VII.—REPORT ON THE WORK OF THE UNITED STATES FISH COMMISSION STEAMER ALBATROSS FOR THE YEAR ENDING DECEMBER 31, 1886.

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

The vessel was at the navy-yard, Washington, D. C., on the first of January, practically ready for sea, although the mechanics were still at work on one of the boilers. Cold weather coming on at this time, the Potomac was frozen over and all navigation ceased.

Lieut. Seaton Schroeder, executive officer and navigator, was detached on January 2, and Lieut. H. S. Waring assumed his duties. Ensign W. S. Benson reported for duty on the 13th, and Ensign W. S. Hogg on the 16th.

We were detained by ice until 7 a. m., February 17, when we cast off from the wharf and steamed down the Potomac river. Several buoys were out of place, and after passing Glymont considerable floating ice was encountered. A heavy gorge was found between Upper and Lower Cedar Points, but we passed it without difficulty or delay. We anchored in Hampton Roads at 1.30 a. m., February 18, and at daylight got underway for the navy-yard, Norfolk, Va., where we arrived and moored to the coal wharf at 8.30 a. m. Having telegraphed our departure to the commandant, we found 100 tons of coal on the wharf awaiting our arrival, thus saving us a day in coaling.

At meridian February 20 we left Norfolk, and proceeded to sea under the following orders:

U. S. Commission of Fish and Fisheries,
Washington, D. C., February 1, 1886.

Sir: For the purpose of extending researches commenced by the Albatross into the distribution and habits of the more important food-fishes of the United States, especially of the mackerel, menhaden, blue-fish, etc., you will proceed, as soon as the steamer is ready, to Norfolk, Va., there, if convenient, to go into dock, and then take on board coal for the trip. After that you will continue the voyage, at the earliest possible moment, to the waters of the Bahama Islands, as there is

reason to believe that the yet undetected winter abode of the fish mentioned may be found to be in that vicinity.

If encountered, you will note the comparative number of the fish, their character and peculiarities; and also determine whether they carry on the operations of spawning, and, if so, under what circumstances. You will also note any facts that may present themselves to you as to other species of fish, such as sheepshead, Spanish mackerel, drum, and other useful food-fishes known on the coast of the United States or peculiar to those waters; and will secure specimens of the various kinds for the purpose of more critical examination on the return of the vessel to Washington.

As in previous cruises, you will make collections by trawl, dredge, or otherwise, of the marine animals inhabiting the waters, whether vertebrate or invertebrate, and will gather as many data as you can respecting their relationship to each other and to their physical surroundings.

The Navy Department having expressed a desire to have a series of soundings made in the Bahama seas for the purpose of extending our hydrographical knowledge, you are authorized to do what you can in this connection without endangering the safety of the men or the vessel under your command. It is understood that the extra expense of any work done in behalf of the Navy Department is to be defrayed by a supply of coal not to exceed 200 tons for the trip; and for this the Department has authorized you to call upon the coal depots at Key West or Pensacola.

You will give the scientific corps accompanying the vessel all possible facilities in carrying out their investigations, allowing them such opportunities for visiting the shores and bringing them on board again as may best aid in their work. Mr. James E. Benedict, as heretofore, will act as chief of the scientific party, aided by Thomas Lee and Willard Nye, jr.

Respectfully,

SPENCER F. BAIRD,
Commissioner.

Lieut.-Commander Z. L. TANNER,
Commanding Steamer Albatross, Navy-Yard, City.

U. S. COMMISSION OF FISH AND FISHERIES,
Washington, D. C., February 2, 1886.

DEAR SIR: In continuation of my original detail of Messrs. Lee and Nye as assistants to Mr. Benedict in the natural history work of the Albatross during her coming cruise, I have taken advantage of the return from California and the Arctic Ocean of Mr. Charles H. Townsend, of the Fish Commission, and arranged to have him accompany the vessel on the Bahama trip. He is a gentleman of most excellent qualifications, and I have no doubt you will find him a pleasant addition to the scientific corps.

You will please arrange to have him mess in the ward-room, and give him comfortable accommodations in any stateroom that may be vacant.

Mr. Townsend is an accomplished collector and naturalist, and has been in the service about three years.

Yours truly,

S. F. BAIRD.

Capt. Z. L. TANNER,
Commanding Steamer Albatross, Navy-Yard, City.

BUREAU OF NAVIGATION, NAVY DEPARTMENT,
Washington, D. C., January 18, 1886.

DEAR SIR: I learn from Lieutenant-Commander Tanner, commanding the U. S. Fish Commission steamer Albatross, that it is your intention that the vessel shall cruise in the vicinity of the Bahama Islands and the Gulf Stream, engaging in work connected with the Commission, and that it will not interfere with this work for Lieutenant-Commander Tanner to fill several important gaps in the lines of deep-sea soundings in that vicinity, provided that the additional coal required for this purpose can be transferred from the Navy Department.

I have therefore to request that, if practicable, the necessary soundings indicated in the accompanying chart by red lines may be taken, and to state that the actual amount of coal consumed by the Albatross for steaming purposes, while so employed, will be issued to that vessel at Key West, not exceeding in amount 200 tons.

Very respectfully, your obedient servant,

J. G. WALKER,
Chief of Bureau.

Prof. SPENCER F. BAIRD,
Commissioner of Fish and Fisheries, Washington, D. C.

We passed Cape Henry at 2.40 p. m. with clear weather and moderate NW. gale. Cautionary off-shore signals were flying at Norfolk, Fortress Monroe, and Cape Henry. The wind continued during the night, and at meridian the following day backed to SW., blowing a fresh gale until noon of the 22d, gradually decreasing in force to a moderate breeze from west in the evening.

We commenced sounding to the northward of Great Abaco on the morning of the 23d, in 557 fathoms, latitude 28° 41′ N., longitude 78° 03′ W., and ran a line to the eastward, reaching a depth of 2,845 fathoms, in latitude 28° 43′ N., longitude 76° 26′ W.

From 5 to 5.30 p. m. we swung ship under steam, observing azimuths of the sun on every other point of the compass in order to ascertain errors due to local attraction.

We then steamed to the southward, and at 12.51 a. m. on the 24th sounded in 3,196 fathoms, latitude 28° 34′ 42″ N., longitude 76° 10′ 25″ W. This depth was a surprise to us, as the soundings on the chart to

the northward and southward did not lead us to expect more than 2,800 fathoms. A line was then run to the southward, terminating in 677 fathoms, latitude 27° 38′ N., longitude 76° 23′ 24″ W., thence to the northward and eastward to latitude 27° 51′ N., longitude 75° 53′ 30″ W., where a depth of 2,599 fathoms was found. The wire parted while reeling in, and we lost the specimen cup and thermometer. The break was attributed to an imperfect splice, but we subsequently learned that it was caused by a partial collapse of the drum.

The weather was boisterous during the day, and although the work was carried on successfully, it was at considerable expense of labor and fuel and no little personal discomfort.

The wind continued from east to south during the 25th, with a heavy head sea. One sounding only was taken during the day, in 2,761 fathoms, latitude 27° 30′ N., longitude 75° 35′ W. The wire parted again while heaving in, and the thermometer and specimen cup were lost. The line was continued to San Salvador, or Watling's Island, the greatest depth found being 2,709 fathoms. We reached the island and anchored off Cockburn Town at 9 p. m. on the 26th. The settlement as seen from seaward consists of a small group of white houses, a tall flagstaff, and two or three boat-houses on the beach. In approaching from the northward, Riding Rock Point will be recognized by three isolated palm trees just back of it, overtopping all other foliage. The coast from the point to the settlement is a series of low rocky cliffs, a white sand beach commencing at the latter point. To reach the anchorage, bring the flagstaff to bear east and stand in slowly, keeping the lead going, and anchor in from 14 to 7 fathoms, white sand bottom. Boats land on the sand beach in front of the settlement.

There is a light-house in process of construction on Dixon's Hill, about two miles from NE. point, and one mile from the eastern shore. The tower is of limestone and is being built in the most substantial manner. Its base is 100 feet above the sea, and the center of focus 65 feet above the base, making a total height of 165 feet above the sea. It is to have a first-order lens, and will be completed in about a year.

Water is procured from wells, and is very hard. Good mutton, fowls, eggs, sweet potatoes, and the fruits of the season can be procured at fair prices.

The magistrate, Maxwell Nairn, esq., the only white man living on the island, is a naturalized American citizen, and was formerly a ship-master sailing from Philadelphia. Lieut.-Commander James M. Forsyth, U. S. N., a relative of Mr. Nairn, had written him of our coming, and he had been looking for us for several weeks. He received us very kindly and made prompt and very satisfactory arrangements for the accommodation of a couple of naturalists we wished to leave on the island while the vessel went to Rum Cay. He gave his office for a laboratory and sleeping quarters, and took them to his own table for meals.

Messrs. Lee and Nye were detailed to remain behind, and they were landed on the morning of the 27th with everything necessary for the prosecution of their work. After seeing them established in their new quarters we got under way about noon and ran a line of soundings to Rum Cay, the greatest depth of water being 1,264 fathoms, white coral ooze.

We arrived and anchored in Port Nelson, Rum Cay, at 5.30 p. m., hauled fires, and made preparations for work on and about the island.

We were met here by still other friends and relatives of Lieut.-Commander Forsyth, whom he had informed of our expected arrival. They exerted themselves to make our stay pleasant and rendered material assistance in the prosecution of our work.

The following day being Sunday no work was done. The collectors were away at early daylight on Monday, and their explorations were prosecuted vigorously during the remainder of our stay. On board ship we overhauled the sounding apparatus, and while transferring the wire from the working reel for the purpose of overhauling splices, &c., we found the drum partially collapsed, thus accounting for our loss of wire on the outward trip. We then mounted a new and heavier reel. Should it show signs of weakness, it would be advisable to adopt some other and stronger type, which can, I think, be readily procured.

A plan of Port Nelson and St. George's Bay, or Man-of-War anchorage was made by Lieutenant Scott, assisted by Ensign Hogg.

We made a fair collection of the fishes of the island, but our attempts to gain information regarding their spawning habits resulted in absolute failure, the natives having little or no knowledge of the subject. When questioned about migratory fishes, such as mackerel, shad, and menhaden, they said they were unknown among the islands, but blue-fish were taken at any season of the year. I was unable to identify the blue-fish of the islands with our northern fish of that name, those I saw being "parrot fish," of a deep blue color and called blue-fish by the natives.

We continued our practice of rendering medical aid to the people of the islands where they had no resident physician, the ship furnishing necessary medicines if they could be spared from the stores. Dr. Flint gave a portion of each day to the care of the sick, and his name will be long remembered by the people of Rum Cay for his kindness and attention.

The harbor and settlement of Port Nelson lie on the south side of Rum Cay, about 6 miles east of Sandy Point, the western extremity of the island. The harbor is formed by a reef running westward from Sumner's Point. The channel is narrow and intricate for vessels of more than 10 feet draught, and should not be attempted without a pilot; 18 feet can be carried through the channel.

St. George's Bay, or Man-of-War anchorage, lies to the westward of Port Nelson, and is in fact a part of the same bay, separate names being

given to designate different localities in the same harbor. It is easy of access, the channel being straight and clear, with a depth of 24 feet. A vessel intending to enter St. George's Bay should keep in blue water, outside of the reef, until the conspicuous white house on Cottonfield Point bears N. by E.; then stand in for it until inside the reef, when she may anchor in any desired depth, white sand bottom. This anchorage is safe in all ordinary weather.

The settlement of Port Nelson will be recognized at a distance by a grove of tall cedar trees near the center of the village which overtop all other foliage. The Government flagstaff marks the head of a small wharf having 4 feet of water at its outer end. The white house referred to on Cottonfield Point is about 1¼ miles to the westward of the flagstaff.

A poor quality of beef, good mutton, fowls, eggs, sweet potatoes, and fruits of the season were obtained at fair prices. The water is procured from wells in which the tides rise and fall, and is decidedly hard.

The following brief historical sketch by Lieut.-Commander James M. Forsyth, U. S. N., a native of the island, is replete with interesting facts and reminiscences:

"Rum Cay, one of the Bahama group, is probably identical with Santa Maria, the second island touched at by Columbus. Little is known of its history until the latter part of the eighteenth century, when, with the adjacent islands, it became the refuge of a number of loyalists from the Carolinas and other parts of the United States. Most of these refugees had been engaged in cotton growing in their former homes, owned slaves whom they brought with them, and continued the cultivation of cotton. The island at this time was well wooded, and in clearing for fields the *lignum-vitæ* and the dye woods not only paid all expenses, but gave a fair profit. The cotton, hard wood, and dye woods were annually shipped to England through agents in Nassau, and supplies were received at the island through the same channel. Later on, probably about 1818, the salt industry began to be developed. The island has one of the best salt ponds in the Bahamas, lying convenient to a safe and commodious anchorage. The salt was manufactured by solar evaporation, and exported direct to the United States and British provinces. For a period of about fifty years the island was fairly prosperous. Then the abolition of slavery began to be pressed on the colonists by the British government, causing an unsettled state of affairs until, finally, emancipation was proclaimed. Naturally this worked great changes in the control of labor. The wants of the newly liberated slaves were few and simple, and in a country where the climate was mild and sea and soil readily yielded the mere necessaries of life, the laborer with his new found liberty was quite independent. Some of the proprietors of land became disheartened and left the island. Those who remained found that cotton could not be profitably cultivated with the uncertain labor of their former slaves, and as the supply of valuable woods was

about exhausted, salt became the leading product. From 1840 to 1852 there was exported from Rum Cay between 100,000 and 250,000 bushels of salt yearly, reaching the highest production in 1852. The prices, paid on delivery on board generally cash down, ranged from 10 to 15 cents a bushel; 10 cents was considered fair profit, 12 cents very good, and 15 cents extra. In November, 1853, a severe hurricane struck the island and caused great damage. The sea broke into the reservoir of the salt pond, injured the canals and wharves, and gave the salt business a set-back from which it never fully recovered. During the Crimean war, 1854–'56, prices went up to 25 cents a bushel. The demand exceeded the supply, for the damage inflicted by the 1853 hurricane limited the production. Since that time the output of salt has gradually decreased, and is now small, the shipment of a cargo being an event. This decline of production was due to various causes, foremost among which were competition, sharply pressed, and the protective tariff placed on salt by the United States. Early in the fifties the salt ponds at Inagua and Fortune Islands were taken hold of by enterprising men who commanded capital. Superior facilities for loading and quicker dispatch were promised to vessels and great pains taken to secure charters in the United States and at St. Thomas (at that time a noted port of call for West India traders who were in search of homeward bound cargoes). This turned the trade into a new channel. Then the United States tariff on salt cut the price down so low that profit on the industry was impossible. With the loss of this trade the population decreased, people leaving the island to search for employment. In 1850 the population was about 800, of whom 35 were whites. At present it is about 350, of whom 3 are whites. The inhabitants are as a whole an industrious, law-abiding people. Their deliberate methods of labor are at times aggravating to foreigners, yet they are capable of long-continued and severe effort and will work faithfully when sure of fair wages and certain pay. At plodding, steady labor they do not excel, a trait more the effect of climate than anything else. In the season of salt raking and the loading of vessels their quick, cheerful mode of work cannot be surpassed. The strong hold the salt industry had on the laboring class was due to the fact that the main work was done in large companies with song and excitement, the returns were prompt and distributed almost at once, whilst there were long periods when the laborer was at liberty to enjoy his ease in a fine climate and work as he pleased on his own little holding. Emancipation was disastrous to the proprietors, but shows a strong balance in its favor in the comparative happiness and comfort it has given to the colored people. Even those who mourn most over the decadence of the Bahamas must admit that it has proved to be the greatest good to the greatest number. At Rum Cay all business is in the hands of the blacks, several of whom show marked ability, integrity, and intelligence. There are several churches and a public school, where the rudiments of an English education are taught. The

inhabitants of this island as a community were never wreckers. They are skillful and fearless boatmen, good fishermen, and make capital sailors on the small craft of the Bahamas. They still cling to the hope that the removal of the United States tariff on salt will restore some of the old-time prosperity, but there is doubt if such would be the case. The trade has sought new channels and is hard to turn back; and new deposits of salt have been found in the United States. The use of canned provisions for sea life, and the supply of armies and navies, has lessened the demand for salt provisions, so that the future of the island must depend on agriculture and stock raising.

"Pineapple culture has been started of late years, the first cargo being shipped to the United States about 1878. At present four or five cargoes are shipped every year, and the prospect for success is good. Fiber plants of several varieties grow readily and efforts are being made to cultivate them. Some attempt is also being made to establish cocoanut groves. The agricultural products of the island were never sufficient to support the population, mainly because more attention was given to salt raking as more remunerative. Supplies were obtained from Watling's and Long Islands. At present, with a reduced population, the products are still insufficient to supply the people, though Indian corn, Guinea corn, sweet potatoes, yams, peas, tomatoes, beans, okra, melons, bananas, plantains, and oranges are produced. Cattle, sheep, and hogs are reared to some extent and shipped to Nassau. Under a careful system of agriculture these products might be largely increased, but unfortunately a method of working land on shares, established just after emancipation, has educated the laborer into carelessness as to the life of the soil. No manuring is attempted, and land is worked until it is exhausted; then new tracts are cleared. A liberal use of fire in clearing often does harm. The soil is light and mainly composed of vegetable mold and is injured as to producing qualities by the passing over it of the flames. This working on shares, with its inherent defects, is not the fault of the colored people, but is rather a legacy from the old slavery times, when, after emancipation, the freedman had no capital but his daily labor, whilst the proprietors held the land. The only way to bring land and labor together was to start this share culture, one-third of the product going to the land owner. This system is, however, steadily being displaced by that of the small freeholder. The colored man's first ambition is to own his house and plot of ground. The descendants of the slaves are therefore buying land from the government and the descendants of the slave-owners, often becoming owners of the land where their forefathers were held in slavery, so that at the present time a large portion of the island is owned by the colored race. The soil will give rich returns when carefully cultivated, and as a quiet home for the small freeholder of the colored people it can hardly be equaled. A bad year may come, caused either by drought or hurricane, but a little forethought in the good years will render the owner of five or ten acres of land more independent and comfortable than a laboring man can pos-

sibly be anywhere else in the world. Land is cheap, government lands selling at five shillings sterling per acre. There is no tax on land, so with ordinary industry a home may easily be kept. If there was a sure market and quick transportation for fruit and vegetables production would be stimulated, for each owner would strive to keep his holding at its best. The day may come when, with the waters of the Bahamas used as a winter cruising-ground by American yachtsmen, and Nassau the headquarters and winter resort it should be, there will be the desired increased demand for out-island produce and an incentive given to more careful and thorough work."

At 5.50 a. m., March 8, we got under way and ran a line of soundings to Conception Island, the greatest depth being 1,017 fathoms. Arriving off the western side of the island about 11 a. m. the naturalists went on shore for a few hours. We, in the mean time, steamed several miles off shore and lowered the trawl in 1,169 fathoms, white coral ooze bottom. After dragging a few minutes it fouled on one of the projecting coral rocks which crop up at intervals throughout the Bahamas, even in the deepest water. We succeeded in getting the trawl on board, with the net somewhat torn, after several hours' effort, only to find a few shrimp, a small octopus, and a few minute forms in the bag. Our experience has been the same on all coral sand or ooze bottoms, which seem to be almost barren of life.

The naturalists returned at 2.45 p. m. with a large number of birds and, the trawl being up, a few minutes later we started ahead, running a line of soundings to Columbus Point, Cat Island, the greatest depth being 845 fathoms, developing a connecting ridge between the islands.

We sounded in 22 fathoms on the reef off Columbus Point about dusk, and a few minutes later slowed down and put over the large surface tow-net. Very little life was found. During the night a line of soundings was carried to Watling's Island, developing a depth of 2,482 fathoms. At daylight on the morning of the 9th we anchored off Cockburn Town, took Messrs. Lee and Nye on board, and returned to Rum Cay, anchoring in St. George's Bay at 4.40 p. m. We were under way at 6.15 a. m. on the 10th, and ran a line of soundings to Cape Sta. Maria, north end of Long Island; thence to the SW. end of Cat Island, where we arrived at 5.27 p. m. and anchored for the night at Hawk's Nest anchorage. The greatest depth found during the day was 1,398 fathoms, between Rum Cay and Long Island, and 1,056 fathoms between the latter and Cat Island.

Hawk's Nest anchorage is safe and convenient, with northerly or easterly winds. We anchored in 7 fathoms, white sand bottom, the buildings on Hawk's Nest hill bearing ENE., with the western extremity of the reef about 300 yards distant.

The naturalists landed at daylight the following morning and returned at 10.30 a. m., when we got under way and ran a line of soundings across Exuma Sound to the NW. end of Exuma Island, thence to the south end of Eleuthera Island, arriving and anchoring at Miller's

anchorage at 6.43 a. m. on the 12th. The naturalists landed an hour later and made a successful hunt for birds, reptiles, &c.

At 1.50 p. m. we got under way and made two hauls with the tangles on the edge of the reef in 36 and 369 fathoms. The bottom was exceedingly rough, the tangles fouling soon after they landed on the reef. We secured very few specimens beside fragments of coral rock which were detached by dragging the apparatus over the uneven surfaces. Finding the work difficult and almost wholly unproductive, we returned to our anchorage at 4.55 p. m.

We were under way again at 1.16 a. m., March 13, and ran a line of soundings to Wide Opening, thence to the head of the Sound. At 2.05 p. m. we lowered the trawl in 791 fathoms, white coral ooze, landing it on deck at 4.53 p. m., with a few shrimp, a fragment of a holothurian, a quantity of dead coral, &c., the mud-bag being filled with the white, pasty ooze of the bottom.

The results of this haul confirm our former experience of the barrenness of waters where the bottom is composed of coral sand or ooze. The haul finished, we started for the channel between Eleuthera and Little San Salvador Islands, sounding 1½ miles inside the reef in 476 fathoms, and one-half mile outside in 926 fathoms. The depth increased to 2,664 fathoms 30 miles to seaward in a northerly direction, latitude 25° 2′ 45″ N., longitude 75° 43′ W. Having completed the line, we steamed for N.E. banks off Northern Eleuthera, running a line of soundings from 11 fathoms on the banks, to 2,663 fathoms, latitude 25° 44′ 45″ N., longitude 76° 23′ 15″ W. The last sounding was taken at 5.10 p. m., March 14. We then stood for Nassau, New Providence, under low speed, arriving and mooring in the harbor at 7.15 a. m., March 15. We were visited by the harbor-master and health officer, and promptly granted pratique. A boat was sent for the United States Consul, T. J. McLain, who visited the ship. At 3 p. m., accompanied by the United States consul, I made an official call on his excellency the governor, Henry A. Blake. It being the closed season, a license for our naturalists to shoot birds for specimens was requested, and granted as follows:

GOVERNMENT HOUSE,
Bahamas, March 17, 1886.

In virtue of the authority vested in me by the terms of the 48th Victoria, chapter 10, I hereby grant permission to the undernamed persons to take, during the year 1886, whatever birds or eggs of birds, protected by the provisions of the said act, they may require for the purposes of the scientific expedition of which they are members.

HENRY A. BLAKE,
Governor.

Jas. E. Benedict, C. H. Townsend, F. L. Washburn, Thomas Lee, W. Nye, jr.

HENRY A. BLAKE,
Governor.

The birds mentioned in the act are: Wild pigeons, partridges, doves, flamingoes, boobies, man-of-war birds, pimlies, noddies.

The governor very kindly sent us the following letter also, which is evidence of his friendly interest in our work, and desire to assist in its prosecution:

GOVERNMENT HOUSE,
Nassau, March 17, 1886.

To whom it may concern:

The governor requests that public officers and other inhabitants of the islands of this colony will afford every assistance in their power to the naturalists on board the U. S. S. Albatross, who are engaged in scientific investigations.

HENRY A. BLAKE,
Governor.

The work of collecting and investigation was carried on vigorously during our stay in port, and large numbers of rare and interesting specimens were obtained.

His excellency the governor visited the ship on the 17th, and spent several hours in inspecting the apparatus, examining the specimens, and familiarizing himself with our methods. He has a good knowledge of natural history, and is doing useful work in that branch of science himself; hence his study of our apparatus and methods was with unusual interest and intelligence.

At 6.10 a. m., March 24, we left the harbor of Nassau, and ran a line of soundings to the south end of Great Abaco, the maximum depth being 1,490 fathoms. At 5.25 p. m. we anchored off Soldiers' Road Settlement and landed Messrs. W. Nye, jr., and C. H. Townsend, with necessary supplies and apparatus for the prosecution of their work while the vessel was absent. This anchorage is safe with winds from NW. and N. to E. The Albatross anchored in 7 fathoms, white sand bottom, Hole-in-the-Wall light-house bearing ENE. three-fourths E. in sight over the land. We left the anchorage at 8.10 p. m., and ran a line of soundings through NW. Providence Channel to Great Isaac's, thence proceeding direct to Key West, Fla., where we arrived and anchored at 2.05 p. m., March 26. The flagship Tennessee, flying the flag of Acting Rear-Admiral James E. Jouett, the Powhatan, Galena, Swatara, and Yantic were at anchor in the harbor, and the U. S. Coast and Geodetic Survey steamer Blake arrived during the evening. The fleet left at 11.45 a. m., March 28, and the U. S. S. Brooklyn came in and went to the coal wharf.

At 1.40 a. m., on the 30th, fire broke out in a building adjoining the San Carlos theater, and quickly spreading among the dry wooden structures in the vicinity, soon became totally unmanageable in the absence of suitable fire apparatus. A working party of thirty men, under command of the executive officer, Lieutenant Waring, was sent on shore from this vessel at 2 a. m., and fought the fire until 3 p. m., when it was under

control. Ensigns Benson and Hogg and Mr. Thomas Lee volunteered their services, and rendered valuable assistance. The party went armed with axes and a coil of rope for pulling down and demolishing buildings, as that was about the only method of fighting the fire in the absence of water and fire-engines. Large parties well officered were sent from the Powhatan and Brooklyn, and the crew of the revenue-cutter Dix were early at the scene of fire. Captain Matthews, of the Brooklyn, with his torpedo corps, leveled many buildings, which tended to narrow the track of the flames as they swept through the city toward the water.

Steam was raised as soon as it was seen that the conflagration was becoming serious, and every preparation made to get under way should assistance be required in moving vessels from the wharves. Several men were detailed to carry hot coffee and hard-bread from the ship to the parties on shore, and about fifty gallons were dispensed in this way, much to the comfort of both officers and men. All the business portion of the city, including the wharves, was burned, beside several large cigar factories and many dwellings. The government property was saved.

We commenced coaling at 6.45 a. m., on April 2, and finished at meridian on the 3d, having taken on board 127 tons.

The fire disarranged all business matters on shore so much that we were unable to procure money for the use of the vessel, fresh water for the boilers, or stores for officers and crew, hence it was determined to go to Havana for the articles required. As there was a wide break in the soundings between American Shoal, on the Florida coast, and Matanzas, we took the opportunity to run a line between the points mentioned. Leaving port at 5.10 p.m. we commenced the line off American Shoal in 145 fathoms, and completed it at 12.45 p.m., April 4, when we started for Havana under steam and sail, arriving and mooring at one of the government buoys at 6.30 p.m. The health officer visited the ship and granted pratique; and officers from Spanish and German men-of-war in port called, tendering the usual civilities. These calls were returned on the following day, when I also visited the commodore (acting admiral) and captain of the port.

The services of the government water-boat were secured and the boilers filled on the 6th, preparations for sea being completed in the mean time. At 7.30 a. m., April 7, we left port and spent the forenoon hauling the tangles near the reef to the eastward of Morro Castle, taking 126 *Pentacrinus*, a variety of coral, crustacea, shells, &c. The trawl was lowered at 2.09 p. m. in 1,025 fathoms, and landed on deck at 4.45; a water haul. The current was so strong that the trawl failed to reach the bottom. We then started for Key West, arriving and anchoring off the government wharf at 6.17 a.m. the following morning.

At 7 a. m. we went alongside the Freeda A. Willey and took from her 50 tons of coal which filled the bunkers and bags, about 30 tons being carried on deck. We cast off and went to sea at 5 p.m., and at 6 a.m.

the following day put the dredge over in 56 fathoms off Carysfort Reef. Thirteen hauls of dredge, tangles, and trawl were made during the day between Carysfort and Fowey's Rocks, in from 56 to 369 fathoms. Large numbers of minute shells, numerous crustacea, small fish, cephalopods, &c., were taken. We continued dredging till dark, then steamed across the straits to Great Isaac's and ran a line of soundings thence to SW. Point, Great Bahama Island; after which the northern part of NW. Providence Channel was sounded, the greatest depth, 869 fathoms, being found 18 miles west of Burrows Cay. The last sounding was taken at 10.16 p. m., and we then steamed direct for Soldiers' Road anchorage, Great Abaco, arriving at 5.40 a. m., April 11.

While engaged in sounding the NW. Providence Channel, we encountered a strong NW. current, exceeding 2 knots per hour, setting into the bight, and a counter-current of some force to the southward and eastward along the line of reefs from Burrows to Gordo Cays. Brisk to fresh easterly winds prevailed.

Boats were sent for Messrs. Nye and Townsend, who had been on the island since March 24. They appeared in good condition, and reported fair success in collecting. Everything being on board, we left at 8.30 a. m. for Tongue of Ocean, anchoring in 4½ fathoms on the eastern bank at 10.40 p. m. We were under way again at 5.20 the following morning, and at 7 a. m. anchored off Green Cay and landed the naturalists. The anchorage is on the west side of the cay, the northwest and southwest points projecting slightly, forming an open bay protected from easterly winds. The bottom is white sand and there is sufficient room for vessels to anchor and swing.

The island is uninhabited at present, but gives evidence of having supported quite a large population in earlier times. The collectors returned at 10.45, much pleased with their success and anxious for another opportunity of landing on the cay. We were under way at 11 a. m., and steaming to the southward passed Booby Rocks, then hauled up to the southward and eastward for the extremity of Tongue of Ocean, sounding and putting the tangles over in 36 fathoms at 5.30 p. m., latitude 23° 34′ N., longitude 76° 33′ W. It was an exceedingly rough coral bottom, and we anticipated a variety of specimens usually found on such ground, but our catch was confined to a few sprays of gorgonian coral, sponges, mollusca, and crustacea. Steaming W. by S. one mile the tangles were again lowered in 369 fathoms, the same rough and barren bottom being encountered.

The large surface tow-net was put over a little after dark with equally poor success, very few specimens being taken. A line of soundings was run to High Point, Andros Island, during the night, and thence to Booby Rocks, where we anchored at 7.10 a. m., April 13. The depth of the southern portion of Tongue of Ocean developed by our soundings averaged about 750 fathoms, ranging from 711 to 805

fathoms, with the bottom of white coral ooze as found throughout the Bahamas.

The naturalists landed as soon as we came to anchor, hoping to get a few specimens of sea birds, numbers of which were seen on the wing hovering over the rocks. They returned in about an hour with two specimens of boobies, the only species of bird they saw. We then got under way, and at 9.46 lowered the tangles in 97 fathoms off the west side of Green Cay. It was an exceedingly rough bottom, and we expected a rich haul, but found nothing but a few gorgonian corals, barnacles, and sponges. The dredge was then lowered in 140 fathoms, coral sand bottom, but it soon caught on a coral lump and parted the rope at the hoisting engine. The end caught under the guard on the dredge-block, which for the second time held the rope till we could clamp and secure it. The bottom was found to be exceedingly barren, a few small shells being the only specimens brought up by the dredge. We anchored off Green Cay at 11.30 a. m., and landed the naturalists. They returned at 1.30 p. m., when we got under way and resumed our work of sounding, finally anchoring for the night on the bank in latitude 24° 29′ N., longitude 77° 15′ W.

We were under way the following morning at daylight and continued the soundings. The weather was clear and pleasant with light airs and calms during the forenoon, but later in the day the wind increased to a moderate gale from north with thick rainy weather and heavy sea. We continued work until dark, then hove to under the lee of Thompson's Cay until daylight the following morning, when a line of soundings was run to the west end of New Providence Island, completing the work in Tongue of Ocean.

The gale continued with a heavy and exceedingly uncomfortable sea. The bar at the entrance of Nassau Harbor was breaking so heavily that we were unable to enter, and were forced to make an anchorage in Southwest Bay to leeward of the island.

The weather appearing to have moderated somewhat on the 17th, we got under way and steamed to the vicinity of the bar which we found still impassable, and were obliged to return to our anchorage in Southwest Bay. Another attempt was made to enter on the 19th, but the bar was still breaking heavily and it was not until the 21st that we succeeded in passing it. We reached the harbor at 11.30 a. m. on that day, received the usual visits, and, during the afternoon, accompanied by the United States consul, I made an official call on the governor.

The naturalists continued their work while we were detained at Southwest Bay, and, after our arrival in Nassau, the fishing and sponging industries of the Bahamas were investigated as thoroughly as our limited time would permit. The results of their inquiries will be found in the naturalist's report.

During the prosecution of our work among the islands we have encountered brisk to strong winds from various points of the compass,

easterly winds prevailing, and much squally weather. These conditions are normal for the months of January and February, but rather exceptional for March and particularly for April. We left Nassau April 30, and ran a line of soundings from Egg Island reef to a point of the shoal off Hole-in-the-Wall, to develop a shoal said to exist in mid-channel. An old shipmaster who traded for many years among the islands said he had fished on it and knew that it existed. We found a depth of 2,222 fathoms on the spot indicated, and saw no signs of shoal water. It is more than probable that the captain fished on the extremity of the reef, making off 10 miles or more from Hole-in-the-Wall, and it is not at all strange that he should think himself half way across the channel, particularly if he was in a small vessel.

From Hole-in-the-Wall we steamed to Little Guana Cay, and sounded in 940 fathoms, latitude 26° 40′ N.; longitude 76° 49′ 30″ W.; then ran a line to the northward and eastward, perpendicular to the coast, to latitude 26° 50′ N., longitude 76° 04′ 45″ W., reaching a depth of 2,670 fathoms. The course was then changed to the northward and westward and a sounding taken in 2,715 fathoms, latitude 27° 11′ N., longitude 76° 19′ W. The next cast gave 943 fathoms, latitude 27° 41′ N., longitude 76° 41′ W. From this point a line was run to the westward to latitude 27° 57′ 30″ N., longitude 77° 27′ 30″ W., in 660 fathoms. The trawl was lowered at this station at 8.29 a. m., May 2, and a large number of pteropod shells, a few fish, a single specimen of *Argonauta*, dead shells of various species, and a quantity of foraminifera were obtained.

A line of soundings was then run to the southward and westward, striking the banks off Grand Cay. At 5.45 p. m. we lowered the trawl in 338 fathoms, coral sand, latitude 27° 22′ N., longitude 78° 07′ 30″ W., and made a successful haul. Among the specimens were four species of sea-urchins, dogfish with young, munidas, two species of gorgonian coral, shrimp, crabs, glass sponges, brachiopod shells, fish, &c. At 7.20 we steamed to the northward and at 8.20 stopped for forty minutes to use the submarine light. A few good specimens were procured, but the waters were exceedingly barren. The course was resumed at 9 p. m., and at 5.24 a. m. the following day the trawl was lowered in 572 fathoms, latitude 27° 58′ 30″ N., longitude 78° 24′ W. Five hauls were made during the day between the above position and latitude 28° 40′ N., longitude 78° 46′ W., in 504 fathoms. The character of the specimens taken in all the hauls was much the same; among them were shrimp, starfish, many fine specimens of flabellum, hermit-crabs, barnacles, sea-urchins, a variety of corals, pennatulas, holothurians, hydroids, several species of fish, &c., beside a large quantity of foraminifera washed from the contents of the mud-bag.

The large tow-net was put over after dark and the submarine lights used, but the surface was barren of life. At 11 p. m. we steamed to the northward and westward, and at 5 30 a. m. the following morning

lowered the trawl in 438 fathoms, gray sand, latitude 29° 16′ 30″ N., longitude 79° 36′ 30″ W. Five hauls were made during the day between the above position and latitude 29° 47′ N., longitude 80° 05′ 45″ W., in 263 fathoms, fine gray sand. The first three hauls brought up large masses of branching coral of various species, besides a few fish, sea-urchins, shrimp, &c. The last two had very little coral, but a variety of other specimens, among which were several species of crabs, mollusca, worm-tubes, shrimp, sea-urchins, and numerous species of fish. The surface net and submarine light were used successfully during the evening.

The working ground of the day was under the bed of the Gulf Stream and extended diagonally across its course. At 9 p. m. we started ahead to the northward and eastward, and at 5.20 a. m., May 5, lowered the trawl in 270 fathoms, gray sand, latitude 30° 47′ 30″ N., longitude 79° 49′ W. Seven hauls were made during the day between the above position and latitude 31° 31′ N., longitude 79° 05′ W., in 277 fathoms, coarse brown sand. The results of the day's work were remarkable for the enormous loads of coral brought up by the trawl and tangles. Other specimens were taken in considerable numbers also, among which may be mentioned hydroids, siliceous sponges, sea-urchins, sea-anemones, and several varieties of fish. A large porpoise was caught during the day, and its skeleton preserved for the National Museum.

The bottom was so thickly covered with coral that the trawl was soon wrecked, and the tangles were used in subsequent hauls. A remarkable feature of the day's work was the capture of nine sharks, of a species unfamiliar to us. One of them was preserved in salt for future examination at the laboratory of the National Museum. The stomach of one was found to contain about a gallon of oil of a reddish tint, which smelled like ordinary fish-oil. Unfortunately most of it was lost, but we saved about half a pint for examination. The presence of this large quantity of oil in a shark's stomach shows that it had fed bountifully on it a short time before, but it would be difficult to conjecture where it could have found it. The stomach contained nothing else.

We steamed to the northward and eastward during the night, and at 5.17 a. m. on the 6th lowered the trawl in 240 fathoms, gray sand and coral, latitude 32° 26′ N., longitude 77° 43′ 30″ W., and made seven hauls during the day between that position and latitude 32° 40′ N., longitude 76° 40′ 30″ W., in 782 fathoms, light gray ooze.

The results of the day's work were very satisfactory. The earlier hauls were on coral bottom and the nets were badly cut, but later in the day, after reaching deeper waters, we found smooth bottom, from which we brought up a great number and variety of specimens. The various forms of deep-sea fish were unusually abundant, besides sea-anemones, corals, hydroids, hermit-crabs, shrimp, cephalopods, pennatulæ, squid, shells, glass sponges, ophiurans, holothurians, &c. The

working ground of the 5th and 6th was, like that of the 4th, under the bed of the Gulf Stream.

The winds, which had been light to moderate from the 2d, increased during the afternoon of the 6th, and at midnight, when the last haul was finished, was blowing a brisk breeze from SW., with indications of approaching bad weather.

The submarine light was used until about 2 a. m. on the 7th, when we started ahead under steam and sail for the capes of the Chesapeake. The weather became overcast during the afternoon and the wind increased, with falling barometer. At 8 p. m. there was a moderate gale from south, with thick threatening weather and incessant thunder and lightning, followed by a furious squall half an hour later. We were near the northern verge of the Gulf Stream off Cape Hatteras, where the sea rises with the wind and assumes a magnitude entirely disproportionate to the apparent cause.

We passed Cape Henry at 7.30 a. m. on the 8th, and the weather still being thick and unsettled, anchored in Hampton Roads until the following morning, when, the storm having passed, we steamed up the bay, anchoring for the night off Upper Cedar Point. We were under way at daylight on the 10th, and arrived at the navy-yard, Washington, D. C., at 10.50 a. m.

We remained at the navy-yard overhauling and refitting for the summer's cruise until June 30, when we left for Norfolk, Va., arriving the following morning.

At 7.30 a. m., July 2, we went into dry-dock, and the work of scraping and painting the bottom commenced. Considerable rust was discovered, but very few barnacles or other marine life. The vessel was last docked at Baltimore May 27, 1885, and has therefore been a little more than thirteen months in the water; five months at sea, three months in the Potomac river, followed by another three months at sea in West Indian waters, and finally about two months in the Potomac. These intervals in fresh water killed the marine growths, thus accounting for the comparatively smooth bottom. The rust was readily accounted for, and was excessive wherever the dredge-rope or sounding-wire had been in contact with the bottom. There was much rust near and below the water-line, where the paint was rubbed off by ice when we were steaming down the Potomac *en route* to the West Indies in February last.

We found another small piece gone from a broken blade on the port propeller, and to compensate for the loss of weight and surface, an equal area was cut off the opposite blade. The outboard bearings are wearing somewhat, and it will be necessary to reline both shafts when the vessel is docked again.

The painting having been finished, the ship was hauled out of dock at 1 p. m., July 7, and at 2 p. m. we commenced coaling, finishing at 2.30 p. m. on the 8th, having received $120\frac{200}{2240}$ tons. At 5.10 p. m. we

cast off from the wharf and proceeded down the Elizabeth River. The weather was clear and very warm. We passed Cape Henry at 7.45 p. m. and at 9.45 set our course for Wood's Holl, Mass. The weather became overcast, with rain-squalls and fogs during the night, continuing until our arrival, at 2.30 p. m., July 10.

At 5.10 p. m., July 15, we left for a dredging trip, and passing Gay Head at 7.35 p. m. we set our course to the southward during the night. The weather was clear and pleasant, with fresh breeze from southwest.

At 9.03 a. m. the following day we sounded in 555 fathoms, latitude 39° 50′ N., longitude 70° 26′ W., and while reeling in the stray line parted, losing one specimen cup and one N. Z. thermometer with Tanner improved case. The beam-trawl was lowered at 9.27 and landed on deck at 11.16, with one octopus, two large crabs, six species of fish, archasters, maldana, and foraminifera. Two other hauls were made during the day in latitude 39° 43′ N., longitude 70° 29′ W., and latitude 39° 38′ N., longitude 70° 22′ W., respectively, resulting about the same as the previous haul, with the addition of several benthodytes and sea-spiders. The surface net was towed in the early morning and evening with meager results.

At 4.30 a. m., July 17, we sounded in 887 fathoms, brown ooze, latitude 39° 33′ N., longitude 70° 50′ W., and at 5.04 put over the beam-trawl. It was landed at 7.42 with one specimen of *Cyclothone lusca*, but no bottom specimens. Two other hauls, in 1,106 and 1,137 fathoms, latitude 39° 35′ N., longitude 70° 54′ W., and latitude 39° 35′ N., longitude 71° 02′ 30″ W., respectively, were made during the day, securing a large quantity of Ophiomusium, 5 species of fish, benthodytes, 1 octopus, and numerous archasters. Serial temperatures were taken to 1,000 fathoms. The surface net was used in the evening as before, but the results were uninteresting.

The following day six stations were occupied, in depths from 326 to 835 fathoms, between latitude 39° 52′ N., longitude 71° 20′ 45″ W., and latitude 39° 37′ N., longitude 71° 08′ W. The results were the same as on the previous days, with the exception of a specimen of *Onus rufus*, taken in the last haul. Serial temperatures were taken to 500 fathoms, and the surface net towed without success. At 9.05 p. m. we started for Wood's Holl. Soon after entering Vineyard Sound the following morning we discovered the steamer Gate City aground on the beach east of Robinson's Hole, Naushon Island, and, communicating with her, learned that she had gone ashore the previous evening during a dense fog. We offered assistance, but there was nothing to be done pending the arrival of divers, who had been sent for. We then resumed our course, and in a few minutes saw the steamer Panther aground near Job's Neck, Naushon Island, and in response to our offers of assistance, they requested us to aid them in getting afloat. We took a hawser from her stern and towed her off the rocks, when she proceeded to New Bedford.

We arrived and moored to the Fish Commission wharf at 10.30 a. m. The captain and agent of the Gate City called about 11.30 and requested us to tow Davis's wrecking scow to the stranded vessel, as it was very important that the divers should be on the spot as soon as possible, and there was no other means of getting them there for several hours. We left soon after with the scow in tow, delivered her at the steamer about 1 p. m., and returned to port.

We remained at the wharf, coaling ship, overhauling apparatus, and making necessary repairs to boilers, until 1.40 p. m., August 2, when we proceeded to sea under the following orders:

U. S. COMMISSION OF FISH AND FISHERIES,
Wood's Holl, Mass., July 29, 1886.

SIR: As soon as the Albatross is ready you will make a cruise to the eastward, for the purpose of determining the existence and, if possible, the character of certain banks which are believed by some to exist, but which, so far, have not been properly sounded and examined.

In connection with this inquiry you will follow, as far as convenient, the suggestions of the Hydrographic Office of the U. S. Navy as embodied in a letter from Commander Bartlett.

A particular point to be examined is the so-called Hope Bank; another is in the vicinity of the Flemish Cap, and also an alleged marine ridge connecting Flemish Cap with the Azores.

In the course of this voyage you will of course take occasion, by sounding, trawling, and dredging, to ascertain any physical or biological characters of the region.

In consequence of Mr. Benedict's resignation, Mr. Thomas Lee, the assistant naturalist, will have charge of the natural history work, and of the various operations of making collections and preserving them for transfer to Wood's Holl.

The length of time during which the voyage is to last is left to your discretion. The principal object of finding and defining the banks in question is to furnish new grounds to the American fishermen, and you will therefore take such steps as are in your power to determine their economical value, by securing full collections of the fishes themselves and the animals that serve them for food.

You are authorized to stop at any port in the British Provinces for the purpose of taking in coal and supplies.

As opportunity presents you will communicate by telegraph your whereabouts and the general condition of the vessel and those on board.

Very respectfully,

SPENCER F. BAIRD,
Commissioner.

Lieut.-Commander Z. L. TANNER,
Commanding Steamer Albatross.

We steamed to the eastward through Vineyard Sound and over Nantucket Shoals. The weather was pleasant, but the barometer was falling rapidly and a heavy thunder-shower approaching from the northward and westward. It followed along the land, gradually gaining on us, until, off the east end of Nantucket, the storm finally passed ahead and across the bow.

The officer of the deck reported seeing on two occasions, between 8 and 10 p. m., several pieces of floating ice from 8 to 10 feet square and 5 feet thick. Ice in this locality in August is unusual, if not unprecedented.

We had light southerly winds and moderate swell during the night, with pleasant weather and passing clouds. A strong NW. wind was blowing at noon on the 3d, and increased to a moderate gale later in the day.

The following is a copy of the Hydrographer's letter, referred to in the preceding orders of the Commissioner:

BUREAU OF NAVIGATION, NAVY DEPARTMENT,
Washington, D. C., July 16, 1886.

DEAR SIR: The receipt of your letter of July 13 is acknowledged. I send to-day copies of Hydrographic Office charts 21*a* and 22*a*, on which I have marked in red pencil the position of possible dangers. The records of these are very meager, and would be of no assistance to you. I have also indicated by blue pencil crosses where it is desirable to have soundings. Of course any others that you can get will be useful.

I am inclined to think there is a submarine ridge extending from the Azores to the Flemish Cap, hence I have marked a line to develop it. This may be the mackerel grounds you have been looking for.

The line across the old position of Hope Bank will develop it in a north and south direction, if it exists. Your line (referring to your work of last year) runs east and west.

Beaufort and Milne Banks ought to be developed, and the vicinity of Zaragosa Rock ought to be closely examined. If you are going to the eastward of the Azores I should like to know it, as there is a host of reported dangers all around these islands.

Very respectfully,

J. R. BARTLETT,
Commander, U. S. Navy, Hydrographer.

Lieut.-Commander Z. L. TANNER, U. S. N.,
Commanding U. S. F. C. Steamer Albatross.

The first line of soundings indicated by blue pencil crosses on Hydrographic Office chart 21*a*, referred to in the above letter, began at latitude 40° 14′ N., longitude 65° 56′ W., where, notwithstanding the prevalence of a gale, we sounded, at 2.10 p. m., August 3, in 2,224 fathoms. We carried the line to the eastward to latitude 40° 20′ N., longitude 64° 54′

W., in 2,575 fathoms, thence to the position assigned to Hope Bank, where eleven soundings were taken at intervals of about 5 miles, the depths ranging from 1,930 to 2,069 fathoms. On the position assigned the bank, latitude 41° 29′ 28″ N., longitude 63° 17′ W., we found a depth of 1,969 fathoms. Five soundings taken by the Albatross last year form another line from 5 to 10 miles farther south.

Leaving the reported position of Hope Bank on the morning of the 5th, we ran a line in a northeasterly direction to Sable Island Bank. The depths decreased gradually, showing no evidence of outlying banks or shoals. This line was recommended by the Hydrographer.

On the morning of the 6th we discovered an unexpected error of the compass, which had carried us about 20 miles out of our course during the night, thus throwing discredit on our steering-card. As we were entering the region of fogs it was necessary to ascertain our compass errors as accurately as possible; accordingly, at as early an hour in the afternoon as practicable, we swung ship under steam, observing azimuths of the sun, from which a table of errors was constructed. A comparison of the card thus obtained, with that we had been using, not only accounted for the deviation from our course, but demonstrated the fact that something was wrong. A search occupying the remainder of the day and night resulted in the discovery of a piece of iron pipe, 1¾ inches outside diameter and 8 feet in length, deposited in the seine-boat on the starboard side of the deck. The forward end of the pipe was about 8 feet from the compass and 1 foot 6 inches below the card. The cause of disturbance being found and removed, a new card was made by swinging the ship on the 7th, the results corresponding nearly with observations in Narragansett Bay.

A line of soundings was then run between Banquereau and Grand Bank, about 60 miles to the southward of our line last year, in from 1,780 to 1,172 fathoms.

At meridian, August 8, we sounded in 34 fathoms on Grand Bank, latitude 44° 52′ N., longitude 50° 25′ W., and put over the hand-lines baited with menhaden. Two cod and two haddock were taken, thus confirming our former experience that menhaden are worthless as bait for cod on the Grand Bank. Another trial was made at 6.12 p. m., in 35 fathoms, without taking a fish.

The significance of hydrographic soundings 1,042 to 1,047, inclusive, in 35, 35, 35, 38, 41, and 115 fathoms, will be made apparent by reference to H. O. chart 21*a*, where the contour of the eastern edge of the Grand Bank is distorted, apparently, on the evidence of a single negative sounding.

The line was continued east on the same parallel to develop a bank referred to in the following extract from a letter of Capt. J. W. Collins of the U. S. Fish Commission schooner Grampus, dated Wood's Holl, Mass., July 10, 1886:

"Referring to our conversation of this date, relative to the possible future movements of the Albatross, I beg to submit to your consideration the following:

"On the general charts of the North Atlantic a small bank is laid down to the eastward of the Grand Bank, perhaps about 200 miles distant from the latter, and about on the 45th parallel of north latitude. This bank, on which are marked depths approximating 75 to 100 fathoms, has long been an object of much interest to the Gloucester fishermen, and much speculation has been indulged in as to whether the bank really exists or not. If so, it is universally believed that cod and halibut may be found there in great abundance, and its authentication would, no doubt, prove a bonanza to the fishermen.

"If it does not exist, the settlement of the question would prove not only interesting, but extremely valuable to the fishermen, since they may be prevented from spending their time in fruitless search for the bank.

"The Albatross is so eminently well adapted to making this research that I trust I may be pardoned for hoping she will look for the place in question if her other work takes her in the vicinity of the Grand Bank during the summer.

"The value of such work may be fairly illustrated by the fact that, a short time ago, while the Grampus lay in Gloucester Harbor, one of the captains came on board who was about to sail on a halibut trip. Incidentally he told me it was his intention to try to find Hope Bank when he got to sea. I told him that it had no existence except in the imagination of the person who reported it, and that the Albatross had found 2,000 fathoms where the bank is laid down.

"This information not only surprised him, but pleased him very much, for he said it would practically save him (and another vessel which was going to make the attempt in company) a broken trip, since he had determined to spend a week or ten days in the search."

The depth found 100 miles east of the Grand Bank was 1,916 fathoms, increasing to 2,658 fathoms 200 miles farther east. The soundings show no rise in the sea-bottom along this line, which extends far enough to the eastward to intersect a marine ridge extending from the Azores to Flemish Cap. On the contrary the depths increased with great regularity until the maximum, 2,658 fathoms, was reached at the extremity of the line in latitude 45° 14′ N., longitude 42° 03′ W. From this point a line was run to Flemish Cap, as indicated by the hydrographer, with still no signs of marine elevations until reaching the abrupt rise of the Cap.

A few words as to the accuracy of our various positions may not be out of place here. We had generally clear weather to 6 p. m. on the 8th, enabling us to locate the soundings as accurately as ordinary sea observations permit. On the 9th, latitude by ex-meridian altitudes of the sun was obtained, but no longitude. Foggy weather and moderate

SW. winds prevailed. The sun was visible at intervals during the 10th, giving us an excellent opportunity of locating the ship. Strong winds to moderate NW. gale prevailed. On the 11th the sun was visible at intervals until late in the afternoon, affording us ample opportunity of locating our stations.

Our first sounding on the 11th was taken at 3 a. m. in 2,135 fathoms, and the next at 10.38 a. m. in 73 fathoms, gray sand, black specks, and stones, on Flemish Cap, latitude 46° 50′ N., longitude 44° 35′ W. The beam-trawl was put over at this station, resulting in the capture of several specimens of Cottidæ, ophiurans, starfish, sea-anemones, sea-urchins, corals, &c. It may be said that stones were a marked feature in all the hauls during the day, the bottom seeming to be pretty thickly strewn with them, dropped there by ice.

Four other hauls were made at stations 2,693 in 78 fathoms, 2,694 in 86 fathoms, 2,695 in 105 fathoms, and 2,696 in 98 fathoms, the character of the bottom and catch comparing closely with those of the first haul.

A serious leak was discovered in the bottom of the port boiler, water and steam escaping to such an extent that it was impossible to get near enough to determine the nature of the damage. Fires were hauled and the boiler blown down, when the leak was traced to a defective gasket on a mud-hole plate.

After the trawl was on board we steamed to the westward toward the Grand Bank, carrying a line of soundings across to further develop the connection between the two banks. The greatest depth was 477 fathoms. Reference to H. O. chart 21*a* will show Flemish Cap to be an extension of the Grand Bank, to which it is connected by a narrow submarine ridge having a depth of 500 fathoms or less, increasing rapidly on either side to 1,000 fathoms.

We were enveloped in a dense fog during the night of the 11th and all of the 12th, which made it impossible to locate ourselves by observation, but, assuming the eastern extremity of the Grand Bank to be correctly laid down on the chart, we were able to plot our soundings with some degree of accuracy.

The normal direction of the current between the banks is about ESE., but we experienced a strong set to the northward and eastward. A fresh SW. breeze which prevailed at the time may account for the change of direction.

The trawl was lowered at 12.09 p. m. on the 12th in 206 fathoms, green mud, black specks, lat. 47° 40′ N., long. 47° 35′ 30″ W., and came up at 1.15 p. m. with specimens of ray, halibut, a large number of macrurus, flounders, sea-anemones, starfish, mollusks, &c. A rock was brought up also, weighing about 2,000 pounds, and much time and patience was expended in getting it on board without sacrificing the net.

Necessary repairs being completed, fires were started under the port boiler.

Soundings were continued toward the coast for navigational purposes, we being enveloped in a dense fog, which continued until 2 p. m. on the 13th. These soundings have been carefully located, and may have some value hydrographically.

We arrived at St. John's, Newfoundland, at 7.10 p. m., August 13, and found H. M. S. Emerald, Lily, and Mallard at anchor in the harbor. An officer came on board, and, in the name of the senior officer present, tendered the usual civilities of the port. The United States consul visited the ship at 10 a. m., August 14. His call was returned later in the day, and official visits were made to the governor, and Capt. A. H. Hamond, of H. M. S. Emerald, senior British naval officer present.

Fires were hauled and the usual work of stopping leaks in the boilers commenced. We coaled ship on the 19th, taking on board 100 tons of anthracite.

Preparations were made for extending the cruise to the eastward, including Beaufort Bank, Milne Bank, and Laura Ethel Shoal, but that part of the expedition being abandoned, we took on board only the quantity of coal required for the trip to Wood's Holl, including a few days' dredging and sounding.

We coaled from Shea's Wharf, where we also filled the boilers with fresh water, which was taken from a hydrant in the street, at a cost of $12 for 10,000 gallons. The necessary hose for conducting the water on board was borrowed of the fire department.

At 9.30 a. m., August 21, we got under way and proceeded to sea *en route* to Wood's Holl. The weather was clear until 5 p. m., when we were enveloped in a dense fog. Cape Race bore WNW. about 4 miles distant. As our course was seaward, we stood on and soon ran out of the fog bank into clear, pleasant weather. Our course during the night was to the southward and westward, and at 8 a. m. the following morning we cast the trawl in 90 fathoms, latitude 45° 07′ N., longitude 55° 09′ W., off the southern extremity of Green and St. Pierre Banks. Five hauls were made during the day on a westerly course, in from 50 to 205 fathoms, the results being numerous ascidians, ophiurans, starfish, mollusca, and several species of fish. The positions and depths indicate an extension of the 100-fathom line to the southward of Green and St. Pierre Banks. Fog shut in about sundown and continued during the night.

We finished trawling for the day at 6.18 p. m. and started ahead, running a line of soundings across the channel between St. Pierre and Banquereau, developing a depth of from 226 fathoms in mid-channel to 32 fathoms on the latter bank.

The fog continued until 6 a. m., August 23. At 7.33 we sounded in 32 fathoms, latitude 44° 25′ N., longitude 57° 35′ W., on Banquereau, and put over several hand-lines, taking 136 cod in 45 minutes. The vessel was not anchored, but allowed to drift. The fish were examined for parasites, contents of stomach, &c. Two hauls of the trawl were made during the day in 140 and 110 fathoms, on the southeast extremity

of Sable Island Bank, resulting in the capture of a few fish, ophiurans, starfish, shrimp, sea-anemones, and mollusca.

At 9.11 a. m., the 24th, we cast the trawl in 1,255 fathoms, latitude 42° 47′ N., longitude 61° 04″ W. The frame was landed at 1.07 p. m., minus the net, which had been torn away by an overload of stones or mud. We expended much time and patience in the vain endeavor to clear it from the bottom without sacrificing the apparatus. We started ahead on our course as soon as the haul was completed, the general appearance of the weather making it inadvisable to cast the trawl again. The wind, which was light during the early part of the day, increased to a moderate gale from WNW. in the afternoon. The barometer was unsteady and there was a heavy southerly swell; in fact, all indications pointed to heavy weather.

The 25th commenced with fresh winds from WNW., and overcast misty weather. We had heavy rains and light to moderate breezes in the middle part, and fresh SSE. winds in the latter part of the day. The barometer was unsteady, and although the sea was comparatively smooth, the general indications were of approaching bad weather. Ten soundings were taken during the day near the position assigned to Hope Bank, in depths ranging from 1,644 to 1,943 fathoms. The soundings are inshore, or to the northward of those taken on the outward trip, and demonstrate beyond doubt that no shoal or bank exists on the ground covered by them.

We were unable to locate our position by observation during the day except by ex-meridian observations of the sun for latitude, and, although we had covered the ground satisfactorily, we determined to remain on the spot until the weather permitted us to verify our work. With this object in view the vessel was hove to from midnight until 1.10 p. m., August 26, when, having ascertained our position by good observations, we proceeded to run a line of soundings at right angles to those of the previous day in from 1,587 to 1,910 fathoms; the results confirming the general accuracy of our former work.

The unsettled weather of preceding days culminated in a cyclone of moderate force on the 26th, as will be shown by the following extract from the meteorological columns of the ship's log.

The force of the wind should be increased about .2 — otherwise the record may be considered correct.

Date.	Time.	Wind, true.	Force.	Barometer.	Sea.
August 25	8 p. m.	E	4-6	29.98	Smooth.
August 26	1 a. m.	E. by S	4-6	29.92	Do.
Do	Noon	ENE	4-7	29.70	Rough.
Do	3 p. m.	NE. by E	4-6	29.64	Heavy.
Do	6 p. m.	NNE	5-6	29.68	Do.
Do	11 p. m.	N	6-8	29.86	Do.
Do	Midnight.	NNW	6-6	29.90	Moderate.
August 27	2 a. m.	NW	3	29.92	Do.
Do	8 a. m.	WNW	3	29.98	Smooth.

Having completed our search for Hope Bank, we ran a line of soundings to the westward to George's Bank without finding any indications of shoal water to the eastward of it.

Having definitely proven that Hope Bank does not exist in the locality assigned it on H. O. chart 21*a*, it may not be out of place here to inquire into the probable reasons for its having been frequently reported. Reference to the chart will show its assigned position to be near the northern edge of the Gulf Stream, where its deep blue waters, with temperatures above the normal and high specific gravity, impinges upon the colder green water of the Arctic current. The first sight of this green water on emerging from the Gulf Stream gives one the impression that he has suddenly struck soundings. The bank once placed on the chart, the navigator who found himself in green water anywhere in that region during foggy weather, or when from any cause he was uncertain of his position, would conclude at once that he was in shoal water, and locate himself on the position assigned to Hope Bank. The difference in color and specific gravity between the waters of the Gulf Stream and the region adjacent varies with the seasons, and is more marked during summer and autumn, when the fresh water from melting ice finds its way from the Arctic.

On August 3, at meridian, in latitude 40° 26′ 30″ N., longitude 66° 19′ W., surface temperature 78° F., the specific gravity reduced to 60° F. was 1.027808, and at noon of the 5th, latitude 41° 48′ N., longitude 62° 51′ 30″ W., surface temperature 67° F., the reduced specific gravity was 1.025008, a difference of .0028, quite sufficient to account for the change of color. Thus it will be seen that the various indications of shoal water are accounted for from natural causes wholly independent of the existence of banks or shoals, and the depths developed by our soundings show positively that none exist in that locality. The navigator in passing over the region had neither time nor the means at hand for satisfactory investigation; therefore he was forced to judge from appearances, which, we have shown, are deceptive.

It may not be out of place here to call attention to a report concerning Hope Bank, which to a casual observer would be considered definite and final as to its existence in the locality mentioned.

We have what purports to be a complete copy of the log of the fishing schooner Marguerite on a voyage from Gloucester, Mass., to Iceland, extending from April 27 to September 24, 1885. On September 21, on the return trip, the following remarks are found relating to the bank above mentioned:

"*From* 4 *to* 8 *a. m.*—Wind steady in force and direction. At 7 a. m., water being discolored, sounded; depth 63 fathoms, with coarse sand. At 7.30 a. m., water looking whiter, sounded again, found 45 fathoms, with small black pebbles. At first thought the vessel had overrun the log and was on soundings on George's Bank. At 8 a. m. sounded; depth 38 fathoms.

"*From 8 a. m. to noon.*—Wind steady in force and direction. At 8.30 a. m. took observation, which almost corresponded with the distance run by the log. At 9 sounded; depth 90 fathoms; hauled the vessel close to the wind SW. by W. At 9.30 sounded; depth 100 fathoms; hard bottom. Tacked ship, run off to the NE. 6 miles, sounded; depth 40 fathoms, with small black pebbles; run to the north 4 miles, sounded; found 75 fathoms; hauled up ESE. 4 miles, sounded; got 62 fathoms; tacked ship and kept off course. At noon found the latitude to be 41° 38′ and longitude 63° 30.′"

The above extract from the schooner's log would seem to be conclusive, at least, as to the soundings having been made as stated, even if her position was not correctly given. A vessel's log is usually taken as evidence in court, and entries in it are generally the results of personal observation of its writer or of other officers in charge of the deck for the time being. Facts only are looked for, and fictitious entries are so foreign to the habit of seamen generally that it would be considered correct until proved otherwise. Yet this copy fails to inspire confidence; in fact, the evidences of its having been cooked to suit the occasion are so palpable that its reliability becomes questionable at every point. It is a well-known fact that a fishing vessel's log is brief, that her navigational and scientific instruments are few, and equal to her absolute necessities only, yet this copy purports to give for every hour of the cruise, day and night, a complete record, including the filling out of 18 columns in the United States Navy log-book, which was used for making the copy, nine of them being meteorological observations, besides remarks more or less full.

On September 20, the day before the discovery of Hope Bank, this remarkable vessel made 77 miles in 12 hours on a SW. by W. course, wind WSW., sailing within one point of the wind! With a wind force of 4 to 5 she made 7 to 8 knots, heeling 3° to 4°, with leeway of one-half a point, the same leeway being maintained later in the day with a speed of 2 knots, heel of 1° to 2°, and wind force from 1 to 2.

The following entry is found on May 13, at noon:

"Latitude, D. R., 48° 35′ 00″ N.

"Longitude, D. R., 42° 38′ 00″ W.

"Latitude by observations of ⊙ 48° 38′ 00″ N.

"Longitude by chronometer ⊙ 42° 36′ 00″ W.

"Current during the time 1.7 knots per hour, setting to the eastward."

We find recorded here a current of 40.8 miles for 24 hours, whereas, assuming the calculations for position to be correct, there was actually a current of 4 miles N., 40° E. during the day.

Similar examples might be quoted throughout the whole log-book, but the above extracts are sufficient to illustrate its value as an accurate record of results. The meteorological record is hardly worthy of comment.

Referring to the log of September 21, we find the schooner making 3 knots an hour until 7 a. m., the time the sounding commenced, and, as the wind is logged "steady in force and direction" from this time till noon, the vessel should have made 15 knots had she continued on her course; but instead of this uninterrupted progress she takes eight soundings in average depths of 64 fathoms, which must have consumed three-quarters of an hour at least, and sails 21 knots, about 5 knots an hour, or 2 miles an hour more than she would have logged had she taken no soundings and continued on her course with the wind two points abaft the beam.

Further comment is unnecessary; enough has been written to show that reports of shoals and banks at sea are not always reliable, even when soundings, character of bottom, and other seemingly reliable data are given. A reference to the plan (Plate I) will show that the schooner Marguerite did not find bottom in the region indicated, and the presumption is strong that the lead was not put over the side at all.

At 9.33 a. m., August 27, we cast the trawl in 1,188 fathoms, latitude 41° 28′ 30″ N., longitude 65° 35′ 30″ W., landing it on deck at 12.44 p. m. Among the forms taken were a quantity of ophiurans, starfish, shrimp, mollusks, blue hake, *coryphænoides*, *Macrurus asper*, and skate. The trawl was lowered again at 2.21 p. m., but it soon buried and was lost.

At 7.09 a. m., August 28, the trawl was lowered in 980 fathoms, latitude 40° 07′ N., longitude 67° 49′ W., and landed on deck at 9.22 a. m.; a water haul, the current having prevented its reaching bottom. Another haul in 866 fathoms, six miles to the westward, brought up an enormous load of mud and numerous ophiurans, holothurians, mollusks, crustaceans, and several varieties of fish, among them being *coryphænoides*, *Macrurus Bairdii*, blue hake, lycodes, &c. A third haul was made in 984 fathoms a few miles farther westward with much the same results.

At 5.35 p. m. we started for Wood's Holl. Fog shut in as soon as we touched the banks and continued until we passed the South Shoal lightship, when it partially cleared. It shut down again off No Man's Land and continued until our arrival in port at 11.58 a. m., August 29.

We saw but few birds during the trip except "Mother Carey" chickens, which were always with us. An occasional gull and a few terns were seen. Whales were seen in the region between Sable Island and Grand Bank, and porpoises were frequentley observed playing about the ship. A large school of curved-fin orcas were seen on Flemish Cap during the morning of August 10.

We were detained in port overhauling our dredging and sounding gear, cleaning and repairing boilers and other mechanical appliances until 5.58 a. m., September 14, when we left for Newport, R. I., for coal, preparatory to a dredging trip.

Arriving at the latter port at 10.30 a. m., we commenced coaling from a schooner alongside at 1.15 p. m., and finished at 6 p. m. the following day, having taken on board $91\frac{154}{2240}$ tons.

We got under way at 6.40 and proceeded to sea *en route* to our working grounds, which were included in the region between latitude 38° and 39° N., and longitude 70° and 72° W. Light to moderate SE. winds, smooth sea, and partially cloudy, pleasant weather was experienced during the night and following day.

At 3.38 p. m., September 16, we lowered the trawl in 1,544 fathoms, brown ooze, latitude 38° 39′ N., longitude 70° 07′ W., and landed it on deck at 7.43 p. m., with numerous specimens of shrimp, starfish, ophiurans, mollusks, *Macrurus asper*, lithodes, benthodytes, benthysaurus, &c. The surface net and submarine electric light were used with fair success until 10 p. m., when we steamed slowly to the southward to change our position.

The trawl was lowered at 5.49 a. m., the 17th, in 1,867 fathoms, latitude 38° 20′ N., longitude 70° 05′ 30″ W., and landed on deck at 10.24, a water haul. There were, however, a few valuable specimens of crustacea, &c., taken while the net was coming up. It was again lowered at 11.20 a. m. in 1,859 fathoms, latitude 38° 20′ N., longitude 70° 08′ 30″ W., and landed at 4.05 p. m., with specimens of hermit-crabs, ophiurans, mollusks, sea-anemones, and eight species of fish. A third haul was made at 4.58 p. m. in 1,825 fathoms, latitude 38° 22′ N., longitude 70° 17′ 30″ W., and landed at 9.46 p. m., with mollusks, ophiurans, starfish, shrimp, ascidians, macrurus, &c. The surface net was used successfully during the evening. Six dolphins and one shark were taken with hook and line during the day, and a large squid of an unknown species was found dead on the surface.

Light airs and calms prevailed, with clear, warm weather, the thermometer reaching 80° Fahr. We had quite a strong current (17′) to the southward and westward, sometimes called the Gulf Stream countercurrent. It was this current which caused the failure of the first haul in the morning.

At 5.33 a. m., September 18, the trawl was lowered in 1,753 fathoms, latitude 38° 29′ 30″ N., longitude 70° 54′ 30″ W., and landed at 10.17 a. m., with several species of fish, shrimp, starfish, sea-anemones, &c. At 11.04 it was put over the second time, in 1,631 fathoms, latitude 38° 29′ 30″ N., longitude 70° 57′ W., and came up at 3.15 p. m., with several macrurus, shrimp, mollusca, gold-band coral, &c. The trawl was cast a third time in 1,615 fathoms, at 3.54 p. m., latitude 38° 24′ N., longitude 71° 13′ W., and was landed at 8.32 p. m., a water haul. There were several interesting specimens, however, taken on the way up.

The engines were stopped and the ship allowed to drift until 3 a. m., September 19, when we ran 10 miles to the westward, and at 5.38 put over the trawl in 1,569 fathoms, latitude 38° 24′ N., longitude 71° 52′ W., landing it on deck at 10.08 a. m., with numerous archasters, shrimp,

Cyclothone lusca, and fish. Two other hauls were made during the day in 1,536 fathoms and 1,509 fathoms, in both cases the trawl failing to reach bottom owing to the strong current. The last haul, latitude 38° 36′ 30″ N., longitude 72° 12′ W., was notable, however, for the capture of a new species of fish, 5 feet in length, allied to *Gastrotomus*. While occupying this station Mr. Lee succeeded in shooting a large blue heron —adult female—which was flying about the ship. The bird was quite fat, and did not appear to be at all distressed, though so far at sea. The surface net and submarine electric light were used to good advantage, large numbers of squid being taken by aid of the latter.

Monday, September 20, moderate breeze from SW., hauling to the northward and increasing to a strong wind at meridian. The trawl was lowered at 6.02 a. m., in 813 fathoms, latitude 38° 56′ N., longitude 72° 11′ 30″ W., and landed on deck at 8.50, with two specimens of *Geryon quinquedens*, flabellum, annelids, holothurians, large numbers of fish, &c. It was cast again at 9.33 in 594 fathoms, latitude 39° 13′ N., longitude 72° 01′ W., and landed at 12.32 p. m., with 190 *Macrurus Bairdii*, 20 blue hake, 3 pole flounders, 4 dogfish, 3 *Geryon*, shrimp, mollusca, annelids, holothurians, &c. A school of whales was seen during the forenoon.

The weather becoming too boisterous to continue dredging, we started for Wood's Holl at 12.40 p. m., arriving and mooring at the wharf at 10.30 a. m., September 21.

We remained at Wood's Holl overhauling the sounding and dredging apparatus, repairing boilers, and making general preparations to leave the station for the season, until October 21, when at 2.40 p. m. we cast off from the wharf and proceeded to sea. The weather was clear, with fresh westerly winds and heavy swell which moderated during the night. We had Mr. Tabor, an artist from the *Century* Company, on board, who made the trip for the purpose of picturing the operations of the Albatross.

An accident occurred on the morning of the 22d which might have been serious. While verifying the scale on the accumulator, the dredge rope broke under a strain of about 5,000 pounds, and the tension-rod flying back with great force, struck the band supporting the accumulator and boom topping-lift at the foremast head, broke the bolts, and allowed the band, accumulator, and boom to come on deck with a crash. No one was hurt, though several men had narrow escapes. The heel of the dredging-boom was broken and the accumulator guide-rods badly bent, besides other minor damages, all of which were repaired during the day and following night.

At 5.42 a. m., October 23, we put the trawl over in 1,685 fathoms, latitude 36° 47′ N., longitude 73° 09′ 30″ W., landing it on deck at 10.19 with many macrurus, starfish, marguerites, crustaceans, and one large lithodes. It was put over again in 1,641 fathoms, at 12.02 p. m., latitude 36° 47′ N., longitude 73° 25′ W., and landed on deck at 4.46 with several species of fish, two (probably new) mollusca, holothurians, &c. The

large surface net was towed at intervals with fair success, and the submarine electric light was used during the evening. Among the specimens taken were about forty squid.

At 5.54 a. m., October 24, the trawl was lowered in 1,374 fathoms, latitude 36° 34′ N., longitude 73° 48′ W., and landed on deck at 10 a. m. with many macrurus, hake, holothurians, starfish, and a large quantity of brisinga. It was cast a second time at 11.10 a. m. in 1,253 fathoms, latitude 36° 34′ N., longitude 73° 54′ 30″ W., but while heaving in the rope parted, losing 1,210 fathoms and the trawl. Another cast was made at 4.09 p. m. in 1,239 fathoms, latitude 36° 39′ N., longitude 74° 03′ 30″ W., and, when landed on deck; at 7.26 p. m., the net was found to contain a large number of macrurus, hake, one large *Synaphobranchus*, many holothurians, benthodytes, a quantity of brisinga, mollusca, &c. The large surface net and submarine electric light were used during the evening with fair success.

At 5.45 a. m., October 25, the trawl was cast in 859 fathoms, latitude 36° 30′ N., longitude 74° 33′ W., and landed on deck at 8.14 a. m. with single specimens of black dogfish and *Gastrostomus*, numerous hake, lycodes, ophiurans, sea-urchins and mollusca, several species of crustaceans, and a quantity of flabellum. A second cast was made at 9.10 a. m. in 679 fathoms, latitude 36° 36′ N., longitude 74° 32′ W., and the trawl landed on deck at 11.30 a. m., containing the same species as were found in the previous haul. A third cast was made at 12.28 p. m. in 727 fathoms, latitude 36° 42′ N., longitude 74° 30′ W., and finished at 2.39 p. m.; contained the usual number of macrurus and hake found in similar depths along the Atlantic coast. Single specimens of pole flounder and *Geryon quinquedens* were found, besides a quantity of skates' eggs containing live embryos. There were also varieties of mollusca and starfish and a quantity of flabellum. The fourth and last cast of the day was made at 4.12 p. m. in 781 fathoms, latitude 36° 45′ N., longitude 74° 28′ W., and finished at 6.44 p. m., the net containing skates' eggs, lycodes, holothurians, pennatulas, macrurus, and hake. There was a single specimen of red brick; also fourteen soles of shoes, the uppers having been rotted away. The surface net was towed at intervals with fair success. Our working ground being in the route of coastwise traffic, one or more steamers were in sight at all times during the day.

At 6.09 a. m., October 26, the trawl was cast in 1,152 fathoms, latitude 37° 27′ N., longitude 73° 33′ W., and landed on deck at 9.20 a. m., with numbers of hake, benthodytes, starfish, holothurians, sea-urchins, pennatulas, and other forms of Alcyonaria. It was cast again at 10.19 a. m. in 944 fathoms, latitude 37° 26′ N., longitude 73° 43′ W., and was up at 1.05 p. m., with many macrurus, starfish, sea-urchins, three cephalopods, *Alloposus mollis*, one specimen of *Onus rufus*, holothurians, Alcyonaria, &c. A third cast was made at 1.52 p. m. in 841 fathoms, latitude 37° 23′ N., longitude 73° 53′ W., the trawl being landed on deck

at 4.35 p. m., with many specimens of macrurus, crustaceans, benthodytes, starfish, sea-urchins, pennatulas, &c. The fourth and last haul was made at 4.55 p. m. in 811 fathoms, latitude 37° 23′ N., longitude 74° 02′ W. It was completed at 7.32 p. m., and, besides an enormous load of mud, the net contained one specimen of a large red spiny crab, lithodes, pennatulas, starfish, flabellum, shells, and a large squid, *Stenoteuthis megaptera*, 5 feet 6½ inches in length, weighing 30 pounds. There were also the usual variety of deep-sea fish. The large surface net was towed at intervals with fair success. The use of this net in winter and spring has shown the surface waters of the North Atlantic to be comparatively barren of life, but during the latter part of summer and autumn many forms of crustacea are found, either mature or in the larval form. Fish are a marked feature of the catch, among them being the surface fishes, of various kinds, that have their homes in floating Gulf-weed, or hover about the *medusæ*. The young of various species, notably the bluefish and flying-fish, are taken in large numbers, besides many other forms too numerous to mention. It may be truly said that the introduction of the large surface net has opened a new field of investigation.

At 7.35 p. m. we started for port. The weather, which had been mild and pleasant, threatened a change for the worse, and, after a night of menacing indications, we encountered, about 5 a. m., a furious squall of wind and rain. Passing Cape Henry at 6.28 a. m., we steamed up Chesapeake Bay and the Potomac River, anchoring for the night at 5.37 p. m., near Lower Cedar Point. We got under way again at daylight, October 28, and reached the navy-yard, Washington, D. C., at 1 p. m. Specimens and other articles received on board for transportation were sent to the Smithsonian Institution, and the work of cleaning and refitting was commenced. Spars and rigging were overhauled and a new fore-top-gallant yard made to replace the old one, which was rotten. The chain cables were overhauled and restowed, store-rooms and holds broken out, cleaned, and painted, or whitewashed, and the inner side of the iron hull scraped and painted where accessible.

The engines were overhauled and repaired by our own people.

An appropriation was made during the first session of the Forty-ninth Congress for new boilers. Passed Assistant Engineer George W. Baird, U. S. N., prepared designs for them, and for a rearrangement of coal-bunkers, &c., which were approved, and, after duly advertising in the public press, the contract was awarded to the Columbian Iron Works and Dry Dock Company, of Baltimore, Md., for the sum of $13,439.

MECHANICAL APPLIANCES.

The mechanical appliances and apparatus generally have worked very well during the year, but experience has suggested improvements here and there, most of which have been adopted.

ACCUMULATOR.

The necessity is still felt for an improved accumulator having greater elasticity under extreme tension. We have consulted the best spring manufacturers in the country and about exhausted the inventive talent on board without thus far attaining the desired result.

COUNTER-BALANCES.

[Plate V.]

When dredging very low speed is required, from one-half to 1½ knots per hour, and to attain it one propeller only is turned as slowly as possible, but even then we cannot always bring the vessel down to the desired limit, except by stopping the engine until her headway is checked, when it is started again. The revolutions could be brought down to 24 per minute in smooth water, but after the introduction of carefully adjusted counter-balances a further reduction to 18 revolutions per minute was effected.

These counter-balances were designed by Passed Assistant Engineer George W. Baird, U. S. N., to reduce the vibration of the engines when running at high speed, and it is gratifying to say that they have served the purpose as well as the more important one mentioned above.

SOUNDING FROM BOATS.

[Plate II.]

The necessity for greater facilities for sounding from boats has been apparent to us on several occasions when developing banks or shoals. It is frequently desirable to extend lines of soundings from 2 or 3 fathoms to several hundred fathoms with the same boat, and we have accomplished the object in a simple and inexpensive manner by fitting our Tanner sounding machine to work on the stern of the steam cutter, thus giving the boat a compact and reliable apparatus for sounding in depths from 1 to 1,000 fathoms.

BAIRD'S ANNUNCIATORS.

[Plate VI.]

Among the most important improvements in mechanical appliances during the year are the pneumatic annunciators designed by Mr. Baird, showing by dial and index pointer, on the bridge and in the pilot-house, what the engines are doing. It is desirable to know whether engine-room signals are promptly and correctly answered on any steamer, but doubly so on this vessel, where the safety of the apparatus depends upon it.

THE SIGSBEE DEEP-SEA SOUNDING MACHINE.

This machine has performed its work admirably during the year. We have crushed one reel, which caused the loss of some wire and two or three sounding cups and thermometers before it was discovered, but

a heavier one being mounted we had no further trouble in that direction, although we had to contend with greater inertia incident to the increased weight. This is of no great importance in moderate depths, but when the weight of wire and its attachments approximate to that of the sinker, every pound of extra weight in the reel detracts from the simplicity and reliability of the apparatus.

Passed Assistant Engineer George W. Baird, U. S. N., of this vessel, proposed an improved reel, which would not only be stronger and lighter, but would avoid the necessity of throwing off and putting on the belt when a sounding is taken. (Plate III.) Mr. Baird describes this important addition to the sounding machine as follows:

"It is made of aluminum bronze, cast by the Cowles Electric Smelting and Aluminum Company, of Cleveland, Ohio, and finished by D. Ballauf, of Washington, D. C. This metal is reported, after tests by responsible engineers, as standing a tensile strain of over 100,000 pounds per square inch, and is represented as being as strong as the best steel as regards compression and torsion.

"The reel is cast in one piece and the rims are strengthened by numerous ribs which do not materially increase its weight.

"The objections to the old reel are its great weight and consequent inertia when revolving at high speed, as in sounding; the delay incident to putting on the belt, and working the water of condensation out of the steam cylinder when starting to reel in; also the necessity of shipping the cranks and heaving in the first few fathoms by hand.

"These objections were kept in mind while making the present design. The bronze reel A and cast-iron pulley D are mounted on the shaft B. The pulley is grooved (*d*) to carry the belt. The original frames CC are used. The pulley D is driven from the same engine and belt which drove the old reel; with the new reel in use the engine is kept running all the time, revolving the pulley D in a direction to reel in the wire.

"The pulley D has its rim beveled and fitted to a corresponding surface on the reel A, and when pressed together will, by its friction, carry the reel with it. The pulley D may be pressed against A, or withdrawn from it through the intervention of the clutch lever E and crank F. The open end of the lever E, which permits the pulley and reel being lifted out of the frame without the lever E being disturbed, is the design of Lieut.-Commander Z. L. Tanner. To retard the velocity of the reel when paying out wire the lever G and its attached brake (shown in dotted lines) are provided. The operation of the machine is as follows: Turn the crank F to the left, which withdraws the friction wheel D from its contact with the reel A, when the latter being freed will revolve and pay out the wire by gravity. The engine is then started and the pulley D revolved in the opposite direction, *i. e.*, the direction to reel in the wire. When the sinker reaches the bottom the crank F is quickly revolved to the right, which throws the friction in gear and starts the reel A to winding in the wire.

"The throttle valve of the engine, the friction crank F, and the friction lever G are close together, and under the control of one man, who can readily regulate and manage them. The counter or register, which measures the quantity of wire paid out or reeled in, is on the opposite side of the machine, convenient for the inspection of the officer in charge of the sounding."

The vessel has not been at sea since the completion of the new reel, but we have tested it at the wharf with a few fathoms of wire and a 35-pound lead, which demonstrated the advantage of the new arrangement over the old as far as rapidity of working is concerned. The strength of the reel can be demonstrated only by practical operations in deep water.

DREDGE ROPE.

The dredge rope furnished by the Hazard Manufacturing Company has not been uniform in tensile strength or length of lay, and the result has been that we have lost several thousand fathoms, with trawls and appurtenances. One lot of 4,000 fathoms was so imperfect that we had to reject it. Crucible steel has been used in the manufacture of our rope heretofore, but the requirements are so great that it has been difficult to fulfill them, and we are now getting estimates for the best mild extra plow steel, which should give much better results. With a superior quality of rope and an improved accumulator we hope to be more economical in the expenditure of dredging apparatus.

DEEP-SEA TEMPERATURES AND THERMOMETERS.

Deep-sea temperatures have been observed with great care during the year, and much thought has been given to the improvement of deep-sea thermometers with a view of attaining still greater accuracy. The following remarks on this subject are by Dr. J. H. Kidder, who has charge of the Fish Commission and Smithsonian Institution instruments, and to whom we are indebted for the suggestion of the special thermometer referred to:

"The Negretti-Zambra deep-sea thermometers now in general use by the Fish Commission, while doubtless the best instruments yet devised, cannot probably be depended upon for differences of temperature less than one-half degree Fahrenheit. Being pointed only to full degrees, upon short stems, the degree spaces are so small that estimation of small fractions is almost as much a matter of opinion as a fact of observation. As heretofore furnished, the individual thermometers have furthermore shown a wide difference in range, some reading from $-30°$ to $+100°$, others from $+34°$ to $+92°$; the results being that scarcely any two instruments showed degree spaces of the same width, and that the observer gained nothing by his experience with one thermometer in estimating fractions of a degree with another. The slight departures from uniformity in breaking column shown by some of the instru-

ments, although seldom equaling half a degree, tend to cast a doubt upon readings to small fractions; and it may be that the quantity of mercury contained in the small safety bulb at the top of the tube is sufficient to cause a fractional error when the temperature of the water differs from that of the air at the time of reading.

"For these reasons, and considering the fact that at depths greater than 1 mile the general ocean temperature falls very gradually if at all, and that observations at far greater depths do not agree in reporting corresponding differences in temperature, I requested authority from the Commissioner to order an experimental half-dozen of longer tubes of uniform range, and pointed to one-fifth degree Fahrenheit (Plate IV). The specification was as follows: 'The special thermometers are required to be of sufficient length to be legibly pointed in fifths of a Fahrenheit degree, and it is particularly desired that all of the instruments now or hereafter ordered shall conform as nearly as possible to the range from 20° to 90° Fahrenheit, as specified in my letter of August 6, 1886.' (Order dated September 6, 1886.)

"As far as can be determined by laboratory experiments the new thermometers fulfill all of the desired conditions, and are besides unusually free from index error. It is possible that before the Albatross sails I shall be able to furnish a correction for the small error arising from the expansion of the mercury contained in the small safety bulb at the top of the tube after oversetting."

THE TANNER IMPROVED THERMOMETER-CASE WITH THE SIGSBEE CLAMP AND THE NEGRETTI-ZAMBRA SPECIAL DEEP-SEA THERMOMETER.

[Plate IV.]

Fig. 1 shows the apparatus complete, and Fig. 2 a vertical sectional elevation of the case containing the thermometer.

NOMENCLATURE.

a. Neck of the bulb.
b. Catch reservoir.
c. Small receptacle.
d. Partition confining mercury in shield surrounding bulb.
e. Glass shield inclosing thermometer.
f. Thermometer-case.
g. Thimble with rubber lining.
h. Spiral springs.
i. Cap.
j. Pivot.
k. Slot for reading scale.
l. Frame of cast brass.
m. Guard.
n. Propeller.
o. Spindle.
p. Stud.
q. Sigsbee clamp.
r. Latch.
s. Slot.

The thermometer-case is made of brass except the Sigsbee clamp, *q*, and spiral springs, *h*, which are phosphor bronze. The frame is cast and the case in which the thermometer is inclosed is an ordinary tube of commercial pattern.

The Negretti-Zambra deep-sea thermometer was described as follows in the Report on the Construction and Outfit of the U. S. Fish Commission Steamer Albatross, 1883:

"The thermometrical fluid is mercury; the bulb containing it is cylindrical, contracted in a peculiar manner at the neck *a;* and upon the shape and fairness of this contraction the success of the insrtument mainly depends. Beyond *a* the tube is bent and a small catch reservoir at *b* is formed for a purpose to be presently explained. At the end of the tube a small receptacle, *c*, is provided. When the bulb is downward the glass contains sufficient mercury to fill the bulb, tube, and a part of the receptacle *c*, having, if the temperature is high, sufficient space in *c*. When the thermometer is held bulb upward the mercury breaks at *a*, but of its own weight flows down the tube, filling *c* and a portion of the tube above *c*, depending upon the existing temperature. The scale is accordingly made to read upward from *c*.

"To set the instrument for observation it is only necessary to place it bulb downward, when the mercury takes the temperature just as in an ordinary thermometer. If at any time or place the temperature is required, all that has to be done is to turn the thermometer bulb upward and keep it in this position until the reading is taken. This may be done at any time afterward, for the quantity of mercury in the lower part of the tube which gives the reading is too small to be sensibly affected by a change of temperature, unless it is very great; while that in the bulb will continue to contract with greater cold and to expand with greater heat. In the latter case some mercury will pass the contraction *a* and fall down and lodge at *b*, but it cannot go farther so long as the bulb is upward, and thus the temperature to be read will not be affected.

"The thermometer is inclosed in a glass shield which eliminates all errors that might arise from pressure at great depths.

"To mount the thermometer, unscrew the cap *i* (Plate IV), drop a spring, *h*, into the case, slip a thimble, *g*, over the glass shield at *d*, put the thermometer in the case, drop in another thimble, which will rest on the upper end of the shield; then place another spring on the thimble and screw the cap in place. The thermometer will then be suspended between delicate spiral springs at the ends, and soft rubber rings which surround the shield. This arrangement has proved effectual in guarding the thermometer against jars incident to the service required of it on board the Albatross.

"To take a temperature set the spindle, *o*, into the hole in the cap, *i*, by screwing it down until the propeller blades are against the stud *p*, then by means of the Sigsbee clamp, *q*, secure it to the temperature rope. The bulb will then be down and the mercury in the tube connected with it, the position required to take the temperature. The water acting on the propeller during the descent will keep it in position, resting against the stud, *p*, but as soon as the reeling in begins the propeller is set in

motion, bringing the screw on the upper end of the spindle into action, gradually raising the propeller until the lower end of the spindle is withdrawn from the hole in the cap, *i*, when the thermometer promptly turns over and registers the temperature by breaking the column of mercury at the point *a*, the column then falling to the bottom of the tube. It can be read at any time afterward, as changes of temperature do not affect the reading after the column is once broken."

The latch, *r*, and slot, *s*, in which it works, has been added to prevent lateral motion after the thermometer has been turned over.

THERMOMETERS FOR AIR AND SURFACE TEMPERATURES.

The instruments for this purpose were made by J. and H. J. Green, New York, and are all that can be desired.

STEAM TRAP.

[Plate VIII.]

The exhaust steam from the radiators, fore and aft the vessel, is trapped to the hot-well and again fed into the boilers, thus effecting a considerable saving in fuel.

We first used the Hawes trap, which did not prove satisfactory. The Chapman trap was then tried with better results, but it frequently failed to carry off the water, thus flooding the radiators and causing more or less annoyance. Mr. Baird, coming to our assistance again, devised a simple and inexpensive trap which has performed its work admirably, relieving us from the annoyances above mentioned.

BOILERS.

[Plate IX.]

Mention has been made of an appropriation for new boilers, made necessary by a contemplated cruise in the Pacific. The old ones are much worn and require extensive repairs after each trip, making them totally unfit for a long cruise.

With the introduction of new boilers we will increase the size of the coal-bunkers between 60 and 70 tons, thus augmenting the steaming distance over 1,000 miles. A "donkey" boiler is included in the new arrangement, for distilling water, heating and lighting ship, and for fire purposes. Heretofore this service has been performed by one of the main boilers, at comparatively large expense.

MAIN STAY-SAIL.

We formerly carried a fore try-sail gaff, but owing to the position of the standard compass, pilot-house rail, &c., were unable to use the sail. We have recently dispensed with the gaff and substituted a stay-sail, containing 900 square feet of canvas, hoisting on the main-

spring stay, which extends from the main to the foremast head. This sail can be carried in ordinary weather.

PERSONNEL.

The health of officers and crew has been excellent during the year, and no deaths have occurred. There have been several changes among the officers. Lieut. Seaton Schroeder, executive officer and navigator, was detached January 2, 1886, Lieut. H. S. Waring assuming his duties.

In the detachment of Lieutenant Schroeder the Commission lost one of the most accomplished and indefatigable workers it has ever drawn from the Navy.

Ensign W. S. Benson reported for duty January 13, and Ensign W. S. Hogg on the 16th.

Mr. James E. Benedict, resident naturalist, resigned September 1, and was succeeded by Thomas Lee, assistant.

The following officers are attached to the vessel at the close of this report, December 31, 1886:

Lieut.-Commander Z. L. Tanner, U. S. N., commanding.
Lieut. H. S. Waring, U. S. N., executive officer and navigator.
Lieut. (J. G.) B. O. Scott, U. S. N.
Lieut. (J. G.) W. S. Hogg, U. S. N.
Ensign W. S. Benson, U. S. N.
Surgeon J. M. Flint, U. S. N.
Paymaster C. D. Mansfield, U. S. N.
Passed Assistant Engineer G. W. Baird, U. S. N.

CIVIL APPOINTMENTS.

Thomas Lee, resident naturalist.
E. H. Shuster, clerk to commanding officer.

PETTY OFFICERS, FIRST CLASS.

Seaman class.

J. W. Astrom, chief boatswain's mate.

Special class

Charles Wright, master-at-arms.
S. L. Pritchard, equipment yeoman.
N. B. Miller, apothecary.
G. A. Miller, paymaster's yeoman.
F. L. Stailey, engineer's yeoman.

Artificer class.

John Hawkins, machinist.
Walter Blundell, machinist.
F. M. Stromberger, machinist,
W. L. Watson, machinist.

Attention is called to the appended reports of the chiefs of the various departments:

Navigator's report, giving a summary of the distances steamed, objects of the cruise, number of soundings, dredgings, &c.

Engineer's report; medical department, sanitary report and record of specific gravities; naturalist's report, including lists of birds and fishes taken in the Bahamas; list of hydrographic soundings; and dredging and trawling record.

Navigator's report—Summary of the movements of the Albatross for the year 1886.

Date.	Movements.	Distance.	Object.
		Miles.	
February 17 to 18	Washington, D. C., to Norfolk, Va	174	
February 20 to 27	Norfolk, Va., to San Salvador	1,053.4	Sounding.
February 27 to 28	San Salvador to Rum Cay	34	Do.
March 8 to 15	Rum Cay to Nassau, New Providence	560.3	Sounding and dredging.
March 24 to 26	Nassau, New Providence, to Key West, Fla.	389.8	Sounding.
April 3 to 4	Key West to Havana, Cuba	156.3	Do.
April 7 to 8	Havana to Key West	90	Sounding and dredging.
April 8 to 21	Key West to Nassau	793.4	Do.
April 30 to May 8	Nassau to Hampton Roads	1,001.8	Do.
May 9 to 10	Hampton Roads to Washington	162	
June 30 to July 1	Washington to Norfolk	174	
July 8 to 10	Norfolk to Wood's Holl	405.8	
July 15 to 19	Wood's Holl and return	390.2	Sounding and dredging.
August 2 to 13	Wood's Holl to St. John's, Newfoundland	1,883.2	Do.
August 21 to 29	St. John's to Wood's Holl	1,060.8	Do.
September 14	Wood's Holl to Newport	40	
September 15 to 21	Newport to Wood's Holl	499.2	Sounding and dredging.
October 21 to 28	Wood's Holl to Washington	724.1	D
Total (95 days)		9,592.3	

The above table gives the number of days the vessel was at sea during the year; also the distance run and the object of each trip. The number of days at sea, 95. Number of dredging stations, 107. Number of hydrographic soundings, 221.

ENGINEER'S DEPARTMENT.

Report of G. W. BAIRD, *Passed Assistant Engineer, U. S. N.*, 1886.

THE MAIN ENGINES.

The engines have been in operation 1,160½ hours, while the ship was on her course, in free route, besides the time occupied in sounding and dredging at sea, while the engines were worked to signal.

The ship has steamed on her course 9,495 geographical miles—a mean of 8.182 knots per hour. During this time the starboard engine made 4,652,279 revolutions and the port engine 4,632,994, being a mean of 66.81 per minute for the starboard, and 66.53 for the port.

The cruising has been made under easy steam, usually on a limited allowance of coal. We are carrying the same boiler pressure (50 pounds per square inch above the atmosphere) that we carried last year, but have seldom run the engines up to the highest power obtainable with even that limited pressure. The highest speed recorded for one hour during

the year is 10.4 knots, and highest average for 7 hours, uninfluenced by wind or sea, is 9.93 knots.

The shaking of the ship (which has never been violent) has been somewhat reduced by the counter-balance wheels (Plate V) which we had built by the Steam Engineering Department at the Washington navy-yard, in January. The writer designed them in two parts, in order to get the wheels on without disturbing the shafts, and by filling certain pockets with lead we contributed counter-balance to the engines. It has always been difficult to move the engines by hand, owing to the preponderance of the moving parts over the original counter-balances; this has been modified by making teeth on the periphery of the wheel (Plate V) which afford additional points for "pinching" the engines. These new counter-balance wheels fit over the forward webs of the low-pressure cranks. The cost of the two wheels complete was $314.04, or about 7¾ cents per pound.

The new feed-pump valves, referred to in my last report, have fulfilled my most sanguine expectation; the pumps have not failed for an instant, during the year, and their noise has been very much diminished.

During the year we have fitted a new key to the starboard rock-shaft, and have put new anti-attrition metal in the port low-pressure crank-pin brasses; we have raised the main valves on their stems to restore the lead.

The following synopsis for the year's run covers the time the ship was running, in free route, on her course; it includes the time the vessel was slowed down, in fogs, going into and coming out of port, running between dredging stations, &c., but not the time soundings or dredgings were being taken. We have considerable trouble to keep the valve-stems of the high-pressure valves and those of the high-pressure cut-offs tight for any extended period; this is owing to the shallowness of the stuffing-boxes and also to the uneven wear of cut-off rods. I will make a requisition for the Katzenstine metallic packing for these rods at the beginning of the year. We have replaced the main air-pump valves with hard-rubber valves, purchased of the Davidson Steam Pump Company at a cost of $29.10.

Synopsis of the steam log of the Albatross for the year 1886.

Engines:	
Mean point of cutting-off, in the high-pressure cylinders, from commencement of stroke ..... inches..	16.3
Mean point of cutting-off, in the low-pressure cylinders, from commencement of stroke ..... inches..	16.8
Mean number of holes of throttle-valve open	4.19
Mean vacuum in the condenser ..... inches..	22.7
Mean pressure in the boilers, per square inch ..... pounds..	47.9
Mean pressure in starboard receiver, per square inch, above zero ..... pounds..	19.3
Mean pressure in port receiver, per square inch, above zero ... do	20

Temperatures:	
Of engine-room	107.9
On deck	67.5
Of injection water	69.8
Of discharge water	95.9
Of feed water	75.4
Total time fires were lighted ..... hours	6,232½
Total time engines were in operation, the ship being on her course ..... do	1,160½
Revolutions:	
Total of starboard engine	4,652,279
Total of port engine	4,632,994
Mean of starboard engine per minute	66.81
Mean of port engine per minute	66.56
Total number of geographical miles	9,495.2
Mean number of geographical miles per hour	8.182
Total tons of coal consumed while engines were in operation	562$\frac{218}{240}$
Mean number of pounds of coal consumed per hour while the engines were in operation	1,087
Total tons of coal consumed for all purposes	953$\frac{149}{240}$
Total tons of refuse (ashes) from the coal	211$\frac{149}{240}$
Draught of water:	
Greatest:	
Forward ..... feet and inches	11 5
Aft ..... do	13 10
Least:	
Forward ..... do	10
Aft ..... do	12 5
Mean, for the whole of the steaming:	
Forward ..... do	10 6.81
Aft ..... do	13 0.31

The greatest continuous speed during the year 1886.

Date, July 19, 1885:	
Speed ..... knots	9.93
Number of hours	7
Direction of wind	NNE.
Force of wind	4
State of sea	Smooth.
Number of furnaces used	4
Steam pressure in boiler, per square inch ..... pounds	50
Steam pressure in receiver, per square inch ..... do	25.5
Revolutions per minute	81.5
Vacuum ..... inches	23.7
Holes in throttle-valve open	5
Cut-off in non-condensing cylinder ..... inches	22
Cut-off in condensing cylinder ..... do	18½
Temperature:	
In engine-room	115
On deck	68.6
Of injection water	69.8
Of discharge water	98
Of feed water	78.7
Draught:	
Forward	10′. 8″
Aft	12′. 7″

Anthracite coal per hour	pounds..	1,226
Indicated horse-power		529.2
		5
		534.2
Coal, per indicated horse-power, per hour	pounds..	2.29

The ship was docked in July at the Norfolk navy-yard. We found the outboard valves in good order. A quantity of barnacles (*Balanidæ*) was found inside the cast-iron chamber of the injection-valve. We found the zinc ferrules in the nozzle of the outboard blow-valve had corroded but little, while the iron chamber appeared preserved. We found the line-shafts, under the insulation tape, to be free from corrosion. This tape has been on the shafts two years.

The annunciator, referred to in my last annual report, was duly completed, and has worked well during the year.

A current of air blown into the bottom of the case (Plate VI) will cause the little wind-mill at the top to revolve. This is mounted on the vertical spindle, which has a screw-thread near its lower end which gears into a toothed wheel; this wheel, which is on a horizontal shaft, carries an arrow on each end; the back of the indicator is secured to one side of the pilot-house, with a circular hole in the wood large enough to move in; the front arrow is visible from the deck and the back arrow from the interior of the pilot-house. If a current of air, blown into the bottom of the indicator, revolves the arrow ahead, it is manifest that the direction of the arrow will be reversed if the current be reversed.

To secure these positive blasts, a small blower (as in Plate VII) is placed in the engine-room, parallel with the line-shaft, to which shaft it is belted. If the engine goes ahead the blower delivers a blast, and if the engine backs the blower induces an air current, and if the engine stops the blower and current of air cease simultaneously.

There is one of these machines for each of the main engines; their action is positive and automatic, and they can make no mistake.

On board the United States ships Boston and Atlanta there are three of these indicators in each circuit, which consequently announces the motion of the engine at as many different parts of the ship. To connect the blower and indicators we use lead pipes.

The inertia of a ship in motion is considerable, and it takes some little time for the ship to change her direction even after the engines are reversed; it often occurs, in sounding and in dredging, that opposing wind and currents carry the ship from the desired position in reference to the wire; hence it becomes imperative for the commander to know, promptly, if either engine has moved in the desired direction. Damage due to mistakes either in striking or in interpreting the signals, which hitherto occurred, have not occurred since the pneumatic indicators have been used. The tax on the commander's mind in reconciling the wind, waves, current, strains on and direction of the dredging wire, while dredging in the great depths of the Gulf Stream is considerable,

and when he had, in addition to this, to remember the direction both engines were moving in, it was a surprise that successful work was done at all.

GOVERNORS.

The Svedberg governors have performed well during the year. They have required no repairs nor alteration, and but little attention.

On completing the repairs to the boilers at the Washington navy-yard, in January, we put a cold-water pressure of 65 pounds in the port boiler and 64 pounds in the starboard boiler; at which pressure they appeared tight, but the soft patches on the front inboard corners began to leak soon afterwards.

The 1½-inch screw (pipe) plugs we put in the boilers were tight. One of the plugs began to leak on the 1st of March and the legs began to leak soon afterwards. On the 1st of April we discovered one of the steel socket rivets broken off; we replaced it with an iron one.

On our return to Washington (from the Bahama cruise) we replaced five rivets in a patch on the back leg of port boiler; and a soft patch on a seam on the shell of starboard boiler; replaced a soft patch in the forward inboard corner of No. 4 furnace; replaced two soft patches in the port inboard corners of both boilers; put a new stem in the starboard main check-valve; calked seams and rivets in No. 4 furnace; a new rivet in a brace in the starboard boiler; replaced two soft patches on the waist of port boiler and one on starboard boiler; replaced a soft patch on the bridge end, inboard corner of No. 1 furnace; to accomplish this last job it was necessary to dig a portion of the cement out of that boiler, which we replaced. We put several new rivets in the front sheet of this furnace.

On completing the repairs at Washington the vessel made her summer cruise, during which time leaks occurred as before, but we were able to obtain fresh water at Wood's Holl and at St. John's—the only ports visited—and we only accumulated scale while at sea after our supply of fresh water was exhausted. Our stay at Wood's Holl was longer and our voyages were of shorter duration than during previous cruises, which enabled us to take better care of the boilers.

During the year we have paid for repairs to the boilers:

For labor, $516.21; for material, $494.15. Total, $1,010.36.

NEW BOILERS.

In obedience to the Commissioner's order the writer designed boilers to replace those now in the ship, which were bid on by a number of large engineering establishments; these bids were opened on the 23d of this month and the Columbian Iron Works and Dry Dock Company, of Baltimore, was found to be the lowest bidder.

The new boilers are to be two in number, cylindrical in form, and are specified to be of "the best American charcoal-hammered iron."

They are to be placed in the main hold fore and aft, one forward of the other, with the fire-room athwart-ships between them.

A steam chimney is placed over the fire-room—between the boilers—and is supported on wrought-iron built-up girders, supported by the boilers, essentially as recommended in my quarterly report dated 31st of March, 1884.

The external diameter of the boilers is 12 feet, and the length on line of axis is 10 feet 3 inches. Each boiler has three furnaces, 36 inches internal diameter, and exposes a length of grate of 6 feet 6 inches, making an aggregate of 117 square feet of grate surface.

The tubes are to be wrought-iron lap-welded, 3 inches external diameter, 7 feet 9 inches long, No. 10 wire gauge in thickness; there are in all 394 tubes, including 48 stay-tubes, which are No. 8 W. G. thick.

The shells of the boilers are to be $\frac{3}{4}$ of an inch thick; the longitudinal seams are double strapped; the circumferential seams are to have single straps; all the seams are butted.

The heads are to be $\frac{9}{16}$ inch thick, butted and strapped. The heads are braced by $1\frac{5}{8}$-inch rods, spaced 12 inches centers, and the other flat surfaces are stayed by $1\frac{1}{4}$-inch screw-stays, spaced $7\frac{1}{2}$-inch centers.

The steam-chimney is 7 feet 4 inches in diameter (the same as the old one) and is 10 feet high.

The flue is 4 feet 4 inches in diameter, is in four sections, stiffened by the Adamson rings, and is $\frac{5}{8}$ inch thick.

The boilers are to sit in and be secured to wrought-iron saddles, which are to be riveted to the floor frames. The holding-down bolts are $1\frac{1}{2}$ inches in diameter, and six in number for each boiler.

The old stop-valves, checks, blows, salinometers, gauges, etc., are to be utilized as far as possible.

A new $8\frac{1}{2}$-inch stop-valve, a section of $8\frac{1}{2}$-inch copper steam pipe, a 3-inch safety-valve, one new escape-pipe, two safety feed-valves, and two sections of feed and blow pipe are to be made new.

The covering of the boilers will consist of half an inch of kaolin, half an inch of hair felt, and half an inch of wood pulp.

The center of the smoke-pipe will come about 5 feet 3 inches forward of the present one. We will put four ventilators (instead of two) into the fire-room, and, by bringing them close to the smoke-pipe, we will leave more "floor room" on deck than at present, and will bring the ventilator hoods clear of the main-stays, that we may run them up about 8 feet into the air. As there will be a boiler on both sides of the fire-room, we will need all the air we can get into the fire-room.

The iron in the old coal-bunkers is to be utilized in the new ones. We will get the new boilers and bunkers between the same bulk heads that inclose the old ones, but the new arrangement affords a space of 12 inches in the clear (at the smallest place) around the boilers, and an increase of more than 30 tons of coal in the bunkers.

DONKEY-BOILER.

This boiler is to be of the same material as the main boilers, is to be cylindrical in form, 4 feet 6 inches in diameter, and 4 feet 8 inches in length. It is to have a single furnace-flue 30 inches in diameter, exposing a grate 3 feet 3 inches long. It is to have a steam drum 24 inches in diameter and 15 inches high; the tubes are to be eight in number, 4½ inches in diameter, and 3 feet 9 inches long, arranged in nests over the spandrels of the furnace; they are to be lap-welded drawn tubes. This little boiler is to be placed on the main deck in the deck-house amidships, between the main steam drum and the galley. The object of using this boiler is to warm the ship, run the dynamo, run the pumps (for washing decks, pumping bilge, supplying the aquaria, etc.), and distilling water when the main boilers are not in use. It is believed that considerable labor and coal will thus be saved, as well as saving the main boilers.

DREDGING-ENGINE.

The follower-bolts in the starboard cylinder of this engine, which were broken a year ago by water freezing in the piston, were at the time temporarily replaced by bolts belonging to another engine, have been replaced by new and proper bolts. The guide-roll of this engine was badly worn and scored by the dredge wire, and was replaced by a new one made at the Washington navy-yard in June last. Two new wrist-pins have been made for this engine. The cost for labor on the above was $13.80; material, 35 cents; total, $14.15.

REELING-ENGINE.

This engine has been overhauled and adjusted; the wrist-pins, which were wearing "out of round," have been turned around one-fourth of a turn, that the future wear may come on the high places.

SOUNDING-ENGINE.

The steam hose on the sounding-engine burst at sea, on the 1st day of May, and as there was no way of repairing it the writer substituted the exhaust-hose for it and erected a temporary exhaust-pipe of iron, which temporary plan answered very well until the ship reached port. We provided new and larger steam hose and attached them. We had the steam cylinder rebored, increasing its diameter nearly one-quarter of an inch, had new piston-rings made, and provided a proper oil-cup to lubricate the valve and piston of this engine. The cylinder was not true and the original piston-rings leaked, which diminished the power of the engine, which is really too small for the work. The changes made it a little better. The writer believes, when the increased pressure from the new boilers is applied to this little engine, that it will reel the wire in about 15 per cent. faster than it did originally. A new

bronze sounding-reel has been built by contract, and has been fitted to its place by the men in this department. Its pulley is slightly less in diameter than that of the original reel, and with increased pressure on the steam piston it is believed that the speed of reeling in will be from this cause augmented. The cost of the labor and material consumed on the engine of the sounding-machine—which come in the writer's department—were as follows:

38 feet of steam hose	$18.00
1 oil-cup	.60
1 hose-coupling	2.00
Labor	20.70
Total	41.30

STEERING-ENGINE.

The steam steering-gear has not been used much during the year, but has, when used, done its work with promptness and precision. The plates over the exhaust chambers and passages are very light and are not bolted close enough; this makes bad air-leaks which reduces the vacuum from 2 to 3 inches in the condenser.

STEAM-WINDLASS.

This machine continues to give satisfaction. Besides hoisting, catting, and fishing the anchors, it is used to reel off wire rope, warp the ship, and hoist boats. No repairs have been needed to this engine during the year, except sweating thin pieces of brass on the sides of the crank-pin brasses, at a cost of $1.38.

STEAM ASH-HOISTER.

This machine continues to work admirably. The (cast-iron) gland to one of the piston-rods was discovered to be broken; there was sufficient metal in it and the fracture showed a clear break, an indication that it was broken by accident or stupidity. The broken gland was replaced by a brass one at the Washington navy-yard, at a cost of $2.76.

STEAM-PUMPS.

We have had to renew the leather cup-packings on the water-piston of the circulating pump during the year, at an expense of $8. The piston, which is of cast iron, is badly corroded and will not last much longer. It should be replaced by a light brass piston fitted for hemp packing. We have had the steam-chest of the hydrant pump rebored, and a new steam-valve put in during the month of June, at an expense of $27.05.

A No. 1 Davidson steam-pump has been purchased and erected in the engine-room to circulate sea-water through the aquaria. The pip-

ing is entirely of brass, and is provided with proper valves, tap-cocks, and safety-valve, which may be regulated in the laboratory. The pump and piping were erected by the men in this department.

Cost of the aquarium pump	$90.56
Cost of piping	48.23
Cost of valves, cocks, and fittings	11.89
Total	150.68

STEAM CUTTERS.

These two boats continue to do good service, and are always ready for use when required. The nature of the service of this ship, which gives us semi-annual opportunities to overhaul these two boats, and the hearty co-operation of the commanding officer in all matters pertaining to their efficiency, are two important elements in the great success of these Herreshoff boats. During the year the following repairs were made to the larger boat, at the Washington yard: A sheet-brass cover was put on the separator, new wrist-pins were put in the cross-heads, and the cross-head gibs were rebabbitted; the lower half of the casing of the boiler has been renewed; new pins were made for the eccentric-rods; new pins were made for the link blocks; the plunger and valve of the hand bilge-pump were refitted; a new steering-wheel and drum were made. In November a set of grate-bars were made. Repairs, such as straightening the screw-blades, which had been bent, remaking joints, &c., have been made by our own men. The cost of repairs to this boat at the Washington navy-yard amounted to $54.66. During the year we have bought from the builders of the boat a new slide-valve for the high-pressure cylinder, at a cost of $5.50. The wear of these slide-valves, which are made of brass, is all on one side.

The smaller boat (the gig) broke her high-pressure piston ring and spring and bent the rod and follower on the 7th of March. The brass follower was screwed to the cast-iron piston by a fine thread; this became loose and unscrewed. We repaired it temporarily by casting a solid Babbitt-metal ring, in place, and straightening the rod and follower; we replaced the piston, later in the year, by one of wrought iron. Later in the year we lost the low-pressure piston in the same way, and replaced it in like manner. The slide-valve of the high-pressure engine, which was worn to a knife-edge on one side, has been replaced with a new one.

The smoke-pipe was rolled out of the gig on the night of the 5th of March, in 3½ fathoms of water; it was recovered by a native diver. The top of the boiler was so badly torn by the accident, and the lower casing so badly corroded and burned out by the end of the summer cruise, that we were obliged to put on an entirely new casing. As the fine boiler-shop at the Washington navy-yard had been discontinued, as such, we were obliged to employ a journeyman boiler-maker and build

the casing ourselves. By the courtesy of the chief engineer of the navy-yard we were permitted to use the shop. We purchased the material from L. H. Schneider, of Washington.

The cost of repairs to the gig during the year was as follows:

1 safety-valve spring	$0.75
1 high-pressure slide-valve	4.50
1 high-pressure piston	13.50
1 low-pressure piston	17.00
Material for new boiler casing	35.57
Labor for new boiler casing	49.68
1 set of fire-bricks	2.50
Total	123.50

FRESH-WATER DISTILLING APPARATUS.

During the year we have distilled 53,425 gallons of water, which has been uniformly of good quality. A leak was discovered in the joint at one end of the coils during the month of June. This leak was stopped by a plumber's joint of soft solder, by a navy-yard workman, at a cost of $9.

The practice of cleaning and whitewashing the interior of the tanks each time they are emptied is continued with good results.

ELECTRIC LIGHT.

The uniformly white, steady, and agreeable light from our Edison incandescent lamps has continued throughout the year.

The commutator of our Z-dynamo, though much worn, is still efficient. The engine is as efficient as when new, and gives us but little trouble. The engine and dynamo are run by a coal-heaver.

The usual amount of breakage of wires and burning out of cut-out plugs has occurred, which has generally been traced to short circuiting through sea-water, which leaks through the decks, &c., and gets at the wires.

We find, in repairing these wires (which are of copper) that they are now quite soft and ductile, though they were quite brittle two years ago. There can now be no doubt that a molecular change is going on in these wires all the time. The three-light pendants, with their flexible cables, have been used the entire year, to the exclusion of the arc lights. The attachment at the end of the cable is troublesome in that the men break them by sometimes screwing up too hard; sometimes they burn out by arcing, from failure to screw them up to good contact, and again by dirt separating the contacts just enough for the purpose.

One of the small tension-screws of the dynamo brushes has been renewed during the year, and drip-pans have been fitted to the pillow-blocks of the dynamo, the blocks being cut out to receive the pans.

The dynamo has been in operation 1,574 hours and 26 minutes during the year, during which time a mean of about 47 lamps has been in circuit, aggregating the following cost:

14¾	tons of coal, at $5.17	$76.25
43½	gallons of oil, at 55 cents	23.925
149	lamps, at 85 cents	126.65
34	3-light safety-plugs, at 8 cents	2.72
18	6-light safety-plugs, at 8 cents	1.44
1	30-light safety-plug, at 8 cents	.08
2	key-sockets, at 70 cents	1.40
4	plain sockets, at 60 cents	2.40
3	wire shade-holders, at 30 cents	.90
3	pounds copper wire, at 40 cents	1.20
2	pounds insulation tape, at 50 cents	1.00
1½	gross assorted screws, at $1.25	1.875
46	feet flexible cord, at 15 cents	6.90
4	attachment plugs, at 40 cents	1.60
3	dynamo-brushes, at 60 cents	1.80
1	standard receptacle, at 44 cents	.44
	Total	250.58

Taking the 16 candle-power lamps as requiring double the current of one 8 candle-power, the mean number of lamps will be (as nearly as can be estimated) 47; the candle-power hours will then be $(47\times1574\times8=)$ 591824, and this quantity, divided into the total cost, gives the cost of $\frac{250.58}{47\times1574\times8}=0.042$ cents per candle-power per hour, or almost exactly what an equal gas-light costs the consumers in Washington city.

The submarine lamps have worked very well during the year. The naturalists employed them extensively on the Bahama Banks, where the white bottom of the sea afforded a beautiful reflector in the darkness of the night. By the aid of the marine glass (improvised in this department) the position of the light and adjacent objects were readily observed even when the surface of the water was disturbed.

Though no hitch or delay has occurred during the year, and the plant has worked fully as well as when first installed, I feel obliged to say that the B circuit of only 51 volts pressure is rather behind the age, so far as economy is concerned, and therefore recommend the exchange of the dynamo for one of higher potential.

The Albatross was, I believe, the first Government vessel (of any nation) that employed the incandescent electric lighting for internal illumination.

The experiments made and the results obtained here were carefully considered in the Navy Department before any venture was made to light their ships in a similar manner. We have produced our light, I believe, at least as economically as any people using so weak a current as we employ, but since we installed our plant great improvements have been made in dynamos. The change in the dynamo will not be very expensive.

LIFE-TIME OF LAMPS.

For the past two years we have kept the lamps in the engine-room alone in circuit all the time, that we might obtain a correct estimate of the average duration of the lamps.

The total lamp hours was 27,987 hours and 31 minutes, and the total number of lamps expended was 30, so that the mean life-time of the lamps in the engine-room appears to be $\left(\frac{27987-31}{30}=\right)$ 932 hours and 54 minutes. Lamp No. 92 is included in the above average, though it was broken after 701 hours of incandescence.

In recording the great life-time of these lamps, it is proper to state that they were in circuit all the time, and were lighted and extinguished daily with the starting and stopping of the dynamo, and were, consequently, never suddenly heated nor cooled.

VENTILATION.

The ventilating fan has been in use, during the warm weather, for several hours each night when at sea. The wastefulness of the Wise motor, which drives the fan, is so great, that the writer does not feel justified in using it a great deal. The new arrangement of boilers will displace the present fan and motor, and I recommend that a pair of Sturtevant's No. 5 monogram exhaust fans and an orthodox steam-engine be put in place thereof. They can be placed in the donkey-boiler room conveniently. To exhaust some of the heated air from the space over the working platform of the engine-room I recommend that two wrought-iron chimneys be run from this point to the open deck above.

The four proposed ventilators to the new fire-room, which will extend 8 feet above the deck, will doubtless be much more efficient than the present two, having the same (18 inches) diameter, and which are only 3 feet above the deck. The movable cowls of the new ventilators will be of copper, to prevent affecting the standard compass.

WARMING.

The usual trouble from breaking of heater valves has continued. It is impossible to say when or by whom these valve-stems are twisted off or threads stripped; it is a contest between small brass valves and muscle, in which the latter appears to triumph. The large heater, which was removed from the berth-deck last year, has been replaced.

The steam traps (Chapman's) have never been satisfactory; water accumulates in the heaters if we trust to the automatic action of the traps, and if we attempt to regulate the drain by adjusting the by-pass, we find steam blowing through at times.

The writer designed a valve (Fig. 2, Plate VIII) and improvised a trap by screwing the valve into a cast-iron cylinder we had been using

for an oil-filter; the steam and water enters at the top and the condensed water escapes through the valve; the steam does not escape.

We substituted this for the Chapman trap for draining the after heaters, and find it works admirably.

COAL.

Excepting 30 tons of semi-bituminous coal purchased at Nassau in April, and about two tons for the cutters, we have used anthracite coal exclusively.

The total consumption, for all purposes, has been 953 tons 419 pounds, and the average cost has been $5.17 per ton.

The quality has been generally good, except that obtained from the Norfolk navy-yard, which we found dirty and air-slaked.

We check the weight of coal received by the increase in the ship's displacement, which latter quantity is obtained from a calculation of the ship's increase in draught of water. We either witness the weighing of every pound of coal we buy, or weigh it ourselves as it is delivered alongside the ship. The following amounts of coal have been used for the purposes specified:

	Tons.
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	562$\frac{2212}{2240}$
Coal consumed to light the ship by electricity	14$\frac{1934}{2240}$
Coal consumed to ventilate the ship	10$\frac{1867}{2240}$
Coal consumed to distill water	23$\frac{1995}{2240}$
Coal consumed by the steam cutters	9$\frac{1736}{2240}$
Coal consumed for driving the hoisting engine, steam windlass, washing decks, warming ship, and keeping fires banked when the main engines were not in operation	277$\frac{1}{7}\frac{7}{4}\frac{1}{0}$
Total coal consumed by the engineer's department	899$\frac{2663}{2240}$
Coal consumed by the equipment department (cooking)	53$\frac{1637}{2240}$

MEDICAL DEPARTMENT.

Report of Surgeon J. M. FLINT, *U. S. Navy.*

The general health of the ship's company during the year has been very good. No cases of serious illness have occurred, and only those trifling accidents incident to all the ruder occupations of men. The provisions for ventilation are the same as heretofore, and are reasonably effective when in use. The between-decks, in this as in all other ships with which I have been acquainted, are more or less malodorous at sea. No precautions can prevent the evolution of foul gases in the bilges of a ship, where the presence of organic matter and the conditions of heat and moisture favorable to decomposition are unavoidable. How to remove these gases before they have contaminated the air of the apartments of men and officers, is a problem not yet solved; it is

evident, however, that any system of ventilation in order to be perfect must be in continuous action.

The first part of the year, from early in February to May, was passed principally among the Bahama Islands, where the temperature was mild, the winds fresh but soft, and the climate generally conducive to health and comfort. The islands themselves in their present condition furnish wonderfully little of general interest to the visitor, and fail utterly to justify the glowing accounts given of them by their discoverers. The inhabitants of the islands, with the exception of New Providence, are poor and thriftless but not wretched or degraded, mostly colored, evidently diminishing in numbers, extracting a very plain subsistence from a thin soil impervious to modern implements of husbandry, and from the more open-handed generosity of the sea. There are no educated medical men on the islands except at Nassau, and the announcement of the presence of a "doctor" among them was sufficient to surround him speedily with a numerous *clientèle*, consisting of the sick, those who had been sick, and those who thought that they might at some future time get sick, all anxious to avail themselves of the rare opportunity for professional treatment. Every effort was made to minister to their necessities as well as their fancies, and their expressions of gratitude for what they received were evidently sincere. So far as was observed the physical condition of the people seemed to be good. There were few maimed or deformed, and only occasional evidence of the prevalence of specific diseases among them, either at present or in the past. These remarks, however, apply only to the outlying islands and not to New Providence, upon which is situated Nassau, the largest town and the principal commercial port of the Bahamas.

Among the interesting cases observed was one of Hysterical Paralysis of several months' continuance, the patient having been utterly unable to move a muscle of the lower extremities during that time. The subject was a well-conditioned young girl, one among numerous victims of a remarkable epidemic of hysteria attending great religious excitement on Cat Island. Several hundred persons, a very large percentage of the whole population, were said to have been affected, mostly young people, boys and men as well as girls and women, and their wild vagaries were related by witnesses with a solemnity that assured the hearer how firmly rooted was the belief in the supernatural character of the manifestations. Treatment of this case by nerve tonics and electricity for a few days was attended by such marked improvement that a complete and speedy recovery was certain.

The summer and autumn cruise of the ship was made on the North Atlantic coast, with Wood's Holl as headquarters, northward as far as St. John's, Newfoundland. The Grand Banks in August developed the same foggy, rainy, disagreeable, and depressing climate for which it is noted, and a week in the quiet and snug harbor of St. John's was a welcome and refreshing interlude. Nothing for record in this department

occurred during the summer, except the development of a case of Melancholia in one of the seamen, who was in consequence transferred to the naval hospital at Chelsea, Mass., and subsequently to the Government Insane Asylum in the District of Columbia. No satisfactory cause for the disease could be assigned.

The determinations and record of the densities of sea-water have been continued by this department during the year. The observations have been chiefly confined to surface densities, and the collection of water for the purpose has usually been made at 12 o'clock each day that the ship was at sea. The specimen is kept until it has taken about the temperature of the room and of the instruments employed, and the same care as heretofore exercised in the reading and reduction. The record in itself presents no remarkable features calling for extended remarks. The high gravities of the Southern waters, where evaporation is rapid, is observable, and especially in those inclosed basins like Exuma Sound and Tongue of the Ocean, where there are no active currents to restore the equilibrium with the ocean water in general. In contrast are the low gravities of the Northern waters, where evaporation is slight and the water is freshened by the Arctic currents.

The record of temperatures and densities observed during the year is appended:

Record of temperatures and specific gravities.

Date.	Time of day.	Latitude N.	Longitude W.	Depth.	Temperature.			Specific gravity.	Specific gravity reduced to 60° F.
					By attached thermometer.	Of the air.	Of specimen at time specific gravity was taken.		
1886.		° ′ ″	° ′ ″		°	°	°		
Feb. 21	12 m.	33 31 00	75 58 00	Surface	69	45	86	1.0243	1.028616
22	12 m.	31 15 24	76 44 00	do	68	66	86	1.0242	1.028516
23	12 m.	28 24 24	78 10 00	do	72	71	86	1.0242	1.028516
24	12 m.	27 44 30	77 16 00	do	71	74	85	1.0244	1.028500
25	12 m.	26 31 00	75 06 30	do	70	70	78	1.0256	1.028408
26	12 m.	24 47 36	74 36 15	do	74	73	77	1.0258	1.028418
27	12 m.	Off San Salvador		do	75	75	77	1.0257	1.028318
Mar. 5	12 m.	Port Nelson, Rum Cay		do	73	75	81	1.0254	1.028739
6	3 p. m.	Well near beach, Port Nelson		do		76	81	1.0010	1.004339
6	3 p. m.	Well in center of town, Port Nelson.		do		76	80	1.000	1.003160
6	3 p. m.	Salt ponds, Port Nelson		do		76	80	1.0850	1.088160
12	12 m.	Exuma Sound		do	71	72	85	1.0248	1.028000
17	12 m.	Harbor of Nassau, New Providence.		do	74	82	76	1.0264	1.028832
April 9	12 m.	25 26 00	79 59 30	do	74	71	84	1.0242	1.028112
10	12 m.	26 33 00	78 21 20	do	73	71	85	1.0240	1.028100
11	12 m.	25 23 00	77 26 00	do	73	72	84	1.0246	1.028500
12	12 m.	Tongue of Ocean, south end		do	73	74	78	1.0264	1.029208
13	12 m.	Green Cay, Tongue of Ocean		do	74	77	77	1.0266	1.029218
14	12 m.	24 50 00	77 39 00	do	74	73	76	1.0260	1.028432
15	12 m.	South Bay, New Providence		do	73	73	76	1.0264	1.028832
30	12 m.	Off Eleuthera Island		do	76	79	85	1.0246	1.028700
May 1	12 m.	Off Abaco Island		do	74	76	86	1.0242	1.028516
2	12 m.	27 48 00	77 37 45	do	73	72	84	1.0246	1.028512
3	12 m.	28 18 00	78 32 30	do	73	72	84	1.0246	1.028512
4	12 m.	29 35 00	79 53 00	do	77	72	85	1.0244	1.028500
5	12 m.	31 09 00	79 33 30	do	77	73	83	1.0250	1.028720

Record of temperatures and specific gravities—Continued.

Date.	Time of day.	Latitude N.	Longitude W.	Depth.	Temperature.			Specific gravity.	Specific gravity reduced to 60° F.
					By attached thermometer.	Of the air.	Of specimen at time specific gravity was taken.		
1886.		° ′ ″	° ′ ″		°	°	°		
May 6	12 m.	32 38 00	77 05 30	....do.....	77	73	84	1.0245	1.028412
7	12 m.	34 10 00	75 22 00	... do.....	74	75	83	1.0246	1.028326
Aug. 3	12 m.	40 26 30	60 19 00	....do.....	75	68	78	1.0250	1.027808
4	12 m.	41 41 00	63 38 00	....do.....	66	70	79	1.0232	1.026183
5	12 m.	41 48 00	62 51 30	....do.....	67	67	78	1.0222	1.025008
6	12 m.	43 23 00	59 32 30	....do.....	61	64	81	1.0212	1.024539
7	12 m.	43 53 30	55 36 00	....do.....	62	63	81	1.0220	1.025339
8	12 m.	44 45 00	50 34 00	....do.....	62	62	81	1.0215	1.024839
9	12 m.	45 03 00	46 15 00	....do.....	62	64	69	1.0245	1.025787
10	12 m.	45 16 00	42 24 00	....do.....	71	69	69	1.0252	1.026487
11	12 m.	46 40 31	44 54 30	....do.....	56	55	60	1.0246	1.025887
12	12 m.	47 41 00	47 28 30	....do.....	48	53	62	1.0248	1.025070
13	12 m.	47 12 00	50 56 30	....do.....	54	57	62	1.0242	1.024470
17	12 m.	St. John's, Newfoundland.		....do.....	54	64	81	1.0215	1.024839
21	12 m.	45 19 00 (Off coast of Newfoundland.)	52 48 00	....do.....	55	64	70	1.0220	1.024983
22	12 m.	45 14 00	55 04 00	....do.....	56	59	70	1.0220	1.024983
23	12 m.	43 52 00	58 51 00	....do.....	62	66	67	1.0202	1.034700
24	12 m.	42 49 00	60 59 00	....do.....	67	70	85	1.0214	1.025500
25	12 m.	41 38 00	63 15 00	....do.....	65	64	85	1.0230	1.027100
26	12 m.	41 55 00	63 49 00	....do.....	73	73	85	1.0234	1.027500
27	12 m.	41 20 00	65 19 00	....do.....	70	68	83	1.0240	1.027726
28	12 m.	40 14 00	67 56 00	....do.....	72	73	84	1.0236	1.027512
Sept. 16	12 m.	39 15 00	70 23 15	....do.....	74	75	79	1.0244	1.027383
17	12 m.	38 20 00	70 12 00	....do.....	77	70	80	1.0242	1.027360
18	12 m.	38 30 30	70 57 30	....do.....	75	76	77	1.0246	1.027218
19	12 m.	38 32 00	72 03 00	....do.....	74	75	78	1.0244	1.027208
20	12 m.	39 10 00	72 06 00	....do.....	72	66	78	1.0245	1.027308
Oct. 22	12 m.	38 39 00	72 38 00	....do.....	66	57	83	1.0244	1.028126
23	12 m.	36 47 00	73 20 00	....do.....	69	67	82	1.0240	1.027520
24	12 m.	36 35 00	73 58 00	....do.....	68	66	81	1.0237	1.027039
25	12 m.	36 42 25	74 30 00	....do.....	69	70	78	1.0242	1.027008
26	12 m.	37 25 00	73 50 00	....do.....	68	71	78	1.0241	1.026908

REPORT OF THE NATURALIST, MR. THOMAS LEE.

The work of the Albatross for 1886 began with a cruise among the Bahama Islands. Mr. James E. Benedict was in charge of the scientific department, and was assisted by Messrs. Willard Nye, jr., C. H. Townsend, F. L. Washburn, and myself.

We left Norfolk February 20, and met with little of interest before reaching our anchorage at Watling's Island. Before speaking of our work, it is my pleasant duty to acknowledge our great indebtedness to Lieut.-Commander James M. Forsyth, of the United States Navy, for furnishing us with much valuable information with regard to the character of the islands, and for letters to Mr. R. C. Nairn, of Watling's Island, and the Misses Forsyth, of Rum Cay, who showed us every courtesy and attention, besides very materially aiding us in our work.

February 27 Mr. Nye and I landed on Watling's Island, and remained there till March 9. The Albatross ran over and anchored at Rum Cay. We were cordially welcomed by Mr. Nairn, who furnished us with comfortable quarters, thus enabling us to get to work at once.

Watling's, like all the islands of the Bahama group, is made up of coral limestone, much weathered upon the surface, and below it of a very cavernous nature. A great part of the interior of the island is occupied by a series of connecting lakes, which are surrounded by hills rising quite abruptly from the water to a height of 50 to 140 feet, and thence sloping more gradually to the ocean. Between the hills and the ocean are a number of large swamps, hardly above tide-level.

The coast-line is partly rough coral rock rising abruptly from the water, partly stretches of coral sand, and the island is pretty well surrounded by outlying coral reefs. Though there is little soil, the greater part of the island is clothed with a dense, low, scrub growth, with here and there a large tree to indicate what the timber was in old times. The surface has been quite extensively under cultivation, but since the abolition of slavery nearly all the white people have left the island, and the negroes cultivate fields only here and there, and scarcely do more than get a living off the ground.

The swamp water is pretty much all brackish, but fresh water can be had at any point by digging down to near the ocean level. It collects slowly and is subject to a rise and fall with the tide.

We found the rough, coral bottom near the shore ill adapted to seining, and the inhabitants brought in but few species of fish caught with hook and line.

A trip across the island to a creek on the eastern coast resulted in the capture of a number of species of fish. There was little opportunity to haul the seine, but we made a number of sets across the mouths of small creeks, and then drove the fish down into the net.

From the lakes we seined a large number of minnows, *Atherina stipes* —a species most plentiful in these waters and apparently the only fish occupying them.

The lake water is very saline and subject to a slight rise and fall with the tide, though there is no apparent connection between the lakes and the ocean.

We made a trip through the lakes to a cave near the new light-house at the northern end of the island, and from which several human skulls are said to have been taken. The cave is near the lake, in the face of a low semicircular ledge of limestone. The mouth of this cave, about 8 feet long by 2 feet in height, was originally walled up. It now stands open, the wall having been pulled down. Within, the cave extends about 50 feet along the face of the ledge on each side of the entrance, and the low roof meets the floor about 20 feet back. It is divided into several chambers by natural columns rising from the floor to the roof. The largest of these chambers extends back to a pool of brackish water on the lake level, and it was from this chamber that we made our collections. A careful search through the other parts of the cave revealed no human remains, and only a few small bits of broken pottery. The outer wall of the cave is a mass of stones, piled up to the roof, through

which the earth from without has washed into the cave, and down across the floor. Whether this wall is artificial or natural would be an exceedingly difficult task to determine.

From among the loose stones and earth, near this outer wall, we picked out several pieces of coarse pottery, and several pieces of bone belonging to the human skull, among them two jaw-bones with teeth intact. About half way across the floor we found a number of human long bones strewn about with no apparent arrangement.

Miss Nairn, who was one of the first to visit this cave, told us that she saw five or six skulls lying upon the floor when she was there, and that one of them had been taken to the library at Nassau.

Both going and coming through the lakes we saw great numbers of cormorants floating lazily about on the water or sitting on the mangrove bushes along the shore. They remain throughout the year and breed on these lakes. We saw, too, a number of herons, of which we shot several, and flocks of Bahama ducks and blue-bills, but could not get near these latter.

Coming home, we landed on Iguana Key and captured six iguanas of the genus *Cyclura*. We saw there a large brown rat, but did not succeed in capturing it.

During our stay on Watling's Island we visited several other caves, but found no human remains. In all the caves visited we found but one bat, though there was every indication that they had been there in great numbers quite recently. The negroes say that they always disappear during the winter months.

We procured a number of stone implements during our stay. These the negroes call thunderbolts, believing that they fall with the lightning. They preserve them very carefully, as a charm to ward off the lightning, and are very loth to part with them.

We made collections of the shore fauna as well as of lizards, crabs, insects, and mollusks from all parts of the island, and of birds we took a number of species as well as several nests with eggs.

Miss Nairn, who seemed quite conversant with the habits of most of the birds, told us that in December, during high winds, swallows sometimes made their appearance, very tired. They stay but a few days, and then disappear. The "gale bird," undoubtedly our bobolink, comes too, during the high autumn winds, in large flocks, but stays only a few days.

On March 8 the Albatross left Rum Cay, and on the same day touched at Conception Island and gave the naturalists a chance to make shore collections. One haul with the beam trawl, near Conception Island, at station 2629 (1,169 fathoms), brought up only a few crustaceans, one glass sponge, one piece of coral, and one fish. The mud-bag was filled with coral sand, with pteropod shells and foraminifera in it.

March 9 the Albatross picked up Mr. Nye and myself and then ran back to Rum Cay, to give us a chance to take some photographs at Port Nelson.

The character of the surface and the growth at Rum Cay are about the same as at Watling's Island, and the collections made at each island were made up largely of the same things.

The land snails, *Helix*, however, on Rum Cay were found clinging to the bushes, in low, wet places, in vast numbers, much greater than observed on any other island, and a very large collection was made.

The inhabitants of Rum Cay fish almost entirely with hand-lines, though occasionally using basket traps. They never attempt to do more than catch fish enough for immediate use.

We left Rum Cay March 10, and anchored off Cat Island for the night. Next morning we landed and made quite extensive collections. Near the shore, and running parallel with it, were several low ridges covered with thick scrub growth and separated by partly open glades. Further inland were fields of millet bordered by quite heavy timber. Had it not been for a high wind our collection of birds here would undoubtedly have been much larger and comprised many more species, as this was one of the best collecting grounds visited during our cruise.

March 12 we landed in the morning on Eleuthera Island, and worked over a low country which stretches from the shore to high land about a mile inland. The day was perfect and our collections comprised a number of birds and a good representation of the shore fauna.

In the afternoon two hauls with the tangle, at stations 2630 (244 fathoms) and 2631 (280 fathoms), brought up only a few glass sponges and a few small pieces of coral.

March 13 a haul with beam trawl, near the head of Exuma Sound, at station 2632 (791 fathoms) showed a bottom of white coral ooze with no apparent animal life.

We anchored in Nassau Harbor, New Providence, on the morning of March 15, and remained till March 24.

To Governor and Mrs. Blake we are indebted for much assistance in our work of making collections, as their knowledge of the character of the country, and of the localities in which certain things could be found, was a great help to us.

Mrs. Blake had a very fine collection of stone implements, from various islands, and a lignum-vitæ stool from a cave on Rum Cay, of which we got very fair negatives.

The fish-market at Nassau afforded an opportunity for making a large collection of fish, as the fishermen are compelled to sell all their fish through the market. The fishing industry is a large one, and I give a few details from data collected upon the subject by Mr. Benedict.

There is no record of the number of vessels employed in fishing, but it is estimated at 120 sail. The vessels are principally of two classes—schooners, measuring 28 to 30 feet on the keel, and sloops of about 18 feet keel.

The schooners carry a crew of 7 men and do most of their fishing with seine of 1-inch mesh, 30 fathoms long, and 80 meshes deep. The sloops

carry 3 or 4 men and do all of their fishing with hand-lines. The hand-line fishing is done with the aid of a water-glass. The water-glasses are simply a box, painted some dull color, with a pane of plain window-glass set in the bottom. The fisherman holds this box on the surface of the water, and, by looking through the glass, can see the bottom through this clear water perfectly plainly to a depth of 50 or 60 feet. When fishing, the men hunt about till they find a spot where the fish are plenty, then, by watching their lines through the glass, they can tell exactly when to strike the fish. Most of the fishing is done at Abaco and the Berry Islands, the vessels staying out about a week and bringing the catch in alive in their wells. The larger specimens of skip-jack, bone, hound, and amber fish are split and dried in the fore rigging, but the bulk of the catch is peddled out fresh at the market—the demand for fish determining the stay of each vessel in port. A fare will run from $12 to $60, and anything over $40 the fisherman considers good work. After paying the expenses of a cruise, two shares of the profits go to the vessel, one to the seine, one to the captain, and one to each member of the crew.

Many species of fish from these waters are excellent eating, and few seem to be poisonous. While barracuda, hog, and amber fish are more likely to be poisonous than other species, this property is by no means confined to them. Cases of poisoning, however, are of such rare occurrence that the natives pay little attention to the matter, and have no rule as to what can be eaten and what cannot.

The sponge fishing is another very important industry, the details of which I give from data collected by Mr. Nye.

The sponging fleet consists of about 475 vessels and employs not less than 4,000 men, the majority of them negroes. The vessels used are sloops of 15 to 20 feet over all, and schooners running up to 20 tons, though commonly about 36 feet over all. The largest schooners carry 12 to 18 men and 6 to 10 boats—one of 12 feet and the others 10 feet in length.

The sloops carry 4 to 7 men and 3 or 4 boats. The small boats are of the smooth, round-bottom class, like the northern smack-boat, but with less sheer.

The sponging trips last about six weeks, and are made at all seasons except the "hurricane month," October, when the vessels are generally hauled up for repairs.

When on the sponge ground the vessel anchors in 3, or heaves to in 5, fathoms of water, and the crew put off, two in a boat, at sunrise, and remain till sunset, unless a boat-load is secured before that time. One man handles the boat, generally sculling, while the other gathers the sponges, using a water-glass in one hand and a long pole, rigged with a two or three tined hook, with the other. The men become very expert with this hook, and work to a depth of 5 fathoms, but seldom if ever over that depth. Ten pounds, dry weight, is a first-class catch for one boat in a day. The fresh sponges are left on deck until the

vessel has a deck-load, when they are taken to the "crawl," a crib built of sticks in the shallow water near the shore, where they are left to rot for six or eight days. The rotten flesh and dirt is then beaten and washed out, the sponge being held in one hand and struck repeatedly with the "clipper," held in the other hand, and frequently rinsed. They are then thrown upon the beach to dry.

One man can wash 50 pounds, dry weight, of large sponges, or 15 pounds of mixed sponges, in a day. Though sponge beds get fished out and destroyed by hurricanes, the fishermen consider the supply inexhaustible, for they say the young sponge grows so rapidly, reaching a marketable size in about three months after its attachment, and new beds are so plenty that they have little trouble in finding either a new set or a new bed. The sponges broken off by storms collect in soft, muddy spots, and are known as "rolling sponges."

The fishermen recognize six kinds of sponges, though both they themselves and the dealers have many names for the different varieties of each. In point of abundance they run: (1) Reef (including glove), *Spongia tubifera*. (2) Grass, *Spongia cerebraformis*. (3) Boat (including velvet), *Spongia barbara*. (4) Wool, *Spongia gossypina*. (5) Yellow, *Spongia corlosia*. (6) Key West (no specimen obtained).

The wool ranks first in value followed by reef, boat, grass, yellow, and Key West. Six hundred pounds, dry weight, is considered a good fare for a single cruise. The sponges are all brought to Nassau and sold through the market. No fixed value can be given, but a first-class wool sponge of 8 inches diameter brings 15 to 20 cents, and the small glove sponges 1 to 2 cents each. The vessel bears one-third of the expense of the outfit and takes one-third of profits. The balance goes two shares to captain, and one share to each member of the crew.

While in Nassau we made large collections of the shore fauna, including fine specimens of the red and of the yellow fan corals, *Gorgonia flabellum*, which grow in great numbers on the reefs.

To Mr. Nye's indefatigable zeal and amphibious habits are due the credit for the bulk of these collections, as well as for the fish not brought into the market for food.

Trips inland added several species to our collection of birds, and one trip to the caves on Captain Lightborn's plantation, on his invitation and under his kindly guidance, resulted in the capture of a number of bats, *Phyllonycteris seyckorni*, which proved very wide-awake and flew swiftly about when disturbed by the lights. The bats, *Vesperugo serotinus*, taken from the vaulted chambers under Fort Charlotte, on the contrary, seemed quite torpid, and would do nothing but chatter, even after having several of their number shot from the bunches hanging to the ceiling.

Among our collections at Nassau were two unlaid but perfectly developed eggs of the Bahama cuckoo, taken from specimens of that bird shot there.

March 24 we started for Key West, stopping on our way to land Messrs. Nye and Townsend on Abaco Island. At Key West we collected several species of birds, among them several specimens of the vireo, *Vireo noveboracensis maynardi*, recently described by Maynard.

This bird seems to be very abundant here, but extremely shy and hard to see among the dense foliage.

On March 30 the greater part of Key West's business section burned down, creating quite an excitement. The next day Mr. Washburn left us to return North. April 3 we sailed for Havana, and on the 7th, on our way back to Key West, five hauls with the tangle at Stations 2633 to 2637, in 100 to 200 fathoms, brought up about one hundred and twenty-five specimens of the sea-lily, *Pentacrinus decorus* and *Pentacrinus mülleri*, with a few sea-urchins and brittle-stars.

We left Key West on April 4, and on the 5th began a line of dredgings, off Carysfort light, at Station 2639 (56 fathoms). We took six hauls with a ship's dredge and four with the beam-trawl, the depth ranging from 56 to 217 fathoms. The bottom proved barren, and we took only a few small crustaceans, fish, and hydroids, the latter attached to the dead scallop shells, which were abundant.

April 11 we picked up Messrs. Nye and Townsend, with their extensive collections.

We had hoped that they would get a few flamingoes on Abaco, but, though they saw about sixty birds, they were too shy to approach, and a fire, which broke out in the woods, soon drove them all from their feeding-grounds.

The flamingoes live on a large tract of land, about 6,000 acres in extent, on the west side of the island. The surface is little above tide-level, and is composed of soft ooze, washed in from the coral reefs. Scattered through this tract are lakes, of all sizes, from 6 inches to 3 feet deep, and islands, of higher ground, covered with trees. The flamingoes keep to the larger lakes, or "swashes," as the inhabitants call them, and are very shy. In the breeding-season they are much less shy, and are frequently killed while feeding in the smaller swashes by negroes, who consider them excellent eating. Parrots are said to have been common on the island, but of late years few are seen on the southern end of the island. One flock was reported as coming daily to feed on an old field, near the light-house at Hole-in-the-Wall, but no specimens were procured.

From Abaco we ran past New Providence into the Tongue of Ocean, and on the morning of April 12 landed on Green Cay. The island is small and heavily wooded, rising to high ground near the center. Near our landing-place was a pond with the remains of old salt-works. In spite of a steady rain we got a number of birds, among them two specimens of Kirtland's warbler.

In the afternoon a haul with tangle at station 2649 (36 fathoms) brought up a few small corals, sponges, mollusks, and crustaceans. A haul at station 2650 (369 fathoms) brought up nothing.

April 13, a haul with tangle at station 2651 (97 fathoms), and with ship's dredge at station 2652 (140 fathoms), brought up a few gorgonian corals, barnacles, and mollusks.

On the 14th two boobies were shot, just after daylight, on Booby Rocks, and later we landed on Green Cay. The white-headed pigeons, *Columbà leucocephala*, were very abundant, but extremely shy, always flying out of thick foliage, and taking great care to put the tree between you and themselves. We shot a number of small birds and found a lizard, *Liocephalus carinatus*, extremely abundant.

In the pores of the limestone, near the salt-pond, were quartered immense soldier-crabs, and under the bushes in the grassy swales in the interior, were hundreds of land-hermits crawling about. On the salt pond we started three Bahama ducks and saw several winter yellow-legs.

In the afternoon we took a haul with beam trawl at station 2653 (1,000 fathoms), and found a bottom of coral ooze with no apparent animal life.

On the 15th we anchored in Southwest Bay, New Providence, and had to wait till the 21st for the bar at Nassau to become passable.

During this time the country was well hunted over and a number of birds taken.

From the ship fish could be plainly seen moving about on the bottom, and several species were captured on hand-lines.

On the 17th Mr. Townsend and I walked to Nassau and shot several birds on our way through the pine woods.

Our second stay at Nassau, April 21 to 30, was pretty much a repetition of our former work, though we added a few species to our collection of birds, and nearly doubled our collection of fish.

We left Nassau April 30 and reached Washington on May 10.

On the way north we took twenty-three hauls with the beam trawl and three with the tangle—stations 2654 to 2679 (263 to 731 fathoms). We added many valuable specimens to our collection of deep-sea fish and invertebrates, several large hauls of coral being of special interest.

At station 2655 one porpoise, *Tursiops tursio*, was taken, of interest from his nearly uniform dark color. At station 2656 eight sharks, *Carcharhinus lamia*, were taken with hook and line. Porpoise blood had been draining from the scuppers all day, and when we put over the electric light in the evening the water was literally alive with these sharks.

Throughout the entire cruise the electric light was used for surface collecting whenever there was an opportunity, and, while among the Bahamas, many interesting forms of fish and invertebrates were taken, as well as at several stations during our run north.

The Albatross lay in Washington till June 30, when we started for Wood's Holl.

July 15 we left Wood's Holl. Mr. Benedict was in charge of the scientific department, assisted by Mr. Sanderson Smith and myself.

We ran to the southward and eastward about 100 miles and took twelve hauls with the large beam trawl at stations 2680 to 2691 (226 to 1,106 fathoms). The bottom there is extremely rich in animal life, and we made very extensive and valuable collections of fish and invertebrates.

August 1 Mr. Benedict left the Albatross. Since that time I have had charge of the scientific department, and Mr. Sanderson Smith has been with the ship, detailed from the shore laboratory.

August 2 we left Wood's Holl for a cruise to the eastward. On the 3d we sighted a large school of porpoises traveling to the southward. On the 5th a barn swallow flew on board ship. On the 6th sighted six finback and one humpback whale, and on the 7th a large school of killers traveling northwest. On the 11th we took several hauls with the beam trawl, beginning at station 2692 (78 fathoms), just to the southward of the Flemish Cap, running up on to the Cap at station 2694 (56 fathoms). Here we found a bottom quite like that of the Grand Bank, while stations 2695 and 2696 (105 and 98 fathoms), just to the west of the Cap, showed a hard, barren bottom.

At station 2697 (199 fathoms), we landed a bowlder of about 2,000 pounds on deck, with a number of sponges, mollusks, crustaceans, and fish.

After this haul we ran to St. John's for coal, and while there I made a collection of young salmon, *Salmo salar*, and brook trout, *Salmo fontinalis*, at Harbor Grace Junction, together with a few birds.

August 24 we left St. John's, and while running to the south passed a number of finback whales moving to the northward.

Eight hauls with beam trawl, beginning at station 2698, near the edge of the bank, and running to the westward to station 2705, brought up many interesting specimens. From the deeper hauls between the two banks we took a great number of sea-pens, *Pennatula aculeata*, and a few specimens of *Pennatula borealis;* also a number of species of fish, among them *Macrurus bairdii* and *Sebastes marinus* in great numbers.

August 23, at hydrographic station 1070 (32 fathoms), we took, on hand-lines, one hundred and thirty-six cod, *Gadus callarias*, in about half an hour's fishing. We used squid for bait, and the cod took it voraciously. An examination of the cods' stomachs revealed a great number of Bank clams, *Cystodaria siliqua*, with a few fish, crabs, squid, and other small mollusks.

One dolphin, *Delphinus delphis*, was here captured from a school. On the 25th there was a winter yellow-leg about the ship, and a swallow flew on board during the high wind next day. On the 26th, too, we saw a number of porpoises, *Delphinus delphis*, moving to windward.

Five hauls with the beam trawl, to the southward and eastward of George's Bank, at stations 2706 to 2710, 866 to 1,188 fathoms, brought up many interesting specimens.

We reached Wood's Holl August 27.

Leaving Wood's Holl September 14, we made a cruise about 200 miles to the southward to deep water on the inner edge of the Gulf Stream, and found a very rich bottom at stations 2711–2722, 594 to 1,867 fathoms. We succeeded in bringing in the large soft holothurians *Benthodytes gigantea* and *Euphronides cornuta*, in an excellent state for study, by injecting them, through the natural orifice, with alcohol and setting the tanks of full strength alcohol in which they were placed directly upon the ice.

One of the deep-sea fishes from station 2720, 1,509 fathoms, *Ophiognathus* sp., was of special interest, as it was the first taken by the Albatross.

During this cruise we observed a pigeon-hawk, a cedar-bird, and a woodpecker about the rigging.

At station 2719 we took a big blue heron—*Ardea herodias*—which was very fat and seemed quite at home out there.

We had excellent opportunities for surface work, and made large collections, both with the scoop-nets about the electric lights and with the large tow-net. As usual the large tow-net brought the best results just about dark in the evening.

While at Wood's Holl, during the latter part of September, I made several trips, in company with Messrs. Edwards and Nye, over to Gay Head and Menemsha Bight, in the steam-launch Cygnet, to secure specimens of the haglets (*Puffinus borealis*) and jægers (*Stercorarius pomarinus* and *parasiticus*), which were following the mackerel and herring. We shot a number of specimens, and were able to make a fine series of skins, besides sending a number of fresh birds to Washington.

On October 21 the Albatross started south. We made thirteen hauls with the beam trawl, stations 2623 to 2635, 629 to 1,672 fathoms, just to the southward of our last work.

The fauna was much the same, but we added one new species of fish to our collections.

A large specimen of the squid, *Sthenoteuthis megaptera*, was taken at our last station.

The amount of phosphorescence about most of the deep-sea life is a very striking feature of all the hauls landed after dark.

It is impossible to speak of our deep-sea work except in this very general way, on account of the vast amount of material collected. For particulars we shall have to wait for the reports of the specialists to whom the material has been turned over for study.

Thanks to the kindness of Dr. Bean and Mr. Ridgway, in allowing me access to their books, I have been able to copy off the following lists of the fish and of the birds collected by us while among the Bahama Islands.

It has seemed advisable to mention in these lists those species taken by other collectors which we did not succeed in finding, and this I have done as far as I have found any record of their work.

Our work for the season closed with the arrival of the Albatross at Washington on October 27.

List of fish taken by steamer Albatross among Bahama Islands and at Nassau fish-market during March and April, 1886.

No.	U. S. Mus. No.	Name, &c.	Common name.	Locality.
		Family *Tetrodontidæ*.		
1	38380	Chilomycterus geometricus Mitchill	Hedge-hog	Market, Nassau.
2	*38507	Tetrodon spengleri Bloch		Electric light, Abaco.
3	*38505	Tetrodon sp		Electric light, Nassau.
4	*38506	Tetrodon sp.†		Electric light, Nassau.
		Tetrodon testudinous Linnæus		Green Turtle Cay.
		Family *Ostraciontidæ*.		
5	38378	Ostracion trigonum Linnæus	Shell-fish	Rum Cay.
6	38376	Ostracion quadricornis Linnæus	Cow-fish	Market, Nassau.
	38377	Ostracion quadricornis		Abaco.
		Family *Balistidæ*.		
7	38374	Balistes vetula Linnæus	Turbot	Rum Cay.
	38373	Balistes vetula	Turbot	Market, Nassau.
8	38372	Balistes buniva Lacépède	Durgan-fish	Rum Cay.
9	38375	Monacanthus pullus Ranzani		Market, Nassau.
10	*38509	Monacanthus sp		Electric light, New Providence.
		Family *Syngnathidæ*.		
11	*38512	Siphostoma sp		Electric light, Abaco.
	*38513	Siphostoma sp		Electric light, Watling's.
	*38514	Siphostoma sp		Electric light, New Providence.
		Family *Pleuronectidæ*.		
(†)	.....	Citharichthys macrops Dressel		Green Turtle Cay.
		Family *Fierasferidæ*.		
12	38498	Fierasfer dubius Putnam		Nassau.
		Family *Ophidiidæ*.		
13	*38499	Ophidium sp		Abaco.
		Family *Blenniidæ*.		
14	*38379	Labrosomus nuchipinnis Quoy & Gaimard.		Abaco.
	*38517	Labrosomus nuchipinnis		Watling's.
	*38515	Labrosomus nuchipinnis		Nassau.
15	38381	Myxodes lugubris Poey		Nassau.
16	38382	Myxodes varius Poey		Nassau.
(†)	.....	Creumobates sp		
17	*38520	Blenny (probably close to Clinus gobio).		Abaco.
		Family *Gobiesocidæ*.		
(†)	.....	Gobiesox cephalus Lacépède		Green Turtle Cay.
18	*38386	Gobiesox sp		Abaco.
		Family *Gobiidæ*.		
19	38384	Gobius soporator Cuv. & Val	Rockfish	Nassau.
	38383	Gobius soporator		Abaco.
	38385	Gobius soporator		Green Cay.
		Family *Scorpænidæ*.		
20	38387	Scorpæna plumieri Bloch	Toadfish	Market, Nassau.
21	38388	Scorpæna grandicornis Cuv. & Val		Abaco.
		Family *Scaridæ*.		
22	38389	Scarus cœruleus Bloch	Bluefish	Market, Nassau.
	*38393	Scarus sp		Nassau.
		Family *Labridæ*.		
23	38390	Sparisoma catesbyi Lacépède	Parrot-fish	Market, Nassau.
24	38392	Sparisoma distinctus Poey	Pug	Nassau.

* Young.

† All fish so marked were taken during the winter of 1886 by students of Johns Hopkins University.

List of fish taken by steamer Albatross among Bahama Islands, &c.—Continued.

No.	U.S. Mus. No.	Name, &c.	Common name.	Locality.
		Family *Labridæ*—continued.		
25	38391	Sparisoma flavescens Bloch & Schneider.	Pug	Market, Nassau
26	38394	Thalassoma bifasciatum Bloch	Slippery Dick	Nassau.
27	38395	Xyrichthys lineatus Linnæus	Yellow pudding-wife	Nassau.
28	38396	Xyrichthys infirmis Bean	Blue pudding-wife	Nassau.
29	38400	Platyglossus radiatus Linnæus	Pudding-wife, Slippery Jenny.	Market, Nassau.
30	38401	Platyglossus maculipinna Müller & Troschel.	Slippery Jenny	Nassau.
31	38397	Platyglossus bivittatus Bloch	Slippery Jenny	Nassau.
	38398	Platyglossus bivittatus	Sucker	Rum Cay.
	38399	Platyglossus bivittatus (1,169 f. near Conception Island).		Station 2629.
(†)		Platyglossus nov. sp		Green Turtle Cay.
32	38402	Lachnolæmus maximus Walbaum	Hogfish	Market, Nassau.
33	38403	Bodianus rufus Linnæus	Spanish hogfish	Market, Nassau.
		Family *Pomacentridæ*.		
34	38404	Pomacentrus leucostictus Müller & Troschel.	Blackfish	Nassau.
35	38405	Pomacentrus obscuratus Poey	Blackfish	Nassau.
	*38504	Pomacentrus sp		Nassau.
36	38408	Glyphidodon saxatilis Linnæus	Scotch porgy	Nassau.
	*38407	Glyphidodon saxatilis		Green Cay.
		Family *Gerridæ*.		
37	38410	Gerres aprion Cuv. & Val	Shad	Watling's.
38	38409	Gerres lefroyi Goode	Narrow shad	Market, Nassau.
(†)		Gerres zebra Cuv. & Val		Green Turtle Cay.
		Family *Acanthuridæ*.		
39	38412	Teuthis hepatus Linnæus	Tang	Market, Nassau.
40	38411	Teuthis tractus Poey	Tang	Market, Nassau.
		Family *Chætodontidæ*.		
(†)		Chætodon striatus Linnæus		Green Turtle Cay.
41	38413	Holacanthus ciliaris Linnæus	Yellow angel-fish	Market, Nassau.
42	38414	Pomacanthus aureus Bloch	Black angel-fish	Market, Nassau.
		Family *Carangidæ*.		
43	38419	Trachurops crumenophthalmus Bloch.	Goggle-eye	Market, Nassau.
44	38421	Caranx latus Agassiz	Horse-eye jack	Market, Nassau.
45	38418	Caranx chrysus Mitchill	Running-jack	Market, Nassau.
46	38422	Caranx bartholomæi Cuv. & Val	Yellow-jack	Market, Nassau.
47	38420	Caranx ruber Bloch	Skip-jack	Market, Nassau.
48	38423	Seriola rivoliana Cuv. & Val	Jack	Watling's.
49	38425	Trachynotus glaucus Bloch	Old-wife	Market, Nassau.
50	38424	Trachynotus rhomboides Bloch	Permit	Market, Nassau.
		Family *Latilidæ*.		
51	38427	Malacanthus plumieri Cuv. & Val	Sand-fish	Nassau.
	38426	Malacanthus plumieri	Sand-fish	Rum Cay.
		Family *Mullidæ*.		
52	38428	Mulloides martinicus Cuv. & Val	Goat-fish	Market, Nassau.
53	38429	Upeneus maculatus Bloch	Goat-fish	Market, Nassau.
		Family *Berycidæ*.		
54	38431	Holocentrum ascensione Osbeck	Squirrel-fish	Market, Nassau.
	38430	Holocentrum ascensione	Red snapper	Rum Cay.
55	38432	Holocentrum riparium Poey		Abaco.
		Family *Sparidæ*.		
56	38433	Kyphosus sectatrix Linnæus	Chub	Market, Nassau.
57	38452	Calamus milneri Goode & Bean	Shed porgy	Market, Nassau.
58	38454	Calamus calamus Cuv. & Val	Saucer-eye porgy	Market, Nassau.
59	38455	Calamus leucosteus? Jordan & Gilbert.	Little-head or sheep-head porgy.	Market, Nassau.

* Young.

† All fish so marked were taken during the winter of 1886 by students of Johns Hopkins University.

List of fish taken by steamer Albatross among Bahama Islands, &c.—Continued.

No.	U. S. Mus. No.	Name, &c.	Common name.	Locality.
		Family *Sparidæ*—continued.		
60	38453	Calamus bajanado Poey	Jolt-head porgy	Market, Nassau.
(†)	.....	Lagodon rhomboides Linnæus	.....	Green Turtle Cay.
		Family *Pristipomatidæ*.		
61	38440			
62	38435	Lutjanus mahogoni Cuv. & Val	Rock snapper	Market, Nassau.
63	38439	Lutjanus griseus Linnæus	Gray snapper	Market, Nassau.
64	38436	Lutjanus analis Cuv. & Val	Mutton-fish	Market, Nassau.
65	38437	Lutjanus caxis? Bloch & Schneider	Schoolmaster	Market, Nassau.
	38438	Lutjanus synagris Linnæus	Lane snapper	Market, Nassau.
66	38434	Lutjanus synagris	.....	Abaco.
67	38441	Lutjanus buccanella Cuv. & Val	Black-finned snapper	Nassau.
	38442	Ocyurus chrysurus Bloch	Yellow tail	Market, Nassau.
68	38443	Ocyurus chrysurus	.....	Abaco.
69	38477	Anisotremus virginicus Linnæus	Pork-fish	Market, Nassau.
	38478	Hæmulon sciurus Shaw	Boar grunt	Market, Nassau.
	38476	Hæmulon sciurus	French margate	Market, Nassau.
70	38479	Hæmulon sciurus	.....	Abaco.
71	38475	Hæmulon melanurum Linnæus	White grunt	Market, Nassau.
72	38484	Hæmulon arcuatum Cuv. & Val	Sow grunt	Market, Nassau.
73	38482	Hæmulon taniatum Poey	Hardhead	Nassau.
74	38480	Hæmulon aurolineatum Cuv. & Val	Hardhead	Nassau.
	38481	Hæmulon flavolineatum Desmarest	Yellow grunt	Nassau.
75	38483	Hæmulon flavolineatum	.....	Abaco.
76	38487	Hæmulon rimator Jordan & Swain	.....	Abaco.
77	38486	Hæmulon carbonarium Poey	Bastard grunt	Market, Nassau.
78	38485	Hæmulon acutum Poey	Sailor's choice	Market, Nassau.
		Hæmulon gibbosum Walbaum	Margate	Market, Nassau.
		Family *Serranidæ*.		
79	38488			
80	38489	Epinephelus striatus Bloch	Hamlet	Market, Nassau.
81	38490	Epinephelus apua Bloch	Spotted hind	Market, Nassau.
	38491	Enneacentrus guttatus Linnæus	Rock hind	Rum Cay.
82	38492	Enneacentrus guttatus	Rock hind	Rum Cay.
	38494	Enneacentrus fulvus Linnæus	Yellow coney	Rum Cay.
		Enneacentrus fulvus punctatus Linnæus.	Nigger-fish	
	38493	Enneacentrus fulvus punctatus Linnæus.	Coney	Nassau.
	38495	Enneacentrus fulvus rubra Bloch & Schneider.	Nigger-fish	Nassau.
	38496	Enneacentrus fulvus rubra	Nigger-fish	Watling's.
		Family *Percidæ*.		
83	38471	Apogon nov. sp	.....	Nassau.
		Family *Priacanthidæ*.		
84	38449	Priacanthus arenatus Cuv. & Val	Glass-eye snapper	Market, Nassau.
85	38450	Priacanthus cruentatus Lacépède	Gold-fish	Rum Cay.
		Family *Sphyrænidæ*.		
86	38446	Sphyræna picuda Bloch & Schneider	Barracouta	Watling's.
		Family *Echeneididæ*.		
87	38416	Echeneis naucrates Linnæus	Sucking-fish	Market, Nassau.
		Family *Atherinidæ*.		
88	{38456} {38458}	Atherina stipes Müller & Troschel	Minnow	Watling's.
	38457	Atherina stipes var	.....	Lake, Watling's.
	38459	Atherina stipes	.....	Rum Cay.
	38460	Atherina stipes	.....	Cat Island.
89	38463	Atherina aræa Jordan & Gilbert	.....	Cat Island.
	38461	Atherina aræa	.....	Watling's.
	38462	Atherina aræa	.....	Rum Cay.
	*38464	Atherina aræa	.....	Abaco.
		Family *Mugilidæ*.		
90	38447	Mugil trichodon Poey	Mullet	Watling's.
	*38448	Mugil trichodon	.....	Abaco.
(†)	.....	Querimana gyrans Jordan & Gilbert	.....	Green Turtle Cay.

* Young.

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List of fish taken by steamer Albatross among Bahama Islands, &c.—Continued.

No.	U. S. Mus. No.	Name, &c.	Common name.	Locality.
		Family *Cyprinodontidæ*.		
91	38501	Cyprinodon rivirendi Poey	Mud-gut	Salt Pond, Green Cay.
(†)	38939	Gambusia puncticulata		Green Turtle Cay.
		Family *Synodontidæ*.		
92	*38502	Synodus sp		Watling's.
	*38503	Synodus sp		Abaco.
		Family *Albulidæ*.		
93	38445	Albula vulpes Linnæus	Bone-fish	Watling's.
	38444	Albula vulpes	Bone-fish	Market, Nassau.
		Family *Elopidæ*.		
94	38519	Elops (probably)		Rum Cay.
	38518	Elops (probably)		Abaco.
		Family *Clupeidæ*.		
95	38469	Clupea sp	Pincers	Nassau.
		Family *Dussumieridæ*.		
96	38465	Dussumieria stolifera Jordan & Gilbert.		Nassau.
	38466	Dussumieria stolifera		Watling's.
	38468	Dussumieria stolifera		Electric light, Rum Cay.
	38467	Dussumieria stolifera		Electric light, Cat Island.
		Family *Muræenidæ*.		
97	38470	Moringua nov. sp		Abaco.
98	38472	Sidera moringa Cuvier	Morray	Nassau.
99	38473	Sidera funebris Ranzani	Morray	Abaco.
100	38474	Echidna catenata Bloch		Abaco.
		Family *Galeorhinidæ*.		
101	38497	Hypoprion brevirostris Poey	Puppy shark	Watling's.

* Young.
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A list of birds taken by steamer Albatross on the Bahama Islands during March and April, 1886.

[+=Species included on authority of Dr. Bryant.
O=Species included on authority of W. B. Moore.
B=Species included on authority of J. K. Brace.
×=Species included on authority of Charles B. Cory.]

Number.	Name.	Bahamas.	Inagua.	Long Island.	Rum Cay.	Fortune Island.	Watling's Island.	Acklin Island.	Conception Island.	Green Cay.	Cat Island.	Andros Island.	Eleuthera.	New Providence.	Great Stirrup Cay.	Abaco.	Grand Bahama.	Bimini.	St. Domingo Cay.	Booby Rocks.	Ship Channel.
	Family *Podicipidæ*.																				
1	Colymbus dominicus (Ditoppur)				2		1					×									
	Family *Laridæ*.																				
	Larus atricilla	+																			
	Gelochelidon nilotica	×																			
	Sterna maxima	+																			
	Sterna sandvicensis acuflavida	+						×													
	Sterna hirundo							×													
	Sterna dougalli	+		×				×													
	Sterna antillarum		×																		
	Sterna anæthetus			×																	
	Sterna *fuliginosa*	+																			
	Sterna philadelphia			O																	
	Anous stolidus	+																			
	Family *Procellariidæ*.																				
	Puffinus auduboni																				+
	Family *Phaëthontidæ*.																				
2	Phaëton flavirostris	×														1					
	Family *Sulidæ*.																				
3	Sula cyanops																		++		
	Sula sula																		+	1	
	Family *Phalacrocoracidæ*.																				
4	Phalacrocorax dilophus floridanus	×					1					×									
5	Phalacrocorax mexicanus						1														
	Family *Pelecanidæ*.																				
	Pelecanus fuscus															(1)		+			
	Family *Fregatidæ*.																				
6	Fregata aquila	+					1														
	Family *Anatidæ*.																				
	Anas boschas	+																			
	Anas carolinensis	+																			
7	Anas discors (Steel)	+																			
	Dafila bahamensis		×				(1)			(1)						1					
8	Aythya americana	+																			
	Aythya marila nearctica	+			3		1														
	Aythya collaris	+																			
	Erismatura rubida	+																			
	Chen hyperborea		+																		
	Dendrocygna arborea	+	+									×									
	Family *Phœnicopteridæ*.																				
	Phœnicopterus ruber		+													(1)					
	Family *Plataleidæ*.																				
	Ajaja ajaja		×															+			
	Family *Ardeidæ*.															•					
	Botaurus exilis													×							
	Ardea herodias	×					(1)							+							

[1] Seen.

A list of birds taken by steamer Albatross on the Bahama Islands, &c.—Continued.

Number.	Name.	Bahamas.	Inagua.	Long Island.	Rum Cay.	Fortune Island.	Watling's Island.	Acklin Island.	Conception Island.	Green Cay.	Cat Island.	Andros Island.	Eleuthera.	New Providence.	Great Stirrup Cay.	Abaco.	Grand Bahama.	Bimini.	St. Domingo Cay.	Booby Rocks.	Ship Channel.
	Family *Ardeidæ*—Continued.																				
	Ardea egretta	+																			
	Ardea candidissima	+																			
9	Ardea rufa	×														1					
10	Ardea prælei															2					
11	Ardea tricolor ruficollis		×			O	3														
	Ardea cœrulea	+																			
12	Ardea virescens (Poor Joe)	+			3		3									1					
	Nycticorax nycticorax nævius																				
13	Nycticorax violaceus (Gaulden)								1	1											
	Family *Rallidæ*.																				
	Rallus longirostris crepitans	+																			
14	Porzana carolina									1		×									
	Inornis martinica	+																			
	Gallinula galeata	+																			
15	Fulica americana	+														1					
	Family *Recurvirostridæ*.																				
	Himantopus nigricollis	×																			
	Family *Scolopacidæ*.																				
	Gallinago delicata	+										×									
	Macrorhamphus griseus		×																		
	Tringa maculata		+																		
	Tringa fuscicollis		×																		
	Tringa minutilla	×																			
	Ereunetes pusillus	×																			
	Calidris arenaria											×									
	Totanus melanoleucus	×	+																		
16	Totanus flavipes		+		3		2														
	Symphemia semipalmata	+														×					
	Bartramia longicauda													O							
	Actitis macularia							×				×									
	Family *Charadriidæ*.																				
	Charadrius squatorola	×										×									
	Charadrius dominicus			×																	
	Ægialitis vocifera	+										×									
	Ægialitis semipalmata	+																			
	Ægialitis meloda	+																			
17	Ægialitis wilsonii	+	×					1				×									
18	Arenaria interpres	×					1														
	Family *Hæmatopodidæ*.																				
19	Hæmatopus palliatus	+	×									×				2					
	Family *Tetraonidæ*.																				
	Colinus virginianus floridanus													[1]+							
	Family *Columbidæ*.																				
20	Columba leucocephala	+	×						2			+									
21	Zenaida amabilis	+			1		6			1											
[2]22	Columbigallina passerina	+			19		3		1	2	1		1			3					
	Geotrygon martinica												×								
	Family *Cathartidæ*.																				
	Cathartes aura											+			[1]×	+					
	Family *Falconidæ*.																				
	Circus hudsonius		+																		
	Accipiter fuscus	+												×							
	Buteo borealis		+											+							

[1] Seen. [2] Nest and eggs.

A list of birds taken by steamer Albatross on the Bahama Islands, &c.—Continued.

Number.	Name.	Bahamas.	Inagua.	Long Island.	Rum Cay.	Fortune Island.	Watling's Island.	Acklin Island.	Conception Island.	Green Cay.	Cat Island.	Andros Island.	Eleuthera.	New Providence.	Great Stirrup Cay.	Abaco.	Grand Bahama.	Bimini.	St. Domingo Cay.	Booby Rocks.	Ship Channel.
	Family *Falconidæ*—Continued.																				
23	Falco peregrinus anatum		+									[1]+		+							
	Falco columbarius						1			2				O		2					
	Falco sparverius													+	+						
	Pandion haliaëtus carolinensis	+																			
	Family *Strigidæ*.																				
	Strix pratincola		+											+							
	Family *Bubonidæ*.																				
	Speotyto cunicularia floridana													O							
	Family *Psittacidæ*.																				
	Psittacus leucocephala		+													[2]					
	Family *Cuculidæ*.																				
24	Crotophaga ani (Black Witch)				5									1							
25	Coccyzus maynardi (Billy Kon-Kon; nov. sp. Ridgway)				4		2						1	+							
3 26	Saurothera bahamensis		O											4							
	Family *Alcedinidæ*.																				
27	Ceryle alcyon	+					[4]			1			•								
	Family *Picidæ*.																				
28	Dryobates villosus maynardi (nov. sp. Ridgway)													1		6					
29	Sphyrapicus varius		+		1									+							
30	Centurus nyeanus (nov. sp. Ridgway)						1														
31	Centurus blakei (nov. sp. Ridgway)															17					
	Family *Caprimulgidæ*.																				
	Chordeiles virginianus minor											×	+								
	Antrostomus carolinensis											×	O								
	Family *Trochilidæ*.																				
5 32	Doricha evelynæ (God Bird)	+	+		21		12		2	6	1		2	7		10					
33	Doricha lyrura		×																		
	Sporadinus ricordi											×				42					
	Sporadinus bracei													B							
	Family *Tyrannidæ*.																				
34	Tyrannus dominicensis	[6]×	O							2											
	Tyrannus magnirostris		+																		
	Pitangus caudifasciatus													+							
35	Pitangus bahamensis													4		3					
36	Mylarchus lencaysiensis		+							2				7		7					
37	Contopus bahamensis												1	1		1					
	Family *Icteridæ*.																				
38	Dolichonyx oryzivorus (Gale Bird)						[3]							+							
	Agelaius phœniceus bryanti (nov. sp. Ridgw.)													+		2					
	Family *Fringillidæ*.																				
39	Ammodramus sandvicensis savanna				1					1		[7]×		B		1					
40	Passer domesticus													[7]O							
	Passerina cyanea										2			O							
	Passerina ciris																				

[1] Eggs.
[2] Reported.
[3] Eggs from ovary.
[4] Seen.
[5] Nest and eggs.
[6] South of New Providence.
[7] Seen only.

A list of birds taken by steamer Albatross on the Bahama Islands, &c.—Continued.

Number.	Name.	Bahamas.	Inagua.	Long Island.	Rum Cay.	Fortune Island.	Watling's Island.	Acklin Island.	Conception Island.	Green Cay.	Cat Island.	Andros Island.	Eleuthera.	New Providence.	Great Stirrup Cay.	Abaco.	Grand Bahama.	Simini.	St. Domingo Cay.	Booby Rocks.	Ship Channel.
	Family *Fringillidæ*—Continued.																				
[1]41	Euetheia bicolor	+	+			12		15		7	4	18		5	4		3				
42	Phyrrulagra violacea	+	×									15	×	10	7		8				
	Phyrrulagra noctis		×	×																	
43	Spindalis zena		×	×								5		9	20						
44	Spindalis zena townsendi (nov. sp. R.)									1						11					
	Family *Hirundinidæ*.																				
45	Callichelidon cyanoviridis											×		+		1					
	Hirundo horreorum	[2]+																			
	Tachycinita bicolor													[2]O							
	Family *Vireonidæ*.																				
46	Vireo altiloquus barbatulus													3							
47	Vireo crassirostris									8				13		13					
48	Vireo crassirostris flavescens (nov. sp. Ridgw.)				14				4		8		17								
	Vireo flavifrons													O							
	Family *Cœrebridæ*.																				
[1]49	Certhiola bahamensis	+	+	×	38		12		18	6	4	×	6	4		9					
50	Mniotilta varia				2		2			2			1	6							
51	Helmintherus vermivorus													3		1					
52	Helminthophila pinus													+		1					
53	Compsothlypis americana		+		1					1				3							
54	Dendroica tigrina	×			5					3				7		2					
	Dendroica æstiva													+							
55	Dendroica coronata				2									+		2					
56	Dendroica cœrulescens						1		1					2							
57	Dendroica petechia gundlachi	[3]×	+		38		9		8				1	1							
	Dendroica maculosa	+												+							
	Dendroica pensylvanica													[2]+							
58	Dendroica striata	+												3							
	Dendroica blackburniæ													[2]+							
59	Dendroica dominica													1							
60	Dendroica kirtlandi						4			2		×									
61	Dendroica vigorsii													2		1					
62	Dendroica palmarum				17		6		3	3	8		3	8		1					
63	Dendroica discolor	×			25		16		1	4	11		7	12		6					
64	Sciurus aurocapillus	×			1		3			3	1		1	7		3					
65	Sciurus noveboracensis	+												+		1					
66	Geothlypis trichas	×			11		4		1	6	1		5	4		6					
67	Geothlypis rostrata													1							
68	Geothlypis tanneri (nov. sp. Ridgw.)															4					
69	Geothlypis coryi (nov. sp. Ridgw.)												3								
70	Setophaga ruticilla	+								2		+		10							
	Family *Troglodytidæ*.																				
[1]71	Mimus bahamensis		+		23		12		9	1	4		6	1							
72	Mimus polyglottus													O		1					
73	Galeoscoptes carolinensis		+		1					3				1		5					
74	Margarops fuscatus		×		10		7														
	Family *Sylviidæ*.																				
75	Polioptila cœrulea		+											6		11					
76	Polioptila cœrulea cæsiogaster (nov. sp. Ridgw.)													6		11					
	Family *Turdidæ*.																				
77	Mimocichla plumbea								1					2		10					
78	Mimocichla rubripes													+							
79	Turdus mustelinus													1							

[1] Nest and eggs.
[2] Seen only.
[3] South of Long Island.

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

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

For the record of hydrographic soundings preceding those herewith reported, reference should be made as follows: Nos. 46–557, pages 111–112, Fish Commission Report for 1884; Nos. 591–868, pages 74–77, Fish Commission Report for 1885.

Record of hydrographic soundings of the U. S. Fish Commission steamer Albatross for the year 1886.

Serial number.	Date.	Hour.	Position. Lat. N.	Position. Long. W.	Depth.	Character of bottom.	Temperatures. Air.	Temperatures. Surface.	Temperatures. Bottom.	Current.
	1886.		° ′ ″	° ′ ″	*Fathoms.*		°	°	°	
869	Feb. 23	10.36 a. m	28 41 00	78 03 00	557	gy. S. bk. Sp	69	70	39.7	Nominal.
870	Feb. 23	12 m	28 40 00	77 52 00	570	gy. S. bk. Sp	71	68	39.7	Do.
871	Feb. 23	1.30 p. m	28 40 30	77 37 00	572	gy. S. bk. Sp	73	73	39.7	Do.
872	Feb. 23	2.58 p. m	28 41 30	77 28 00	581	gy. S. bk. Sp	86	74	39.7	Do.
873	Feb. 23	4.44 p. m	28 42 00	77 09 00	600	wh. S	86	74	39.2	Do.
874	Feb. 23	6.45 p. m	28 42 30	76 53 30	623	gy. S. bk. Sp	71	70	39.2	Do.
875	Feb. 23	8.20 p. m	28 42 45	76 39 00	762	Oz	67	70	39.7	Do.
876	Feb. 23	9.58 p. m	28 43 00	76 26 55	2,845	Oz	70	70	36.8	Northwest by north, 1 knot.
877	Feb. 24	12.51 a. m	28 34 42	76 10 25	3,196	Oz	68	69	36.8	Northwest, 1½ knots.
878	Feb. 24	4.20 a. m	28 24 06	76 15 55	1,407	No specimen	69	71	37.8	Nominal.
879	Feb. 24	6.02 a. m	28 12 30	76 15 00	691	gy. S	69	71	39.2	Do.
880	Feb. 24	7.41 a. m	28 01 00	76 12 00	622	yl. Oz. gy. S	69	71	39.2	Do.
881	Feb. 24	9.10 a. m	27 49 00	76 12 00	633	gy. and br. S	70	71	39.5	Do.
882	Feb. 24	10.41 a. m	27 38 00	76 23 24	677	br. S	72	71	39.0	No current.
883	Feb. 24	12.08 p. m	27 37 03	76 12 00	705	gy. and br. S	74	71	39.1	Do.
884	Feb. 24	2.08 p. m	27 42 00	76 02 00	762	For	70	72	39.2	Do.
885	Feb. 24	5.25 p. m	27 51 00	75 53 30	2,589	No specimen	71	73	.....	Do.
886	Feb. 25	6.45 a. m	27 30 00	75 35 00	2,761	No specimen	70	71	.....	North by west, 2 knots.
887	Feb. 26	4.14 a. m	25 29 00	74 50 00	2,589	For. Oz	73	72	.....	North by west, ½ knot.
888	Feb. 26	10.40 a. m	24 50 00	74 36 45	2,709	br. Oz	74	73	36.7	
889	Feb. 26	2.59 p. m	24 25 00	74 36 00	2,639	br. Oz	76	75	37.6	
890	Feb. 26	6.52 p. m	24 08 00	74 35 00	1,135	hrd	74	73	38.6	
891	Feb. 27	12.54 p. m	23 57 00	74 36 30	535	Co	77	75	43.8	
892	Feb. 27	1.56 p. m	23 50 00	74 38 00	1,264	wh. S. Co	77	76	38.2	
893	Feb. 27	3.17 p. m	23 43 00	74 39 30	1,263	lt. br. Oz	79	77	38.2	
894	Mar. 8	7.07 a. m	23 37 20	74 57 40	850	Co. S	78	75	39.1	
895	Mar. 8	8.16 a. m	23 42 20	74 59 30	657	Co. S	78	75	40.1	
896	Mar. 8	8.49 a. m	23 44 35	75 01 35	1,017	Co. S	78	75	38.7	
897	Mar. 8	9.40 a. m	23 46 30	75 03 50	578	Co. S	78	75	42.3	
898	Mar. 8	10.38 a. m	23 49 30	75 08 30	115	wh. Co. S	75	73	67.8	
899	Mar. 8	3.44 p. m	23 55 20	75 11 20	845	Co. S. bk. Sp	74	75	39.2	
900	Mar. 8	4.49 p. m	24 01 20	75 13 30	741	wh. S. rd. and bk. Sp. For	73	75	39.5	
901	Mar. 8	5.54 p. m	24 08 30	75 15 00	22	wh. S. Sp. and brk. Sh	73	74	74.3	
902	Mar. 8	7.36 p. m	24 09 00	75 06 00	2,194	br. M. Co. S	72	74	37.2	
903	Mar. 8	10.18 p. m	24 08 00	74 56 30	2,462	br. Oz	72	74	36.7	
904	Mar. 9	12.56 a. m	24 08 00	74 45 00	2,255	br. Oz	72	74	36.5	
905	Mar. 9	3.20 a. m	24 07 00	74 38 00	2,081	br. Oz	72	74	36.7	
906	Mar. 9	3.44 p. m	23 35 00	74 47 30	149	Co. S. Sh	78	75	65.1	

907	Mar. 10	8.14 a.m	23	37	00	75	06	30	1,398	Co. S.	71	74	38.4	
908	Mar. 10	10.17 a.m	23	46	30	75	13	45	1,338	Co. S.	72	74	38.2	
909	Mar. 10	12.08 p.m	23	43	45	75	20	45	448	Co. S.	72	74	48.3	
910	Mar. 10	1.23 p.m	23	50	30	75	23	30	1,047	Co. S.	69	73	38.5	
911	Mar. 10	2.48 p.m	23	56	30	75	26	30	1,211	Co. S.	68	73	38.3	
912	Mar. 10	4.18 p.m	24	02	45	75	29	00	361	Co. S.	69	73	54.3	
913	Mar. 10	5.05 p.m	24	06	30	75	30	45	273	hrd. Co. S.	70	73	n.t.	
914	Mar. 11	10.46 a.m	24	07	00	75	32	30	515	Co. S.	68	72	n.t.	
915	Mar. 11	12.13 p.m	24	01	15	75	38	45	1,051	Co. S. bk. Sp.	67	72	38.6	
916	Mar. 11	1.42 p.m	23	55	20	75	45	10	1,056	Co. S.	68	73	38.6	
917	Mar. 11	3.03 p.m	23	49	30	75	51	40	974	Co. S. bk. Sp.	68	73	39.1	
918	Mar. 11	4.20 p.m	23	43	30	75	58	00	124	Co. S.	69	73	68.3	
919	Mar. 11	5.44 p.m	23	52	00	76	00	15	863	gy. Oz.	67	73	39.1	
920	Mar. 11	7.42 p.m	24	00	40	76	02	45	967	wh. Co. S.	66	73	38.6	
921	Mar. 11	9.43 p.m	24	09	00	76	05	00	990	wh. Co. S.	66	72	38.6	
922	Mar. 11	11.35 p.m	24	17	20	76	07	30	1,002	wh. Co. S.	66	72	38.6	
923	Mar. 12	1.37 a.m	24	25	40	76	09	50	971	gy. Oz.	64	69	38.6	
924	Mar. 12	3.43 a.m	24	33	40	76	11	20	937	gy. Oz.	65	71	38.6	
925	Mar. 12	5.47 a.m	24	39	40	76	13	50	781	Co. S.	66	68	39.0	
926	Mar. 13	2.31 a.m	24	36	30	76	12	00	899	Co. S.	72	71	39.0	
927	Mar. 13	4.11 a.m	24	33	00	76	24	30	923	Co. S.	73	71	38.6	
928	Mar. 13	5.50 a.m	24	29	00	76	31	15	801	wh. Oz.	73	72	39.1	
929	Mar. 13	7.18 a.m	24	25	00	76	37	00	143	wh. Oz.	73	72	70.2	
930	Mar. 13	8.21 a.m	24	33	00	76	35	30	842	Co. S.	76	73	38.8	No current.
931	Mar. 13	9.41 a.m	24	41	30	76	33	45	864	Co. S.	80	74	38.8	Do.
932	Mar. 13	11.02 a.m	24	49	20	76	32	15	764	Co. S.	80	74	39.1	Do.
933	Mar. 13	11.58 a.m	24	52	30	76	31	30	325	gy. Oz.	78	74	56.2	Do.
934	Mar. 13	8.43 p.m	24	35	20	76	02	45	476	wh. Oz.	75	74	46.5	Do.
935	Mar. 13	9.37 p.m	24	38	20	76	01	45	926	wh. Oz.	75	74	n.t.	Strong northeast.
936	Mar. 13	11.28 p.m	24	46	50	75	55	45	1,965	gy. Oz.	74	73	36.7	
937	Mar. 14	1.45 a.m	24	54	30	75	49	20	2,432	br. Oz.	75	73	36.7	No current.
938	Mar. 14	4.22 a.m	25	02	45	75	43	00	2,664	br. Oz.	75	73	36.7	Do.
939	Mar. 14	1.23 p.m	25	35	00	76	35	15	11	Co. S.	71	72	n.t.	Do.
940	Mar. 14	1.36 p.m	25	35	30	76	34	30	14	Co. S.	71	72	n.t.	Do.
941	Mar. 14	1.55 p.m	25	36	30	76	34	45	29	Co. S. rd. Sp.	71	72	n.t.	Do.
942	Mar. 14	2.08 p.m	25	37	15	76	34	00	139	hrd. Co.	71	72	n.t.	
943	Mar. 14	3.05 p.m	25	40	15	76	29	15	1,927	Co. S.	73	72	38.1	North-northwest, ¾ knot
944	Mar. 14	5.10 p.m	25	44	45	76	23	15	2,663	br. Oz.	72	72	36.7	North-northwest, ¼ knot.
945	Mar. 24	6.30 a.m	25	07	00	77	21	30	375	Co. S.	69	72	n.t.	No current.
946	Mar. 24	8.02 a.m	25	15	30	77	24	45	1,409	br. Oz. Co.	71	73	38.4	West by north, 2 knots.
947	Mar. 24	10.05 a.m	25	25	30	77	27	50	1,490	br. Oz.	70	74	39.1	No current.
948	Mar. 24	1.03 p.m	25	35	30	77	27	45	1,079	hrd. Co. S.	69	74	39.1	South, 1½ knots.
949	Mar. 24	3.51 p.m	25	47	00	77	20	30	1,164	hrd. Co. S.	68	74	38.6	South, ¾ knot.
950	Mar. 24	10.34 p.m	25	53	15	77	33	00	1,312	gy. Oz.	65	71	36.4	Do.
951	Mar. 25	4.03 a.m	25	59	00	78	12	00	411	gy. Oz.	66	71	49.8	
952	Mar. 25	6.49 a.m	26	04	00	78	29	00	383	br. and gy. Oz.	69	74	51.8	No current.
953	Mar. 25	8.55 a.m	26	07	00	78	45	30	281	wh. Oz.	69	75	58.3	Do.
954	Apr. 3	9.33 p.m	24	14	00	81	30	00	145	brk. Sh.	72	73	46.3	
955	Apr. 3	11.02 p.m	24	05	45	81	30	30	445	wh. Oz.	72	75	41.6	East-northeast.
956	Apr. 4	12.56 a.m	23	58	30	81	31	00	589	gy. S. rl. Sp.	72	75	40.5	East-northeast, 1 knot.
957	Apr. 4	2.42 a.m	23	51	00	81	31	45	980	gy. S. bk. Sp.	73	76	39.9	North-northeast, 2 knots.
958	Apr. 4	5.00 a.m	23	43	00	81	32	15	777	br. Oz.	73	76	39.6	Do.

Record of hydrographic soundings, &c.—Continued.

Serial number.	Date.	Hour.	Position. Lat. N.			Position. Long. W.			Depth.	Character of bottom.	Temperatures. Air.	Temperatures. Surface.	Temperatures. Bottom.	Current.
	1886.		°	′	″	°	′	″	*Fathoms.*		°	°	°	
959	Apr. 4	6.43 a. m	23	35	30	81	32	45	815	lt. br. Oz	74	76	39.6	
960	Apr. 4	8.25 a. m	23	28	00	81	33	15	792	lt. br. Oz	74	77	39.6	No current.
961	Apr. 4	10.03 a. m	23	20	30	81	33	45	707	br. Oz	73	77	40.6	Do.
962	Apr. 4	11.51 a. m	23	13	00	81	34	30	398	br. Oz. Sh	76	77	50.0	Do.
963	Apr. 4	12.36 p. m	23	08	00	81	35	30	261	br. S. Sh	76	77	56.7	
964	Apr. 10	4.50 a. m	26	21	00	78	50	45	443	wh. Oz	68	76	48.4	
965	Apr. 10	7.02 a. m	26	27	00	78	38	00	290	br. S. brk. Sh	70	74	60.6	
966	Apr. 10	9.16 a. m	26	25	30	78	27	50	528	br. S	70	73	40.7	West-northwest, 1 knot.
967	Apr. 10	11.33 a. m	26	31	30	78	21	00	367	yl. M	70	73	53.0	Do.
968	Apr. 10	12.18 p. m	26	33	00	78	24	20	18	Co. S	71	73	73.2	
969	Apr. 10	12.26 p. m	26	32	30	78	24	00	148	Co. S	71	73	n. t.	
970	Apr. 10	1.20 p. m	26	36	30	78	18	30	18	Co	71	73	74.7	
971	Apr. 10	2.24 p. m	26	38	30	78	14	00	274	Co. lt. br. Oz	71	74	62.3	
972	Apr. 10	4.23 p. m	26	39	00	78	09	00	157	gy. Oz	72	74	67.2	
973	Apr. 10	5.04 p. m	26	38	45	78	00	00	10	gy. S. fne. Sh	71	73	n. t.	
974	Apr. 10	5.52 p. m	26	34	00	77	58	45	234	gy. Oz	71	73	63.8	
975	Apr. 10	7.35 p. m	26	22	00	78	08	00	867	wh. Oz	70	73	39.6	
976	Apr. 10	10.10 p. m	26	16	00	77	55	00	711	br. Oz	69	73	39.6	
977	Apr. 12	9.17 p. m	23	39	15	76	47	00	740	wh. Oz	74	74	39.6	North, slight.
978	Apr. 12	11.08 p. m	23	44	00	77	00	00	756	wh. Oz	73	74	40.2	
979	Apr. 13	12.55 a. m	23	49	00	77	13	00	763	wh. Oz	73	74	39.4	
980	Apr. 13	3.12 a. m	23	50	00	77	25	30	740	lt. br. Oz	73	73	39.6	
981	Apr. 13	4.43 a. m	23	58	00	77	20	00	805	lt. br. Oz	73	73	39.4	
982	Apr. 13	6.18 a. m	23	57	00	77	12	15	514	lt. br. Oz	73	73	40.4	
983	Apr. 13	2.22 p. m	24	07	00	77	21	00	809	wh. Oz	82	74	57.3	
984	Apr. 13	3.54 p. m	24	13	00	77	30	30	822	lt. br. Oz	78	74	39.4	
985	Apr. 13	5.20 p. m	24	19	30	77	24	30	852	lt. br. Oz	70	74	47.6	
986	Apr. 13	6.46 p. m	24	25	00	77	18	15	639	wh. M	74	74	59.8	
987	Apr. 14	5.35 a. m	24	29	30	77	19	00	441	wh. M	72	73	45.7	
988	Apr. 14	7.28 a. m	24	37	00	77	30	00	939	Co. M	80	73	39.1	
989	Apr. 14	9.28 a. m	24	43	00	77	42	00	734	lt. br. Oz	76	74	39.6	
990	Apr. 14	7.01 p. m	25	10	30	77	57	30	959	lt. br. Oz	71	73	38.6	
991	Apr. 15	7.23 a. m	25	11	00	77	47	30	1,195	lt. br. Glob. Oz	69	73	40.7	
992	Apr. 15	9.23 a. m	25	02	30	77	40	00	1,084	yl. M	74	73	39.8	
993	Apr. 17	7.42 a. m	25	06	00	77	32	00	794	Co. S	72	73	39.4	South, ½ knot.
994	Apr. 30	12.12 p. m	25	35	45	76	57	00	1,527	lt. br. Oz	79	76	44.2	
995	Apr. 30	1.39 p. m	25	39	30	76	53	45	1,922	wh. Co. Oz	79	76	36.9	
996	Apr. 30	3.10 p. m	25	43	00	76	58	00	2,222	br. Oz	79	76	39.1	
997	Apr. 30	4.55 p. m	25	47	00	77	03	00	1,773	gy. S. bk. Sp	77	76	37.0	

998	Apr. 30	6.25 p.m.	25	50	45	77	09	00	114	*No specimen*		77	76	n. t.	
999	May 1	1.51 a.m.	26	40	00	76	49	30	942	brk. Sh		75	77	39.1	
1000	May 1	3.47 a.m.	26	43	00	76	38	30	2,860	br. Oz		75	77	36.8	East by south, ½ knot.
1001	May 1	6.55 a.m.	26	45	00	76	26	00	2,764	gy. Co. S		77	76	38.1	Do.
1002	May 1	9.42 a.m.	26	47	00	76	15	00	2,693	br. Co. S		76	74	38.4	
1003	May 1	12 m	26	50	00	76	04	45	2,670	br. Oz		76	74	38.1	
1004	May 1	4.36 p.m.	27	11	00	76	19	00	2,715	Co. S. For		76	73	38.1	
1005	May 2	12.06 a.m.	27	41	00	76	41	00	943	gy. Oz. bk. Sp		69	72	38.6	
1006	May 2	2.18 a.m.	27	45	00	76	52	30	671	yl. Oz. bk. Sp		69	72	41.1	North, ½ knot.
1007	May 2	4.18 a.m.	27	49	00	77	04	00	690	yl. Oz. bk. Sp		69	72	41.1	
1008	May 2	6.15 a.m.	27	53	00	77	16	00	669	yl. Oz. bk. Sp		71	73	39.9	
1009	May 2	11.13 a.m.	27	49	30	77	35	00	661	Co. S. For		72	73	.....	
1010	May 2	12.57 p.m.	27	42	30	77	45	00	663	lt. br. Oz		74	74	40.5	
1011	May 2	2.30 p.m.	27	35	45	77	51	00	682	Wire parted, lost 400 turns, thor., and lead		74	74	.....	
1012	May 2	3.39 p.m.	27	27	00	77	59	00	610	wh. S		74	74	40.8	
1013	May 5	4.35 p.m.	31	27	00	79	12	00	280	crs. gy. S		76	77	50.2	
1014	July 18	3.05 a.m.	39	57	00	71	24	45	58	br. S. Sh		72	71	53.1	
1015	July 18	3.43 a.m.	39	54	00	71	24	00	119	gn. M		72	71	51.0	
1016	July 18	5.26 a.m.	39	50	00	71	20	30	226	gn. M		72	71	43.1	
1017	Aug. 3	2.10 p.m.	40	14	00	65	56	00	2,224	br. Oz. C		68	75	36.7	
1018	Aug. 3	6.22 p.m.	40	15	00	65	35	00	2,951	br. Oz		68	74	36.2	
1019	Aug. 4	1 a.m.	40	20	00	64	54	00	2,575	gy. and br. Oz		68	73	37.3	Northwest, 1 knot.
1020	Aug. 4	6.40 a.m.	40	32	24	63	53	00	2,337	lt. br. Oz		67	73	.....	
1021	Aug. 4	12.27 p.m.	41	20	28	63	27	30	1,919	lt. br. Oz		70	66	37.5	Northwest, 1 knot.
1022	Aug. 4	1.50 p.m.	41	29	28	63	21	00	1,932	lt. br. Oz		69	64	37.7	Do.
1023	Aug. 4	3.04 p.m.	41	29	28	63	17	00	1,969	lt. br. Oz		68	64	37.3	Do.
1024	Aug. 4	4.35 p.m.	41	29	28	63	10	15	1,980	lt. br. Oz		69	64	37.3	East-northeast, 1 knot.
1025	Aug. 4	6.02 p.m.	41	29	28	63	05	15	1,996	lt. br. Oz		65	66	.....	East, 1 knot.
1026	Aug. 4	7.37 p.m.	41	25	30	63	08	00	2,025	lt. br. Oz		65	66	36.2	
1027	Aug. 4	10.44 p.m.	41	24	00	63	19	00	2,033	lt. br. Oz		66	65	36.3	
1028	Aug. 5	1.03 a.m.	41	22	20	63	29	30	2,054	lt. br. Oz		65	66	36.2	
1029	Aug. 5	3.11 a.m.	41	31	00	63	27	30	1,939	lt. br. Oz		65	66	36.2	
1030	Aug. 5	4.45 a.m.	41	30	30	63	15	00	1,978	lt. br. Oz		64	63	36.2	
1031	Aug. 5	6.22 a.m.	41	32	30	63	00	30	2,033	lt. br. Oz		62	64	36.3	
1032	Aug. 5	8.19 a.m.	41	29	30	62	47	30	2,069	lt. br. Oz		62	64	36.2	
1033	Aug. 5	12.31 p.m.	41	53	00	62	35	15	1,768	No specimen		67	67	.....	
1034	Aug. 5	4.47 p.m.	42	21	00	62	18	00	1,138	br. Oz		69	66	38.2	Northeast by east, 2 knots.
1035	Aug. 5	8.48 p.m.	42	43	00	62	03	00	231	gy. S. bk. Sp		67	64	40.8	
1036	Aug. 6	8.44 p.m.	43	30	00	57	40	00	1,731	lt. br. Oz		64	62	37.2	East-northeast, 1 knot.
1037	Aug. 7	4.37 a.m.	43	45	00	56	09	00	1,758	stk. br. M		62	62	37.2	
1038	Aug. 7	12.38 p.m.	44	02	00	54	39	00	1,780	lt. gy. M		66	64	36.9	East, ½ knot.
1039	Aug. 7	6.43 p.m.	44	13	00	53	47	00	1,172	br. Oz		63	63	37.7	East, 1 knot.
1040	Aug. 8	12.03 a.m.	44	23	00	52	42	00	81	For. bk. Sp		61	62	31.9	
1041	Aug. 8	12 m	44	52	00	50	25	24	24	rd. S. bk. Sp		62	62	39.7	
1042	Aug. 8	6.12 p.m.	45	00	00	49	15	00	35	wh. S. brk. Sh		60	62	31.1	
1043	Aug. 8	6.54 p.m.	45	00	00	49	09	00	35	brd		60	62	31.0	
1044	Aug. 8	7.27 p.m.	45	00	00	49	03	00	35	wh. S		57	59	30.9	
1045	Aug. 8	8.03 p.m.	45	00	00	48	57	00	38	P		57	58	31.4	
1046	Aug. 8	8.39 p.m.	45	00	00	48	51	00	41	P. wh. S. brk. Sh		57	58	30.4	
1047	Aug. 8	9.13 p.m.	45	00	00	48	45	00	115	crs. wh. S. brk. Sh		57	56	31.9	
1048	Aug. 8	11.43 p.m.	45	02	00	48	20	00	1,169	lt. br. Oz		57	56	37.8	
1049	Aug. 9	6.47 a.m.	45	02	00	47	08	00	1,916	lt. br. Oz		62	59	38.2	East, 1 knot.

Record of hydrographic soundings, &c.—Continued.

Serial number.	Date.	Hour.	Position. Lat. N.	Position. Long. W.	Depth.	Character of bottom.	Temperatures. Air.	Temperatures. Surface.	Temperatures. Bottom.	Current.
	1886.		° ′ ″	° ′ ″	*Fathoms.*		°	°	°	
1050	Aug. 9	1.32 p. m	45 02 00	45 58 00	1,981	br. Oz	65	62	36.3	
1051	Aug. 9	7.56 p. m	45 04 00	44 38 00	2,549	br. Oz	65	63	36.2	
1052	Aug. 10	2.40 a. m	45 06 00	43 23 30	2,621	lt. br. Oz	67	68	36.8	North, 1 knot.
1053	Aug. 10	9.36 a. m	45 14 00	42 03 00	2,658	br. Oz. For	69	70	37.8	North-northwest, 1½ knots.
1054	Aug. 10	6.47 p. m	45 43 00	43 00 00	2,577	lt. br. Oz	69	68	36.8	Do.
1055	Aug. 11	3.03 a. m	46 21 00	43 47 00	2,135	S. G	57	60	37.3	Northeast, 1¼ knots.
1056	Aug. 11	7.43 p. m	47 02 30	45 06 30	103	hrd	59	58	38.2	
1057	Aug. 11	9.20 p. m	47 14 00	45 31 30	155	wh. S. bk. Sp	58	57	39.7	
1058	Aug. 12	1.51 a. m	47 27 00	46 11 30	423	br. Oz	56	57	38.7	
1059	Aug. 12	6.58 a. m	47 32 12	46 53 30	477	No specimen	53	49	.....	
1060	Aug. 12	4.37 p. m	47 44 00	48 12 30	170	gy. S. P	55	50	37.1	Southerly, ½ knot.
1061	Aug. 12	5.21 p. m	47 46 00	48 19 30	168	gy. S. bk. Sp	55	51	36.5	Do.
1062	Aug. 12	7.17 p. m	47 49 00	48 41 30	147	gy. S. bk. Sp. brk. Sh	54	51	35.2	
1063	Aug. 13	12.14 a. m	47 57 00	49 24 30	108	gy. S. bk. Sp	54	52	32.4	
1064	Aug. 13	3.48 a. m	48 02 00	50 10 30	100	gy. M	55	53	30.4	
1065	Aug. 13	7.58 a. m	47 31 00	50 17 00	62	gy. S. bk. Sp. P	56	54	30.1	
1066	Aug. 13	11.31 a. m	47 26 00	51 00 30	74	fne. gy. S. bk. Sp	57	54	.....	
1067	Aug. 13	2.37 p. m	47 30 00	51 45 00	98	gn. M	55	55	.....	
1068	Aug. 22	8.55 p. m	44 40 00	56 43 30	226	gy. M	60	58	40.4	
1069	Aug. 22	11.43 p. m	44 31 00	57 09 00	38	gy. S. P	60	58	39.7	
1070	Aug. 23	7.23 a. m	44 25 00	57 35 00	32	wh. S. bk. Sp	63	59	.....	
1071	Aug. 23	3.44 p. m	43 38 00	59 18 30	63	gy. S. bk. Sp	67	62	35.6	
1072	Aug. 25	8.02 a. m	41 37 00	62 58 00	1,943	dk. br. Oz	63	65	36.9	Southeast, 2 knots.
1073	Aug. 25	9.33 a. m	41 37 00	63 05 00	1,864	dk. br. Oz	63	68	36.7	Do.
1074	Aug. 25	10.58 a. m	41 37 00	63 11 30	1,798	dk. br. Oz	63	65	37.2	Southeast, 1½ knots.
1075	Aug. 25	12.21 p. m	41 37 00	63 18 00	1,779	dk. br. Oz	64	65	37.1	East, 2 knots.
1076	Aug. 25	1.53 p. m	41 37 00	63 26 00	1,762	dk. br. Oz	70	73	36.9	Do.
1077	Aug. 25	3.15 p. m	41 37 00	63 34 00	1,741	dk. br. Oz	70	73	36.9	
1078	Aug. 25	4.35 p. m	41 42 00	63 34 00	1,644	dk. br. Oz	70	72	37.2	
1079	Aug. 25	6.01 p. m	41 42 00	63 27 00	1,693	dk. br. Oz	70	72	36.9	
1080	Aug. 25	7.26 p. m	41 42 00	63 21 00	1,697	dk. br. Oz	70	72	36.9	
1081	Aug. 25	9.05 p. m	41 42 00	63 14 30	1,713	lt. br. Oz. For	70	71	37.5	Easterly, 2 knots.
1082	Aug. 26	12.29 p. m	41 49 00	63 50 00	1,587	br. Oz. gy. M	73	73	37.5	
1083	Aug. 26	2.09 p. m	41 42 00	63 47 30	1,620	br. Oz. For	74	73	37.2	East by north, 2 knots.
1084	Aug. 26	3.34 p. m	41 37 00	63 45 00	1,699	br. Oz. For	74	74	37.2	
1085	Aug. 26	4.59 p. m	41 32 00	63 43 00	1,805	br. Oz. For	74	74	36.7	
1086	Aug. 26	6.26 p. m	41 26 00	63 40 45	1,910	br. Oz. For	74	73	36.7	
1087	Aug. 26	8.29 p. m	41 27 00	63 54 30	1,880	lt. br. Oz	70	73	36.7	
1088	Aug. 27	12.26 a. m	41 27 00	64 22 30	1,879	lt. br. Oz. For	67	72	36.7	Northwest, 2 knots.
1089	Aug. 27	4.10 a. m	41 28 00	64 51 30	1,696	No specimen	68	72	.....	

Record of dredgings and trawlings of the U. S. Fish Commission steamer Albatross for the year 1886.

[For the record of Albatross dredging stations preceding that herewith presented, reference should be made as follows: Nos. 2001-2116, pages 219-221, Fish Commission Report for 1883; Nos. 2117-2310, pages 106-110, Fish Commission Report for 1884; Nos. 2311-2628, pages 66-73, Fish Commission Report for 1885.]

Serial number.	Date.	Hour.	Position.		Temperatures.			Depth.	Character of bottom.	Wind.		Drift.		Instrument used.
			Lat. N.	Long. W.	Air.	Surface.	Bottom.			Direction.	Force.	Direction.	Distance.	
	1886.		° ′ ″	° ′ ″	°	°	°	*Fath.*					*Miles.*	
2629	Mar. 8	12.07 p.m	23 48 40	75 10 40	73	73	38.4	1,169	Co. S	N.	1	S. by W. ½ W.	24	L. B. T.
2630	Mar. 12	2.10 p.m	24 39 45	76 11 30	72	72	61.8	244	Co. S	SE.	4	ESE.	½	Tgls.
2631	Mar. 12	3.03 p.m	24 39 30	76 11 00	73	72	59.8	280	Co. S	SE.	4	NNW.	½	Tgls.
2632	Mar. 13	2.29 p.m	24 30 43	76 23 45	75	73	30.4	791	Co. S. gy. Oz	SSE.	4	E. by N.	2	L. B. T.
2633	Apr. 7	8.05 a.m	23 11 00	82 19 30	74	76	60.8	208	Co. S	NE.	3			Tgls.
2634	Apr. 7	8.48 a.m	23 10 45	82 18 45	74	76	.....	162	br. S. brk. Sh	NE.	3			Tgls.
2635	Apr. 7	10.05 a.m	23 10 55	82 18 55	71	73	62.8	208	dead Co. Sh	N. by E.	3			Tgls.
2636	Apr. 7	10.52 a.m	23 10 45	82 18 45	71	73	62.6	191	dead Co. Sh	N. by E.	3			Tgls.
2637	Apr. 7	11.32 a.m	23 10 45	82 19 00	70	75	63.8	143	dead Co. Sh	N. by E.	3			Tgls.
2638	Apr. 7	2.09 p.m	23 17 45	82 18 00	69	76	39.6	1,025	yl. S	N.	3			L. B. T.
2639	Apr. 9	6.05 a.m	25 04 50	80 15 10	70	73	.....	56	Co. S	NE.	4	NE. by N.	¼	Bl. Dr.
2640	Apr. 9	6.33 a.m	25 05 00	80 15 00	70	73	.....	56	Co. S	NE.	4	NE. by N.	¼	L. B. T.
2641	Apr. 9	8.14 a.m	25 11 30	80 10 00	70	74	69.2	60	Co. S	NE.	4	NE. by N.	¼	L. B. T.
2642	Apr. 9	10.41 a.m	25 20 30	79 58 00	71	74	42.6	217	gy. S	NE. by E.	4	NE. by N.	1	L. B. T.
2643	Apr. 9	11.54 a.m	25 25 00	79 55 15	71	74	43.1	211	gy. S	NE. by E.	4	NE. by N.	1½	L. B. T.
2644	Apr. 9	2.01 p.m	25 40 00	80 00 00	73	73	43.4	193	gy. S	NNE.	3	N. ½ W.	¾	Bl. Dr.
2645	Apr. 9	3.15 p.m	25 46 30	80 02 00	70	75	43.4	157	gn. S	NNE.	3			Bl. Dr.
2646	Apr. 9	4.14 p.m	25 47 00	80 05 00	71	75	.....	85	gy. S. For	NNE.	3	N.	¼	Bl. Dr.
2647	Apr. 9	4.49 p.m	25 48 00	80 04 00	71	75	.....	85	gy. S. For	NNE.	3	N.	¾	Bl. Dr.
2648	Apr. 9	5.17 p.m	25 53 00	80 03 30	71	73	.....	84	gn. M	NNE.	3	N.	¾	Bl. Dr.
2649	Apr. 12	5.25 p.m	23 34 00	76 33 00	73	74	74.2	36	Co. S	SE.	6			Tgls.
2650	Apr. 12	6.01 p.m	23 34 30	76 34 00	73	74	57.8	369	Co. S. wh. Oz	SE.	6	SE. by E.	2	Tgls.
2651	Apr. 13	9.46 a.m	24 02 00	77 12 45	75	74	73.4	97	wh. Oz	E.	4			Tgls.
2652	Apr. 13	10.06 a.m	24 12 30	77 13 00	75	74	67.1	140	wh. M	E.	4			Bl. Dr.
2653	Apr. 14	11.35 a.m	24 52 30	77 39 00	78	74	39.1	1,000	lt. br. Oz	N.	3	NW. by W.	3	L. B. T.
2654	May 2	8.29 a.m	27 57 30	77 27 30	76	73	39.3	660	yl. Oz. bk. Sp	WNW.	2	NW. by W.	1	L. B. T.
2655	May 2	5.49 p.m	27 22 00	78 07 30	72	76	47.5	338	gy. S	NW.	3	NW. by W.	¾	L. B. T.
2656	May 3	5.24 a.m	27 58 30	78 21 00	69	71	41.2	572	For	N.	3	WNW.	1½	L. B. T.
2657	May 3	8.35 a.m	28 08 00	78 28 00	71	73	44.7	540	For	N.	3	WNW.	1½	L. B. T.
2658	May 3	12.20 p.m	28 21 00	78 33 00	72	73	44.7	514	For. brk. Sh	N. by E.	3	NNW. ½ W.	1½	L. B. T.
2659	May 3	3.35 p.m	28 32 00	78 42 00	73	74	45.2	509	br. For	N.	3	NW.	1	L. B. T.
2660	May 3	6.47 p.m	28 40 00	78 46 00	72	74	45.7	504	yl. For	NNE.	3	NW.	¾	L. B. T.
2661	May 4	5.29 a.m	29 16 30	79 36 30	70	75	45.5	438	gy. S. bk. Sp	ENE.	4	NNW.	1	L. B. T.
2662	May 4	8.19 a.m	29 24 30	79 43 00	72	75	43.7	434	gy. S. brk. Sh	ENE.	4	NNW.	¾	L. B. T.

Record of dredgings and trawlings, &c.—Continued.

Serial number.	Date.	Hour.	Position. Lat. N.	Position. Long. W.	Temperatures. Air.	Temperatures. Surface.	Temperatures. Bottom.	Depth.	Character of bottom.	Wind. Direction.	Wind. Force.	Drift. Direction.	Drift. Distance.	Instrument used.
	1886.		° ′ ″	° ′ ″	°	°	°	*Fath.*					*Miles.*	
2663	May 4	10.46 a.m	29 39 00	79 49 00	72	77	42.7	421	br. S	E.	4	NNW.	⅔	L. B. T.
2664	May 4	2.26 p.m	29 41 00	79 55 00	74	75	42.7	373	Co. S	E.	2	N.	1	L. B. T.
2665	May 4	5.16 p.m	29 47 00	80 05 45	75	76	45.2	263	fne. gy. S	ESE.	3	SSE.	¾	L. B. T.
2666	May 5	5.26 a.m	30 47 30	79 49 00	70	74	48.3	270	gy. S	E.	1	NNE.	1¼	L. B. T.
2667	May 5	7.22 a.m	30 53 00	79 42 30	75	75	48.7	273	gy. S. bk. Sp	E.	2	NNE.	¾	L. B. T.
2668	May 5	9.37 a.m	30 58 30	79 38 30	73	76	46.3	294	gy. S. dd. Co	E.	2	NNE.	¼	L. B. T.
2669	May 5	11.23 a.m	31 09 00	79 33 30	73	77	43.7	352	gy. S. dd. Co	E.	2	NNE.	½	L. B. T.
2670	May 5	1.52 p.m	31 20 00	79 22 00	73	74	44.5	280	gy. S. dd. Co	E.	1	....	.....	L. B. T.
2671	May 5	2.45 p.m	31 20 00	79 22 00	76	77	....	280	gy. S. dd. Co	E. by S.	1	....	.....	Tgls.
2672	May 5	5.55 p.m	31 31 00	79 05 00	73	77	54.3	277	crs. br. S	SE.	1	NE. by E.	¼	Tgls.
2673	May 6	5.17 a.m	32 26 00	77 43 30	72	77	51.6	240	Co. gy. S. bk. Sp	SW.	1	NE. by E.	½	L. B. T.
2674	May 6	8.45 a.m	32 32 00	77 17 00	72	76	46.0	316	gy. S. bk. Sp. Sh	SW.	2	E.	1½	L. B. T.
2675	May 6	10 a.m	32 32 30	77 15 00	73	75	45.8	327	gy. S. bk. Sp. Sh	SW.	2	E.	1	L. B. T.
2676	May 6	12.19 p.m	32 39 00	77 01 00	73	77	45.8	407	gn. Oz. gy. S.	SW.	2	E.	1	L. B. T.
2677	May 6	2.49 p.m	32 39 00	76 50 30	75	78	39.3	478	gn. M	SW.	2	E.	1¼	L. B. T.
2678	May 6	5.42 p.m	32 40 00	76 49 30	74	77	38.7	731	lt. gy. Oz	SSW.	3	SSW.	1	L. B. T.
2679	May 6	8.14 p.m	32 40 00	76 40 30	72	75	38.6	782	lt. gy. Oz	SSW.	3	SW.	1½	L. B. T.
2680	July 16	9.27 a.m	39 50 00	70 26 00	...	...	.....	555	No specimen	S. by E.	5	SSE. ¼ E.	⅜	L. B. T.
2681	July 16	12.55 p.m	39 43 00	70 29 00	...	...	.....	990	gn. M	S.	4	SE.	1	L. B. T.
2682	July 16	5.28 p.m	39 38 00	70 22 00	...	...	.....	1,004	gn. M. S	WSW.	3	SE. by E.	1½	L. B. T.
2683	July 17	5.04 a.m	39 33 00	70 50 00	...	...	.....	887	br. Oz	SSW.	2	SE. by S.	1	L. B. T.
2684	July 17	8.18 a.m	39 35 00	70 54 00	...	...	.....	1,106	br. C. bk. Sp	SSW.	1	SSE.	1½	L. B. T.
2685	July 17	1.59 p.m	39 35 00	71 02 30	...	...	.....	1,137	gn. M. wh. Sp	Calm.	0	S.	1½	L. B. T.
2686	July 18	4.31 a.m	39 52 00	71 20 45	...	...	.....	226	gn. M	SW.	2	W.	¾	L. B. T.
2687	July 18	6.12 a.m	39 46 00	71 19 00	...	...	.....	326	gn. M	SW.	1	W.	¾	L. B. T.
2688	July 18	8.17 a.m	39 42 00	71 12 00	...	...	.....	644	gn. M	SW.	1	SW. by W.	1	L. B. T.
2689	July 18	10.18 a.m	39 42 00	71 15 30	...	...	.....	525	gn. M	SSW.	1	NW.	2	L. B. T.
2690	July 18	1.12 p.m	39 39 00	71 11 00	...	...	.....	643	gn. M	Calm.	0	SW.	1	L. B. T.
2691	July 18	5.18 p.m	39 37 00	71 03 00	...	...	.....	635	lt. gn. M	SSW.	2	NW.	1½	L. B. T.
2692	Aug. 11	10.49 a.m	46 50 00	44 35 00	...	...	.....	73	gy. S. sml. bk. St	NW.	3	W. by S.	⅛	L. B. T.
2693	Aug. 11	12.09 p.m	46 53 00	44 39 30	...	...	.....	78	rd. and gn. S. bk. and gy. P	NW.	2	W. by S.	1¼	L. B. T.
2694	Aug. 11	1.55 p.m	46 52 30	44 54 30	...	...	.....	86	gy. S. bk. Sp	WSW.	3	WNW.	¼	L. B. T.
2695	Aug. 11	3.44 p.m	46 51 30	45 06 30	...	...	.....	105	gy. S. bk. Sp. P	W.	3	NE.	½	L. B. T.
2696	Aug. 11	4.33 p.m	46 53 30	45 05 30	...	...	.....	98	gy. S. bk. Sp	W.	3	NE.	½	L. B. T.
2697	Aug. 12	12.09 p.m	47 40 00	47 35 30	...	...	.....	206	gn. M. bk. Sp	SSW.	2	SW. by S.	½	L. B. T.
2698	Aug. 22	8.10 a.m	45 07 00	55 09 00	...	...	.....	90	gy. S. bk. Sp. P	SSW.	2	S. by W.	¼	L. B. T.
2699	Aug. 22	10.53 a.m	45 01 00	55 23 00	...	...	.....	72	Co	WSW.	2	E. ¼ S.	½	L. B. T.

2700	Aug. 22	1.29 p. m	44 56 30	55 48 00	....	....	......	59	gy. S. bk. Sp	SW.	2	E. ¼ S.	⅛	L. B. T.
2701	Aug. 22	2.02 p. m	44 56 00	55 49 30	....	....	......	75	gy. S. bk. Sp	S.	2	E. ¼ S.	⅛	L. B. T.
2702	Aug. 22	5.25 p. m	44 50 00	56 19 30	....	....	......	215	gn. M	S.	3	W.	¾	L. B. T.
2703	Aug. 23	11.30 a. m	44 01 00	59 02 30	....	....	......	140	gy. S. bk. Sp	S. by W.	4	WSW.	½	L. B. T.
2704	Aug. 23	4.52 p. m	43 32 00	59 22 00	....	....	......	110	gy. S. bk. Sp	SW. by S.	6	WNW. ¼ W.	¾	L. B. T.
2705	Aug. 24	9.11 a. m	42 47 00	61 04 00	....	....	......	1,255	lt. br. Oz	N.	1	N. by E. ½ E.	2½	L. B. T.
2706	Aug. 27	9.33 a. m	41 28 30	65 35 30	....	....	......	1,188	gy. Oz. For	SE.	2	SW.	1½	L. B. T.
2707	Aug. 27	2.21 p. m	41 24 00	65 48 00	....	....	......	1,099	br. Oz. For	WSW.	3	SW. by W.	1½	L. B. T.
2708	Aug. 28	7.09 a. m	40 07 00	67 49 00	....	....	......	980	br. Oz	SW. by W.	4	W.	1	L. B. T.
2709	Aug. 28	9.55 a. m	40 07 00	67 54 00	....	....	......	866	br. M	WSW.	2	WNW.	¾	L. B. T.
2710	Aug. 28	2.45 p. m	40 06 00	68 01 30	....	....	......	984	gn. M	SSW.	3	....	......	L. B. T.
2711	Sept. 16	3.40 p. m	38 59 00	70 07 00	....	....	......	1,544	Glob. Oz	SE.	4	W.	1½	L. B. T.
2712	Sept. 17	5.49 a. m	38 20 00	70 05 30	....	....	......	1,867	br. Oz	Calm.	0	W.	1½	L. B. T.
2713	Sept. 17	11.20 a. m	38 20 00	70 08 30	....	....	......	1,859	br. Oz	Calm.	0	W.	1½	L. B. T.
2714	Sept. 17	4.58 p. m	38 22 00	70 17 30	....	....	......	1,825	br. Oz	WSW.	1	SW.	1½	L. B. T.
2715	Sept. 18	5.33 a. m	38 29 30	70 54 30	....	....	......	1,753	br. Oz	WSW.	2	WNW.	1½	L. B. T.
2716	Sept. 18	11.04 a. m	38 29 30	70 57 00	....	....	......	1,631	br. Oz. For	NW.	2	NW.	1½	L. B. T.
2717	Sept. 18	3.54 p. m	38 24 00	71 13 00	....	....	......	1,615	br. Oz	NE.	3	NW.	1	L. B. T.
2718	Sept. 19	5.38 a. m	38 24 00	71 52 00	....	....	......	1,569	br. Oz	E.	4	NNW.	2	L. B. T.
2719	Sept. 19	11.13 a. m	38 29 00	71 59 00	....	....	......	1,536	gy. Oz	ESE.	3	NW.	1½	L. B. T.
2720	Sept. 19	3.54 p. m	38 36 30	72 12 00	....	....	......	1,509	gy. Oz	S.	2	NE. by N.	2	L. B. T.
2721	Sept. 20	6.02 a. m	38 56 00	72 11 30	....	....	......	813	gy. Oz	W. by N.	4	NW.	1	L. B. T.
2722	Sept. 20	9.33 a. m	39 13 00	72 01 00	....	....	......	594	gn. M	N. by W.	6	WSW.	3	L. B. T.
2723	Oct. 23	5.42 a. m	36 47 00	73 09 30	....	....	......	1,685	gy. Oz. For	N. by W.	2	WSW. ¾ W.	1	L. B. T.
2724	Oct. 23	12.02 p. m	36 47 00	73 25 00	....	....	......	1,641	gy. Oz. For	NNW.	2	SW.	2	L. B. T.
2725	Oct. 24	5.54 a. m	36 34 00	73 48 00	....	....	......	1,374	gy. Oz. For	NE.	5	W.	1½	L. B. T.
2726	Oct. 24	11.10 a. m	36 34 00	73 54 30	....	....	......	1,253	gy. Oz	NE.	4	W. by S.	1	L. B. T.
2727	Oct. 24	4.09 p. m	36 35 00	74 03 30	....	....	......	1,239	gy. Oz	ENE.	4	W.	1	L. B. T.
2728	Oct. 25	5.45 a. m	36 30 00	74 33 00	....	....	......	859	gy. Oz	NE. by E.	3	NW. ½ N.	1	L. B. T.
2729	Oct. 25	9.10 a. m	36 36 00	74 32 00	....	....	......	679	dk. gn. M	ENE.	2	NNE.	1	L. B. T.
2730	Oct. 25	12.28 p. m	36 42 00	74 30 00	....	....	......	727	gn. M. For	E.	2	N.	¾	L. B. T.
2731	Oct. 25	4.12 p. m	36 45 00	74 28 00	....	....	......	781	gy. Oz	Calm.	0	N. by E.	1	L. B. T.
2732	Oct. 26	6.09 a. m	37 27 00	73 33 00	....	....	......	1,152	dk. gn. M	SE.	1	WSW.	1½	L. B. T.
2733	Oct. 26	10.19 a. m	37 26 00	73 43 00	....	....	......	941	gn. M	SE.	2	SW. by W.	2	L. B. T.
2734	Oct. 26	1.52 p. m	37 23 00	73 53 00	....	....	......	841	sft. gn. M	SE.	2	WSW.	1½	L. B. T.
2735	Oct. 26	4.55 p. m	37 23 00	74 02 00	....	....	......	811	sft. gn. M	SE.	2	SW.	1½	L. B. T.

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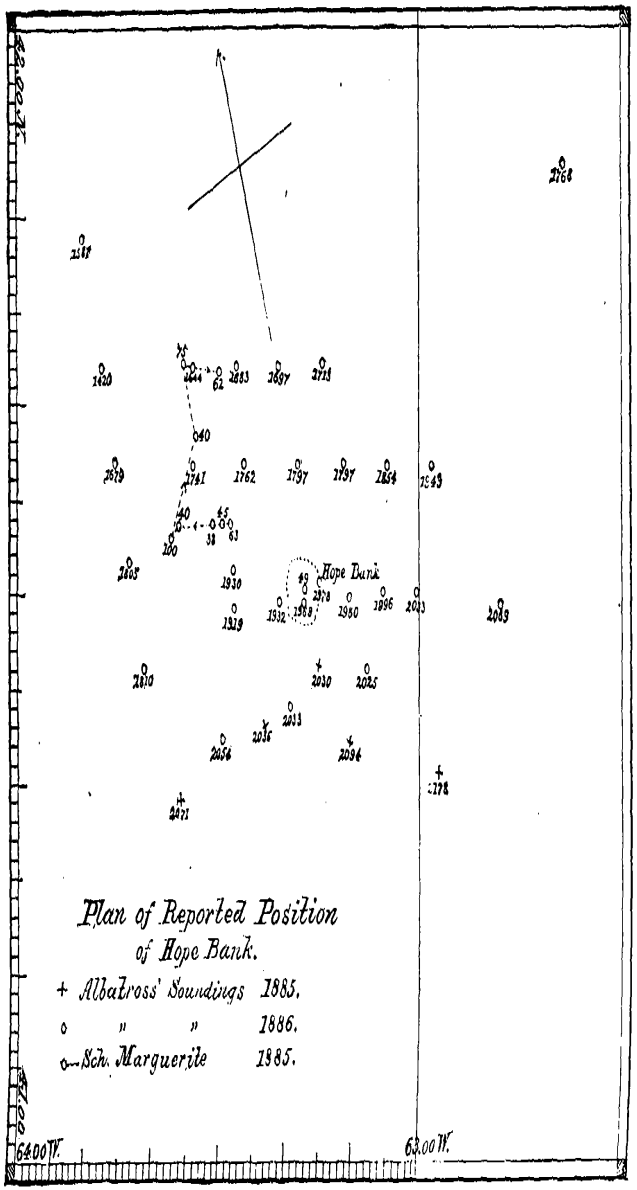
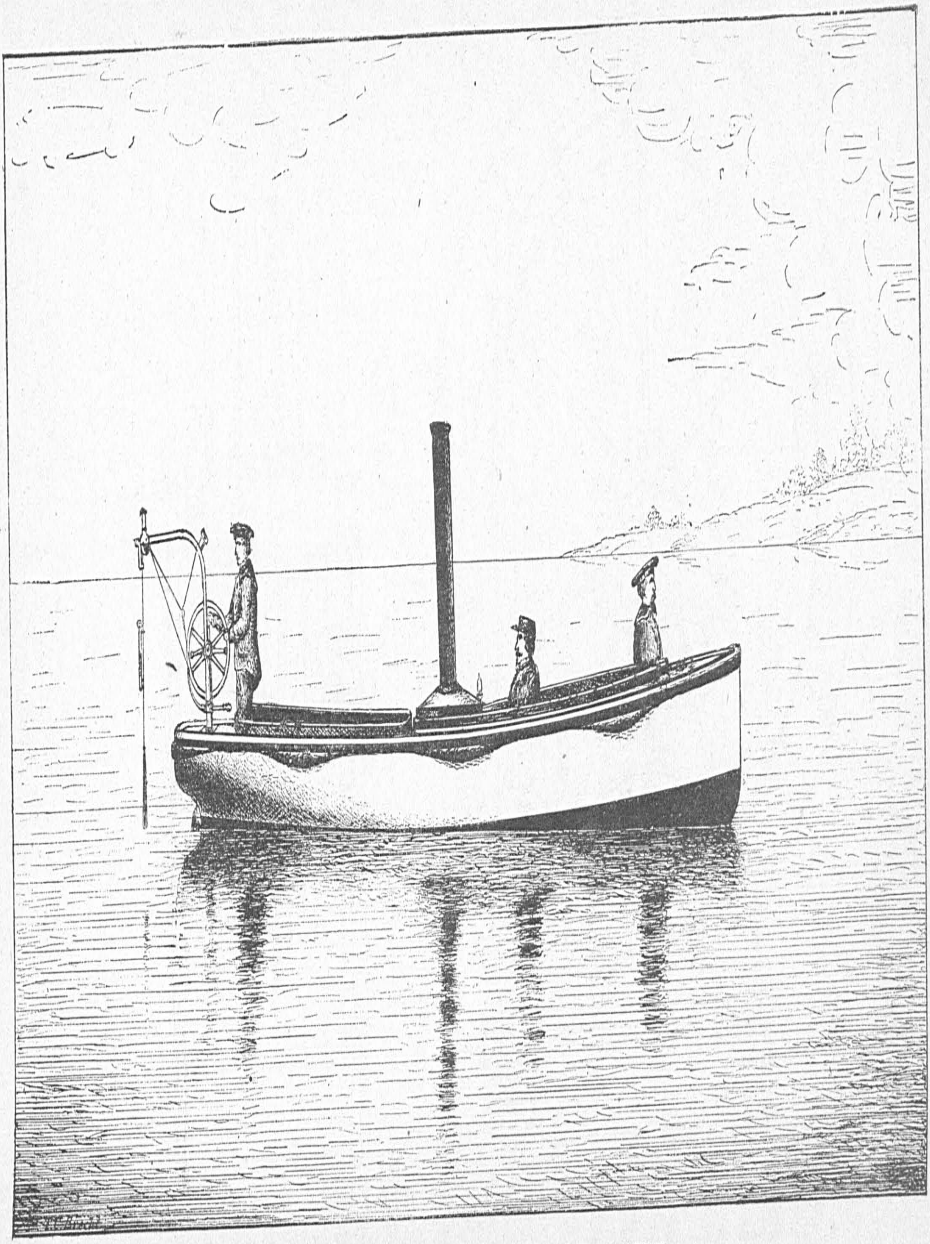
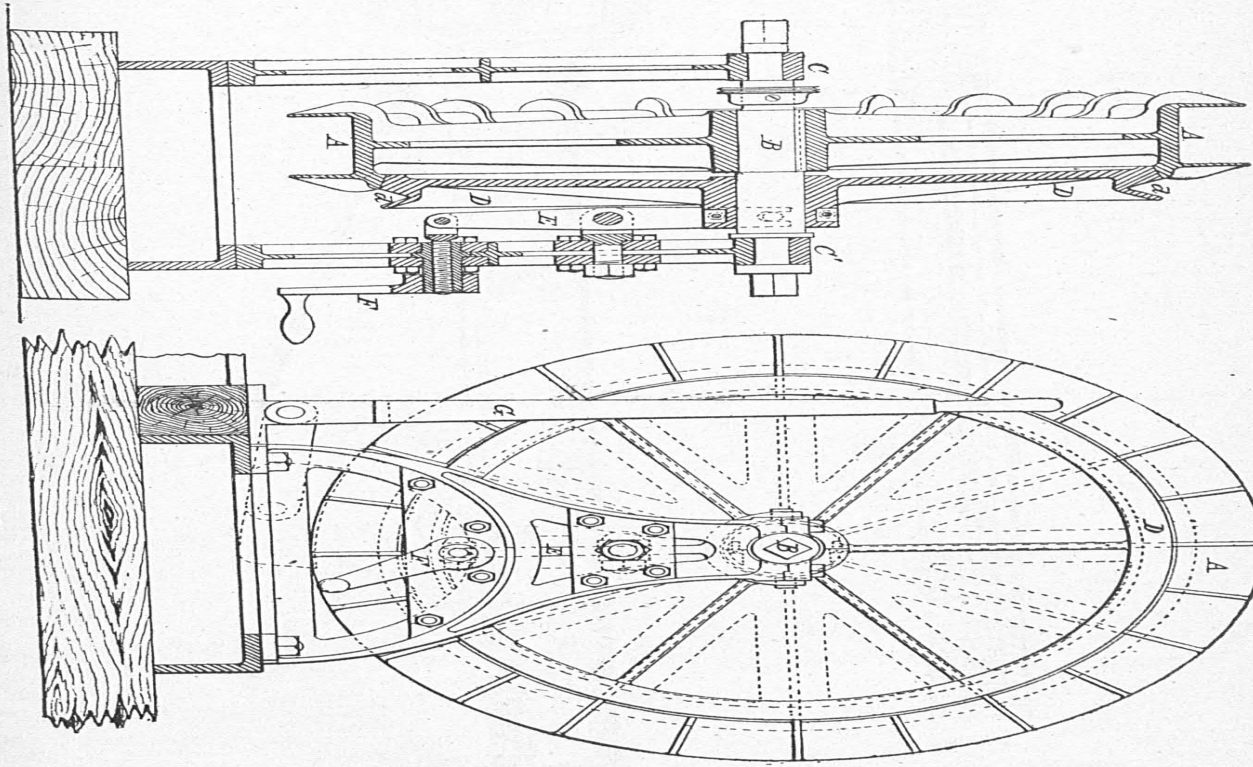
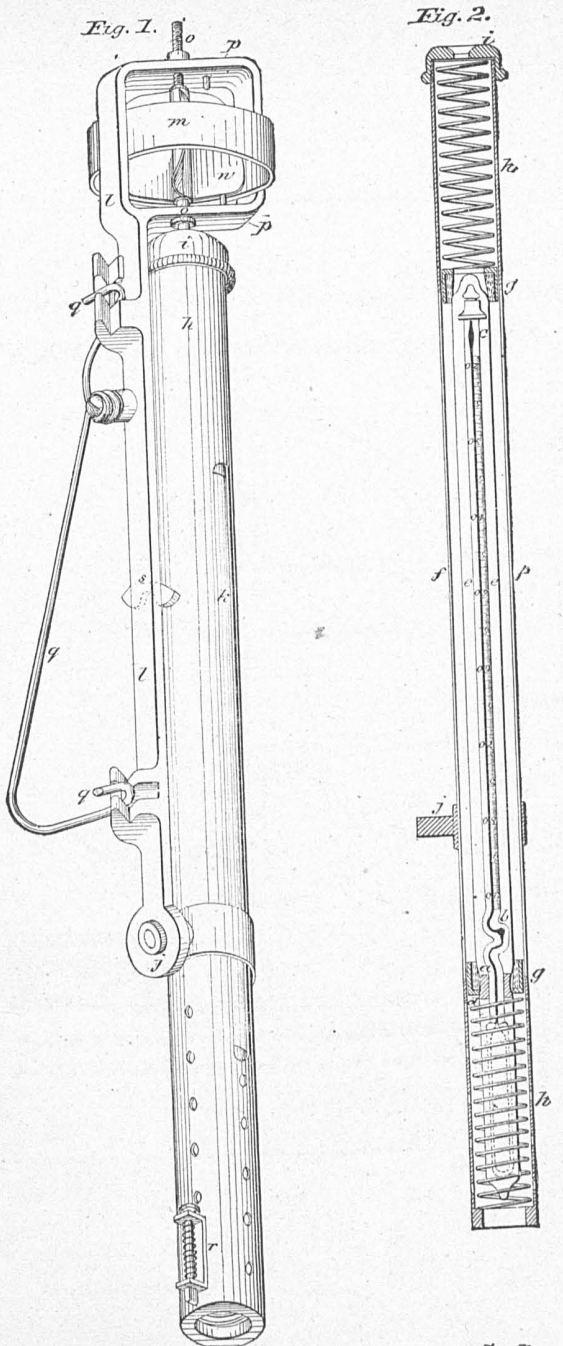

Hope Bank
Plan of Reported Position
of Hope Bank.
+ Albatross' Soundings 1885.
o " " 1886.
o—Sch. Marguerite 1985.
64.00 W.
63.00 W.



THE TANNER SOUNDING MACHINE MOUNTED IN THE STEAM CUTTER.



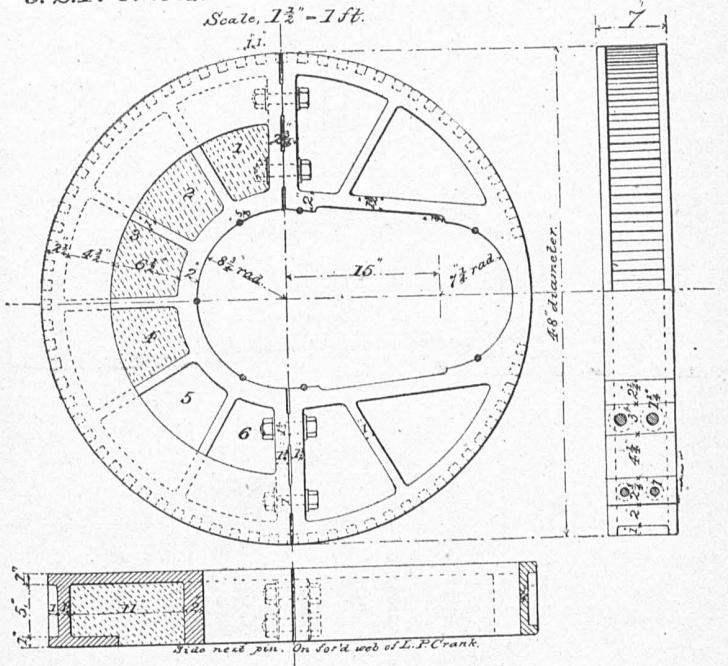
IMPROVEMENT IN DEEP-SEA SOUNDING MACHINE.



The Tanner improved thermometer case, with the Sigsbee clamp, used with the Negretti & Zambra special deep sea thermometer.

Two Counter-balance Wheels, of Cast iron.

U.S.F.C. Str. Albatross, Oct. 2d 1885.



Pockets 1, 2, 3 and 4 loaded, for starboard engine

Pockets 3, 4, 5 and 6 loaded for port engine

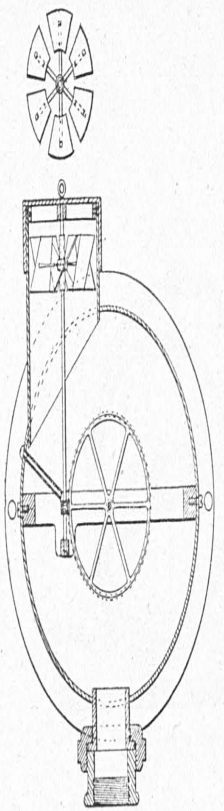


Fig. 1.

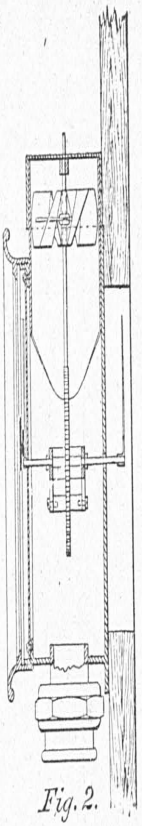


Fig. 2.

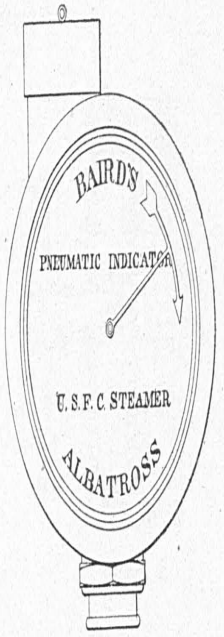


Fig. 3.

BAIRD'S

PNEUMATIC INDICATOR.

The Blower

for the

Pneumatic Indicator.

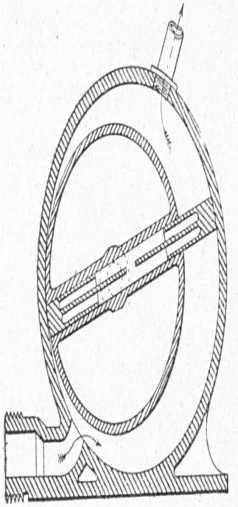


Fig. 4.

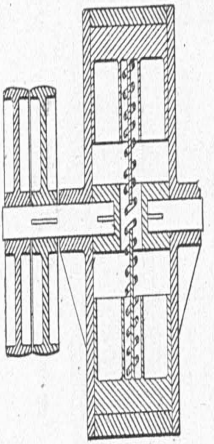


Fig. 5.

Fig. 1.

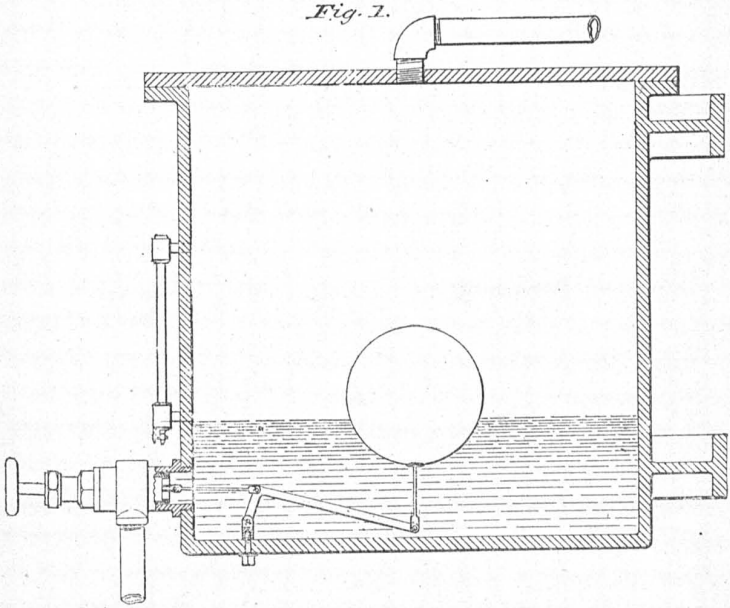
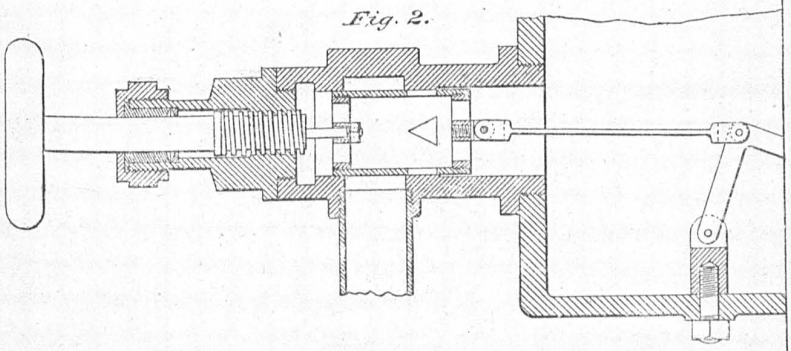
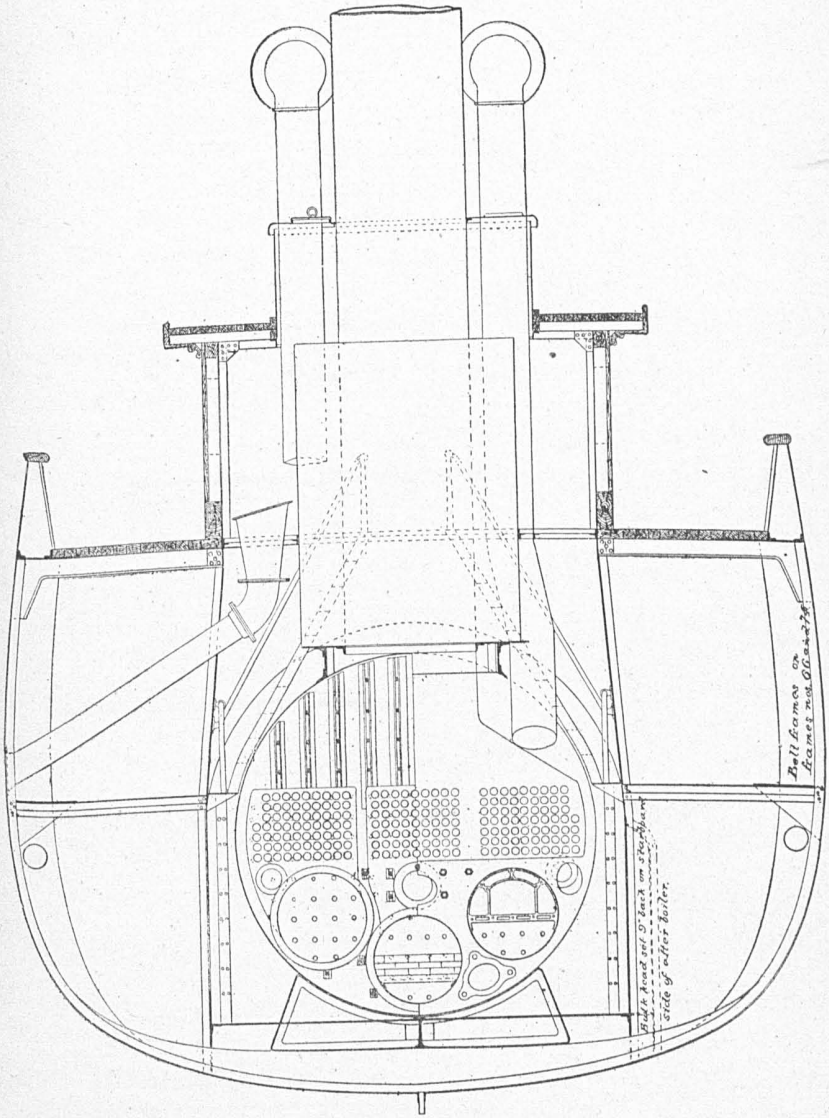


Fig. 2.

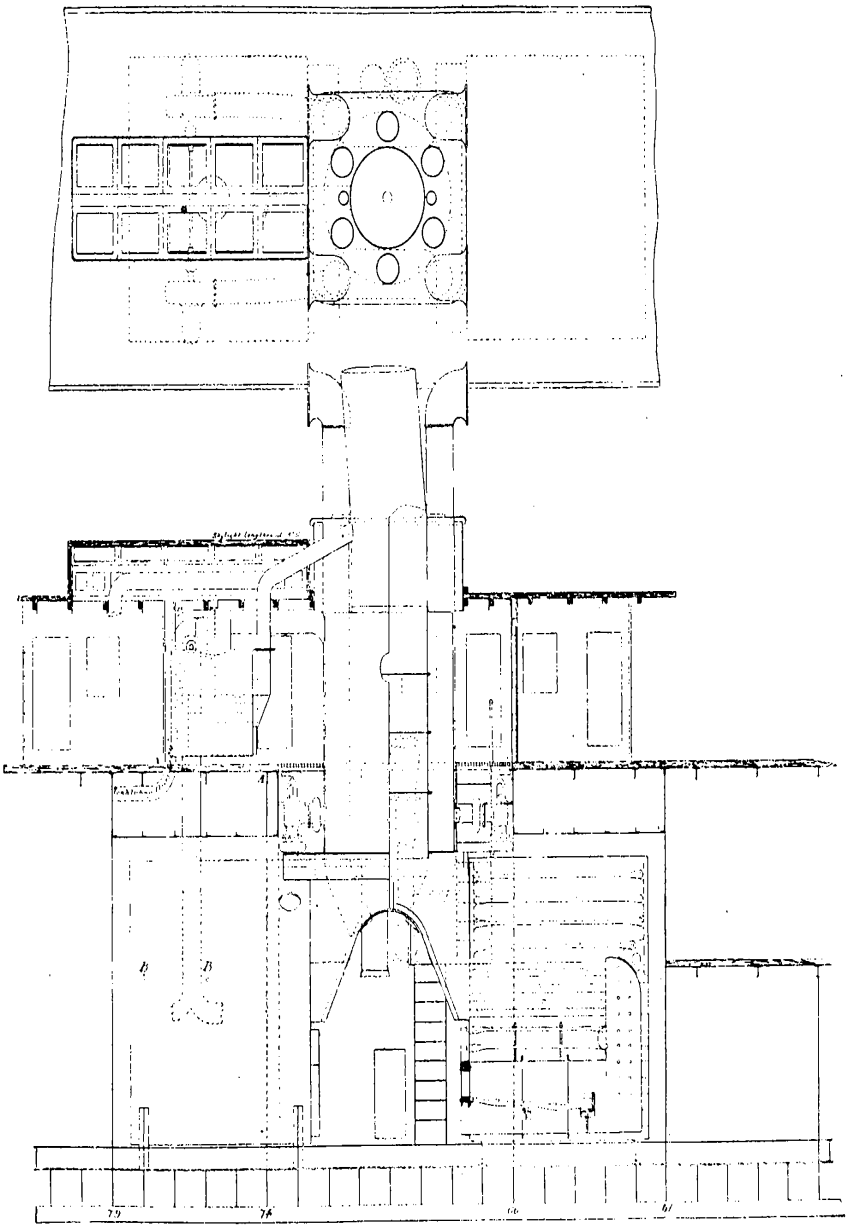


BAIRD'S

AUTOMATIC STEAM TRAP.



BOILERS FOR THE STEAMER ALBATROSS.



BOILERS FOR THE STEAMER ALBATROSS.

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