officer in charge of the deck or his assistants, the direction of the movement of the engines, whether ahead or aback.

While the engines are working ahead an index revolves in the direction in which an arrow, on its free extremity, points; upon reversing the engines the motion of the index is reversed.

The mechanism immediately employed in producing these movements is inclosed in a case, of which the dial over which the index revolves is the face. The index is mounted upon a shaft or spindle, which carries a toothed wheel.

The wheel and spindle are turned by the revolutions of a second spindle placed at right angles with the first, carrying a worm or endless screw, the threads of which mesh with the teeth of the wheel. The second spindle carries also a series of fans, arranged like the blades of a screw propeller, or like the vanes of the common anemometer.

By means of an air current, which flows in one direction when the ship's engines are going ahead and in the opposite direction when they are backing, the fans and their spindle are rapidly revolved, and the proper motion transmitted through the spiral gearing to the index. The movement of the index is moderate in speed, but the speed is variable with the speed of the engine, and incidentally affords a means of estimating, by the eye, the speed as well as the direction of the movement of the engines and the ship.

The air current is derived from a small rotary blower placed near the engine shaft, and turned by it through the operation of belts. When turned in one direction the blower draws the air from the vanes of the annunciator through a pipe, in one enlarged extremity of which, forming a mouth, the vanes revolve. When turned in the opposite direction the air is driven through the connecting pipe to the vanes, and the direction of the movement of the latter, upon the instant, reversed.

It is a very great advantage to the person maneuvering the ship to know, without the delay attending inquiry or observation of the movement of the ship herself, exactly what the latter is to be. Should mistake be made it will be apparent before it is too late to correct it.

The apparatus is simple and elegant, the power consumed by it is inconsiderable, and it is not at all likely to get out of order.

Its first cost needs never to be great, and the cost of maintenance trifling. Drawings of it are hereto appended.

The Board recommends it for purchase and use for purposes under cognizance of the Bureau of Steam Engineering.

We are, sir, very respectfully, your obedient servants,

CHARLES H. BAKER,
Chief Engineer, U. S. N.
R. D. TAYLOR,
Passed Assistant Engineer, U. S. N.
R. R. LEITCH,
Passed Assistant Engineer, U. S. N.

Commodore W. W. QUEEN, U. S. N.,
Commandant.

UNITED STATES NAVY-YARD, WASHINGTON,
Commandant's Office, December 24, 1885.

Respectfully referred to the Bureau of Steam Engineering.

W. W. QUEEN,
Commodore, Commandant.

REPORT OF THE MEDICAL DEPARTMENT, BY JAMES M. FLINT, SURGEON, U. S. N.

The general health of the officers and men during the year has been good. There have been no deaths from disease, and only one serious accident, whereby the victim lost his life by drowning, having fallen overboard at sea. One severe case of typhoid fever occurred in the early part of the year, but there is no reason to attribute the disease to any cause existing on board the ship, as the man had been enlisted but a short time before the appearance of his illness, and his was the only case of the kind that occurred. He was temporarily removed to the naval hospital at Pensacola, until convalescence was assured, when he returned to the ship and has since entirely regained his health.

It is perhaps worthy of note that of 65 vaccinations during the year 41 were successful. All of the 65 claimed to have been vaccinated previously, and 42 of them showed good evidence thereof in well-marked cicatrices. Among these latter presenting good evidence of previous vaccination, revaccination was effective in 26 cases. Fresh bovine virus was used and introduced by scarification.

No changes affecting the sanitary condition of the ship have been made during the year, and reference is made to former annual reports from this department for statistics and descriptions of all that pertains

to the arrangements for the accommodation of the crew, for ventilation, lighting, heating, &c.

The following ports were visited: Washington, D. C.; Norfolk, Va.; Key West, Fla.; Havana, Cuba; Cozumel Island, Yucatan; Pensacola, Fla.; New Orleans, La.; Tampa, Fla.; Baltimore, Md.; Newport, R.I.; St. John's, N. F.; Halifax, N. S.; Wood's Holl, Mass.; New York, N. Y.

Specific gravity observations were continued except in those portions of the Atlantic covered by previous cruises. The results are appended. Of especial interest is the series of date March 1, 5.30 o'clock, to March 2, 3 o'clock. This series of observations commences at the jetties of the South Pass of the Mississippi River and extends directly out into the Gulf of Mexico for the distance of about 75 nautical miles. The course of the ship from the jetties was SE. ¼ E.; average speed a little over 8 knots; wind light from the NE. The 5.30 specimen of water was taken from the river just inside the mouth of the jetties; at 6 o'clock the ship was about 5 miles out; after that, 8 miles may be added to the distance for each hour. It will be seen that at 50 miles from its mouth the river is practically lost in the Gulf, and at 75 miles all influence upon the density of the Gulf water has disappeared.

REPORT OF THE NATURALIST, MR. JAMES E. BENEDICT.

The first cruise of the Albatross in 1885 began on the 3d of January, when the ship sailed from Norfolk, Va., for the Gulf of Mexico. Dredging began on the 5th, when four hauls were made with the beam trawl, resulting in the capture of many invertebrates and fish. Captain Collins set a large trawl line in the morning, but succeeded in taking only three fish. Surface collecting was carried on with vigor. We arrived in Key West on the 9th, where some of us collected birds for the practice in skinning. Dr. Bean and Captain Collins made several hauls along shore with the capelin seine. The bottom was too rough to accomplish much in this way.

On the 15th of January the ship sailed for Havana, making several good hauls on the way. Several days were spent off Havana using the tangles for sea-lilies and other echinoderms, corals, and hydroids. In this work we were very successful, the tangles usually coming up so well filled with specimens that it was necessary to put on a clean tangle while the one from the bottom was being picked over. The work in this locality is interesting, as it is on a fishing ground frequented by small fishing craft from Havana, which have from time to time brought in some of the rare invertebrates and fish. The bottom is so rough that it was no uncommon thing for the tangles to catch, and it required careful maneuvering of the ship to free them without loss of the outfit. After leaving this place the ship cruised to the westward through the southern portion of the Gulf, dredging and doing surface work when there was

any occasion for it. From one haul a barrel of siliceous sponges was saved; also very many specimens of a small worm belonging to the family Eunicidæ.

On the 23d of January the Albatross dropped anchor off the town of San Miguel, island of Cozumel. After arrangements had been made by Captain Tanner with the magistrate of the island the naturalists were allowed to go ashore and collect. During the stay of about six days nearly two hundred bird-skins were made, and more than that number of birds preserved in alcohol. From this collection of birds Mr. Ridgway has described sixteen new species and several sub-species. Dr. Bean and Captain Collins made several hauls with the seine and captured several new species of fish, and also some very desirable known species. The reptiles are said by Professor E. D. Cope to be interesting and to indicate a rich fauna. Only three species of mammals were taken.

On the evening of the 29th we steamed away from Cozumel, and on the 30th made seven hauls on Campeche Bank in water from 21 to 27 fathoms in depth. Some of the hauls showed good food bottom and added some fine invertebrates to our collection. A number of good-sized fish were caught with hook and line, after which we left the bank and steamed straight to Pensacola, Fla., where we remained several days.

A short cruise was made to the red-snapper fishing grounds off Pensacola on the 7th of February. Eight hauls were made, which will, I think, show the relative abundance of the different invertebrates at this locality. From Mr. Silas Stearns, a prominent correspondent of the Fish Commission, living in Pensacola, we learned that while the red snapper was not in danger of extermination, as some think, the limited extent of its range along the Gulf coast of Florida makes it possible to over-fish, and so deplete the waters that it can no longer be sought with profit. Already the Pensacola fishermen are obliged to go farther south than formerly. Shortly after this, the Albatross sailed for New Orleans, where the vessel remained until March 1.

During the latter part of March large collections were made on the more southern red-snapper banks of Florida. At Key West Captain Collins made a careful study of the fisheries which supply that city and export fish to Cuba. On the way to Washington an unsuccessful effort was made to take tile-fish on ground where, from the nature of the bottom, depth, &c., we thought it possible that they might live. We arrived at the Washington navy-yard on the 6th of April.

The second cruise began on the 2d of June at Norfolk, Va., and ended at Washington on the 8th. The object of this cruise was to make trials with the trawl line from Cape Charles to Cape Hatteras in water of suitable depth for tile-fish. Early in the morning of the 3d the ship was 70 miles east of Cape Charles. Here the first hauls were made with the beam-trawl, which brought up a large number of *Munidæ*. The trawl line, which had been baited the night before, was then set

in the same place, but without result, not even a dogfish being taken. From this station we gradually worked south toward Cape Hatteras. Life was found to be less and less abundant as we proceeded. *Cancer borealis* and *Eupagurus politus*, the latter in the shells of Neptunea, were common. The bottom in this region to a depth of 100 fathoms seems to be a drift unsuitable for sponges, corals, and other things which afford hiding-places for small fish and the invertebrates, upon which they feed. The bottom is composed of sand and mud mixed with many broken shells and a few living ones. Worms belonging principally to the Nephthydidæ and Lumbriconeridæ are not uncommon. A few of the larger forms of foraminifera are also found. Hand-lines were used in the afternoon of the 5th. Two specimens of *Caulolatilus chrysops* Gill, an *Epinephelus*, and several specimens of *Serranus* were caught. Among the surface animals taken was *Argonauta argo*. An effort was made to keep this alive, but did not succeed. The ship arrived in Washington on the 8th.

The Albatross left Washington on its third cruise on the 13th of June. After taking in bait at Newport, R. I., it cruised to the eastward and then north, putting in to St. John's, Newfoundland, making various soundings and dredgings on the way. After a stay of a few days at St. John's the ship cruised about the Banks, dredging when possible. Very often the nets of the trawls and dredges came from the bottom so badly torn that it was necessary to replace them before more work could be done. In many places the bottom was covered with bowlders of different sizes; in others it was smooth and sandy; in such places *Echinarachnius parma* were taken in large numbers, with now and then a hermit-crab, small flounders, and sculpins. During this cruise one hundred and nine hauls were made. The invertebrates were for the most part well known. The notes on the fish and the fishermen were made by Captain Collins, and are to be written out at some future day. The Albatross reached Wood's Holl on the 16th of July.

The Albatross put to sea from Wood's Holl for a short cruise on the tile-fish ground in the evening of August 6th, and returned on the 12th, having made twenty-eight hauls with the trawl, and having set the long trawl-line five times. Collecting on the surface was carried on with good result. Squid and flying-fishes were taken with the aid of the electric light. A dolphin (*Delphinus delphis*) was harpooned by Mr. G. A. Miller. This being a common species it was turned over to Dr. Libbey for histological purposes.

The cruise of the Albatross beginning August 27 and ending September 5 is of especial interest on account of the great depth of water in which the principal dredging was done. The average depth of water at the first eleven stations was $1{,}923\frac{6}{11}$ fathoms. At eight of these stations numerous bottom specimens were obtained. The success of the surface collecting was unusual. As heretofore much assistance was

given by the crew, some of whom were nearly always at hand with scoop-nets ready to capture anything coming within reach.

The large surface net was used after dark with the best results. In the day-time it was not so successful. Some of the more interesting surface fish were placed in the aquarium and brought into Wood's Holl alive. Three specimens of *Argonauta argo* were placed in jars, and the water was kept running through in the hope of keeping them alive. One lived for three days, and was killed not unlikely by the change in the temperature of the water from 75° to 60° F. Early in the evening of September 2 a petrel flew on board, blinded, no doubt, by the electric light. As soon as convenient the bird was skinned; and upon the arrival of the ship in Wood's Holl it was sent to Mr. Ridgway, curator of the department of birds, National Museum. Mr. Ridgway found the bird to be the *Pelagodroma marina* (Lath.) of Australia, and never before found in the North Atlantic and but twice in the South Atlantic. The position of the ship when the bird was taken was latitude N. 43° 34′ 18″, longitude W. 66° 09′.

The sixth cruise was from Wood's Holl, and lasted from the 17th to the 25th of September. Ten hauls were made with the beam-trawl, and more than the usual time was spent in surface collecting. Our large surface nets were used as often as possible, one from each side of the ship. These nets strain water through their meshes at the rate of nearly 12,000 gallons per minute when the ship is moving at the rate of 2 miles an hour. At the rate of 10,000 gallons per net the amount of water strained in an hour would be for both nets 1,200,000 gallons. The use of this net began with the first cruise of the year, and has been very satisfactory, only the very smallest objects escaping through its meshes. As might be expected from the large amount of water passing through it, many rare forms of fish and invertebrates are taken during a cruise.

The last cruise was from New York to Washington, going south as far as the coast of North Carolina. Leaving New York on October 15, the ship sailed southward, stopping to do surface work morning and evening whenever practical. Before daylight on the 16th the large net was put over and towed for an hour, taking hundreds of fish of one species and a few of a dozen others. The invertebrates taken at the same time were numerous and interesting. Among the mollusks were several species of Salpæ, Pteropods, Heteropods, and one small male argonaut. The preservation of the large amount of varied material taken by the net requires the attention of at least one collector the greater part of the time. During the cruise thirty-seven hauls were made, Nos. 2592 to 2628, inclusive. The last five were on very rich ground in water about 250 fathoms in depth. The ship reached Washington on the 24th of October.

The number of hauls made on the various cruises is three hundred and eighteen.

Record of dredgings and trawlings of the U. S. Fish Commission steamer Albatross, during the year ending December 31, 1885.

Serial number.	Date.	Time.	Position.		Temperature.			Depth.	Character of bottom.	Wind.		Drift.		Instrument used.
			Lat. N.	Long. W.	Air.	Surface.	Bottom.			Direction.	Force.	Direction.	Distance.	
	1885.		° ′ ″	° ′ ″	°	°	°	*Fath.*					*Miles.*	
2311	Jan. 5	9.47 a. m.	32 55 00	77 54 00	69	72	59.1	79	crs. S. bk. Sp	SE.	3			L. B. T.
2312	Jan. 5	10.48 a. m.	32 54 00	77 53 30	69	73	57.6	88	crs. S. bk. Sp	ESE.	3			L. B. T.
2313	Jan. 5	12.17 p. m.	32 53 00	77 53 00	69	73	57.2	90	crs. S. bk. Sp. brk. Sh	ESE.	3			L. B. T.
2314	Jan. 5	3.06 p. m.	32 43 00	77 51 00	70	69	47.4	159	crs. S. bk. Sp. brk. Sh	SSE.	4			L. B. T.
2315	Jan. 15	2.17 p. m.	24 26 00	81 48 15	77	75	.....	37	Co	ESE.	5			L. B. T.
2316	Jan. 15	3.21 p. m.	24 25 30	81 47 45	77	75	74	50		ESE.	5			L. B. T.
2317	Jan. 15	4.22 p. m.	24 25 45	81 46 45	77	75	75	45	Co	ESE.	5			L. B. T.
2318	Jan. 15	5.00 p. m.	24 25 45	81 46 00	77	75	75	45	Co	ESE.	5			L. B. T.
2319	Jan. 17	6.45 a. m.	23 10 57	82 20 06	71	76	.....	143	gy. Co	ESE.	1			Tels.
2320	Jan. 17	7.25 a. m.	23 10 39	82 18 48	72	76	.....	130	fne. Co	ESE.	1			Tels.
2321	Jan. 17	7.58 a. m.	23 10 54	82 18 06	74	77	.....	230	fne. gy. S	ESE.	1			Tels.
2322	Jan. 17	8.53 a. m.	23 10 54	82 17 45	75	77	.....	115	Co	ESE.	1			Tels.
2323	Jan. 17	10.04 a. m.	23 10 51	82 19 03	78	78	.....	163	wh. br. Co	ESE.	2			Tels.
2324	Jan. 17	11.17 a. m.	23 10 25	82 20 24	78	78	79.1	33	Co	ESE.	2			Tels.
2325	Jan. 17	11.39 a. m.	23 10 48	82 19 54	78	78	.....	170	lt. br. Co	ESE.	2			Tels.
2326	Jan. 17	12.15 p. m.	23 11 45	82 18 54	79	78	62	194	br. Co	ESE.	2			Tels.
2327	Jan. 17	12.53 p. m.	23 11 45	82 17 54	80	76	.....	182	fne. br. S	SSE.	1			Tels.
2328	Jan. 17	2.11 p. m.	23 11 03	82 19 15	81	75	58	203	fne. gr. Co	W.	1			Tels.
2329	Jan. 17	2.45 p. m.	23 11 03	82 18 45	81	75	.....	118	wh. Co	W.	1			Tels.
2330	Jan. 17	3.50 p. m.	23 10 48	82 19 15	81	75	.....	121	fne. gy. Co	W.	2			Tels.
2331	Jan. 17	4.35 p. m.	23 10 21	82 19 55	80	75	.....	114	Co	W.	1			Tels.
2332	Jan. 19	6.48 a. m.	23 10 38	82 20 06	73	75	.....	156	wh. gr. Co	SSE.	3			Tels.
2333	Jan. 19	7.26 a. m.	23 10 36	82 19 12	73	75	.....	169	fne. wh. Co	SSE.	3			Tels.
2334	Jan. 19	8.00 a. m.	23 10 42	82 18 24	74	75	.....	67	wh. Co	SSE.	3			Tels.
2335	Jan. 19	9.00 a. m.	23 10 39	82 20 21	76	77	.....	201		NE.	3			Tels.
2336	Jan. 19	9.46 a. m.	23 10 48	82 18 52	77	77	.....	157	Co	NE.	3			Tels.
2337	Jan. 19	11.02 a. m.	23 10 39	82 20 21	78	78	.....	199	Co	NE.	3			Tels.
2338	Jan. 19	11.53 a. m.	23 10 40	82 20 15	79	78	.....	189	Co	NE.	3			Tels.
2339	Jan. 19	12.43 p. m.	23 10 40	82 20 15	79	78	.....	191	Co	NE.	3			Tels.
2340	Jan. 19	1.35 p. m.	23 10 47	82 20 06	80	78	.....	204	Co	NE.	3			Tels.
2341	Jan. 19	2.11 p. m.	23 11 00	82 19 06	79	78	.....	143	Co	NE.	3			Tels.
2342	Jan. 19	2.57 p. m.	23 10 39	82 20 21	78	78	.....	201	Co	NE.	3			Tels.
2343	Jan. 19	3.32 p. m.	23 11 35	82 19 25	78	78	.....	279	fne. Co	NE.	3			Tels.
2344	Jan. 19	4.40 p. m.	23 10 39	82 20 21	78	78	.....	199	br. Co	NE.	3			Tels.
2345	Jan. 20	12.36 p. m.	23 10 40	82 20 15	84	78	.....	184	fne. gy. wh. Co	E.	4			Tels.
2346	Jan. 20	1.24 p. m.	23 10 39	82 20 21	83	78	.....	200	Co	E.	4			Tels.
2347	Jan. 20	2.11 p. m.	23 10 39	82 20 21	82	78	.....	216	Co	E.	4			Tels.

2348	Jan. 20	3 04 p. m	23 10 30	82 20 21	82	78		2.1	Co	E.	4	Tgls.
2349	Jan. 20	3.51 p. m	23 10 40	82 20 15	82	78		182	Co	E.	4	Tgls.
2350	Jan. 20	4.37 p. m	23 10 39	82 20 21	81	78		213	Co	E.	3	S.B.T.
2351	Jan. 21	9 02 a. m	22 41 00	84 16 30	78	77		426		SSE.	2	L.B.T.
2352	Jan. 21	11.13 a. m	22 35 00	84 23 00	79	77	45	463	wh. Co	Variable.	0-1	L.B.T.
2353	Jan. 22	9.23 a. m	20 59 00	86 23 00	79	79	62.8	167	Co	NE.	1	Tgls.
2354	Jan. 22	10.17 a. m	20 59 30	86 23 45	80	78		130	Co	NE.	1	S.B.T.
2355	Jan. 22	11.28 a. m	20 56 48	86 27 00	83	78		369	yl. Oz	NE.	2	S.B.T.
2356	Jan. 29	1.29 p. m	20 18-30	87 03 00	84	78		137	fne. wh. Co	ESE.	3	Tgls.
2357	Jan. 29	2.07 p. m	20 19 00	87 03 10	81	78		178	wh. Co	ESE.	4	Tgls.
2358	Jan. 29	2.57 p. m	20 19 00	87 03 30	82	78		222	fne. wh. Co	ESE.	4	S.B.T.
2359	Jan. 29	4.07 p. m	20 19 10	87 03 30	84	78	50.8	231	wh. Co	ESE.	4	S.B.T.
2360	Jan. 30	7.42 a. m	22 08 30	86 49 00	79	78		26	wh. Co	SE.	3	Tgls.
2361	Jan. 30	8.45 a. m	22 08 15	86 51 15	80	78		25	Co. S	SE.	3	S.B.T.
2362	Jan. 30	9.18 a. m	22 08 30	86 53 30	79	78		25	Co. S	SE.	3	S.B.T.
2363	Jan. 30	10.38 a. m	22 07 30	87 06 00	78	77		21	wh. R. Co	SE.	3	S.B.T.
2364	Jan. 30	11.37 a. m	22 08 40	87 06 00	79	77		22	Co. S	SE.	3	S.B.T.
2365	Jan. 30	3.00 p. m	22 18 00	87 04 00	79	77		24	wh. R. Co	SSE.	2	S.B.T.
2366	Jan. 30	4.52 p. m	22 28 00	87 02 00	77	76		27	fne. wh. Co	SSE.	2	S.B.T.
2367	Jan. 30	6.32 p. m	22 38 00	87 00 00	75	76		124	wh. Co	Calm.	0	S.B.T.
2368	Feb. 7	12.11 p. m	29 15 00	85 32 00	60	64		28	crs. gy. S. brk. Sh	SE.	2	Tgls.
2369	Feb. 7	12.46 p. m	29 16 30	85 32 00	60	64		26	crs. gy. S. brk. Sh	S.	3	L.B.T.
2370	Feb. 7	1.16 p. m	29 18 15	85 32 00	60	64		25	crs. gy. S. brk. Sh	S.	3	L.B.T.
2371	Feb. 7	2.16 p. m	29 17 00	85 30 45	65	66		26	gy. S. brk. Sh	S.	3	L.B.T.
2372	Feb. 7	2.47 p. m	29 15 30	85 29 30	64	64		27	G	S.	3	L.B.T.
2373	Feb. 7	3.27 p. m	29 14 00	85 29 15	64	64		25	Co	S.	3	L.B.T.
2374	Feb. 7	4.27 p. m	29 11 30	85 29 00	63	65		26	S. G. brk. Sh	S.	3	L.B.T.
2375	Feb. 7	5.15 p. m	29 10 00	85 31 00	62	65		30	S. bk. Sp. brk. Sh	S.	4	L.B.T.
2376	Feb. 11	1.43 p. m	29 03 15	88 16 00	58	62	46.5	324	gy. M	NE.	4	L.B.T.
2377	Feb. 11	3 44 p. m	29 07 30	88 06 00	50	63	67	210	gy. M	E.	4	L.B.T.
2378	Feb. 11	5.40 p. m	29 14 30	88 09 30	50	63		68	gy. M	NE.	4	L.B.T.
2379	Mar. 2	5.40 a. m	28 00 15	87 42 00	60	66		1,467	yl. Oz	NE.	6	L.B.T.
2380	Mar. 2	10.43 a. m	28 02 30	87 43 45	60	69	40.1	1,430	br. M	NNE.	3	L.B.T.
2381	Mar. 2	3.59 p. m	28 05 00	87 56 15	59	69		1,330	lt br. M	N.	2	L.B.T.
2382	Mar. 3	5.37 a. m	28 19 45	88 01 30	59	62	39.6	1,255	gy. M	NE.	1	L.B.T.
2383	Mar. 3	10.23 a. m	28 32 00	88 06 00	62	69	39.8	1,181	br. gn. M	NE.	2	L.B.T.
2384	Mar. 3	2.59 p. m	28 45 00	88 15 30	70	67	39.6	940	br. gy. M	E.	2	L.B.T.
2385	Mar. 3	6.37 p. m	28 51 00	88 18 00	61	67	40.1	730	gy. M	E.	2	L.B.T.
2386	Mar. 4	5.36 a. m	29 15 00	88 06 00	62	67	61.8	60	bn. M	NE.	1	L.B.T.
2387	Mar. 4	7.46 a. m	29 24 00	88 04 00	61	61		32	S. G. brk. Sh	NE.	2	L.B.T.
2388	Mar. 4	9.45 a. m	29 24 30	88 01 00	61	61		35	yl. S. bk. Sp	NE.	2	L.B.T.
2389	Mar. 4	10.56 a. m	29 26 00	87 56 00	64	62		27	gy. S. brk. Sh	NE.	2	L.B.T.
2390	Mar. 4	12.48 p. m	29 27 30	87 48 30	62	62		30	crs. S. bk. Sp. Sh	NE.	2	L.B.T.
2391	Mar. 4	2.03 p. m	29 32 00	87 45 00	61	59		25	gy. S. bk. Sp	ENE.	2	L.B.T.
2392	Mar. 13	5.27 a m	28 47 30	87 27 00	66	62	40.7	724	br. gy. M	SW.	3	L.B.T.
2393	Mar. 13	9.37 a. m	28 43 00	87 14 30	70	64	41.1	525	lt. gy. M	NE.	1	L.B.T.
2394	Mar. 13	1.35 p. m	28 38 30	87 02 00	70	66	41.8	420	gn. M	WSW.	2	L.B.T.
2395	Mar. 13	4.31 p. m	28 36 15	86 50 00	72	66	44.1	347	gy. M	WSW.	2	L.B.T.
2396	Mar. 13	6.09 p. m	28 34 00	86 46 00	64	65		335	gy. M	WSW.	3	L.B.T.
2397	Mar. 14	5.22 a. m	28 42 00	86 36 01	64	65	46.1	360	gy. M	NE.	2	L.B.T.
2398	Mar. 14	8.24 a. m	28 43 00	86 26 00	64	67	48.6	277	gy. M	NE	2	L.B.T.
2399	Mar. 14	10.52 a. m	28 44 00	86 18 00	70	68	51.6	196	gy. M	NE	2	L.B.T.

Record of dredgings and trawlings of the U. S. Fish Commission steamer Albatross, &c.—Continued.

Serial number.	Date.	Time.	Position.		Temperature.			Depth.	Character of bottom.	Wind.		Drift.		Instrument used.
			Lat. N.	Long. W.	Air.	Surface.	Bottom.			Direction.	Force.	Direction.	Distance.	
	1885.		° ′ ″	° ′ ″	°	°	°	*Fath.*					*Miles.*	
2400	Mar. 14	1.23 p. m.	28 41 00	86 07 00	71	67	.....	169	gy. M	ENE.	1	.....	.....	L. B. T.
2401	Mar. 14	4.01 p. m.	28 38 30	85 52 30	73	69	.....	142	gn. M. brk. Sh	Calm.	0	.....	.....	L. B. T.
2402	Mar. 14	6.18 p. m.	28 36 00	85 33 30	65	63	.....	111	gy. M	Calm.	0	.....	.....	L. B. T.
2403	Mar. 15	5.30 a. m.	28 42 30	85 29 00	67	65	.....	88	gy. M	SW.	2	.....	.....	L. B. T.
2404	Mar. 15	7.45 a. m.	28 44 00	85 16 00	68	66	.....	60	gy. S	SW.	1	.....	.....	L. B. T.
2405	Mar. 15	9.39 a. m.	28 45 00	85 02 00	68	68	.....	30	gy. S. brk. Co	ESE.	1	.....	.....	L. B. T.
2406	Mar. 15	11.21 a. m.	28 46 00	84 49 00	67	64	.....	26	crs. S. Co	SE.	2	.....	.....	L. B. T.
2407	Mar. 15	1.14 p. m.	28 47 30	84 37 00	64	63	.....	24	Co. brk. Sh	SE.	2	.....	.....	L. B. T.
2408	Mar. 16	9.22 a. m.	28 28 00	84 25 00	60	64	.....	21	Co	NE.	4	.....	.....	L. B. T.
2409	Mar. 18	1.12 p. m.	27 04 00	83 21 15	67	66	.....	26	crs. gy. S. brk. Sh	W.	4	.....	.....	L. B. T.
2410	Mar. 18	3.52 p. m.	26 47 30	83 25 15	67	66	.....	28	fne. wh. S. bk. Sp. brk. Sh	WNW.	4	.....	.....	Rake dredge.
2411	Mar. 18	6.21 p. m.	26 33 30	83 15 30	69	67	.....	27	fne. wh. S. bk. Sp	NW.	4	.....	.....	L. B. T.
2412	Mar. 19	6.50 a. m.	26 13 30	83 08 45	62	66	.....	27	fne. gy. S. bk. Sp. brk. Sh	NW.	3	.....	.....	L. B. T.
2413	Mar. 19	10.04 a. m.	26 06 00	82 57 30	68	66	.....	24	fne. S. bk. Sp. brk. Sh	NNW.	2	.....	.....	L. B. T.
2414	Mar. 19	6.11 p. m.	25 04 30	82 59 15	67	69	.....	26	fne. wh. S. brk. Sh	NW.	2	.....	.....	L. B. T.
2415	Apr. 1	5.31 a. m.	30 44 00	79 26 00	70	70	45.6	440	Co. crs. S. Sh. For	ENE.	3	.....	.....	L. B. T.
2416	Apr. 1	12.01 p. m.	31 26 00	79 07 00	70	74	53.8	276	Co. brk. Sh	ENE.	5	.....	.....	L. B. T.
2417	Apr. 2	12.13 p. m.	33 18 30	77 07 00	69	67	65.8	95	fne. gy. S	ESE.	4	.....	.....	L. B. T.
2418	Apr. 2	12.54 p. m.	33 20 00	77 05 00	69	67	65.8	90	gy. S	ESE.	4	.....	.....	L. B. T.
2419	Apr. 2	5.25 p. m.	33 34 00	76 40 30	69	72	60.3	107	fne. gy. S. bk. Sp	ESE.	3	.....	.....	L. B. T.
2420	Apr. 5	6.20 p. m.	37 03 20	74 31 40	50	48	47.7	104	bk. S. M. G	S. by E.	1	.....	.....	L. B. T.
2421	June 3	5.40 a. m.	37 07 00	74 34 30	61	61	.....	64	fne. gy. S. P	NE.	2	.....	.....	L. B. T.
2422	June 3	9.55 a. m.	37 08 30	74 33 30	66	63	52.5	85	crs. gy. S. bk. Sp. brk. Sh	E.	4	.....	.....	L. B. T.
2423	June 3	3.11 p. m.	37 10 15	74 32 00	65	67	.....	143	gn. M. fne. S	ENE.	3	.....	.....	L. B. T.
2424	June 4	4.36 a. m.	36 41 37	74 42 15	69	67	52.5	85	bk. M	S.	1	.....	.....	L. B. T.
2425	June 4	11.30 a. m.	36 20 24	74 46 30	72	69	51.5	119	dk. gy. M. fne. S	SSW.	2	.....	.....	L. B. T.
2426	June 4	4.49 p. m.	36 01 30	74 47 30	77	71	52.0	93	crs. gy. bk. S. brk. Sh	S.	3	.....	.....	L. B. T.
2427	June 23	6.00 a. m.	42 46 00	51 00 00	49	47	38.7	523	hrd	S.	1	.....	.....	L. B. T.
2428	June 23	8.18 a. m.	42 48 00	50 55 30	50	48	38.3	826	gn. M	S.	2	.....	.....	L. B. T.
2429	June 23	12.04 p. m.	42 55 30	50 51 00	51	45	38.7	471	gy. M	S.	3	.....	.....	L. B. T.
2430	June 23	3.05 p. m.	42 58 30	50 50 00	51	46	.....	179	gn. S. P	S.	2	E. by N.	1.50	L. B. T.
2431	June 23	4.24 p. m.	43 00 00	50 47 30	51	46	33.5	129	yl. S. bk. Sp	S.	2	ESE.	1	L. B. T.
2432	June 23	5.28 p. m.	43 01 00	50 45 00	51	47	.....	64	fne. gy. S	SSW.	3	ESE.	1	L. B. T.
2433	June 23	6.05 p. m.	43 05 00	50 43 00	52	48	33.0	57	gn. S	SW.	3	E.	1.50	L. B. T.
2434	June 23	7.20 p. m.	43 08 00	50 40 00	54	48	34.0	51	gn. M	SW.	3	E.	1.50	L. B. T.
2435	June 23	8.13 p. m.	43 12 00	50 38 45	54	48	34.0	47	bk. M	SW.	4	E.	1.50	L. B. T.
2436	June 24	4.22 a. m.	43 30 00	50 05 30	53	49	34.0	30	wh. S. bk. Sp. brk. Sh	SW.	4	ESE.	1	L. B. T.

2437	June 24	5.04 a. m.	43 36 00	50 05 00	53	49	35 8	37	crs. brk. Sh. brk. St.	SW.	4	ESE.	1	L.B.T.	
2438	June 24	5.40 a. m.	43 36 00	50 03 30	54	48	36.8	37	gn. S. bk. Sp. brk. Sh.	SW.	4	ESE.	1	L.B.T.	
2439	June 24	6.50 a. m.	43 37 00	49 56 30	54	48	37.8	36	wh. S. bk. Sp	SW.	5	ESE.	1	L.B.T.	
2440	June 24	7.55 a. m.	43 38 00	49 49 30	54	48	38.3	33	fne. wh. S. bk. Sp.	SW.	5	ESE.	1	L.B.T.	
2441	June 25	5.05 a. m.	43 27 00	49 42 00	45	43	33.0	34	wh. S. brk. Sh.	W.	2	N. by E.	1.50	L.B.T.	
2442	June 25	6.42 a. m.	43 33 00	49 43 00	46	44	33.2	36	wh. S. brk. Sh.	W.	3	NNE.	1	L.B.T.	
2443	June 25	8.47 a. m.	43 44 00	49 45 00	50	46	34.9	35	wh. S. brk. Sh.	WNW.	2	NNE.	1	L.B.T.	
2444	June 25	11.21 a. m.	43 59 00	49 45 30	49	45	34.4	39	wh. S. brk. Sh.	WNW.	2	NNE.	1	L.B.T.	
2445	June 25	12.54 p. m.	44 09 30	49 46 30	47	44	33.5	39	brk. Sh.	SW.	3	NNE.	1	L.B.T.	
2446	June 25	2.21 p. m.	44 20 00	49 52 00	48	43	35.3	40	brk. Sh.	SW.	3	NNE.	1	L.B.T.	
2447	June 25	3.55 p. m.	44 26 00	49 42 00	48	43	34.8	39	brk. Sh.	WSW.	3	NNE.	1	L.B.T.	
2448	June 25	4.40 p. m.	44 28 00	49 39 30	48	43	33.9	40	S. G.	WSW.	3	NNE.	1	L.B.T.	
2449	June 25	7.03 p. m.	44 37 00	49 50 30	46	42	33.0	39	brk. Sh.	SW.	4	NNW.	1	L.B.T.	
2450	June 25	8.33 p. m.	44 45 00	50 02 30	45	42	31.0	44	P. brk. Sh.	SSW.	4	NNW.	.50	L.B.T.	
2451	June 26	4.19 a. m.	45 58 00	50 34 00	41	40	29.7	67	S. Sh.	SSW.	3	NW. by N.	1	S.B.T.	
2452	June 26	6.14 a. m.	47 04 00	50 48 00	54	40	29.7	89	fne. gn. S.	SW.	3	NNW.	1	L.B.T.	
2453	June 26	8.02 a. m.	47 10 00	51 02 00	48	41	29.7	82	gn. M. fne. S.	WSW.	3	NNW.	1	L.B.T.	
2454	June 26	10.17 a. m.	47 16 00	51 16 00	46	42	29.7	74	fne. gy. S.	SW.	2	NNW.	1	L.B.T.	
2455	June 26	12.25 p. m.	47 21 00	51 38 30	45	43	30.0	81	br. S.	SW.	2	W.	.75	L.B.T.	
2456	July 2	8.00 a. m.	47 29 00	52 18 00	47	46	.....	86	G.	SW.	2	S. by E.	1	Bl. Dr.	
2457	July 2	10.48 a. m.	47 13 00	52 24 00	48	47	29.5	86	gy. S.	SW.	2	S. by E.	1	Bl. Dr.	
2458	July 2	2.35 p. m.	46 48 30	52 34 00	50	48	29.5	89	S. gn. M.	SSE.	2	S. by W.	1	Bl. Dr.	
2459	July 2	6.10 p. m.	46 23 00	52 45 00	50	49	29.5	88	crs. gy. S.	SSW.	3	S.	1	Bl. Dr.	
2460	July 3	4.45 a. m.	45 50 00	54 06 00	50	47	30.0	67	gy. S. Sh.	WSW.	1	WSW.	.50	Bl. Dr.	
2461	July 3	6.03 a. m.	45 47 00	54 13 30	54	48	30.0	59	fne. S. bk. Sp.	WSW.	1	W.	.50	Sh. Dr.	
2462	July 3	7.18 a. m.	45 45 30	54 20 30	52	48	30.0	41	wh. S. bk. Sp.	WSW.	2	W.	.50	Bl. Dr.	
2463	July 3	8.30 a. m.	45 44 00	54 27 00	51	50	30.0	45	brk. Sh.	WSW.	2	W.	.75	Bl. Dr.	
2464	July 3	10.14 a. m.	45 40 00	54 41 00	52	47	32.0	42	wh. bk. S. brk. Sh.	WSW.	2	W.	.75	Sh. Dr.	
2465	July 3	12.15 p. m.	45 35 00	55 01 00	52	48	30.0	67	bk. gy. S.	WSW.	2	S.	.75	Sh. Dr.	
2466	July 3	2.40 p. m.	45 29 00	55 24 00	54	53	30.0	67	Co.	SW.	2	SSW.	.75	Sh. Dr.	
2467	July 3	5.31 p. m.	45 23 00	55 41 00	58	52	35.8	38	fne. wh. S. bk. Sp.	SW.	2	SSW.	.75	Bl. Dr.	
2468	July 3	7.45 p. m.	45 11 30	55 51 30	57	52	33.0	42	fne. bk. S.	SW.	1	S. by W.	50	Sh. Dr.	
2469	July 4	4.29 a. m.	44 58 37	56 20 45	55	54	40.5	201	gn. M.	SW.	1	ESE.	1	L.B.T.	
2470	July 4	7.37 a. m.	44 47 00	56 33 45	56	54	40.2	224	gy. M.	S.	1	ESE.	1.50	L.B.T.	
2471	July 4	10.31 a. m.	44 34 00	56 41 45	56	53	40.4	218	gy. M. S.	S. by E.	3	SW. by W.	1.50	L.B.T.	
2472	July 4	4.30 p. m.	44 27 30	57 10 45	59	53	40.0	137	crs. S. G.	S.	3	NW.	.50	Tgls. with grapnels.	
2473	July 4	5.17 p. m.	44 27 15	57 10 00	58	53	40.0	219	crs. S. brk. Sh.	SW.	2	NNW.	.50	Tgls. with grapnels.	
2474	July 4	6.07 p. m.	44 28 30	57 10 45	58	53	40.0	133	hrd.	SW.	2	W.	.50	Tgls. with grapnels.	
2475	July 4	6.50 p. m.	44 28 30	57 10 00	54	53	.....	222	yl. S. P.	SW.	3	WNW.	.50	Tgls. with grapnels.	
2476	July 4	7.21 p. m.	44 28 50	57 10 30	54	53	.....	200	yl. S. P.	SW.	3	N. by W.	1 .50	Tgls. with grapnels.	
2477	July 4	8.05 p. m.	44 29 30	57 11 15	54	51	.....	114	crs. wh. S. P.	SW.	3	NNW.		L.B.T.	
2478	July 5	5.06 a. m.	44 05 30	57 16 30	53	52	.....	191	fne. yl. S.	WSW.	2	N. by W.	.75	Tgls.	
2479	July 5	5.53 a. m.	44 05 45	57 16 45	53	52	.....	129	wh. S. P.	W.	2	NNW.	.50	Tgls.	
2480	July 5	6.54 p. m.	44 06 00	57 16 30	54	52	.....	189	wh. S. P.	W.	2	NNW.	.75	Sh. Dr.	
2481	July 5	7.36 a. m.	44 07 30	57 16 45	54	52	.....	116	G.	NW.	2	NE.	.75	Sh. Dr.	
2482	July 5	8.38 a. m.	44 08 00	57 16 15	54	52	.....	265	br. M.	NW.	2	N. by W.	.50	Sh. Dr.	
2483	July 5	10.18 a. m.	44 16 00	57 12 45	53	53	.....	175	crs. G.	NW.	2	NE.	.50	Sh. Dr.	

Record of dredgings and trawlings of the U. S. Fish Commission steamer Albatross, &c.—Continued.

Serial number.	Date.	Time.	Position.		Temperature.			Depth.	Character of bottom.	Wind.		Drift.		Instrument used.
			Lat. N.	Long. W.	Air.	Surface.	Bottom.			Direction.	Force.	Direction.	Distance.	
	1885.		° ′ ″	° ′ ″	°	°	°	*Fath.*					*Miles.*	
2484	July 5	11.26 a.m.	44 20 00	57 11 15	59	54	.....	204	fne. wh. S.	NW.	2	N. by E.	.50	Sh. Dr.
2485	July 5	12.30 p.m.	44 24 00	57 09 50	58	54	.....	205	fne. wh. S.	NW.	2	N. by W.	.50	Sh. Dr.
2486	July 5	1.38 p.m.	44 26 00	57 11 15	58	54	39.7	190	crs. S. G.	W. by N.	2	NNW.	.75	Sh. Dr.
2487	July 5	3.20 p.m.	44 28 30	57 14 45	57	54	.....	39	gy. S. G	W. by N.	2	NNE.	1	Sh. Dr.
2488	July 5	5.02 p.m.	44 35 00	57 13 30	56	53	.....	150	yl. S.	NW.	2	ESE.	.50	Sh. Dr.
2489	July 5	7.17 p.m.	44 43 00	57 22 45	55	53	.....	33	wh. S	NW.	2	ESE.	.75	Sh. Dr.
2490	July 6	4.44 a.m.	45 27 30	58 27 45	50	52	.....	50	G. P	SSW.	1	WNW.	.50	Sh. Dr.
2491	July 6	6.00 a.m.	45 24 30	58 35 15	51	53	.....	59	wh. S	SSW.	1	W.	.50	Sh. Dr.
2492	July 6	7.32 a.m.	45 22 00	58 43 45	51	53	33.3	75	wh. S.	SSW.	2	W.	.50	Sh. Dr.
2493	July 6	8.53 a.m.	45 19 00	58 51 15	52	53	32.3	45	wh. S. brk. Sh	SSW.	2	W.	.50	Sh. Dr.
2494	July 6	10.40 a.m.	45 14 30	59 06 45	54	54	32.5	50	S. G	SSW.	1	W.	.25	Tgls.
2495	July 6	12.20 p.m.	45 10 00	59 23 45	54	54	32.5	44	hrd	SSW.	1	W.	.25	Tgls.
2496	July 6	1.30 p.m.	45 07 30	59 27 45	58	56	32.2	44	crs. yl. S. P	S.	1	W.	.25	Tgls.
2497	July 6	3.10 p.m.	45 04 00	59 38 45	58	55	33.0	57	yl. S. brk. Sh. hrd	S.	1	W.	.75	Sh. Dr.
2498	July 6	5.21 p.m.	44 54 00	59 46 45	63	57	.....	65	fne. br. S	SSW.	2	W.	1	L. B. T.
2499	July 6	7.01 p.m.	44 46 30	59 55 45	62	57	35.8	130	bk. M	SSW.	2	W. by S.	1	L. B. T.
2500	July 7	7.10 a.m.	44 28 00	60 15 15	59	58	.....	36	S. G	S.	2	W.	.50	L. B. T.
2501	July 7	8.02 a.m.	44 27 00	60 20 15	59	58	38.7	26	S. G	S.	2	W.	.50	L. B. T.
2502	July 7	11.09 a.m.	44 19 00	60 39 15	60	57	34.8	54	yl. S	S.	1	NNW.	.50	L. B. T.
2503	July 7	1.43 p.m.	44 22 30	61 00 15	63	60	35.0	47	P	SSW.	1	WNW.	.50	L. B. T.
2504	July 7	4.22 p.m.	44 23 00	61 22 45	65	62	40.6	82	bk. M. G	SSW.	1	WNW.	.50	Sh. Dr.
2505	July 7	6.46 p.m.	44 23 30	61 44 15	63	63	42.3	93	dk. br. M	SSW.	1	W. by S.	.50	L. B. T.
2506	July 8	4.15 a.m.	44 26 00	62 10 00	61	61	43.1	127	dk. br. M	SW.	1	WNW.	.50	L. B. T.
2507	July 8	6.46 a.m.	44 27 30	62 33 30	62	61	41.6	80	hrd	SW.	1	WNW.	.50	Sh. Dr.
2508	July 8	9.13 a.m.	44 28 30	62 56 00	62	61	39.7	72	br. M	Calm.	0	WNW.	.50	L. B. T.
2509	July 8	11.29 a.m.	44 30 00	63 18 00	64	61	34.8	43	crs. S	Calm.	0	WNW.	.50	Sh. Dr.
2510	July 11	10.45 a.m.	44 18 00	63 23 00	58	53	39.2	68	bk. M. brk. Sh	(*)		(*)		Dredge.
2511	July 11	12.29 p.m.	44 05 30	63 31 30	60	57	41.0	84	br. M	SW.	1	W. by N.	1	Sh. Dr.
2512	July 11	3.00 p.m.	43 48 00	63 46 30	62	58	42.6	103	br. M	SW.	2	W.	.50	Sh. Dr.
2513	July 11	5.38 p.m.	43 31 00	63 56 30	62	58	43.6	134	gv. Oz	SW.	2	SSW.	.50	S. B. T.
2514	July 11	7.16 p.m.	43 28 30	63 57 30	62	59	43.1	126	bk. M	SW.	2	SSW.	.50	S. B. T.
2515	July 12	4.21 a.m.	43 18 30	63 51 30	61	58	36.3	57	S. G	N.	2	W.	.50	Sh. Dr.
2516	July 12	5.35 a.m.	43 15 00	63 58 00	59	58	36.3	52	rky	NW.	2	WSW.	.50	Sh. Dr.
2517	July 12	9.02 a.m.	43 10 00	64 18 00	60	60	38.3	55	yl. S. bk. Sp	NNW.	2	W.	.50	Sh. Dr.
2518	July 12	11.16 a.m.	43 05 00	64 40 30	60	59	38.7	60	St	NNW.	2	W.	.50	Sh. Dr.
2519	July 12	2.11 p.m.	42 51 15	64 40 00	61	60	39.2	53	hrd	NW.	2	WSW.	.25	Sh. Dr.
2520	July 12	3.51 p.m.	42 41 00	64 55 30	60	60	40.6	62	rky	WNW.	3	SW. by S.	.25	Sh. Dr.

2521	July	12	5.26 p. m	42 30 30	65 02 00	61	62	42.1	65	S. G	WNW.	3	SW. by S.	.25	Sh. Dr.
2522	July	12	7.05 p. m	42 20 00	65 07 30	62	61	46.7	104	S. G	NW.	2	SW. by S.	.50	S. B. T.
2523	July	13	4.26 a. m	41 48 30	65 44 30	59	60	41.6	111	S. G. St	NNW.	2	W.	.25	Sh. Dr.
2524	July	13	5.14 a. m	41 48 45	65 47 00	60	60	42.6	85	S. G. St	ENE.	1	WSW.	.25	Sh. Dr.
2525	July	13	5.54 a. m	41 49 00	65 49 30	62	60	43.6	72	S. G. brk. Sh	E.	1	E. by N.	.25	Sh. Dr.
2526	July	13	8.49 a. m	41 40 45	65 46 00	65	66	.....	121	P	NE.	1	NE. by E.	.50	Sh. Dr.
2527	July	13	1.30 p. m	41 59 00	65 35 30	66	61	.....	117	S. G	(†)	.....	(†)	.....	(†)
2528	July	13	6.29 p. m	41 47 00	65 37 30	75	69	38.7	677	br. S	N.	1	WSW.	1	L. B. T.
2529	July	14	5.08 a. m	41 03 30	66 14 00	66	65	38.7	662	gy. M	SE.	1	SW. by S.	1	L. B. T.
2530	July	14	9.08 a. m	40 53 30	66 24 00	70	67	38.4	956	gy. Oz	SE.	1	SW. by W.	1	L. B. T.
2531	July	14	1.43 p. m	40 42 00	66 33 00	72	67	38.4	852	gy. M	SE.	2	SW. by W.	1	L. B. T.
2532	July	14	5.57 p. m	40 34 30	66 48 00	75	67	38.7	705	gy. M	SE.	2	WSW.	1	L. B. T.
2533	July	15	4.34 a. m	40 16 30	67 26 15	72	68	38.7	828	br. Oz	WNW.	3	NNW.	1	L. B. T.
2534	July	15	9.22 a. m	40 01 00	67 29 15	66	70	37.8	1,234	gy. Oz	NW.	3	NE.	1	L. B. T.
2535	July	15	1.03 p. m	40 03 30	67 27 15	66	70	37.8	1,149	gy. Oz	WNW.	1	NW.	1.50	L. B. T.
2536	Aug.	7	5.46 a. m	39 56 15	70 47 30	69	74	.....	157	gn. M. fne. S	N.	1	WNW. W.	.50 1	L. B. T.
2537	Aug.	7	6.53 a. m	39 56 45	70 50 30	71	74	46.2	156	gn. M. fne. S	NE.	1	NW. by N.	1	L. B. T.
2538	Aug.	7	7.48 a. m	39 57 30	70 51 15	71	74	46.2	150	gn. M. fne. S	NE.	1	N.	1	L. B. T.
2539	Aug.	7	8.57 a. m	39 59 45	70 53 00	71	74	47.7	133	gn. S	NE.	1	N.	1	L. B. T.
2540	Aug.	7	11.20 a. m	39 58 20	70 52 00	72	74	46.7	144	gn. S	NE.	1	N.	1	L. B. T.
2541	Aug.	7	12.00 m	39 57 45	70 50 30	73	73	47.7	134	gn. S. brk. Sh	NE.	1	N. by W.	1	L. B. T.
2542	Aug.	7	3.00 p. m	40 00 15	70 42 20	73	76	47.2	129	S. brk. Sh	NE.	2	NNW.	1	L. B. T.
2543	Aug.	7	4.27 p. m	39 58 15	70 42 30	72	76	45.2	166	gn. S. bk. Sp	NE. by E.	2	N.	1	L. B. T.
2544	Aug.	8	6.19 a. m	40 01 45	70 24 00	70	74	47.7	131	gn. S. bk. Sp	ENE.	3	N.	.50	L. B. T.
2545	Aug.	8	7.31 a. m	40 01 00	70 23 45	70	74	46.7	142	gn. S. bk. Sp	ENE.	4	N.	.50	L. B. T.
2546	Aug.	8	12.47 p. m	39 53 30	70 17 30	73	72	39.6	538	gn. M	ENE.	4	NW. by W.	1.50	L. B. T.
2547	Aug.	8	2.25 p. m	39 54 30	70 20 00	70	76	39.6	390	gn. M	ENE.	4	N.	1	L. B. T.
2548	Aug.	8	4.37 p. m	39 56 00	70 14 30	69	76	43.4	260	gn. S. bk. Sp	E.	4	N.	.50	L. B. T.
2549	Aug.	8	6.43 p. m	39 51 30	70 17 00	76	76	39.5	571	gn. M	E.	4	WNW.	1.50	L. B. T.
2550	Aug.	9	5.23 a. m	39 44 30	70 30 45	73	76	38.5	1,081	br. M	E. by N.	3	NW.	2	L. B. T.
2551	Aug.	9	8.47 a. m	39 46 00	70 36 30	77	77	38.7	778	gy. Oz	ENE.	4	.....	.....	.....
2552	Aug.	9	12.33 p. m	39 47 07	70 35 00	77	77	39.6	721	gy. Oz	ENE.	4	NNW.	1.50	L. B. T.
2553	Aug.	9	3.48 p. m	39 48 00	70 36 00	72	77	39.2	551	gn. M	ENE.	3	W. by N.	2	L. B. T.
2554	Aug.	9	5.56 p. m	39 48 30	70 40 30	71	77	39.6	445	gn. M	ENE.	4	N.	.50	L. B. T.
2555	Aug.	10	6.13 a. m	39 53 00	71 32 00	72	75	47.7	136	gn. M. S	E.	1	N.	.50	L. B. T.
2556	Aug.	10	7.39 a. m	39 52 15	71 32 00	72	75	.....	180	gn. M. fne. S	E.	2	N.	.50	S. B. T.
2557	Aug.	10	9.00 a. m	39 53 10	71 31 00	76	75	46.7	154	gn. M	SE.	2	WNW.	.50	S. B. T.
2558	Aug.	10	12.16 p. m	39 47 15	71 50 30	76	76	50.3	123	gn. S	SE.	2	NE.	.50	S. B. T.
2559	Aug.	10	1.11 p. m	39 48 00	71 48 30	78	76	.....	120	br. M. S	SE.	1	NNE.	1	S. B. T.
2560	Aug.	10	3.13 p. m	39 48 10	71 48 40	78	76	50.7	114	br. M. S	SE.	1	NE.	.50	L. B. T.
2561	Aug.	10	5.33 p. m	39 38 00	71 42 00	80	77	39.2	500	gn. M	SSE.	1	N. by E.	1	L. B. T.
2562	Aug.	11	5.53 a. m	39 15 30	71 25 00	76	76	37.3	1,434	gy. Oz	S.	2	NE. by N.	1	L. B. T.
2563	Aug.	11	10.30 a. m	39 18 30	71 23 30	82	77	37.4	1,422	gy. Oz	S.	1	N.	1	L. B. T.
2564	Aug.	11	3.22 p. m	39 22 00	71 23 30	79	78	37.3	1,390	gy. Oz	SW.	2	NE. by N.	1	L. B. T.
2565	Aug.	28	1.15 p. m	38 19 20	69 02 30	72	77	36.2	2,069	gy. and br. Oz	WSW.	2	E.	3	L. B. T.
2566	Aug.	29	5.39 a. m	37 23 00	68 08 00	75	80	36.4	2,620	gy. Oz	NW.	4	SW. by S.	2	L. B. T.
2567	Aug.	30	5.27 a. m	37 45 00	66 56 00	72	78	36.4	2,721	gy. Oz	ESE.	2	(‡)	.....	(‡)

* Dredge rope parted, losing ship's dredge and 70 fathoms of wire rope.
† Dories lowered with trawl grapnels to drag for coral. Several sprays obtained.
‡ Lost trawl.

Record of dredgings and trawlings of the U. S. Fish Commission steamer Albatross, &c.—Continued.

Serial number.	Date.	Time.	Position.		Temperature.			Depth.	Character of bottom.	Wind.		Drift.		Instrument used.
			Lat. N.	Long. W.	Air.	Surface.	Bottom.			Direction.	Force.	Direction.	Distance.	
	1885.		° ′ ″	° ′ ″	°	°	°	*Fath.*					*Miles.*	
2568	Aug. 31	9.48 a. m.	39 15 00	68 08 00	72	75	36.9	1,781	gy. Oz	ENE.	2	N. by E.	1	L. B. T.
2569	Aug. 31	3.00 p. m.	39 26 00	68 03 30	74	75	37.0	1,782	gy. Oz	W.	1	SSW.	1	L. B. T.
2570	Sept. 1	7.12 a. m.	39 54 00	67 05 30	72	72	36.8	1,813	Glob. Oz	Calm.	....	N.	1	L. B. T.
2571	Sept. 1	1.37 p. m.	40 09 30	67 09 00	75	72	37.8	1,356	gy. Glob. Oz	WSW.	2	N.	1	L. B. T.
2572	Sept. 2	5.00 a. m.	40 29 00	66 04 00	72	72	37.8	1,768	gy. Oz	NW.	3	W.	.50	L. B. T.
2573	Sept. 2	12.12 p. m.	40 34 18	66 00 00	71	71	37.3	1,742	gy. M. S	NW.	5	WNW.	1	S. B. T.
2574	Sept. 3	7.10 a. m.	41 02 30	65 08 15	65	71	36.7	1,791	yl. Glob. Oz	NNW.	3	WNW.	1	(*)
2575	Sept. 3	1.43 p. m.	41 07 00	65 26 30	64	71	37.1	1,710	gy. Oz	NW.	1	W.	1	S. B. T.
2576	Sept. 4	1.58 p. m.	41 15 30	68 15 00	64	61	.....	18	crs. wh. S. yl. Sp	SW.	2	NW. by W.	.25	S. B. T.
2577	Sept. 4	2.55 p. m.	41 17 00	68 21 00	64	61	....	32	yl. S. P. hrd	SW.	3	WNW.	.25	S. B. T.
2578	Sept. 4	4.34 p. m.	41 20 30	68 34 30	63	60	54.4	37	fne. wh. S. bk. Sp	S.	2	WNW.	.25	S. B. T.
2579	Sept. 4	6.20 p. m.	41 23 00	68 47 00	62	61	42.2	70	fne. dk. gy. S	S.	2	W.	.25	S. B. T.
2580	Sept. 4	8.10 p. m.	41 25 30	69 01 00	61	62	42.4	83	yl. S. bk. Sp	SSW.	4	W.	.25	S. B. T.
2581	Sept. 13	8.21 a. m.	39 43 00	71 31 00	66	70	.....	394	gn. M	SW.	3	S.	.....	L. B. T.
2582	Sept. 18	2.53 p. m.	39 30 00	71 43 00	68	70	47.2	197	gn. M	SSW.	4	NE.	.....	L. B. T.
2583	Sept. 18	4.18 p. m.	39 30 45	71 43 00	68	70	.....	131	gn. M. S	SSW.	4	SSW.	.....	L. B. T.
2584	Sept. 19	7.02 a. m.	39 05 30	72 23 20	71	72	39.5	541	gy. M	SW. by W.	4	S.	.....	L. B. T.
2585	Sept. 19	4.28 p. m.	39 03 30	72 17 00	74	73	39.0	542	dk. gy. M	W. by S.	1	(†)	.....	(*)
2586	Sept. 20	9.33 a. m.	39 02 40	72 40 00	69	71	40.2	328	dk. gy. M	NNE.	3	W.	1	S. B. T.
2587	Sept. 20	11.40 a. m.	39 02 00	72 38 00	70	71	39.7	404	dk. gy. M	NNE.	5	W.	.50	S. B. T.
2588	Sept. 20	3.21 p. m.	39 02 00	72 36 00	70	71	39.5	479	gn. M	NE. by E.	6	W.	.50	S. B. T.
2589	Sept. 21	8.37 a. m.	38 55 00	72 50 30	66	70	44.2	231	gn. M. S	ENE.	3	N. by W.	.50	S. B. T.
2590	Sept. 21	10.28 a. m.	38 53 30	72 52 00	68	71	47.6	199	gn. M. S	ENE.	3	N. by W.	.50	S. B. T.
2591	Sept. 21	12.08 p. m.	38 53 30	72 52 00	67	71	.....	188	gn. M. S	ENE.	3	N. by W.	.50	S. B. T.
2592	Oct. 17	11.14 a. m.	35 02 29	75 12 09	70	79	.....	120	fne. gy. S	N.	4	S.	.50	L. B. T.
2593	Oct. 17	12.00 m	35 01 19	75 12 00	70	79	.....	143	gy. S. bk. Sp	N.	4	NNE.	1	L. B. T.
2594	Oct. 17	1.25 p. m.	35 01 00	75 12 00	70	78	.....	160	crs. gy. S. brk. Sh	N.	3	NNE.	1	L. B. T.
2595	Oct. 17	4.26 p. m.	35 08 09	75 05 30	78	78	.....	63	gy. S. brk. Sh	N.	3	S.	.50	L. B. T.
2596	Oct. 17	5.52 p. m.	35 08 30	75 10 00	74	78	.....	49	gy. S	N.	3	S.	.50	L. B. T.
2597	Oct. 18	6.07 a. m.	34 57 00	75 43 30	69	76	.....	15	crs. gy. S	NE.	2	SE.	.25	L. B. T.
2598	Oct. 18	7.18 a. m.	34 51 00	75 40 15	71	77	....	22	wh. S. brk. Sh	NE.	2	S. by E.	.25	L. B. T.
2599	Oct. 18	8.25 a. m.	34 45 20	75 38 10	72	77	.....	25	wh. S. brk. Sh	NE.	2	S. by E.	.25	L. B. T.
2600	Oct. 18	9.39 a. m.	34 39 30	75 35 30	75	78	.....	87	fne. gy. S. bk. Sp. brk. Sh	NE.	2	S. by E.	.35	L. B. T.
2601	Oct. 18	11.09 a. m.	34 39 15	75 33 30	74	78	.....	107	gy. S. P	NE.	2	S. by E.	.25	L. B. T.
2602	Oct. 18	12.03 p. m.	34 38 30	75 33 30	74	78	....	124	S. R	NE.	2	S. by E.	.25	L. B. T.
2603	Oct. 18	1.33 p. m.	34 38 30	75 33 30	70	77	.....	124	S. R	NE.	2	S. by E.	.25	L. B. T.
2604	Oct. 18	5.25 p. m.	34 37 30	75 39 45	76	78	.....	31	yl. S. brk. Sh	ENE.	1	S. by E.	.25	L. B. T.

2605	Oct.	18	6.43 p. m.	34 35 30	75 45 30	75	78	.....	32	wh. S. bk. Sp	Calm.	....	S. by E.	.25	L. B. T.
2606	Oct.	18	7.58 p. m.	34 35 15	75 52 00	73	78	.....	25	wh. S. bk. Sp	WNW.	1	S. by W.	.25	L. B. T.
2607	Oct.	19	6.15 a. m.	34 38 00	76 12 00	71	78	.....	18	fne. gy. S.	ENE.	3	ENE.	.25	L. B. T.
2608	Oct.	19	7.19 a. m.	34 32 00	76 12 00	71	76	.....	22	crs. gy. S. bk. Sp	S.	1	SSE.	.25	L. B. T.
2609	Oct.	19	8.24 a. m.	34 26 00	76 12 00	74	78	.....	22	fne. gy. S.	S.	2	SSE.	.25	L. B. T.
2610	Oct.	19	9.32 a. m.	34 20 00	76 12 00	74	75	.....	22	wh. S. bk. Sp. brk. Sh.	S.	3	SSE.	.25	L. B. T.
2611	Oct.	19	10.35 a. m.	34 15 00	76 11 30	76	75	.....	31	bk. S. brk. Sh	ESE.	3	SSW.	.25	L. B. T.
2612	Oct.	19	11.45 a. m.	34 11 00	76 10 30	77	78	.....	52	crs. wh. S. brk. Sh.	ESE.	3	NE. by N.	.25	L. B. T.
2613	Oct.	19	1.45 p. m.	34 09 00	76 02 00	77	78	.....	168	gy. S. bk. Sp	SSE.	2	NE.	.50	L. B. T.
2614	Oct.	19	3.00 p. m.	34 09 00	76 02 00	77	78	.....	168	gy. S. bk. Sp	SSE.	2	NE.	.50	L. B. T.
2615	Oct.	20	6.17 a. m.	33 45 00	77 25 00	76	75	.....	18	gy. S.	SSE.	3	SSE.	.25	Dredge.
2616	Oct.	20	7.20 a. m.	33 42 45	77 31 00	76	75	.....	17	S. P.	SSE.	3	SSE.	.25	Dredge.
2617	Oct.	20	10.00 a. m.	33 37 30	77 36 30	77	75	.....	14	crs. yl. S. brk. Sh	SE.	3	E.	.25	Dredge.
2618	Oct.	20	10.55 a. m.	33 37 15	77 35 30	76	74	.....	17	crs. yl. S. brk. Sh	SE. by S.	3	E.	.25	S. B. T.
2619	Oct.	20	11.19 a. m.	33 38 00	77 36 00	76	74	.....	15	crs. yl. S. brk. Sp. rot. Co	SE.	3	SE.	.25	Dredge.
2620	Oct.	20	12.13 p. m.	33 37 45	77 36 30	78	75	.....	15	gy. S. rot. Co	SE. by S.	3	ESE.	.25	S. B. T.
2621	Oct.	20	1.54 p. m.	33 34 00	77 42 00	76	75	.....	9	gy. S. brk. Co.	SE. by S.	3	ESE.	.25	S. B. T.
2622	Oct.	20	3.48 p. m.	33 38 00	77 36 00	76	74	.....	15	gy. S. brk. Co.	SE. by S.	3	ESE.	.25	S. B. T.
2623	Oct.	20	4.09 p. m.	33 38 00	77 36 00	76	74	.....	15	gy. S. brk. Co.	SE. by S.	3	ESE.	.25	S. B. T.
2624	Oct.	21	6.27 a. m.	32 36 00	77 29 15	71	78	.....	258	gy. S. bk. Sp.	WSW.	5	SSW.	.50	L. B. T.
2625	Oct.	21	7.50 a. m.	32 35 00	77 30 00	70	76	.....	247	gy. S. bk. Sp.	NE.	5	S. by E.	.50	L. B. T.
2626	Oct.	21	10.50 a. m.	32 27 30	77 26 30	69	76	.....	353	fne. gy. S.	SSW.	2	SE. by S.	.50	L. B. T.
2627	Oct.	21	2.06 p. m.	32 21 30	77 07 00	69	77	.....	437	yl. M.	SSW.	4	E.	.50	L. B. T.
2628	Oct.	21	3.51 p. m.	32 24 00	76 55 30	70	77	.....	528	yl. M.	SSW.	2	W.	.50	L. B. T.

*Lost trawl.

†Dredge-rope parted, losing large beam-trawl and 321 fathoms of wire rope.

Record of hydrographic soundings of the U. S. Fish Commission steamer Albatross, during the year ending December 31, 1885.

Serial number.	Date.	Time.	Position.		Weight of sinker.	Reel.	Depth.	Character of bottom.	Temperature.		
			Lat. N.	Long. W.					Air.	Surface.	Bottom.
	1885.		° ′ ″	° ′ ″	*Lbs.*		*Fms.*		°	°	°
591	Mar. 4	8. 50 a. m.	29 28 00	88 03 00	14	T.	25	gy. S	60	60	.....
592	Mar. 4	12. 12 p. m.	29 24 00	87 52 00	14	T.	36	fne. gy. S. bk. Sp....	64	62	.....
593	Mar. 4	3. 22 p. m.	29 33 00	87 39 00	14	T.	25	crs. S. bk. Sp. brk. Sh	61	60	.....
594	Mar. 4	4. 18 p. m.	29 36 30	87 36 00	14	T.	22	fne. wh. S	60	61	.....
595	Mar. 4	5. 20 p. m.	29 40 30	87 32 30	14	T.	22	fne. wh. S	59	60	.....
596	Mar. 7	5. 48 a. m.	29 16 19	85 49 30	14	T.	30	gy. S. bk. Sp. brk. Sh.	58	64	.....
597	Mar. 7	6. 44 a. m.	29 16 00	85 47 30	14	T.	29	yl. S. bk. Sp. brk. Sh.	58	64	.....
598	Mar. 7	8. 00 a. m.	29 17 20	85 45 30	14	T.	31	yl. S. bk. Sp. brk. Sh.	58	64	.....
599	Mar. 7	9. 10 a. m.	29 18 40	85 43 30	14	T.	30	yl. S. bk. Sh. brk. Sh	61	62	.....
600	Mar. 7	9. 38 a. m.	29 20 00	85 41 30	14	T.	27	yl. S. bk. Sp. brk. Sh.	60	61	.....
601	Mar. 7	10. 02 a. m.	29 19 00	85 41 45	14	T.	29	yl. S. bk. Sp. brk. Sh.	60	61	.....
602	Mar. 7	10. 24 a. m.	29 18 15	85 41 00	14	T.	28	yl. S. bk. Sp. brk. Sh.	60	61	.....
603	Mar. 7	10. 45 a. m.	29 17 30	85 40 15	14	T.	29	yl. S. bk. Sp. brk. Sh.	61	60	.....
604	Mar. 7	11. 03 a. m.	29 16 45	85 39 30	14	T.	28	yl. S. bk. Sp. brk. Sh.	61	60	.....
605	Mar. 7	11. 36 a. m.	29 16 00	85 38 45	14	T.	31	yl. S. bk. Sp. brk. Sh	61	60	.....
606	Mar. 7	11. 59 a. m.	29 15 11	85 38 00	14	T.	33	gy. S. bk. Sp	61	60	.....
607	Mar. 7	12. 16 p. m.	29 15 10	85 37 00	14	T.	32	fne. gy. S. bk. Sp....	61	60	.....
608	Mar. 7	12. 33 p. m.	29 15 10	85 36 00	14	T.	31	fne. gy. S. bk. Sp....	63	61	.....
609	Mar. 7	12. 56 p. m.	29 15 40	85 35 15	14	T.	29	fne. gy. S	65	62	.....
610	Mar. 7	1. 16 p. m.	29 16 15	85 34 30	14	T.	25	crs. R. bk. S. Sh.	65	62	.....
611	Mar. 7	1. 36 p. m.	29 15 00	85 34 30	14	T.	27	wh. S. bk. Sp. Sh....	65	63	.....
612	Mar. 7	1. 55 p. m.	29 14 00	85 33 30	14	T.	27	fne. S. bk. Sp	65	63	.....
613	Mar. 7	2. 10 p. m.	29 13 00	85 32 30	14	T.	26	fne. wh. S. bk. Sp ...	65	63	.....
614	Mar. 7	2. 23 p. m.	29 12 30	85 32 00	14	T.	26	crs. S. bk. Sp. Sh....	65	63	.....
615	Mar. 7	2. 57 p. m.	29 15 10	85 34 30	14	T.	29	fne. wh. S. bk. Sp	65	64	.....
616	Mar. 7	3. 16 p. m.	29 16 30	85 36 00	14	T.	29	fne. wh. S. bk. Sp	65	64	.....
617	Mar. 7	3. 32 p. m.	29 17 10	85 36 30	14	T.	27	fne. wh. S. bk. Sp	64	64	.....
618	Mar. 7	3. 48 p. m.	29 17 50	85 37 00	14	T.	27	fne. S. bk. Sp. brk. Sh.	63	64	.....
619	Mar. 7	4. 07 p. m.	29 18 30	85 37 30	14	T.	28	gy. bk. S. brk. Sh	63	64	.....
620	Mar. 7	4. 24 p. m.	29 19 15	85 38 00	14	T.	26	gy. bk. S. brk. Sh	63	64	.....
621	Mar. 7	4. 40 p. m.	29 19 40	85 39 20	14	T.	26	gy. bk. S. brk. Sh	63	63	.....
622	Mar. 7	4. 58 p. m.	29 20 05	85 40 40	14	T.	26	gy. bk. S. brk. Sh	63	63	.....
623	Mar. 7	5. 15 p. m.	29 20 30	85 42 00	14	T.	26	gy. bk. S. brk. Sh	63	63	.....
624	Mar. 7	5. 32 p. m.	29 19 45	85 42 50	14	T.	28	gy. bk. S. brk. Sh	62	64	.....
625	Mar. 7	5. 45 p. m.	29 19 20	85 43 15	14	T.	28	gy. bk. S. brk. Sh	62	63	.....
626	Mar. 7	5. 56 p. m.	29 19 00	85 43 15	14	T.	28	gy. bk. S. brk. Sh	62	63	.....
627	Mar. 8	5. 55 a. m.	29 16 15	85 42 30	14	T.	30	gy. bk. S. brk. Sh	58	60	.....
628	Mar. 8	6. 47 a. m.	29 16 45	85 41 00	14	T.	29	gy. bk. S. brk. Sh	56	59	.....
629	Mar. 8	7. 34 a. m.	29 15 30	85 40 15	14	T.	29	gy. bk. S. brk. Sh	57	60	.....
630	Mar. 8	8. 11 a. m.	29 17 45	85 42 00	14	T.	31	gy. bk. S. brk. Sh	57	60	.....
631	Mar. 8	8. 22 a. m.	29 20 30	85 44 00	14	T.	27	gy. bk. S. brk. Sh	57	60	.....
632	Mar. 8	9. 05 a. m.	29 19 30	85 45 00	14	T.	29	gy. bk. S. brk. Sh	57	60	.....
633	Mar. 8	9. 21 a. m.	29 20 15	85 45 40	14	T.	29	gy. bk. S. brk. Sh	57	60	.....
634	Mar. 8	9. 58 a. m.	29 21 00	85 46 20	14	T.	28	G. brk. S. Sh	56	60	.....
635	Mar. 8	2. 56 p. m.	28 51 20	85 10 00	14	T.	31	gy. S. brk. Sh	64	65	.....
636	Mar. 8	3. 13 p. m.	28 52 10	85 09 20	14	T.	30	crs. gy. S. brk. Sh ..	64	65	.....
637	Mar. 8	3. 25 p. m.	28 53 00	85 08 40	14	T.	29	gy. S. brk. Sh	64	65	.....
638	Mar. 8	3. 37 p. m.	28 54 00	85 08 00	14	T.	28	gy. S. bk. Sp. brk. Sh	63	65	.....
639	Mar. 15	1. 53 p. m.	28 48 00	84 36 00	14	T.	24	S. Co. brk. Sh	61	63	.....
640	Mar. 15	2. 08 p. m.	28 47 00	84 35 50	14	T.	24	S. Co. brk. Sh	61	62	.....
641	Mar. 15	2. 20 p. m.	28 46 00	84 35 40	14	T.	23	S. Co. brk. Sh	62	61	.....
642	Mar. 15	2. 44 p. m.	28 45 00	84 35 30	14	T.	24	S. Co. brk. Sh	61	60	.....
643	Mar. 15	3. 17 p. m.	28 44 00	84 35 20	14	T.	24	S. Co	60	59	.....
644	Mar. 15	3. 38 p. m.	28 43 00	84 35 30	14	T.	24	S. Co. brk. Sh.	60	62	62
645	Mar. 15	3. 53 p. m.	28 42 00	84 35 40	14	T.	26	S. bk. Sp. brk. Sh...	60	61	.....
646	Mar. 15	4. 02 p. m.	28 41 30	84 35 50	14	T.	26	crs. bk. gy. S. Co ..	60	61	.....
647	Mar. 15	4. 12 p. m.	28 41 00	84 36 00	14	T.	27	gy. S. bk. Sp. Co ...	60	61	.....
648	Mar. 15	4. 24 p. m.	28 40 45	84 35 30	14	T.	26	wh. S. bk. Sp. brk. Sh	59	61	.....
649	Mar. 15	4. 50 p. m.	28 40 00	84 32 40	14	T.	26	wh. S. brk. Sh	58	62	.....
650	Mar. 15	5. 23 p. m.	28 42 00	84 29 50	14	T.	24	yl. S. bk. Sp. brk. Sh.	58	62	.....
651	Mar. 15	5. 45 p. m.	28 43 20	84 28 00	14	T.	22	Co	58	62	.....
652	Mar. 15	6. 02 p. m.	28 44 00	84 27 00	14	T.	23	fne. wh. S. brk. Sh ..	58	62	.....
653	Mar. 15	6. 20 p. m.	28 41 40	84 26 00	14	T.	21	crs. gy. S	58	62	.....
654	Mar. 16	5. 30 a. m.	28 50 00	84 32 30	14	T.	21	brk. Sh	59	62	.....
655	Mar. 16	6. 22 a. m.	28 45 00	84 33 15	14	T.	24	fne. wh. S. bk. Sp. brk. Sh.	59	62	.....
656	Mar. 16	7. 05 a. m.	28 40 00	84 32 00	14	T.	27	fne. wh. S. bk. Sp	60	63	.....
657	Mar. 16	7. 51 a. m.	28 38 45	84 28 30	14	T.	24	fne. wh. S. brk. Sh ..	59	63	.....
658	Mar. 16	8. 42 a. m.	28 32 45	84 27 00	14	T.	24	crs. gy. S. brk. Sh ...	60	64	.....
659	Mar. 16	10. 50 a. m.	28 25 00	84 21 00	14	T.	24	crs. S. bk. Sp. Sh	62	63	.....
660	Mar. 16	11. 33 a. m.	28 21 00	84 18 00	14	T.	23	crs. S. bk. Sp. Sh	62	63	.....
661	Mar. 16	12. 18 p. m.	28 20 00	84 12 00	14	T.	22	gy. S	62	63	.....
662	Mar. 16	1. 02 p. m.	28 19 45	84 06 00	14	T.	21	wh. S. bk. Sp. brk. Sh.	59	63	.....
663	Mar. 16	1. 45 p. m.	28 15 45	84 02 35	14	T.	21	wh. S. bk. Sp. brk. Sh.	60	62	.....

Record of hydrographic soundings of the U. S. Fish Commission steamer Albatross, during the year ending December 31, 1885—Continued.

Serial number.	Date.	Time.	Position. Lat. N.	Position. Long. W.	Weight of sinker.	Reel.	Depth.	Character of bottom.	Temperature. Air.	Surface.	Bottom.
	1885.		° ′ ″	° ′ ″	*Lbs.*		*Fms.*		°	°	°
664	Mar. 16	2.46 p. m.	28 11 45	83 59 10	14	T.	22	wh. S. bk. Sp. brk. Sh.	61	63	.....
665	Mar. 16	3.32 p. m.	28 07 45	83 55 40	14	T.	22	wh. S. bk. Sp.	60	64	.....
666	Mar. 16	4.15 p. m.	28 03 45	83 52 15	14	T.	22	fne. gy. S. bk. Sp.	60	64	.....
667	Mar. 16	5.00 p. m.	27 59 40	83 48 50	14	T.	22	crs. S. brk. Sh.	60	63	.....
668	Mar. 16	5.42 p. m.	27 55 30	83 45 25	14	T.	22	gy. bk. S.	60	63	.....
669	Mar. 16	6.23 p. m.	27 51 30	83 42 00	14	T.	21	fne. wh. S. bk. Sp.	60	63	.....
670	Mar. 16	7.05 p. m.	27 50 00	83 36 15	14	T.	20	wh. S. bk. Sp.	60	62	.....
671	Mar. 16	7.47 p. m.	27 49 00	83 30 30	14	T.	18	crs. S. bk. Sp. brk. Sh.	60	61	.....
672	Mar. 16	8.26 p. m.	27 48 10	83 24 45	14	T.	16½	gy. S. brk. Sh.	60	60	.....
673	Mar. 16	9.08 p. m.	27 47 30	83 19 00	14	T.	15	gy. S. bk. Sp.	60	62	.....
674	Mar. 16	9.45 p. m.	27 46 45	83 13 15	14	T.	12	crs. gy. S. bk. Sp. brk. Sh.	60	62	.....
675	Mar. 16	10.24 p. m.	27 46 10	83 07 30	14	T.	10	crs. gy. S. bk. Sp.	60	62	.....
676	Mar. 16	11.00 p. m.	27 46 00	83 02 00	14	T.	8	gy. S. bk. Sp. brk. Sh.	60	62	.....
677	Mar. 18	11.06 a. m.	27 16 00	83 10 00	14	T.	18	gy. bk. S.	65	64	.....
678	Mar. 18	12.30 p. m.	27 08 30	83 19 30	14	T.	25	crs. gy. bk. S.	67	66	.....
679	Mar. 18	2.17 p. m.	26 58 00	83 22 30	14	T.	26	crs. gy. S. brk. Sh.	68	66	.....
680	Mar. 18	3.10 p. m.	26 53 00	83 24 00	14	T.	27	wh. S. bk. Sp. brk. Sh.	67	66	.....
681	Mar. 18	5.06 p. m.	26 42 30	83 22 45	14	T.	29	crs. S. bk. Sp. brk. Sh.	80	67	.....
682	Mar. 18	5.40 p. m.	26 38 00	83 20 00	14	T.	28	crs. S. bk. Sp.	73	67	.....
683	Mar. 19	5.22 a. m.	26 28 15	83 11 00	14	T.	26	fne. wh. S. bk. Sp.	63	67	.....
684	Mar. 19	6.10 a. m.	26 23 15	83 11 15	14	T.	28	crs. gy. S. bk. Sp. brk. Sh.	61	67	.....
685	Mar. 19	7.53 a. m.	26 12 30	83 06 30	14	T.	27	crs. gy. S. bk. Sp. brk. Sh.	63	66	.....
686	Mar. 19	8.37 a. m.	26 08 30	83 03 45	14	T.	25	fne. wh. S. bk. Sp. brk. Sh.	63	66	.....
687	Mar. 19	9.23 a. m.	26 04 30	83 01 00	14	T.	24	fne. wh. S. bk. Sp. brk. Sh.	63	66	.....
688	Mar. 19	10.20 a. m.	25 54 00	82 59 30	14	T.	24	fne. wh. S.	67	66	.....
689	Mar. 19	12.00 m.	25 49 00	83 01 00	14	T.	25	fne. wh. S.	66	67	.....
690	Mar. 19	12.39 p. m.	25 44 30	83 02 30	14	T.	27	S. Co.	67	68	.....
691	Mar. 19	1.26 p. m.	25 29 30	83 01 00	14	T.	27	gy. S. brk. Sh.	68	69	.....
692	Mar. 19	2.15 p. m.	25 34 30	83 01 00	14	T.	27	gy. S. bk. Sp.	67	69	.....
693	Mar. 19	2.59 p. m.	25 29 30	83 01 00	14	T.	28	crs. gy. S. brk. Sh.	67	69	.....
694	Mar. 19	3.38 p. m.	25 24 30	83 00 00	14	T.	27	gy. S. bk. Sp.	67	69	.....
695	Mar. 19	4.19 p. m.	25 19 30	82 59 30	14	T.	27	gy. M. brk. Sh.	68	69	.....
696	Mar. 19	4.56 p. m.	25 14 30	82 59 00	14	T.	27	gy. M. fne. S. brk. Sh.	68	69	.....
697	Mar. 19	5.34 p. m.	25 09 30	82 59 00	14	T.	27	brk. Sh.	67	69	.....
698	Apr. 1	5.26 p. m.	31 55 00	79 20 00	35	S.	54	gy. bk. S. brk. Sh.	66	69	60.8
699	Apr. 1	5.55 p. m.	31 54 45	79 17 00	14	T.	86	gy. M. brk. Sh.	66	69	60.3
700	Apr. 2	11.33 a. m.	33 21 30	77 09 00	35	S.	71	gy. S.	61	70	66.8
701	Apr. 2	5.03 p. m.	33 35 00	76 42 15	35	S.	91	fne. gy. S.	65	72	65.2
702	Apr. 3	10.01 p. m.	36 30 00	73 14 00	60	S.	2,340	bu. Oz.	59	72	36.8
703	Apr. 4	1.59 a. m.	36 45 00	73 28 00	60	S.	1,646	bu. Oz.	68	66	37.2
704	Apr. 4	5.40 a. m.	36 57 30	73 47 00	60	S.	1,436	bu. Oz.	61	55	37.5
705	Apr. 4	10.18 a. m.	37 01 08	74 10 00	35	S.	1,208	bu. Oz.	50	52	38.7
706	Apr. 4	6.20 p. m.	37 09 23	74 30 30	35	S.	336	gn. M.	45	46	.....
707	Apr. 5	5.00 a. m.	37 03 00	74 39 00	14	T.	50	fne. yl. S. bk. Sp.	42	46	.....
708	Apr. 5	5.27 a. m.	37 03 45	74 37 10	14	T.	51	fne. yl. S. bk. Sp.	42	46	46.8
709	Apr. 5	5.41 a. m.	37 03 40	74 35 00	14	T.	54	yl. S. bk. Sp. brk. Sh.	42	47	46.8
710	Apr. 5	6.05 a. m.	37 03 30	74 33 30	14	T.	59	G. crs. S. brk. Sh.	42	47	47.7
711	Apr. 5	7.02 a. m.	37 03 00	74 33 00	14	T.	67	(Lost lead)	42	49	.....
712	Apr. 5	8.00 a. m.	37 04 30	74 32 00	14	T.	98	bk. S.	43	49	.
713	Apr. 5	11.11 a. m.	37 05 00	74 57 30	14	T.	24	gy. S. brk. Sh.	42	44	43
714	Apr. 5	1.36 p. m.	37 02 30	75 22 00	14	T.	17	fne. wh. S. bk. Sp.	43	40	40.5
715	Apr. 5	4.10 p. m.	36 59 00	75 45 00	14	T.	9	fne. gy. S. bk. Sp.	44	42	41.3
716	Apr. 5	5.32 p. m.	36 57 30	75 58 00	14	T.	6	gy. bk. S.	46	43	42
717	Apr. 5	7.20 p. m.	37 07 30	76 08 30	14	T.	6½	M. brk. Sh.	50	44	42.5
718	Apr. 5	10.12 p. m.	37 32 00	76 08 00	14	T.	7⅔	gn. M.	48	44	40.5
719	Apr. 6	1.20 a. m.	37 54 00	76 09 00	14	T.	14	bu. M.	50	42	37.7
720	Apr. 6	4.30 a. m.	38 07 30	76 32 00	14	T.	12	bu. M.	52	43	38.7
721	June 3	4.39 a. m.	37 07 30	74 31 00	25	T.	75	fne. gy. S.	61	60	.....
722	June 3	6.37 a. m.	37 08 00	74 34 45	25	T.	61	crs. gy. S. P.	61	61	54
723	June 3	9.40 a. m.	37 08 20	74 34 00	25	T.	68	crs. gy. bk. brk. Sh.	66	67	52.5
724	June 3	10.45 a. m.	37 09 30	74 33 45	25	T.	75	crs. gy. S. bk. Sp. brk. Sh.	67	67	52.5
725	June 3	2.59 p. m.	37 10 15	74 31 00	25	T.	307	gn. M.	65	67	.....
726	June 3	3.52 p. m.	37 11 30	74 32 30	25	T.	103	gy. M. crs. S. bk. Sp.	65	67	51.5
727	June 4	5.20 a. m.	36 40 30	74 42 00	25	T.	135	M. fne. bk. S.	69	68	44.8
728	June 4	7.45 a. m.	36 43 00	74 41 00	25	T.	160	bk. M.	74	69	48.8
729	June 4	8.35 a. m.	36 43 00	74 42 00	25	T.	98	brk. Sh. G.	75	70	52
730	June 4	8.44 a. m.	36 43 00	74 46 30	25	T.	78	S. G.	75	70	.....
731	June 5	4.47 a. m.	35 26 00	74 42 00	35	S.	87	gy. M.	75	76	39.5

Record of hydrographic soundings of the U. S. Fish Commission steamer Albatross, during the year ending December 31, 1885—Continued.

Serial number.	Date.	Time.	Position.		Weight of sinker.	Reel.	Depth.	Character of bottom.	Temperature.		
			Lat. N.	Long. W.					Air.	Surface.	Bottom.
	1885.		° ′ ″	° ′ ″	*Lbs.*		*Fms.*		°	°	°
732	June 5	5.38 a. m.	35 26 30	74 44 00	35	S.	388	bk. M	76	74	40.5
733	June 5	6.04 a. m.	35 27 00	74 46 00	20	T.	210	bk. M	76	74	44
734	June 5	6.22 a. m.	35 27 15	74 42 30	20	T.	69	bk. M	72	75	54
735	June 5	1.42 p. m.	35 12 00	75 09 30	35	S.	17	gy. S. brk. Sh	75	75	72.5
736	June 5	2.11 p. m.	35 12 15	75 05 00	20	T.	50½	fne. gy. S. bk. Sp. brk. Sh.	76	76	65
737	June 5	2.36 p. m.	35 12 30	75 03 30	20	T.	72	crs. gy. S. brk. Sh	76	76	60
738	June 5	2.46 p. m.	35 12 45	75 02 00	20	T.	68	R. Co	76	76	60
739	June 5	4.03 p. m.	35 13 00	75 01 00	20	T.	123	gy. S. bk. Sp. brk. Sh.	76	76	53
740	June 5	6.42 p. m.	35 11 00	75 07 00	20	T.	52	crs. gy. S. bk. Sp	78	75	65
741	June 6	5.38 a. m.	34 58 00	75 12 00	20	T.	66	fne. gy. S. bk. Sp	66	75	58
742	June 6	6.23 a. m.	34 59 00	75 13 00	20	T.	54	fne. gy. S. bk. Sp	66	75	61
743	June 19	5.45 a. m.	41 15 30	64 23 00	60	S.	1,915	yl. Oz	66	69	37.1
744	June 19	8.37 a. m.	41 18 15	63 55 00	35	S.	2,044	yl. Oz	68	66	.....
745	June 19	11.45 a. m.	41 19 23	63 35 30	60	S.	2,071	gy. Oz	71	69	37
746	June 19	1.50 p. m.	41 23 20	63 23 15	60	S.	2,035	br. Oz	67	59	36.8
747	June 19	3.30 p. m.	41 26 15	63 15 00	60	S.	2,020	br. Oz	63	57	36.8
748	June 19	4.55 p. m.	41 22 00	63 10 00	60	S.	2,004	yl. Oz	61	60	36.7
749	June 19	6.45 p. m.	41 20 30	62 57 00	60	S.	2,178	gy. Oz	61	61	37
750	June 20	6.05 a. m.	40 40 30	60 33 00	60	S.	2,995	yl. Oz	63	75	36.5
751	June 21	4.15 a. m.	40 21 00	56 27 00	60	S.	3,103	gy. Oz	64	68	37.8
752	June 21	4.20 p. m.	40 24 30	54 24 00	60	S.	2,957	gy. Oz	78	74	36.8
753	June 21	9.50 p. m.	40 18 00	53 39 30	60	S.	2,803	gy. Oz	66	70	36.8
754	June 22	1.12 a. m.	40 16 00	53 16 30	60	S.	2,882	gy. Oz	66	69	37
755	June 22	3.45 a. m.	40 13 00	53 02 00	60	S.	2,897	gy. Oz	66	70	38.6
756	June 22	12.50 p. m.	40 55 30	52 02 30	60	S.	2,873	gy. Oz	71	67	36.8
757	June 22	8.20 p. m.	41 51 00	51 31 00	60	S.	2,118	gy. Oz	56	54	38.3
758	June 23	12.48 a. m.	42 18 30	51 16 00	60	S.	1,499	gy. Oz	51	52	37.2
759	June 23	3.42 a. m.	42 37 00	51 05 30	60	S.	1,070	gn. Oz	51	50	38
760	June 23	11.33 a. m.	42 51 30	50 55 00	35	S.	970	hrd	52	45	38.7
761	June 23	1.32 p. m.	42 56 00	50 50 00	35	S.	309	gn. M. S	51	45	38.7
762	June 24	8.55 a. m.	43 38 00	49 42 00	18	T.	30	S. brk. Sh	53	48	39.2
763	June 24	9.39 a. m.	43 38 00	49 34 30	18	T.	38	wh. S. bk. Sp. brk. Sh.	53	48	36
764	June 24	10.44 a. m.	43 38 00	49 27 00	18	T.	125	gn. M. crs. gy. S	53	49	.....
765	June 24	6.28 p. m.	44 26 00	49 33 00	18	T.	34	wh. S. brk. Sh	51	45	35.1
766	June 24	11.00 p. m.	44 57 00	49 38 00	18	T.	36	wh. S. brk. Sh	46	44	32.7
767	June 25	4.59 p. m.	46 29 00	49 39 30	18	T.	39	gy. S	48	43	34.4
768	July 2	11.20 p. m.	46 02 30	53 26 00	18	T.	76½	crs. gy. bk. S	48	47	29.5
769	July 3	2.45 a. m.	45 54 00	53 53 00	35	S.	78	dk. gn. S. brk. Sh	49	47	29.5
770	July 3	3.32 a. m.	45 52 00	53 59 00	35	S.	75	fne. gy. S	49	47	29.5
771	July 3	5.04 a. m.	45 49 45	54 06 30	35	S.	67	bk. S	50	46	29.7
772	July 4	1.09 p. m.	44 21 30	56 52 15	35	S.	761	gy. Oz	56	52	38.7
773	July 4	1.53 p. m.	44 22 50	56 56 30	35	S.	795	gy. Oz	59	54	38.7
774	July 4	2.41 p. m.	44 24 10	57 00 40	35	S.	566	hrd	59	53	38.7
775	July 4	3.16 p. m.	44 25 30	57 04 45	35	S.	366	gy. Oz. P	59	53	39.7
776	July 4	3.37 p. m.	44 26 00	57 06 15	35	S.	454	gy. Oz	59	53	39.7
777	July 4	4.05 p. m.	44 27 00	57 09 15	35	S.	333	crs. S. G	59	53	40
778	July 4	8.33 p. m.	44 30 30	57 12 45	35	S.	99	crs. S. P	54	51	.....
779	July 5	4.02 a. m.	44 05 15	57 14 15	35	S.	346	gy. C	54	54	.....
780	July 5	4.26 a. m.	44 05 15	57 15 30	35	S.	375	S. brk. Co	54	54	.....
781	July 5	6.27 a. m.	44 06 00	57 17 00	35	S.	90	wh. S. P	53	52	.....
782	July 5	7.26 a. m.	44 06 30	57 17 00	35	S.	142	hrd. wh. S	54	52	.....
783	July 5	9.20 a. m.	44 11 00	57 14 45	35	S.	183	P	55	53	.....
784	July 5	9.50 a. m.	44 13 30	57 13 45	35	S.	155	lge. P	55	53	.....
785	July 5	1.10 p. m.	44 24 45	57 10 15	35	S.	204	gy. S	59	54	.....
786	July 5	2.03 p. m.	44 26 30	57 10 45	35	S.	175	crs. S	57	54	.....
787	July 5	2.26 p. m.	44 28 30	57 10 45	35	S.	180	fne. S	57	54	.....
788	July 5	2.50 p. m.	44 28 30	57 12 45	35	S.	145	fne. gy. S	57	54	39.7
789	July 5	3.43 p. m.	44 29 00	57 14 45	35	S.	40	hrd. crs. P	57	54	.....
790	July 5	4.04 p. m.	44 31 00	57 14 45	35	S.	42	hrd. crs. P	57	54	.....
791	July 5	4.23 p. m.	44 33 00	57 14 45	35	S.	48	fne. wh. S	57	54	.....
792	July 5	4.43 p. m.	44 35 00	57 14 45	35	S.	90	yl. S	57	54	.....
793	July 5	5.38 p. m.	44 35 00	57 12 15	35	S.	188	M. fne. S	56	53	.....
794	July 5	6.28 p. m.	44 39 00	57 17 00	35	S.	124	wh. S	55	53	.....
795	July 6	12.43 a. m.	45 03 00	57 56 00	18	T.	39	hrd	50	52	32
796	July 6	2.44 a. m.	45 16 00	58 11 45	18	T.	75	wh. S	50	52	33.5
797	July 6	3.85 a. m.	45 21 30	58 18 45	18	T.	54	rot. Co	50	52	32
798	July 6	5.12 a. m.	45 27 00	58 28 45	35	S.	45	fne. wh. S. bk. Sp	50	52	.....
799	July 6	6.31 a. m.	45 24 00	58 36 45	35	S.	67	fne. M	51	53	.....
800	July 6	7.56 a. m.	45 21 30	58 44 45	35	S.	42	wh. S. P	51	53	32
801	July 6	9.05 a. m.	45 18 30	58 52 45	18	T.	45	yl. S	52	53	.....
802	July 6	10.52 a. m.	45 14 00	59 08 15	18	T.	48	S. G	54	54	.....
803	July 6	12.35 p. m.	45 09 30	59 25 15	18	T.	43	hrd	54	54	.....
804	July 6	1.48 p. m.	45 07 00	59 28 45	18	T.	46	yl. S	58	56	.....

Record of hydrographic soundings of the U. S. Fish Commission steamer Albatross, during the year ending December 31, 1885—Continued.

Serial number.	Date.	Time.	Position. Lat. N.	Position. Long. W.	Weight of sinker.	Reel.	Depth.	Character of bottom.	Temperature. Air.	Surface.	Bottom.
			° ′ ″	° ′ ″	*Lbs.*		*Fms.*		°	°	°
805	July 6	2.30 p. m.	45 06 00	59 31 30	18	T.	48	yl. S	58	56	32.3
806	July 6	2.59 p. m.	45 05 00	59 34 00	18	T.	52	yl. S	58	55	.....
807	July 6	3.47 p. m.	45 03 00	59 39 45	18	T.	58	yl. S	60	56	.....
808	July 6	9.03 p. m.	44 36 00	59 51 45	18	T.	48	yl. S. G	59	58	35.8
809	July 6	9.43 p. m.	44 32 30	59 46 45	18	T.	70	fne. wh. S	59	58	35.3
810	July 7	4.12 a. m.	44 40 00	59 53 45	18	T.	48	S. G	58	58	34.8
811	July 7	4.39 a. m.	44 39 30	59 57 45	18	T.	54	S. brk. P	58	58	.....
812	July 7	5.21 a. m.	44 38 00	60 03 45	18	T.	57	fne. gy. bk. S	58	58	.....
813	July 7	6.24 a. m.	44 32 00	60 11 15	18	T.	74	S. G	57	58	.....
814	July 7	7.34 a. m.	44 28 00	60 16 15	18	T.	33	S. G	59	58	.....
815	July 7	8.15 a. m.	44 26 30	60 21 45	18	T.	26	S. G	59	58	.....
816	July 7	11.37 a. m.	44 19 00	60 40 45	18	T.	63	yl. S. P	60	57	.....
817	July 7	12.17 p. m.	44 22 00	60 44 15	18	T.	54	yl. S	65	57	34.1
818	July 8	10.46 a. m.	44 29 30	63 11 00	18	T.	51	hrd	64	61	34.6
819	July 8	12.17 p. m.	44 30 30	63 19 00	18	T.	40	R	65	61	.....
820	July 11	10.23 p. m.	43 12 00	64 00 30	18	T.	54	hrd	60	58	37.8
821	July 12	12.08 p. m.	43 01 00	64 45 30	18	T.	47	hrd	60	60	38.7
822	July 12	10.00 p. m.	42 12 30	65 14 00	18	T.	100	G	61	62	.....
823	July 12	11.59 p. m.	42 05 00	65 22 00	18	T.	74	crs. G	60	62	.....
824	July 13	2.00 a. m.	41 58 00	65 30 00	18	T.	339	bu. M	60	62	.....
825	July 13	6.42 a. m.	41 49 50	65 45 30	18	T.	85	S. G	62	60	42.6
826	July 13	6.51 a. m.	41 49 30	65 45 30	18	T.	82	S. G	63	60	.....
827	July 13	7.04 a. m.	41 49 00	65 45 30	18	T.	81	S. G	63	60	42.3
828	July 13	7.23 a. m.	41 47 00	65 47 15	18	T.	75	S. G	63	60	42.6
829	July 13	7.44 a. m.	41 44 30	65 47 00	18	T.	79	stf. bu. C. G	63	60	45.2
830	July 13	7.59 a. m.	41 44 45	65 45 30	18	T.	84	S. G	63	60	45.2
831	July 13	8.20 a. m.	41 42 45	65 45 45	18	T.	83	S. G	63	60	.....
832	July 13	9.24 a. m.	41 42 00	65 45 30	18	T.	84	crs. S. G	65	66	.....
833	July 13	9.48 a. m.	41 40 30	65 45 00	18	T.	278	wh. S. bk. Sp	66	66	.....
834	July 13	10.16 a. m.	41 42 30	65 44 15	18	T.	363	S. P	66	66	.....
835	July 13	11.54 a. m.	41 55 10	65 44 00	18	T.	129	crs. S. G	64	60	41.6
836	July 13	12.19 p. m.	41 55 50	65 42 30	18	T.	156	hrd	64	60	.....
837	July 13	12.37 p. m.	41 56 25	65 41 00	18	T.	175	brk. Sh	64	60	.....
838	July 13	12.50 p. m.	41 57 00	65 39 40	18	T.	176	brk. Sh	66	61	.....
839	July 13	1.09 p. m.	41 58 00	65 37 30	18	T.	128	P	66	67	.....
840	Aug. 8	5.02 a. m.	39 57 45	70 23 30	18	T.	234	gn. S	71	75	41.6
841	Aug. 8	5.43 a. m.	40 00 45	70 24 00	18	T.	154	gn. S. bk. Sp	71	75	46.2
842	Aug. 8	10.50 a. m.	39 59 00	70 22 45	18	T.	167	gn. S. bk. Sp. brk. Sh.	71	74	45.7
843	Aug. 8	11.23 a. m.	39 56 15	70 21 30	18	T.	233	gn. M. S	71	72	41.9
844	Aug. 8	12.01 p. m.	39 53 28	70 20 30	35	S.	300	gn. M. S	73	72	40.6
845	Aug. 8	3.36 p. m.	39 56 00	70 20 45	35	S.	237	gn. M	70	76	41.6
846	Aug. 8	6.05 p. m.	39 51 30	70 15 30	35	S.	344	gn. M	70	76	43.9
847	Aug. 8	8.20 p. m.	39 52 30	70 21 00	35	S.	416	stf. gn. M	70	74	39.6
848	Aug. 9	3.08 a. m.	39 54 15	70 20 00	35	S.	315	hrd	71	76	41.6
849	Aug. 9	7.14 p. m.	39 49 00	70 42 00	35	S.	452	gy. M	71	77	39.6
850	Aug. 10	3.01 a. m.	39 44 30	71 20 30	35	S.	562	gn. M	74	76	39.3
851	Aug. 10	4.18 a. m.	39 47 15	71 24 30	35	S.	397	gy. Oz	71	76	39.6
852	Aug. 10	4.57 a. m.	39 49 40	71 27 30	35	S.	298	gn. Oz	69	74	40.6
853	Aug. 10	5.34 a. m.	39 52 00	71 30 30	35	S.	206	gn. M	72	75	43.6
854	Aug. 10	7.42 p. m.	39 41 00	71 42 00	35	S.	378	gn. S	70	77	39.6
855	Aug. 31	5.00 a. m.	38 45 00	68 04 00	60	S.	1,949	lt. bu. Glob. Oz	72	75	36.4
856	Sept. 1	4.09 a. m.	39 44 00	67 03 00	60	S.	2,009	gy. Oz	71	72	36.8
857	Sept. 3	4.15 a. m.	40 52 30	65 07 00	60	S.	2,009	yl. Glob. Oz	63	71	.....
858	Sept. 18	1.25 p. m.	39 47 00	71 39 45	35	S.	291	gn. M	68	70	.....
859	Sept. 19	8.52 a. m.	39 04 00	72 23 00	35	S.	659	gn. M	71	72	38.5
860	Sept. 19	9.41 a. m.	39 05 30	72 25 30	35	S	519	gn. M	72	72	39
861	Sept. 20	4.10 a. m.	39 04 00	72 16 00	35	S	877	.....	70	72	(*)
862	Sept. 20	6.54 a. m.	39 05 30	72 20 00	35	S.	715	gy. M	70	62	38.7
863	Sept. 21	4.00 a. m.	39 04 30	73 02 00	35	S.	47	crs. gy. S. bk. Sp	67	70	48.8
864	Sept. 21	6.42 a. m.	39 02 00	72 59 30	35	S.	47	crs. gy. S. bk. Sp	66	70	48.8
865	Sept. 21	7.30 a. m.	38 58 30	72 55 00	35	S.	55	crs. dk. gy. S	66	70	50.9
866	Oct. 17	10.27 a. m.	35 02 00	75 09 30	35	S.	197	gy. M	70	79	.....
867	Oct. 18	10.36 a. m.	34 38 00	75 32 00	18	T.	210	gn. M	75	78	46.7
868	Oct. 20	8.35 a. m.	33 40 30	77 37 00	18	T.	15	fne. gy. S. brk. Sh	76	77	.....

* Wire parted, losing thermometer and 800 turns of wire.

Table of fishing stations of U. S. Fish Commission steamers Fish

Date.	Time.	Position.		Depth (fathoms).	Character of bottom.	Temperature.			Object of search.	Implement used.
		Lat. N.	Long W			Air.	Surface.	Bottom.		
1880.		° ′ ″	° ′ ″			°	°	°		
Sept. 13	4.45 a. m.	39 57 00	70 56 00	126	S. M	68	70	53	Tile-fish	Trawl-line
13	3.12 p. m.	39 48 30	70 54 00	250	M	74	71.5	42	...do	...do
1881.										
Aug. 9	6.15 a. m.	40 01 00	71 12 30	138	S. M	72	69	50	...do	...do
23	4.20 a. m.	40 03 00	70 31 00	100	S. M	68	66	52	...do	...do
Sept. 21	6.00 a. m.	39 58 00	70 06 00	113	S. brk. Sh	67	67	47	...do	...do
1882.										
Aug. 22	5.58 a. m.	40 02 00	70 35 00	116	gy. M	69	71	48	...do	...do
Oct. 4	6.45 a. m.	40 00 00	70 37 00	99	S	65	62	47	...do	...do
1883.										
May 25	5.15 a. m.	40 05 25	70 28 00	91	gy. M. S	49	49	48	...do	...do
26	1.05 p. m.	39 29 00	72 19 55	74	gy. M. S	55	50	49.5	...do	...do
Sept. 20	6.50 a. m.	40 05 00	70 34 45	70	bu. M	67	68	50	...do	...do
20	2.45 p. m.	40 01 50	70 39 20	111	gy. S	70	68	47	...do	...do
21	5.30 a. m.	40 01 50	70 59 00	117	gn. M	68	69	49	...do	...do
Nov. 9	8.23 a. m.	35 19 30	75 15 20	16	S. Sh	71	76	66	General	Hand-line
9	11.00 a. m.	35 16 00	75 02 30	48	bu. M. S	76	78	66	Tile-fish	...do
12	7.59 a. m.	36 16 15	74 51 20	40	gy. S. G		68	56	...do	...do
1884.										
Aug. 1		41 03 30	71 08 00	18	S. G				Codfish	...do
2	5.24 a. m.	40 03 00	70 38 00	101	gn. M. fne. S	65	63	51	Tile-fish	Trawl-line
2	1.08 p. m.	40 00 15	70 55 30	136	gn. M. S	71	70	49	...do	...do
3	5.13 a. m.	40 01 30	71 12 30	113	gn. M. S	67	66	48.6	...do	...do
3	1.54 p. m.	39 54 30	71 08 00	235	gn. M. S	73	70	43	...do	...do
6	11.24 a. m.	39 56 30	69 43 00	84	S. brk. Sh	77	75	52	...do	...do
Sept. 25		41 03 30	71 08 00	18	S. G				Codfish	Hand-line
27	8.20 p. m.	40 46 30	69 50 15	18	S. bk. Sp	61	60	56	...do	...do
1885.										
Jan. 5	9.47 a. m.	32 55 00	77 54 00	79	S. bk. Sp	69	72	59	Tile-fish	Trawl-line
30	10.38 a. m.	22 07 30	87 06 00	21	wh. S. Co	78	77		General	Hand-line
30	11.37 a. m.	22 08 40	87 06 00	22	S. Co	79	77		...do	...do
Feb. 7	8.11 a. m.	29 16 30	85 34 00	27	gy. and bk. S. and Sh	60	64	65	...do	...do
7	12.00 m	25 15 19	85 34 00	30	gy. and bk. S. and Sh				...do	...do
Mar. 4	5.36 a. m.	29 15 00	88 06 00	60	bu. M	62	67	61.8	...do	...do
4	7.46 a. m.	29 24 00	88 04 00	32	S. G. brk. Sh	61	61		...do	...do
4	8.50 a. m.	29 28 00	88 03 00	25	gy. S	60	60		...do	...do
4	9.45 a. m.	29 24 30	88 01 00	35	yl. S. bk. Sp	61	61		...do	...do
4	10.56 a. m.	29 28 00	87 56 00	27	gy. S. brk. Sh	64	62		...do	...do
4	12.12 p. m.	29 24 00	87 52 00	36	fne. gy. S. bk. Sp	64	62		...do	...do
4	12.48 p. m.	29 27 30	87 48 30	30	ers. S. bk. Sp. brk. Sh	62	62		...do	...do
4	2.03 p. m.	29 32 00	87 45 00	25	gy. S. bk. Sp	61	59		...do	...do
4	3.22 p. m.	29 33 00	87 39 00	25	ers. S. bk. Sp. brk. Sh	61	60		...do	...do
4	4.18 p. m.	29 36 30	87 36 00	22	fne. wh. S	60	61		...do	...do
4	5.20 p. m.	29 40 30	87 32 30	22	fne. wh. S	59	60		...do	...do
7	5.48 a. m.	29 16 19	85 49 30	30	gy. S. bk. Sp. brk. Sh	58	64		...do	...do
7	6.44 a. m.	29 16 00	85 47 30	29	yl. S. bk. Sp. brk. Sh	58	64		...do	...do
7	8.00 a. m.	29 17 20	85 45 30	31	yl. S. bk. Sp. brk. Sh	58	64		...do	...do
7	9.10 a. m.	29 18 40	85 43 30	30	yl. S. bk. Sp. brk. Sh	61	62		...do	...do
7	9.38 a. m.	29 20 00	85 41 30	27	yl. S. bk. Sp. brk. Sh	60	61		...do	...do
7	10.02 a. m.	29 19 00	85 41 45	29	yl. S. bk. Sp. brk. Sh	60	61		...do	...do
7	10.24 a. m.	29 18 15	85 41 00	28	yl. S. bk. Sp. brk. Sh	60	61		...do	...do
7	10.45 a. m.	29 17 30	85 40 15	29	yl. S. bk. Sp. brk. Sh	61	60		...do	...do
7	11.03 a. m.	29 16 45	85 39 30	28	yl. S. bk. Sp. brk. Sh	61	60		...do	...do
7	11.36 a. m.	29 16 00	85 38 45	31	yl. S. bk. Sp. brk. Sh	61	60		...do	...do
7	11.59 a. m.	29 15 11	85 38 00	33	gy. S. bk. Sp	61	60		...do	...do
7	12.16 p. m.	29 15 10	85 37 00	32	fne. gy. S. bk. Sp	61	60		...do	...do
7	12.33 p. m.	29 15 10	85 36 00	31	fne. gy. S. bk. Sp	63	61		...do	...do
7	12.56 p. m.	29 15 40	85 35 15	29	fne. gy. S	65	62		...do	...do
7	1.16 p. m.	29 16 15	85 34 30	25	ers. R. bk. S. Sh	65	62		...do	...do
7	1.36 p. m.	29 15 00	85 34 30	27	wh. S. bk. Sp. Sh	65	63		...do	...do
7	1.55 p. m.	29 14 00	85 33 30	27	fne. S. bk. Sp	65	63		...do	...do
7	2.10 p. m.	29 13 00	85 32 30	26	fne. wh. S. bk. Sp	65	63		...do	...do
7	2.23 p. m.	29 12 30	85 32 00	26	ers. S. bk. Sp. Sh	65	63		...do	...do
7	2.57 p. m.	29 15 10	85 34 30	29	fne. wh. S. bk. Sh	65	64		...do	...do
7	3.16 p. m.	29 16 20	85 36 00	29	fne. wh. S. bk. Sp	65	65		...do	...do
7	3.32 p. m.	29 17 10	85 36 30	27	fne. wh. S. bk. Sp	64	64		...do	...do
7	3.48 p. m.	29 17 50	85 37 00	27	fne. S. bk. Sp. brk. Sh	63	64		...do	...do
7	4.07 p. m.	29 18 30	85 37 30	28	gy. bk. S. brk. Sh	63	64		...do	...do
7	4.24 p. m.	29 19 15	85 38 00	26	gy. bk. S. brk. Sh	63	64		...do	...do
7	4.40 p. m.	29 19 40	85 39 20	26	gy. bk. S. brk. Sh	63	63		...do	...do

Hawk and Albatross, September 13, 1880, *to October* 20, 1885.

Tile-fish (*Lopholatilus chamæleonticeps*).	Hake (*Phycis tenuis*).	Whiting (*Merluccius bilinearis*).	Skate (*Raia* sp.).	Dogfish (*Mustelus canis*).	Codfish (*Gadus morrhua*).	Red groupers (*Epinephelus morio*).	Black bass (*Serranus atrarius*).	Red snappers (*Lutjanus Blackfordii*).	Black groupers (*Epinephelus nigritus*).	Haddock (*Gadus æglefinus*).	Norway haddock (*Sebastes marinus*).	Miscellaneous.
0	Many.		Many.									
	Many.		Many.									
19	Many.	Many.	Many.									
67	Many.	Many.	Many.									
	Many.		Many.									
	Many.	Many	Many.									
	Many.		Many.	Many.								
	Few.			Few.								
	2	1										
	Few.	Few.	Few.									
	Few.	Few.	Few.									
					12							
	103	2	1	40								
	68	4	5									
	98	15	3	1								
		1	5									
	15			8								
				1								
				Many.								
	2					Many.						
						Many.						
						4		117				3 gage, 32 porgies.
						1		9				10
								7				10
												1 porgie.
						2						1 porgie.
						6		5				1 porgie.
						5		2				1 porgie.

Table of fishing stations of U. S. Fish Commission steamers Fish Hawk

Date.	Time.	Position. Lat. N.	Position. Long W.	Depth (fathoms).	Character of bottom.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Object of search.	Implement used.
1885.		° ′ ″	° ′ ″			°	°	°		
Mar. 7	4.58 p.m.	29 20 05	85 40 40	26	gy. bk. S. brk. Sh	63	63	....	General.	Hand-line.
7	5.15 p.m.	29 20 30	85 42 00	26	gy. bk. S. brk. Sh	63	63	....	....do	....do
7	5.32 p.m.	29 19 45	85 42 50	28	gy. bk. S. brk. Sh	62	63	....	....do	....do
7	5.45 p.m.	29 19 26	85 43 15	28	gy. bk. S. brk. Sh	62	63	....	....do	....do
7	5.56 p.m.	29 19 00	85 43 15	28	gy. bk. S. brk. Sh	62	63	....	....do	....do
8	5.55 a.m.	29 16 15	85 42 30	30	gy. bk. S. brk. Sh	58	60	....	....do	....do
8	6.47 a.m.	29 16 45	85 41 00	29	gy. bk. S. brk. Sh	56	59	....	....do	....do
8	7.34 a.m.	29 15 30	85 40 15	29	gy. bk. S. brk. Sh	57	60	....	....do	....do
8	8.11 a.m.	29 17 45	85 42 00	31	gy. bk. S. brk. Sh	57	60	....	....do	....do
8	8.22 a.m.	29 20 30	85 44 00	27	gy. bk. S. brk. Sh	57	60	....	....do	....do
8	9.05 a.m.	29 19 30	85 45 00	29	gy. bk. S. brk. Sh	57	60	....	....do	....do
8	9.24 a.m.	29 20 15	85 45 40	29	gy. bk. S. brk. Sh	57	60	....	....do	....do
8	9.58 a.m.	29 21 00	85 46 20	28	G. brk Sh	56	60	....	....do	....do
8	2.56 p.m.	28 51 20	85 10 00	31	gy. S. brk. Sh	64	65	....	....do	....do
8	3.13 p.m.	28 52 10	85 09 20	30	crs. gy. S. brk. Sh	64	65	....	....do	....do
8	3.25 p.m.	28 53 00	85 08 40	29	gy. S. brk. Sh	64	65	....	....do	....do
8	3.37 p.m.	28 54 00	85 08 00	28	gy. S. bk. Sp. brk. Sh	63	65	....	....do	....do
15	1.53 p.m.	28 48 00	84 36 00	24	S. Co. brk. Sh	64	63	....	....do	....do
15	2.08 p.m.	28 47 00	84 35 50	24	S. Co. brk. Sh	63	62	....	....do	....do
15	2.20 p.m.	28 46 00	84 35 40	23	S. Co. brk. Sh	62	61	....	....do	....do
15	2.44 p.m.	28 45 00	84 35 30	24	S. Co. brk. Sh	61	60	....	....do	....do
15	3.17 p.m.	28 44 00	84 35 20	24	S. Co	60	59	....	....do	....do
15	3.38 p.m.	28 43 00	84 35 30	24	S. Co. brk. Sh	60	62.1	62.1	....do	....do
15	3.53 p.m.	28 42 00	84 35 40	26	S. bk. Sp. brk. Sh	60	61	....	....do	....do
15	4.02 p.m.	28 41 30	84 35 50	26	crs. bk. gy. S. Co	60	61	....	....do	....do
15	4.12 p.m.	28 41 00	84 36 00	27	gy. S. bk. Sp. Co	60	61	....	....do	....do
15	4.24 p.m.	28 40 45	84 35 30	26	wh. S. bk. Sp. brk. Sh	60	61	....	....do	....do
15	4.50 p.m.	28 40 00	84 32 40	26	wh. S. brk. Sh	59	61	....	....do	....do
15	5.23 p.m.	28 42 00	84 29 50	24	vl. S. bk. Sp. brk. Sh	58	62	....	....do	....do
15	5.45 p.m.	28 43 20	84 28 00	22	Co	58	62	....	....do	....do
15	6.02 p.m.	28 44 00	84 27 00	23	fne. wh. S. brk. Sh	58	62	....	....do	....do
15	6.20 p.m.	28 44 40	84 26 00	21	crs. gy. S.	58	62	....	....do	....do
16	5.30 a.m.	28 50 00	84 32 30	21	brk. Sh	59	62	....	....do	....do
16	6.22 a.m.	28 45 00	84 33 15	24	fne. wh. S. bk. Sp*	59	62	....	....do	....do
16	7.05 a.m.	28 40 00	84 34 00	27	fne. wh. S. bk. Sp	60	60	....	....do	....do
16	7.51 a.m.	28 38 45	84 28 30	24	fne. wh. S. brk. Sh	59	63	....	....do	....do
16	8.42 a.m.	28 32 45	84 27 00	24	crs. gy. S. brk. Sh	60	64	....	....do	....do
16	9.22 a.m.	28 28 00	84 25 00	21	Co	60	64	....	....do	....do
16	10.50 a.m.	28 25 00	84 21 00	24	crs. S. bk. Sp. Sh	62	63	....	....do	....do
16	11.33 a.m.	28 21 00	84 18 00	23	crs. S. bk. Sp. Sh	62	63	....	....do	....do
16	12.18 p.m.	28 20 00	84 12 00	22	gy. S	62	63	....	....do	....do
16	1.02 p.m.	28 19 45	84 06 00	21	wh. S. bk. Sp. brk. Sh	59	63	....	....do	....do
16	1.45 p.m.	28 15 45	84 02 35	21	wh. S. bk. Sp. brk. Sh	60	62	....	....do	....do
16	2.46 p.m.	28 11 45	83 59 10	22	wh. S. bk. Sp. brk. Sh	61	63	....	....do	....do
16	3.32 p.m.	28 07 45	83 55 40	22	wh. S. bk. Sp.	60	64	....	....do	....do
16	4.15 p.m.	28 03 45	83 52 15	22	fne. gy. S. bk. Sp	60	64	....	....do	....do
16	5.00 p.m.	27 59 40	83 48 50	22	crs. S. brk. Sh	60	63	....	....do	....do
16	5.42 p.m.	27 55 30	83 45 25	22	gy. bk. S	60	63	....	....do	....do
16	6.23 p.m.	27 51 30	83 42 00	21	fne. wh. S. bk. Sp	60	63	....	....do	....do
16	7.05 p.m.	27 50 00	83 36 15	20	wh. S. bk. Sp	60	63	....	....do	....do
16	7.47 p.m.	27 49 00	83 30 30	18	crs. S. bk. Sp. brk. Sh	60	62	....	....do	....do
16	8.26 p.m.	27 48 10	83 24 45	16½	gy. S. brk. Sh	60	61	....	....do	....do
16	9.08 p.m.	27 47 30	83 19 00	15	gy. S. bk. Sp	60	61	....	....do	....do
16	9.45 p.m.	27 46 45	83 13 15	12	crs. gy. S. bk. Sp. brk. Sh	60	62	....	....do	....do
16	10.24 p.m.	27 46 10	83 07 30	10	crs. gy. S. bk. Sp	60	62	....	....do	....do
16	11.00 p.m.	27 46 00	83 02 00	8	gy. S. bk. Sp. brk. Sh	60	62	....	....do	....do
18	11.06 a.m.	27 16 00	83 10 00	18	gy. bk. S	65	64	....	....do	....do
18	12.30 p.m.	27 08 30	83 19 30	25	crs. gy. bk. S	67	66	....	....do	....do
18	1.12 p.m.	27 04 00	83 21 15	26	crs. gy. S. brk. Sh	67	66	....	....do	....do
18	2.17 p.m.	26 58 00	83 22 30	26	crs. gy. S. brk. Sh	68	66	....	....do	....do
18	3.10 p.m.	26 53 00	83 24 00	27	wh. S. bk. Sp. brk. Sh	67	66	....	....do	....do
18	5.06 p.m.	26 42 30	83 22 45	29	crs. S. bk. Sp. brk. Sh	80	67	....	....do	....do
18	5.40 p.m.	26 38 00	83 20 00	28	crs. S. bk. Sp	73	67	....	....do	....do
18	6.21 p.m.	26 33 30	83 15 30	27	fne. wh. S. bk. Sp	69	67	....	....do	....do
19	5.22 a.m.	26 28 15	83 11 00	26	fne. wh. S. bk. Sp	63	67	....	....do	....do
19	6.10 a.m.	26 23 15	83 11 15	28	crs. gy. S. bk. Sp. brk. Sh	61	67	....	....do	....do
19	6.50 a.m.	26 18 30	83 08 45	27	fne. gy. S. bk. Sp. brk. Sh	62	66	....	....do	....do
19	7.53 a.m.	26 12 30	83 06 30	27	crs. gy. S. bk. Sp. brk. Sh	63	66	....	....do	....do
19	8.37 a.m.	26 08 30	83 03 45	25	fne. wh. S. bk. Sp*	63	66	....	....do	....do
19	9.23 a.m.	26 04 30	83 01 00	24	fne. wh. S. bk. Sp*	63	66	....	....do	....do

*Also brk. Sh.

and Albatross, September 13, 1880, *to October* 20, 1885—Continued.

Tile-fish (*Lopholatilus chamæleonticeps*).	Hake (*Phycis tenuis*).	Whiting (*Merlucius bilinearis*).	Skate (*Raia* sp.).	Dogfish (*Mustelus canis*).	Codfish (*Gadus morrhua*).	Red groupers (*Epinephelus morio*).	Black bass (*Serranus atrarius*).	Red snappers (*Lutjanus Blackfordii*).	Black groupers (*Epinephelus nigritus*).	Haddock (*Gadus æglefinus*).	Norway haddock (*Sebastes marinus*).	Miscellaneous.
						8		11	2			
						4		1				(*)
						4		1				
						6		2				
								42	2			
						4		1				
						2						
						1		10				
						10		2				
						1						
						2		1				1 porgie.
						4		2	1			
								1				
								1				
						1		12				
						1						
						3						1 porgie.†

* 1 spotted hind.

† Also 1 scamp.

Table of fishing stations of U. S. Fish Commission steamers Fish Hawk

Date.	Time.	Position. Lat. N.	Position. Long W	Depth (fathoms).	Character of bottom.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Object of search.	Implement used.
1885.		° ′ ″	° ′ ″			°	°	°		
Mar. 19	10.04 a. m.	26 00 00	82 57 30	24	fne. S. bk. Sp. brk. Sh	68	66	...	General.	Hand-line.
19	10.20 a. m.	25 54 00	82 59 30	24	fne. wh. S	67	66	...	do	do
19	12.00 m.	25 49 00	83 01 00	25	fne. wh. S	66	67	...	do	do
19	12.39 p.m.	25 44 30	83 02 30	27	S. Co	67	68	...	do	do
19	1.26 p.m.	25 39 30	83 01 00	27	gy. S. brk. Sh	68	69	...	do	do
19	2.15 p.m.	25 34 30	83 01 00	27	gy. S. bk. Sp	67	69	...	do	do
19	2.59 p.m.	25 29 30	83 01 00	28	crs. gy. S. brk. Sh	67	69	...	do	do
19	3.38 p.m.	25 24 30	83 00 00	27	gy. S. bk. Sp	67	69	...	do	do
19	4.19 p.m.	25 19 30	82 59 30	27	gy. M. brk. Sh	68	69	...	do	do
19	4.56 p.m.	25 14 30	82 59 00	27	gy. M. fne. S. brk. Sh	68	69	...	do	do
19	5.34 p.m.	25 09 30	82 59 00	27	brk. Sh	67	69	...	do	do
19	6.11 p.m.	25 04 30	82 59 15	26	fne. wh. S. brk. Sh	67	69	...	do	do
Apr. 1	5.55 p.m.	31 54 45	79 17 00	86	gy. M. brk. Sh	66	69	60.3	Tile-fish	do
2	5.25 p.m.	33 34 00	76 40 30	107	fne. gy. S. bk. Sp	69	72	60.3	do	do
5	6.20 a. m.	37 03 20	74 31 40	104	S. M. G	42	47	48	do	do
5	7.02 a. m.	37 03 00	74 33 00	67	S. M. G	42	49	...	do	do
5	8.09 a. m.	37 04 30	74 32 00	98	brk. Sh	43	49	...	do	do
June 3	6.37 a. m.	37 08 00	74 34 45	61	crs. gy. S. P	62	60	54	do	Trawl-line
3	10.45 a. m.	37 09 30	74 33 45	75	crs. gy. S. brk. Sh	67	67	52.5	do	do
3	3.52 p.m.	37 11 30	74 32 30	103	S. gy. M. crs. bk. Sp	65	67	51.5	do	do
4	5.20 a. m.	36 40 30	74 42 00	135	S. gy. M. fne. bk. Sp	69	68	48.8	do	do
4	8.44 a. m.	36 43 00	74 46 30	78	S. G	75	70	...	do	Hand-line
4	11.30 a. m.	36 20 24	74 46 30	119	gy. M. fne. S	72	69	51.5	do	Trawl-line
4	4.49 p.m.	36 01 30	74 47 30	93	crs. gy. and bk. S*	77	71	52	do	do
5	6.22 a. m.	35 27 15	74 42 30	69	bk. M	72	75	54	do	do
5	2.11 p.m.	35 12 15	75 05 00	50½	fne. gy. and bk. S*	76	76	62	do	Hand-line
5	2.36 p.m.	35 12 30	75 03 30	72	crs. gy. S. brk. Sh	76	76	60	do	do
5	2.46 p.m.	35 12 45	75 02 00	68	R. Co	76	76	60	do	do
5	4.03 p.m.	35 13 00	75 01 00	123	gy. S. bk. Sp. brk. Sh	76	76	53	do	do
5	6.42 p.m.	35 11 00	75 07 00	52	crs. gy. S. bk. Sp	78	75	65	do	do
6	5.38 a. m.	34 58 20	75 12 00	66	fne. gy. S. bk. Sp	66	75	58	do	do
6	6.23 a. m.	34 59 00	75 13 00	54	fne. gy. S. bk. Sp	66	75	61	do	do
24	9.39 a. m.	43 38 00	49 34 30	38	wh. S. bk. Sp. brk. Sh	53	48	36.2	Codfish	do
25	4.59 p.m.	46 20 00	49 30 30	39	gy. S	48	43	34	do	do
July 3	6.03 a. m.	45 47 00	54 13 30	59	fne. S. bk. Sp	54	48	39	do	do
3	7.18 a. m.	45 45 30	54 20 30	41	wh. S. bk. Sp	52	48	30	do	do
3	8.30 a. m.	45 44 00	54 27 00	45	brk. Sh	51	50	30	do	do
3	10.14 a. m.	45 40 00	54 41 00	42	wh. and bk. S. brk. Sh.	52	47	32	do	do
3	5.31 p.m.	45 23 00	55 41 00	38	fne. wh. S. bk. Sp	58	52	36	do	do
5	7.17 p.m.	44 43 00	57 32 45	33	wh. S	55	53	...	do	do
6	6.31 a. m.	45 24 00	58 36 45	67	fne. M	51	53	...	do	do
6	7.56 a. m.	45 21 30	58 44 45	42	wh. S. P	51	53	32	do	do
6	9.05 a. m.	45 18 30	58 52 45	45	yl. S	52	53	...	do	do
6	10.52 a. m.	45 14 00	59 08 15	48	S. G	54	54	...	do	do
6	12.35 p.m.	45 09 30	59 25 15	43	hrd	54	54	...	do	do
6	1.48 p.m.	45 07 00	59 28 45	46	yl. S	58	56	...	do	do
7	8.02 a. m.	44 27 00	60 20 15	26	S. G	59	58	36	do	do
7	8.15 a. m.	44 26 30	60 21 45	26	S. G	59	58	...	do	do
7	1.43 p.m.	44 22 30	61 00 15	47	P	63	60	35.2	do	do
12	9.02 a. m.	43 10 00	64 18 00	55	yl. S. bk. Sp	60	60	38.5	do	do
12	12.08 p.m.	43 01 00	64 45 30	47	hrd	60	60	39	do	do
Aug. 7	8.57 a. m.	39 59 45	70 53 00	133	gn. S	71	74	47.7	Tile-fish	Trawl-line
7	3.00 p.m.	40 00 15	70 42 20	129	S. brk. Sh	73	76	47.2	do	do
8	6.19 a. m.	40 01 45	70 24 00	131	gn. S. bk. Sp	70	74	47.7	do	do
10	6.13 a. m.	39 53 00	71 32 00	136	gn. M. S	72	75	47.7	do	do
10	1.11 p.m.	39 48 00	71 48 30	120	br. M. S	78	76	...	do	do
Sept. 18	8.21 a. m.	39 43 00	71 34 00	394	gn. M	66	70	...	do	do
18	2.53 p.m.	39 50 00	71 43 00	137	gn. M	68	70	47.2	do	do
19	9.41 a. m.	39 05 30	72 25 30	519	gn. M	72	72	39	do	do
20	9.33 a. m.	39 02 40	72 40 00	328	dk. gy. M	69	71	40.2	do	do
20	8.37 a. m.	38 55 00	72 50 30	231	gn. M. S	66	70	44.2	do	do
Oct. 17	11.14 a. m.	35 02 20	75 12 00	120	fne. gy. S	70	70	...	do	do
18	12.03 p.m.	34 38 30	75 33 30	124	S. R	74	78	...	do	do
19	1.45 p.m.	34 09 00	76 02 00	168	gy. S. bk. Sp	77	78	...	do	do
20	7.20 a. m.	33 42 45	77 31 00	17	S. P	76	75	...	Sea-bass	Hand-line
20	10.00 a. m.	33 37 30	77 36 30	14	crs. yl. S. brk. Sh	77	75	...	do	do
20	10.55 a. m.	33 37 15	77 35 30	17	crs. yl. S. brk. Sh	76	74	...	do	do
20	11.19 a. m.	33 38 00	77 36 00	15	crs. yl. S. rot. Co. *	76	74	...	do	do
20	12.13 p.m.	33 37 45	77 36 30	15	gy. S. rot. Co	78	75	...	do	do
20	1.54 p.m.	33 34 00	77 42 00	9	gy. S. brk. Co	76	75	...	do	do
20	3.48 p.m.	33 38 00	77 36 00	15	gy. S. brk. Co	76	74	...	do	Trawl-line
20	3.48 p.m.								do	Hand-line

* Also brk. Sh.

and Albatross, September 13, 1880, to October 20, 1885—Continued.

Tile-fish (*Lopholatilus chamæleonticeps*).	Hake (*Phycis tenuis*).	Whiting (*Merluccius bilinearis*).	Skate (*Raia* sp.).	Dogfish (*Squatina* sp.).	Codfish (*Gadus morrhua*).	Red grouper (*Epinephelus morio*).	Black bass (*Serranus atrarius*).	Red snapper (*Lutjanus Blackfordii*).	Black grouper (*Epinephelus nigritus*).	Haddock (*Gadus æglefinus*).	Norway haddock (*Sebastes marinus*).	Miscellaneous.
								1				
								3	1			
				20								
				6								
	4											
	6											
	6	1										
							1					
							2		2			2
					18							
					88							4
					3							1
					10							
					2							
					5							
					1							1
					5							
					3							2
					3							3
					22							
					12							
					4						1	
	49	7	5									
	34	9									1	
	37	6	2								5	
	12		6									
	6	4	4									1
	1	1	1									4
	23		6									
	8	1	4									1
												2
							1					2
				1			14					3
							2					
							31					
												1
							12					3
							100					3

Record of serial temperatures taken by the U. S. Fish Commission steamer Albatross during the year 1885.

Date.	Serial number.	Position.		Depth. (fathoms).	Character of bottom.	Temperature (degrees).													
		Lat. N.	Long. W.			Air.	Surface.	25 fathoms.	50 fathoms.	100 fathoms.	200 fathoms.	300 fathoms.	400 fathoms.	500 fathoms.	600 fathoms.	700 fathoms.	800 fathoms.	900 fathoms.	1,000 fathoms.	Bottom.
1885.		° ′ ″	° ′ ″																	
Mar. 13	2393	28 43 00	87 14 30	525	gy. M	70	64	65.2	64.0	57.9	.....	45.7	43.0	.....	.....	.....	.....	.....	.....	41.0
Apr. 1	Hyd. 699	31 51 45	79 17 00	86	gy. M. brk. Sh	66	60	69.9*	68.4†	66.3‡	63.3§	60.8‖	.....	.....	.....	.....	.....	.....	.....	60.3
3	Hyd. 702	36 30 00	73 14 00	2,340	bu. Oz	69	72	.....	.....	.....	59.6¶	.....	.....	41.3	.....	.....	.....	.....	.....	36.8
4	Hyd. 703	36 45 00	73 28 00	1,646	bu. Oz	68	66	.....	.....	.....	43.0¶	.....	...	39.6	.....	.....	.....	.....	.....	37.2
4	Hyd. 704	36 57 30	73 47 00	1,436	bu. Oz	61	55	50.8	49.9	52.2	43.0	.....	39.5	.....	38.4	38.6	52.2	38.1	40.6	37.5
4	Hyd. 705	37 01 06	74 10 03	1,208	bu. Oz	50	52	50.1	44.0	51.3	44.0	.....	39.7	39.3	40.8	.....	.....	.....	.....	38.7
5	Hyd. 712	37 04 30	74 32 00	98	bk. S	43	40	50.8	48.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Aug. 7	2542	40 00 15	70 42 20	129	S. brk. Sh	73	76	59.8	56.3	49.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	47.2
9	Hyd. 840	39 49 00	70 42 00	452	gy. M	71	77	59.5	57.0	49.8	44.0	40.5	.....	.....	.....	.....	.....	.....	.....	39.6
10	Hyd. 854	39 41 00	71 42 00	378	gn. S	76	77	62.5	45.8	40.0	42.1	40.1	.....	.....	.....	.....	.....	.....	.....	39.6
11	2564	39 22 00	71 23 30	1,396	gy. Oz	79	78	61.6	58.1	51.3	48.8	40.3	40.0	39.4	39.0	39.2	38.8	38.5	41.3	37.3
28	2565	38 19 20	69 02 30	2,069	br. & gy. Oz	72	77	76.8	53.7	53.1	54.2	49.9	40.1	39.4	38.7	39.0	38.6	38.8	38.6	38.2
29	2566	37 23 00	68 08 00	2,620	gy. Oz	75	80	81.2	73.2	68.6	64.6	63.0	59.1	53.7	45.3	40.7	40.2	39.5	39.3	36.4
Sept. 1	2571	40 09 30	67 09 00	1,336	gy. Glob. Oz	75	72	65.7	60.2	54.8	45.7	41.8	40.0	39.7	38.8	39.8	.....	.....	.....	37.8
2	2573	40 34 18	66 09 00	1,742	gy. M. S	71	71	68.3	61.0	52.8	49.4	42.0	40.2	39.7	39.1	39.4	38.6	38.8	38.1	37.3
3	2575	41 07 00	65 26 30	1,710	gy. Oz	64	71	71.2	59.1	52.8	47.0	41.3	40.2	39.8	39.3	38.7	38.8	38.4	38.0	37.1
Oct. 21	2628	32 24 00	76 55 30	528	yl. M	70	77	79.9	77.6	59.0	48.0	45.5	40.2	.....	.....	.....	.....	.....	.....	38.5

*5 fathoms. †10 fathoms. ‡15 fathoms. §25 fathoms. ‖50 fathoms. ¶250 fathoms.

Record of temperatures and specific gravities taken by the U. S. Fish Commission steamer Albatross during the year 1885.

Date.	Time of day.	Locality.	Depth.	Temperature by attached thermometer.	Temperature of the air.	Temperature of specimen at time specific gravity was taken.	Specific gravity.	Specific gravity reduced to 60° Fahrenheit.
1885.			*Fathoms.*	°	°	°		
Jan. 22	9.40 a. m.	Sta. 2353, Lat. 20° 59′ N., Long. 86° 23′ W	Surface	79	80	83	1.0234	1.027126
Jan. 22	7.00 p. m.	Off island of Cozumel	do	76	76	70	1.0265	1.027650
Feb. 7	1.00 p. m.	Sta. 2369, Lat. 29° 16′ 30″ N., Long. 85° 32′ W	do	64	63	73	1.0258	1.025724
Feb. 11	11.45 a. m.	Hyd. 583, Lat. 28° 58′ 20″ N., Long. 88° 14′ W	do	60	51	70	1.0264	1.027850
Mar. 1	5.00 p. m.	South Pass, Mississippi River	do	41	58.5	58	1.0016	1.001360
Mar. 1	5.30 p. m.	Jetties, Mississippi River	do	41	56	58	1.0016	1.001360
Mar. 1	6.00 p. m.	Off jetties, Mississippi River*	do	54	55	67	1.0094	1.010357
Mar. 1	7.00 p. m.	do	do	58	61	61	1.0140	1.014130
Mar. 1	8.00 p. m.	do	do	58	61	64	1.0144	1.014948
Mar. 1	9.00 p. m.	do	do	62	60	68	1.0140	1.015136
Mar. 1	10.00 p. m.	do	do	57	60	60	1.0182	1.018200
Mar. 1	11.00 p. m.	do	do	58	58	69	1.0186	1.019887
Mar. 1	12.00 m.	do	do	64	59	68	1.0245	1.025630
Mar. 2	1.00 a. m.	do	do	65	60	68	1.0269	1.027136
Mar. 2	2.00 a. m.	do	do	66	60	68	1.0264	1.027536
Mar. 2	3.00 a. m.	do	do	61	67	69	1.0268	1.026987
Mar. 2	6.27 a. m.	Sta. 2379, Lat. 28° 00′ 15″ N., Long. 87° 42′ W	do	66	61	76	1.0258	1.028232
Mar. 2	8.00 p. m.	Sta. 2381, Lat. 28° 05′ N., Long. 87° 58′ 15″ W	do	66	60	79	1.0252	1.028183
Mar. 3	8.00 a. m.	Sta. 2382, Lat. 28° 19′ 45″ N., Long. 88° 01′ 30″ W	do	68	61	81	1.0250	1.028330
Mar. 3	8.00 p. m.	Sta. 2385, Lat. 28° 51′ N., Long. 88° 18′ W	do	69	60	79	1.0250	1.027983
Mar. 4	8.00 a. m.	Sta. 2387, Lat. 29° 24′ N., Long. 88° 04′ W	do	61	61	77	1.0240	1.026618
Mar. 4	12.00 a. m.	Lat. 29° 25′ N., Long. 87° 52′ 30″ W	do	62	64	79	1.0242	1.027183
Mar. 4	8.00 p. m.	Pensacola Bay, Florida	do	61	56	76	1.0251	1.027532
Mar. 7	12.00 m.	Lat. 29° 15′ 11″ N., Long. 85° 38′ W	do	60	61	76	1.0258	1.028232
Mar. 13	10.00 a. m.	Sta. 2393, Lat. 28° 43′ N., Long. 87° 14′ 30″ W	do	65	70	70	1.0236	1.026383
Mar. 13	10.00 a. m.	do	25	65.2	70	78	1.0248	1.027808
Mar. 13	10.00 a. m.	do	50	64	70	77	1.0254	1.028018
Mar. 13	10.00 a. m.	do	100	57.9	70	77	1.0250	1.027618
Mar. 13	10.00 a. m.	do	200	.....	70	77	1.0248	1.027418
Mar. 13	10.00 a. m.	do	300	45.7	70	77	1.0250	1.027618
Mar. 13	10.00 a. m.	do	400	43	70	77	1.0248	1.027418
Mar. 13	10.00 a. m.	do	500	41	70	77	1.0250	1.027618
Mar. 14	11.00 a. m.	Sta. 2399, Lat. 28° 44′ N., Long. 86° 18′ W.	Surface	68	70	81	1.0246	1.027939
Mar. 15	11.30 a. m.	Sta. 2406, Lat. 28° 46′ N., Long. 84° 40′ 30″ W	do	64	66	82	1.0247	1.028220
Mar. 16	12.00 m.	Lat. 28° 20′ N., Long. 84° 15′ W	do	63	62	80	1.0246	1.028326
Mar. 16	5.45 p. m.	Hyd. 668, Lat. 27° 59′ 30″ N., Long. 83° 45′ 25″ W	do	63	60	82	1.0246	1.028120

*Course of ship SE. ¾ E., 8.2 knots per hour.

Record of temperatures and specific gravities taken by the U. S. Fish Commission steamer Albatross during the year 1885—Continued.

Date.	Time of day	Locality.	Depth.	Temperature by attached thermometer.	Temperature of the air.	Temperature of specimen at time specific gravity was taken.	Specific gravity.	Specific gravity reduced to 60° Fahrenheit.
1885.			*Fathoms.*	°	°	°		
Mar. 17	12.00 m	Tampa Bay, Florida	Surface	63	63	78	1.0206	1.023408
Mar. 18	3.30 p. m.	Hyd. 673, Lat. 27° 08′ 30″ N., Long. 83° 19′ 30″ W	do	66	67	78	1.0248	1.027606
Mar. 19	8.30 a. m.	Hyd. 686, Lat. 26° 08′ 30″ N., Long. 83° 03′ 45″ W	do	66	65	82	1.0243	1.027820
Mar. 19	1.30 p. m.	Hyd. 691, Lat. 25° 39′ 30″ N., Long. 83° 01′ W	do	69	67	81	1.0244	1.027739
Mar. 19	6.30 p. m.	Sta. 2414, Lat. 25° 04′ 30″ N., Long. 82° 59′ 15″ W	do	68	65	81	1.0244	1.027739
June 3	12.00 m	Lat. 37° 10′ N., Long. 74° 34′ W	do	67	65	81	1.0248	1.028130
June 4	12.00 m	Lat. 36° 20′ 24″ N., Long. 74° 46′ 45″ W	do	70	72.5	83	1.0242	1.027926
June 5	12.00 m	Lat. 35° 22′ 57″ N., Long. 75° W	do	72.5	75	78	1.0244	1.027208
June 19	9.00 a. m.	Hyd. 744, Lat. 41° 18′ 15″ N., Long. 63° 56″ W	do	67.5	66	81	1.0248	1.028139
June 19	12.00 m	Hyd. 745, Lat. 41° 19′ 23″ N., Long. 63° 35′ 30″ W	do	69	71	79	1.0250	1.027983
June 19	7.00 p. m.	Hyd. 749, Lat. 41° 20′ 30″ N., Long. 62° 57′ W	do	61.5	61	84	1.0232	1.027112
June 20	7.00 a. m.	Hyd. 750, Lat. 40° 40′ 30″ N., Long. 60° 33′ W	do	77	62	82	1.0246	1.028120
June 21	12.00 m	Lat. 40° 22′ 54″ N., Long. 55° 21′ W	do	71	68	80	1.0250	1.028160
June 21	4.30 p. m.	Hyd. 752, Lat. 40° 24′ 30″ N., Long. 54° 24′ W	do	75	68	76	1.0257	1.028132
June 22	1.00 p. m.	Hyd. 756, Lat. 40° 55′ 30″ N., Long. 52° 02′ 30″ W	do	66	64	76	1.0250	1.027432
June 22	8.30 p. m.	Hyd. 757, Lat. 41° 51′ N., Long. 51° 31′ W	do	54	68	75	1.0230	1.025365
June 23	8.00 a. m.	Sta. 2427, Lat. 42° 46′ N., Long. 51° W	do	48	50	78	1.0232	1.026008
June 23	7.00 p. m.	Sta. 2434, Lat. 43° 08′ N., Long. 50° 40′ W	do	48	52	77	1.0230	1.025618
June 24	9.00 a. m.	Hyd. 762, Lat. 43° 38′ N., Long. 49° 42′ W	do	48	53	76	1.0228	1.025232
June 24	6.30 p. m.	Hyd. 765, Lat. 44° 26′ N., Long. 49° 33′ W	do	45	50	75	1.0230	1.025265
June 25	8.45 a. m.	Sta. 2443, Lat. 45° 44′ N., Long. 49° 45 W	do	46	50	74	1.0232	1.025286
June 25	12.50 p. m.	Sta. 2445, Lat. 46° 09′ 30″ N., Long. 49° 48′ 30″ W	do	44	47	74	1.0232	1.025286
June 25	7.00 p. m.	Sta. 2449, Lat. 46° 37′ N., Long. 49° 50′ 30″ W	do	42	46	74	1.0234	1.025486
June 26	11.13 a. m.	Sta. 2454, Lat. 47° 10′ N., Long. 51° 16′ W	do	42	46	73	1.0236	1.025524
July 2	10.40 a. m.	Sta. 2457, Lat. 47° 13′ N., Long. 52° 24′ W	do	47	48	77	1.0226	1.025218
July 2	6.10 p. m.	Sta. 2459, Lat. 46° 23′ N., Long. 52° 45′ W	do	46	50	77	1.0224	1.025018
July 3	8.00 a. m.	Sta. 2463, Lat. 45° 44′ N., Long. 54° 27′ W	do	48	51	75	1.0230	1.025265
July 3	12.30 p. m.	Sta. 2465, Lat. 45° 35′ N., Long. 55° 01′ W	do	50	53	76	1.0228	1.025232
July 3	8.00 p. m.	Sta. 2468, Lat. 45° 11′ 30″ N., Long. 55° 51′ 3 ″ W	do	50	54	76	1.0228	1.025232
July 4	10.30 a. m.	Sta. 2471, Lat. 44° 34′ N., Long. 56° 41′ 45″ W	do	54	56	76	1.0228	1.025232
July 4	5.10 p. m.	Sta. 2473, Lat. 44° 27′ 15″ N., Long. 57° 10′ W	do	51	56	76	1.0220	1.024432
July 5	9.15 a. m.	Sta. 2483, Lat. 44° 16′ N., Long. 57° 12′ 45″ W	do	53	56	78	1.0214	1.024208
July 5	7.12 p. m.	Sta. 2489, Lat. 44° 43′ N., Long. 57° 22′ 45″ W	do	53	55	78	1.0214	1.024208
July 6	9.00 a. m.	Sta. 2493, Lat. 45° 19′ N., Long. 58° 51′ 15″ W	do	54	54	78	1.0212	1.024008
July 6	7.00 p. m.	Sta. 2498, Lat. 44° 46′ 30″ N., Long. 59° 55′ 45″ W	do	56	62	77	1.0215	1.024118
July 7	8.00 a. m.	Sta. 2501, Lat. 44° 27′ N., Long. 60° 20′ 15″ W	do	56	59	78	1.0213	1.024108

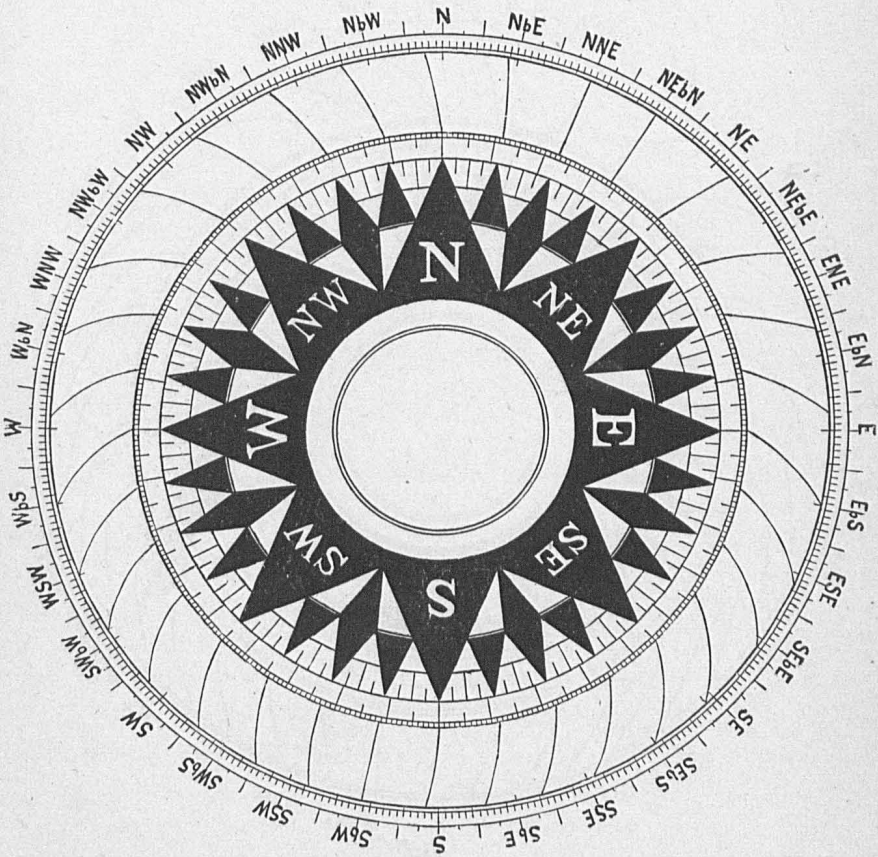
July 7	7.00 p.m.	Sta. 2505, Lat. 44° 23′ 30″ N., Lat. 61° 44′ 15″ W	....do	63	63	80	1.0214	1.024560
July 8	9.00 a.m.	Sta. 2508, Lat. 44° 28′ 30″ N., Lat. 62° 56′ W	....do	61	62	82	1.0210	1.024520
July 8	11.30 a.m.	Sta. 2509, Lat. 44° 30′ N., Long. 63° 18′ W	....do	61	65	82	1.0208	1.024320
July 9	9.00 a.m.	Harbor of Halifax, Nova Scotia	....do	61	67	78	1.0206	1.023408
July 11	12.30 p.m.	Sta. 2511, Lat. 44° 05′ 30″ N., Long. 63° 31′ 30″ W	....do	55	60	78	1.0216	1.024408
July 11	7.30 p.m.	Sta. 2514, Lat. 43° 28′ 30″ N., Long. 63° 57′ 30″ W	....do	59	61	78	1.0216	1.024408
July 12	11.15 a.m.	Sta. 2518, Lat. 43° 05′ N., Long. 64° 40′ 30″ W	....do	59	60	80	1.0216	1.024760
July 12	7.00 p.m.	Sta. 2522, Lat. 42° 20′ N., Long. 65° 07′ 30″ W	....do	62	62	80	1.0216	1.024760
July 13	8.40 a.m.	Sta. 2526, Lat. 41° 40′ 45″ N., Long. 65° 46″ W	....do	66	65	82	1.0230	1.026520
July 13	7.00 p.m.	Sta. 2528, Lat. 41° 47′ N., Long. 65° 37′ 30″ W	....do	60	65	82	1.0230	1.026520
July 14	8.30 a.m.	Sta. 2530, Lat. 40° 53′ 30″ N., Long. 66° 24′ W	....do	67	70	85	1.0224	1.026500
July 14	6.00 p.m.	Sta. 2532, Lat. 40° 34′ 30″ N., Long. 66° 48′ W	....do	68	72	85	1.0224	1.026500
July 15	8.30 a.m.	Sta. 2534, Lat. 40° 01′ N., Long. 67° 29′ 15″ W	....do	70	66	85	1.0234	1.027500

NOTE.—Specimens retained in lower laboratory until they had acquired about the temperature of the room; thermometer corrections applied; Tagliabue thermometer used; makers No. 344, F. C. No. 5300; F. C. No. of float 5165.

In the preceding tables the abbreviations for the characters of the bottom and the instrument used are from the following code:

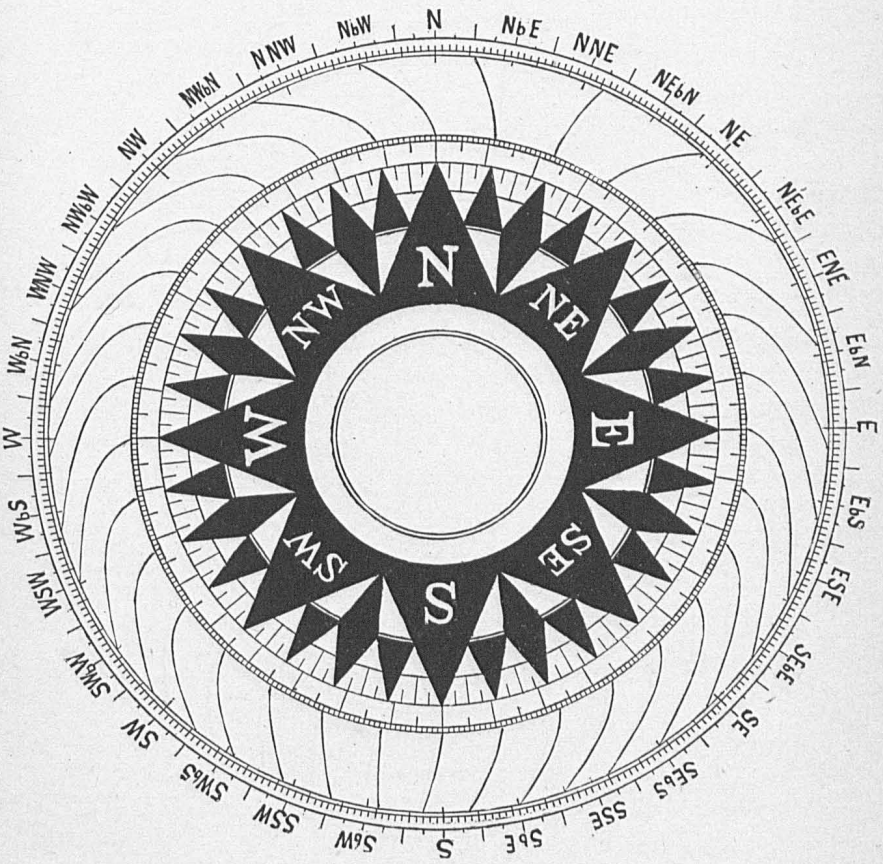
Abbreviation.	Meaning.	Abbreviation.	Meaning.	Abbreviation.	Meaning.	Abbreviation.	Meaning.	Abbreviation.	Meaning.	Abbreviation.	Meaning.
C.....	Clay.	P.....	Pebbles.	lge.....	large.	br.....	brown.	dk.....	dark.	L. B. T..	Large beam-trawl.
Co.....	Coral.	Oz.....	Ooze.	rky.....	rocky.	choc.....	chocolate color.	gy.....	gray.	S. B. T..	Small beam-trawl.
St.....	Stones.	R.....	Rock.	rot.....	rotten.	gn.....	green.	rd.....	red.	Bl. Dr..	Blake dredge (deep-sea dredge).
G.....	Gravel.	Sh.....	Shells.	stk.....	sticky.	lt.....	light.	wh.....	white.		
S.....	Sand.	Glob....	Globigerina.	crs.....	coarse.	slat.....	slate color.	stf.....	stiff.	Sh. Dr..	Ship's dredge (mud-bag).
For.....	Foraminifera.	Sp.....	Specks.	hrd.....	hard.	yl.....	yellow.				
Pter.....	Pteropoda.	brk.....	broken.	sml.....	small.	bk.....	black.			Tgls.....	Tangles.
M.....	Mud.	fne.....	fine.	sft.....	soft.	bu.....	blue.				

Key West, Fla. January 1885.



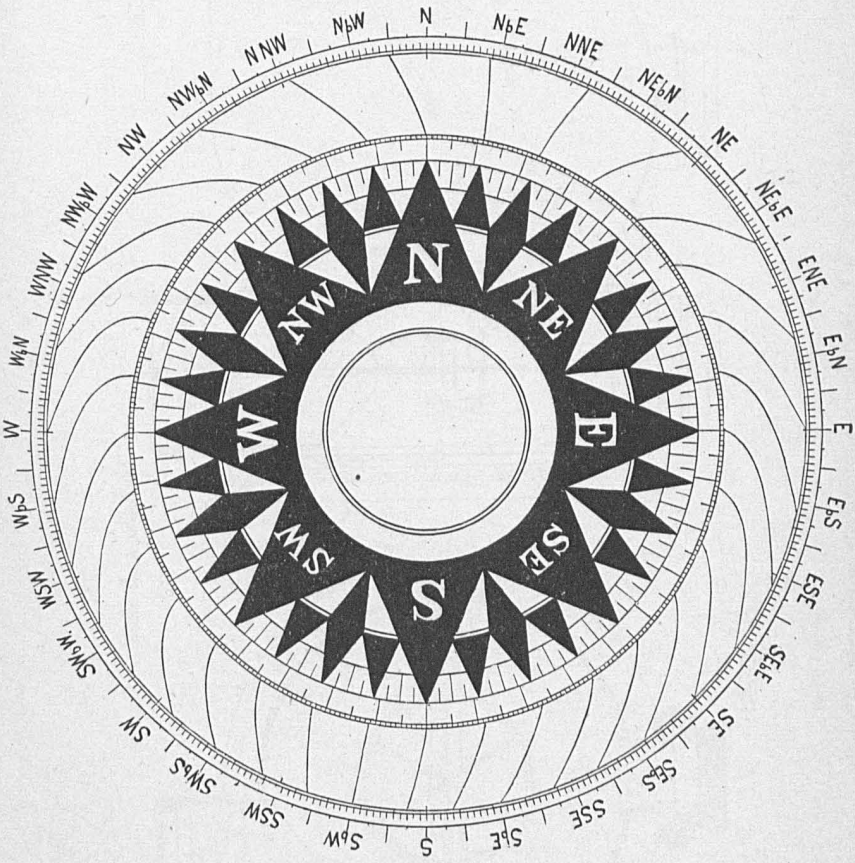
Steering-card. Key West, Florida, January, 1885.

Narragansett Bay. June 1885.



Steering-card. Narragansett Bay, June, 1885.

Chesapeake Bay, October 1885.



Steering-card. Chesapeake Bay, October, 1885.

Baird's annunciator, showing index and method of its working.

Baird's annunciator, showing rotary blower near engine.

Blank page retained for pagination

INDEX.

[NOTE.—The references are to page-figures in brackets.]