

No. 17.—ARCTIC RELIEF EXPEDITIONS.

CRUISES OF THE U. S. S. RODGERS AND U. S. S. ALLIANCE, AND REPORT OF THE JEANNETTE RELIEF BOARD.

CRUISE OF THE RODGERS.

INSTRUCTIONS TO LIEUT. R. M. BERRY.

NAVY DEPARTMENT,
Washington, May 20, 1881.

SIR: You will advise me, at the earliest moment, of the day fixed for your departure; and you will urge to a speedy completion such arrangements as may be necessary for your safe and early start. The balance of your crew leave New York by rail this evening, under Lieutenant Commander Lamberton. You will pursue, as nearly as practicable, the course recommended by the board of which Rear-Admiral John Rodgers was president, for the search you are about to undertake. You will report to the department your progress and the condition of your vessel and command, by every available channel of communication during your voyage, making your reports as full and detailed as practicable. In the pursuit of your adventurous and arduous voyage, you carry with you the sympathy and entire confidence of the department. Nothing that can be done to contribute to your well-being and success shall be omitted. As soon as you are fully ready you will sail. The eyes of your fellow-countrymen, of the scientific men of all the world, and especially of those interested in Arctic explorations, will follow you anxiously on your way through the unknown seas, to which you go. May Heaven guard and bless you and your officers and men, and crown your heroism with success and glory.

Very respectfully, your obedient servant,

WM. H. HUNT,
Secretary of the Navy.

Lieut. ROB'T M. BERRY, U. S. N.,
Commanding U. S. S. Rodgers, San Francisco.

Commodore T. S. Phelps's report of the condition of the Rodgers.

No. 53.]

COMMANDANT'S OFFICE,
Navy-Yard, Mare Island, Cal., June 2, 1881.

SIR: I have the honor to report that the United States steamer Rodgers was commissioned on the 30th ultimo, and in all departments of the yard completed ready for sea on the 1st instant, but owing to the non-arrival of stores, fur-clothing, &c., from the East, is unavoidably delayed. Lieutenant Berry, commanding, will sail immediately upon their receipt.

The Rodgers has been thoroughly strengthened throughout, including heavy hanging knees, diagonal braces, inside breast hooks and partners

for wedging the masts, strengthened where necessary with 3-inch oak planking; furnished with composition ice-crushers, spare rudder, spare propeller, six superior boats, new suit of sails, &c.; running rigging, and a liberal supply of stores in all departments.

The machinery has been thoroughly overhauled and put in complete order; three additional pumps and one distiller have been supplied, together with steam-heaters and pipes fore and aft the ship, and both engines and appliances found entirely satisfactory on their trial under steam.

In addition to the very large amount of stores and pemmican purchased from the "Jeannette Search Expedition appropriation," she has received three years' full Navy rations of nearly every description, and altogether it is estimated there will be on board an ample supply of food for 35 officers and men to last fully five years.

In conclusion, I believe I am safe in saying that in the Rodgers's ability to meet and overcome the dangers and difficulties of ice navigation; in her equipments and outfits; in the quantity, quality, and superior packing of her provisions, she has never been surpassed, or perhaps equaled, by any vessel fitted for the Arctic regions.

I am, sir, very respectfully, your obedient servant,

THOS. S. PHELPS,
Commandant.

Hon. WM. H. HUNT,
Secretary of the Navy, Washington, D. C.

Reports of Lieut. R. M. Berry.

U. S. S. RODGERS,
Navy-Yard, Mare Island, June 2, 1881.

SIR: I have the honor to acknowledge the receipt of your letter of instructions issued May 20, 1881.

Thanking you for the assurance of the confidence reposed in me and for the kindness of your sentiments, I have the honor to report that the Rodgers has been fitted to my entire satisfaction at this yard, the commandant and officers in charge of departments having evinced an interest in fitting her little less than had they been going in her.

All is now in readiness to sail as soon as some of the freight from the East, which has been delayed, arrives. I am anxious to be off at the earliest moment, so as to lose none of the coming season. I will telegraph as soon as all freight has arrived.

I have also to acknowledge the receipt of the department's letter of May 21, 1881, with its inclosures.

Very respectfully, your obedient servant,

R. M. BERRY,
Lieutenant, United States Navy, Commanding U. S. S. Rodgers.

Hon. WM. H. HUNT,
Secretary of the Navy, Washington, D. C.

U. S. S. RODGERS,
Petropaulooski, Kamtchatka, July 24, 1881.

SIR: I have the honor to inform the department of the arrival of this vessel at this port at 7 p. m. of the 19th instant, thirty-three days from San Francisco, Cal. The health of the officers and crew is excellent.

I found in port the Russian Corvette *Streloch*, which had arrived a few days previously from Vladivostock; her commanding officer, Capt. A. De Livron, informed me that just before sailing, he received a telegram from his government directing him to offer me any service within his power, which he had done by offering the use of his men, and assisting me to obtain information of the natives north of here. He proposes going as far north as Cape Serdze Kamen, and will bring back a mail from there for us. I have succeeded in obtaining twenty-five reindeer suits, and have taken on board forty-four dogs and a native from here as driver. I could obtain very little dried fish for dog food, as the salmon are not yet dried, but hope to get the remainder farther north.

I shall sail for St. Michael's this a. m.

Very respectfully, your obedient servant,

R. M. BERRY,

Lieutenant, United States Navy, Commanding.

Hon. WM. H. HUNT,

Secretary of the Navy, Washington, D. C.

U. S. S. RODGERS,
St. Lawrence Bay, August 19, 1881.

SIR: I have the honor to report that after leaving St. Michaels we experienced heavy head winds, which, with dense fogs, caused us to be four days in making the run to Plover Bay. The Tchoutchi interpreter and dog driver, whom I sought there, I found had gone to the Arctic in one of the whalers, and a second one, who had been engaged by Captain De Levron of the *Strelock* for the Rodgers, declined going after I arrived, and told me that he was averse to wintering in the Arctic.

Upon my arrival here yesterday morning, I found the *Strelock* in port, and Captain De Levron gave me the following rumor, obtained from the master of the American schooner *R. B. Handy*, which was in here the previous day:

That the Tchoutchis had reported that a vessel had been seen near Cape Serdze Kamen, having a figure head of reindeer horns, with four dead bodies in the fore-castle, and also that the natives on the American side had reported that four men with dogs had been seen to the eastward of Point Barrow, going in the direction of McKenzie's River.

I have given the above report, though it seems to me too undefined and indefinite to place much confidence in either of the statements.

I shall leave here for Herald Island this afternoon via Cape Serdze Kamen. The *Strelock* will accompany me as far as the latter place, and unless the two vessels should be separated by unforeseen circumstances, will bring back a mail for us. Captain De Levron brought from Petropaulovski a bullock with hay enough to keep it for some time, which he presented to this vessel.

We shall take on board here two Tchoutchis as hunters and dog drivers. We leave here with coal enough to steam one hundred days full power, and leave enough for heating purposes this winter, with a good outfit of arctic clothing and five small bullocks, which will permit the issue of fresh meat forty times during the winter without any game.

I inclose a report of Assistant Engineer A. V. Zane, on the condition of the engines and boilers of this vessel.

Two of the officers of the *Strelock* made application to join this ves-

sel as interpreters, or in any capacity in which they should be thought of service.

The officers and crew are well and in good spirits.

Respectfully, your obedient servant,

R. M. BERRY,

Lieutenant, United States Navy, Commanding.

Hon. WM. H. HUNT,

Secretary of the Navy, Washington, D. C.

U. S. S. RODGERS,

St. Lawrence Bay, Siberia, August 19, 1881.

SIR: In obedience to your order, I hereby make the following report as to the kind and condition of the machinery and boilers of this vessel:

The engine is of the single, inverted cylinder, direct-acting, condensing type, fitted with an independent cut-off, momentarily adjustable. The diameter of the cylinder is 22 inches, and the stroke, in length, is the same. There are a jet condenser, a double-acting air-pump, and a single-acting feed-pump; these pumps receive motion from the main engine. The propeller is two-bladed, true screw, of 8½ feet diameter and 10 feet pitch; it is very narrow, so that when standing vertically between the stern post and the rudder post, it will be in a great measure protected from the ice. The thrust-bearing is of the disk variety, and the propeller is retained in its vertical position behind the stern post by clamping the disks of the thrust-bearing by means of set screws. There is no apparatus for disconnecting the propeller shaft from the crank shaft.

The boiler is of the flue and return tubular kind; has two furnaces, each 4 feet 6 inches in depth, and 3 feet in width; there are two flues to each furnace, one 16 inches in external diameter, and the other 8½ inches. The safety-valve is 5 inches in diameter and is set to blow off at a pressure of 50 pounds per square inch.

There are two auxiliary pumps, one a small Davidson pump, connected with the distiller, and with the boiler as a feed-pump, and with the bilge; the other is a Sewell and Cameron pump, No. 4; it is connected with the boiler and with the bilge; there is a fire-hose coupling in each pump. The Davidson pump was part of the original outfit of the vessel; the Sewell pump, as also a patent bilge-water ejector, and the distiller, were put in at Mare Island navy-yard.

There is a pair of small inverted-cylinder, direct-acting engines forward on the berth deck, connected, through gearing, with the windlass; these receive steam from a small auxiliary boiler of the locomotive kind; they can also be driven from the main boiler. The ship is heated by steam and the heaters may receive steam from either the main or auxiliary boiler.

The engines, boilers, and pumps, and all the appendages thereto are excellent of their kind, and are in good condition.

Very respectfully,

A. V. ZANE,

Assistant Engineer, U. S. Navy.

Lieut. R. M. BERRY, U. S. N.,

Commanding U. S. S. Rodgers.

U. S. S. RODGERS,
Off Herald Island, September 14, 1881.

SIR: I have the honor to report that the U. S. S. Rodgers sailed from St. Lawrence Bay at 10.20 p. m. August 19, and the next morning entered the Arctic Ocean in company with the Russian Corvette Strelock, but was separated from her by a fresh westerly wind followed by thick weather.

Touched at Serdze Kamen August 21, and sent a boat on shore to inquire about a reported wreck, but could get but little information, experiencing great difficulty in communicating with the natives. From them we learned that the United States revenue cutter Corwin had visited that point and sent a search party on shore near Kolientchin Island.

I sailed the same evening for Herald Island, and August 23 at 7 p. m. sighted Cape Hawaii, Wrangel Island, bearing W. N. W. distant about 12 miles with the ice extending about 10 miles off the shore. At 8 a. m. the next morning both Wrangel Island and Herald Island were in plain sight, and we arrived off the latter at noon of the same day.

A boat was sent on shore in charge of Master H. S. Waring to search for tidings of the Jeannette and missing whalers, and an examination of the western extremity of the island was made and the remainder scanned from the summit of the highest land with glasses, without discovering any tracings.

The wind having shifted from N. W. to S. W. the surf on the beach increased to such an extent that it became necessary for the boat to leave shore without having finished the examination. After the return of the boat to the ship we steamed along the southern shore of the island without discovering any cairn and then headed for Cape Hawaii.

August 25, at 10 a. m., sighted Cape Hawaii and shortly after made the ice along the starboard beam, seemingly densely packed; skirted it, and at 4 p. m. sighted a lead from the masthead and followed it in. Progress was at first very slow, but soon we had the satisfaction of finding the ice more open, and at 10 p. m., having passed through about 10 miles of ice, we dropped anchor about one-half mile from shore in 6 fathoms of water. Sent a boat on shore the next morning to examine a lagoon, which was seen by a party that landed as soon as the ship was anchored, and found at its mouth an excellent small harbor, a rough draft of which is inclosed.

The vessel was moved into the harbor and preparations commenced for three search parties to explore the island for traces of the missing parties.

The parties got off August 27 between 3 and 4 p. m. Master H. S. Waring, with a whaleboat and crew, was ordered to explore the coast, passing to the northward of the island, and was accompanied by Assistant Surgeon J. D. Costille. At the point marked on the chart of the island inclosed he found a cairn, left by Capt. C. L. Hooper, U. S. R. M., the contents of which I inclose. A copy was left in the cairn. Great difficulty was experienced in working the boat through the ice, and on August 30, having entered a shallow bay, a northerly wind sent the pack down and imprisoned the boat there. After waiting three days, without any prospect of getting out, he returned overland with his party to the ship, leaving the boat and her equipments. The place where the boat is left will be found on the chart.

Ensign H. J. Hunt was ordered to explore the coast, passing by southward of the island in a whaleboat, and was accompanied by Passed-Asstistant Engineer A. V. Zane. He skirted the coast to the southward,

the westward, and to the northward as far as the position marked on the inclosed chart. Finding it impossible to proceed farther, on account of the ice, without delay of uncertain duration, and being instructed not to remain beyond the 10th of this month, he returned to the ship, passing again to the southward.

The third party I took charge of, and was accompanied by Surgeon M. D. Jones and four men. After having penetrated 20 miles in a N. W. by N. direction in the interior, I ascended a mountain which, by barometric measurement, was 2,500 feet high, and could see from its summit the sea in all directions, except between S. S. W by W. per compass. The day was very clear, and no land except Herald Island was visible from this height. There was no ice in sight to the southward. A strip seemingly 10 miles wide to the westward, with open water between it and the shore, densely packed ice to the northward, in which no openings could be seen, but open water between it and the shore and narrow streaks of ice to the eastward.

It will be seen from the chart that the whole coast line, with the exception of a few miles of outlying sandspits, has been examined, and I believe it impossible that any of the missing parties ever landed here.

I found among the drift-wood, about six miles west of the ship when in harbor, the slings of a topsail yard, about 12 feet long and 11 inches in diameter, which looked as if it had been in the water about two years, and I should judge that it had belonged, from its appearance, to a merchant vessel.

We sailed from Rodgers Harbor, Wrangel Land, yesterday morning at 9.20, and last evening at 5.30 visited the bay where the whaleboat was left, but were unable to penetrate but a short distance, owing to grounded ice and shoal water.

I shall finish the examination of Herald Island, and then proceed to the northward as far as possible in search of some other land where the Jeannette or missing whalers may have touched. I shall try and communicate again with the whalers to inform the department of my plans for the winter. All well on board.

Respectfully, your obedient servant,

R. M. BERRY,

Lieutenant, United States Navy, Commanding.

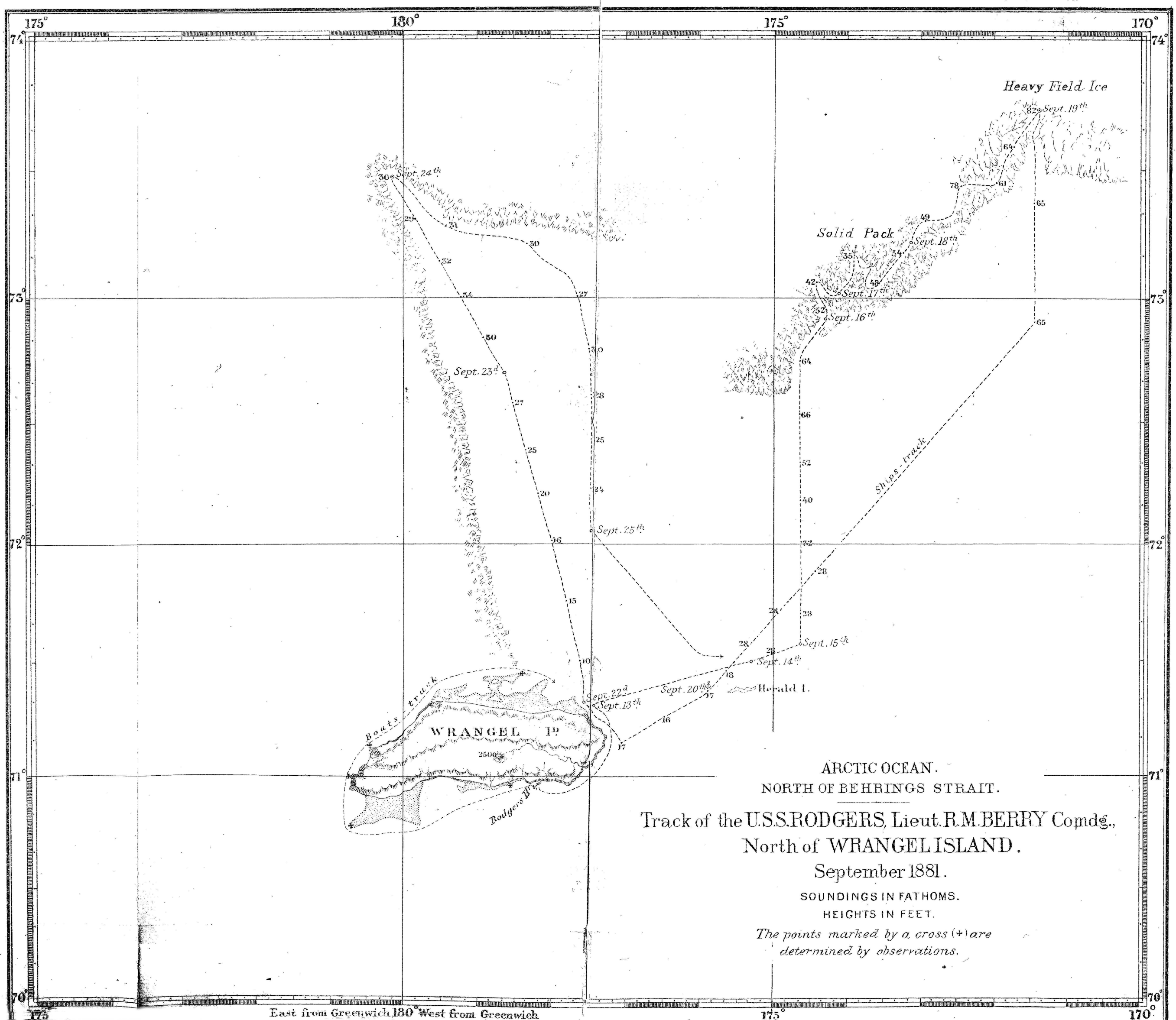
Hon. WM. H. HUNT,

Secretary of the Navy.

U. S. S. RODGERS,

Latitude 71° 55' N., longitude 175° 10' W., September 27, 1881.

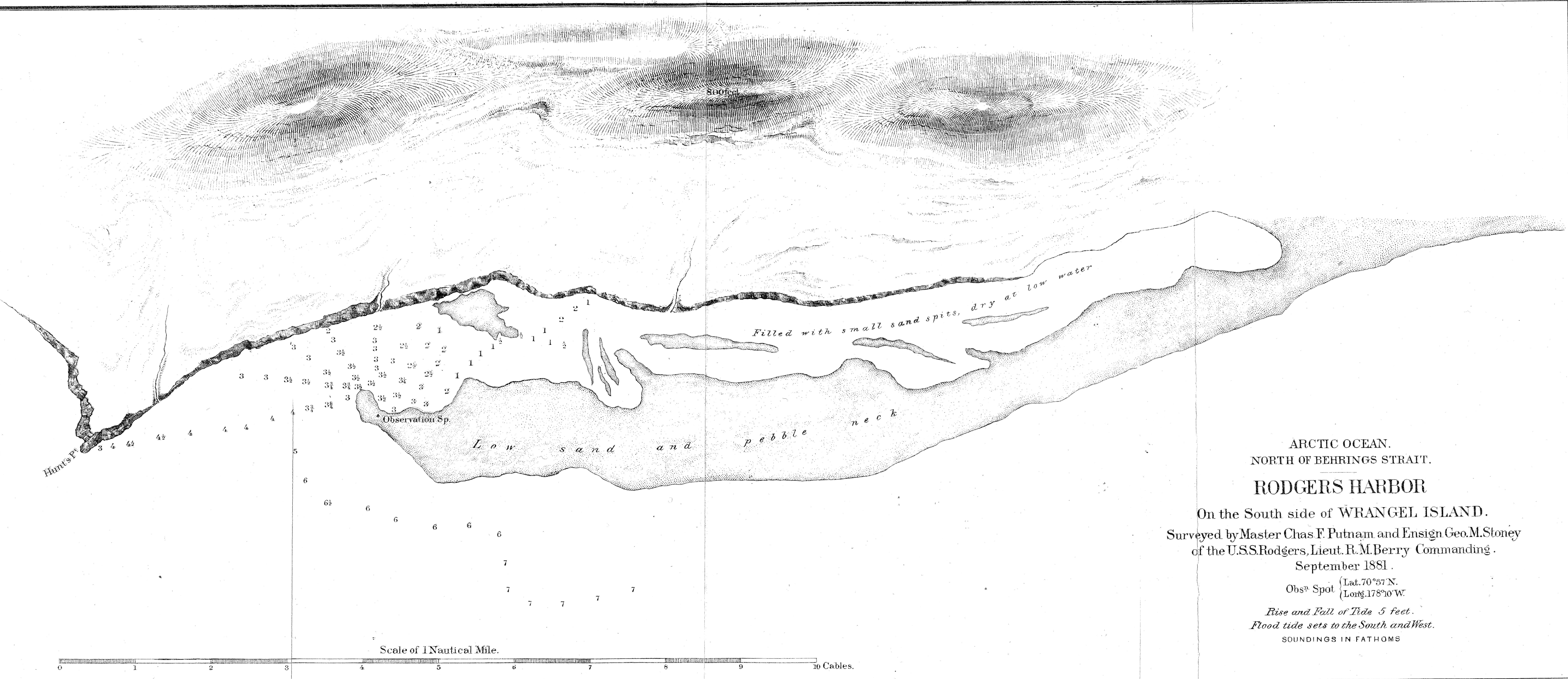
SIR: I have the honor to report that after putting my letter of the 14th instant aboard the whale bark Coral I sent a boat on the following morning, with Master H. S. Waring in charge, to examine the remainder of Herald Island. After pulling around the eastern end of the island he returned to the ship and reported that he could effect no landing, and the ship was headed due north. At 3.50 a. m. of the 16th ran into loose ice, and at 4 came up to a dense pack, the weather being thick and snowing. At 8.30, the weather having cleared somewhat, the ship was headed to the westward, and soon after discovering an apparent lead to the northwest it was followed, but soon ended in a dense, impenetrable pack, with smooth, unbroken field-ice beyond as far as the eye could reach. Upon returning out of the pocket the ice to the westward was seen to trend so much to the southward that I thought best to turn to the eastward, and skirting the pack came to a lead the next morning,



ARCTIC OCEAN.
 NORTH OF BEHRING'S STRAIT.
 Track of the U.S.S. RODGERS, Lieut. R.M. BERRY Comdg.,
 North of WRANGEL ISLAND.
 September 1881.

SOUNDINGS IN FATHOMS.
 HEIGHTS IN FEET.

The points marked by a cross (+) are determined by observations.

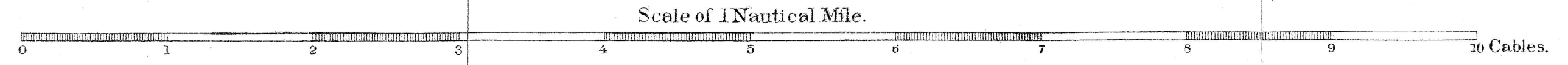


ARCTIC OCEAN.
 NORTH OF BEHRINGS STRAIT.
RODGERS HARBOR

On the South side of WRANGEL ISLAND.
 Surveyed by Master Chas F. Putnam and Ensign Geo. M. Stoney
 of the U.S.S. Rodgers, Lieut. R. M. Berry Commanding.
 September 1881.

Obsⁿ Spot (Lat. 70°57' N.
 Long. 178°10' W.)

Rise and Fall of Tide 5 feet.
 Flood tide sets to the South and West.
 SOUNDINGS IN FATHOMS



Drawn at the U.S. Hydrographic Office.

ARCTIC OCEAN.
NORTH OF BEHRINGS STRAIT.
WRANGEL ISLAND

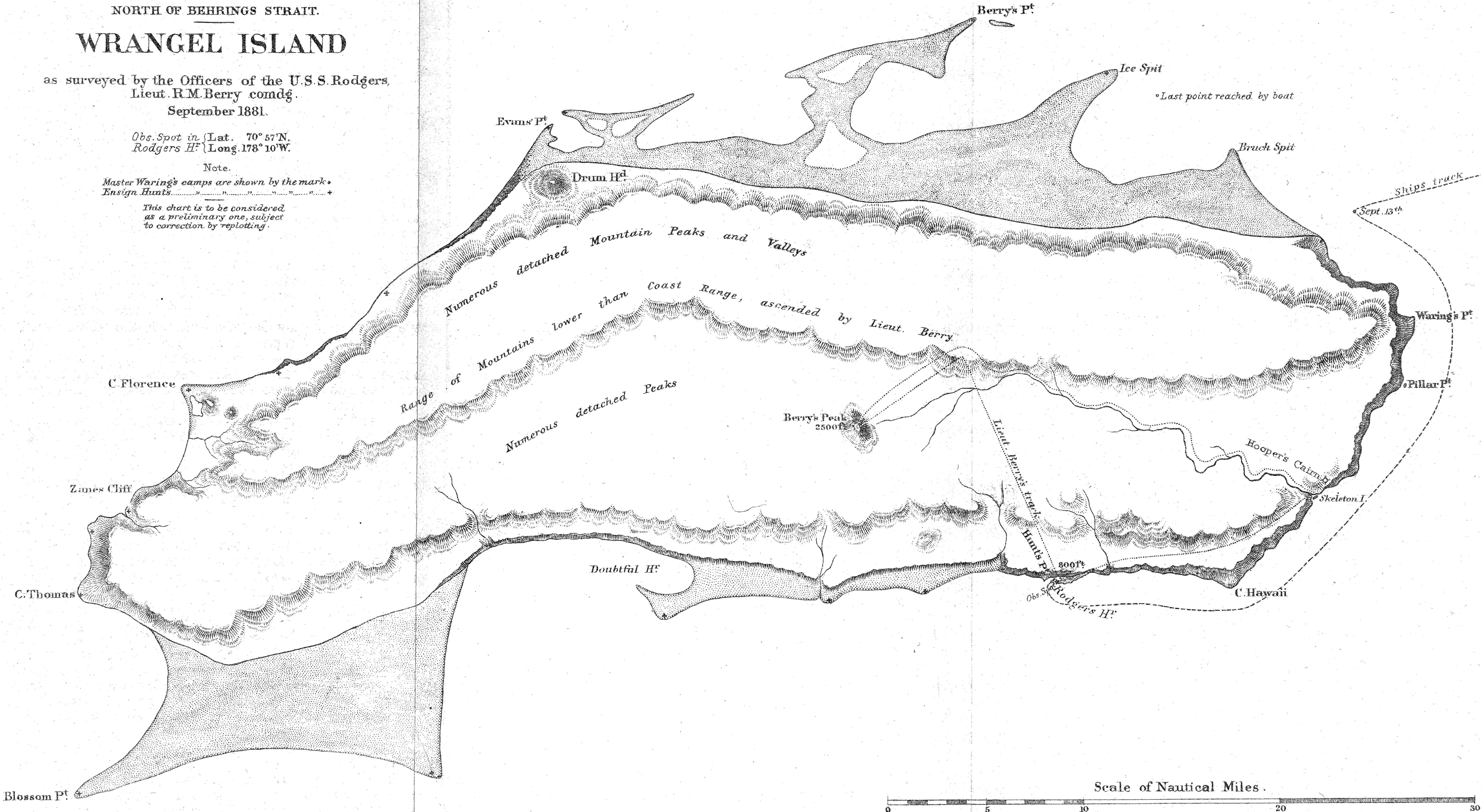
as surveyed by the Officers of the U.S.S. Rodgers,
Lieut. R.M. Berry comdg.
September 1881.

Obs. Spot in (Lat. 70° 57' N.
Rodgers H^t Long. 178° 10' W.)

Note.

Master Waring's camps are shown by the mark *
Ensign Hunt's

This chart is to be considered
as a preliminary one, subject
to correction by replotting.



which we followed, forcing our way through small ice and floe-pieces until 5 p. m., when we came up to the pack, so dense as to discover neither leads nor open patches of water ahead.

After working from daylight until dark we had only penetrated 15 miles. It was now too dark to see our way, and the ship was secured to a floe for the night. The temperature fell to 8° below freezing, and young ice from 1 to 3 inches was formed around the ship, cementing the floes together. At 3 a. m. the ship was cast loose from the floe and headed for a lead about 100 yards distant, which was reached after steaming full power for an hour and fifteen minutes through the ice that had closed around us after securing the vessel.

Having followed the lead to open water, we again skirted the pack to the eastward and entered a third lead, which we followed to its end, meeting again the ice in serried masses.

Having now reached latitude $73^{\circ} 44'$ north, longitude $171^{\circ} 48'$ west, without discovering any indications of land with a bright lookout kept at the crew's nest, but, on the contrary, from soundings, that the water invariably deepened as we proceeded north, and finding also that the main pack from this point trended well to the southward of east, I thought it best to return to the northeast point of Wrangel Island, and proceed from here in a northerly and westerly direction in hopes of finding the high land north of Wrangel Island reported "as situated in 178° west longitude and extending as far north of 73° north latitude as the eye could reach" by Captain Smith of the whale bark *New Bedford*.

We found that a part of the ice had drifted out of the bay where one of the exploring boats was deserted, and we picked the boat up, then headed to the northward and westward, having ice in sight along our port beam as far as we went. We crossed the one hundred and seventy-eighth meridian and reached a position the latitude of which is $73^{\circ} 28'$ north and the longitude $179^{\circ} 52'$ east, then recrossed the one hundred and seventy-eighth meridian in 73° north without sighting land, with the horizon throughout and the sky to the northward clear.

Except where we attempted to follow the leads referred to above, I have found the northern ice of such a nature that it would not be possible to pass its outer edge, consisting in places of heavy pack and in others of unbroken fields of miles in extent.

The field-ice was from 2 to 3 feet out of water. Believing that it would be useless to try and proceed farther in that direction this season, and that by an attempt to do so the vessel would be in danger of being caught in the pack and have to winter there without an adequate prospect of accomplishing anything, for it is difficult to conjecture in what direction the *Jeannette* drifted after she was once fast in the pack, being at the mercy of winds and currents, I propose next to proceed from here to the coast of Siberia and follow it to the westward, looking there for tidings of the missing vessels and for a suitable harbor to winter in from which to send out sledge parties and be in a position to succor any one who might reach that coast. Failing to find a suitable harbor, I will leave a party with dogs, sledges, and provisions for one year to make the search, and will winter the vessel in St. Lawrence Bay and send parties from there also.

In the spring I will proceed to Plover Bay, fill up with coal, and continue the search.

Since Wrangel Land has proved to be an island of so small an extent, with no other land near it, I deem it useless to winter there, as recommended by the *Jeannette* Relief Board under the false supposition that it extended far to the northward.

In my letter of the 19th ultimo from St. Lawrence Bay I referred to a report of men with dogs having gone to the eastward from Point Barrow, which report I am assured by the whalers is wholly without foundation.

The other report that a vessel drifted on the coast of Siberia west of Kolintchin Bay last November they believe to be true, and from the description given of her by the natives that she was the Vigilant. They described her as having deer's horns on the flying-jibboom, with her masts cut away and hanging over the side and dead bodies within her.

After some of the natives had visited her and gone for more to take from her what they wanted she drifted off the coast again. They also state that some small articles obtained from these natives, and now in possession of Captain Hooper, were recognized as belonging to the Vigilant.

We still have 250 tons of coal on board; the vessel, in every respect, is in good condition, and the crew and officers all well.

Very respectfully,

R. M. BERRY,

Lieutenant United States Navy, Commanding.

Hon. WILLIAM H. HUNT,

Secretary of the Navy.

UNITED STATES REVENUE MARINE,

REVENUE CUTTER CORWIN,

August 12, 1881.

Landed here this date, having previously landed at Herald Island. A "cairn," with information inclosed, may be found on the N.E. summit of the island. The finder is requested to send the contents of this bottle to the New York Herald.

J. C. ROSSE.

UNITED STATES REVENUE MARINE, U. S. S. CORWIN,

Wrangel's Land, August 12, 1881.

The U. S. S. Corwin, Capt. C. L. Hooper commanding, visited this land, in search of tidings from the United States exploring steamer Jeannette. A cask of provisions will be found on the second cliff to the northward. All well on board.

U. S. S. RODGERS,

St. Lawrence Bay, October 16, 1881.

SIR: I have the honor to report that this vessel arrived at this port from the Arctic Ocean yesterday morning at 8 a. m.

After sending my report of 27th of September by the steam whaler Belvedere, I proceeded to Herald Island and finished its examination without finding any traces of the Jeannette or missing whalers. A cairn was found on the N. E. summit left by Dr. Rosse, of the United States revenue cutter Corwin, containing simply the information that he landed there in July last and that all were well.

I next proceeded to the coast of Siberia in search of winter quarters, sighting it just east of Cape Jakan, a strong north wind blowing at the time, and a heavy sea running so that it was not possible to send a boat on shore. I coasted to the eastward, examining the shore from the ship; but towards evening the wind freshened, and falling snow shut out the shore altogether. I stood off from shore and laid to for forty-

eight hours, without any improvement in the weather, when I gave up the attempt to examine the shore at that place and headed for an island situated about 20 miles west of Cape Serdze, where I succeeded in putting up a house, and left Master C. F. Putnam in command of a party consisting of Assistant Surgeon M. D. Jones, Pay Clerk W. H. Gilder, Orloff Petersen, captain of top, Frank Melvis, captain of top, and Constantine Taternoff. I inclose a copy of the orders furnished Mr. Putnam.

The party was fully supplied with arctic clothing, provisions for one year, besides a large quantity of pemmican, for men and dogs, fuel, sledges, and a boat.

I left there on the 8th instant for this place, and experienced stormy and thick weather throughout the passage, with a violent gale from the westward on the 13th and 14th instant.

I shall now proceed to put the ship in winter quarters here, and render all as comfortable as possible. Our provisions have all proved to be of excellent quality, and we are in every respect well provided for the winter.

As soon as the ice opens next summer, I shall proceed first to Plover Bay and fill up with coal, then to St. Michael's for mail before returning to the Arctic to continue the search.

All well on board. I send this by the whale bark Progress, Captain Barker.

Respectfully, your obedient servant,

R. M. BERRY,

Lieutenant, United States Navy, Commanding.

Hon. WM. H. HUNT,
Secretary of the Navy.

U. S. S. RODGERS, *October 8, 1881.*

SIR: You will take command of the party left on the island of this place, and you will be supplied with provisions for one year, with dogs and sleds for exploring the coast to the westward in search of the Jeanette's crew and the survivors of the Mount Wollaston and Vigilant. In case any of them should reach the Siberian coast you will afford them all practicable relief and assistance. Later in the season, when the snow has fallen and traveling is possible, I will join you here, unless prevented by some unforeseen circumstances. In case I do not, I will come in the ship for you as soon as the ice will permit next summer. During your stay here you will make such observations on the currents, tide, winds, weather, movement of the ice, and any others you may think important without interfering with the main object of your party. You will erect cairns at intervals, giving directions for reaching the depot, and try and interest the natives by offering reward, &c., in case they assist any of the parties in reaching the coast. Upon reaching the ship you will furnish me with a detailed account of the work done by your party and a tracing of the coast explored. Passed Assistant Surgeon M. D. Jones will be assigned to your party to advise you upon hygiene; Pay Clerk W. H. Gilder as an assistant; Frank Melvis, captain of top; Orloff Petersen, captain of top, and Constantine Taternoff have been assigned to your party, the last as a dog-driver.

Very respectfully,

R. M. BERRY,

Lieutenant, United States Navy, Commanding.

C. F. PUTNAM,
Master, United States Navy.

NAVY DEPARTMENT,
Washington, D. C., May 27, 1881.

SIR: You will prepare your ship with all dispatch to proceed on a cruise in search of the Jeannette, between Greenland, Iceland, and the coast of Norway, and as far as the northern coast of Spitzbergen, if it is possible to get there without endangering your vessel.

You will proceed at least as far north as 77° latitude, and as far as $77^{\circ} 45'$, if it is possible to get there without danger from ice.

Before sailing, the bow of your ship will be sheathed with live oak, 2 inches thick, extending from the stern 35 feet aft, with a strong iron guard on the stern to protect the vessel against drift ice.

You will take on board an extra supply of provisions, in case you should fall in with the Jeannette.

You will make requisition for some warm winter-service clothing, in case your crew should require it.

The inclosed itinerary will be for your guidance after you sail.

The department will take care that you are supplied with all the charts and sailing directions necessary for navigating the northern seas.

It is possible, if you arrive at the southern extremity of Spitzbergen in August, you will find the sea clear of ice, but do not attempt to break through any large fields of floating ice. In sailing towards Spitzbergen, *early in the season*, there is sometimes great difficulty in forcing a vessel through at Bear or Cherry Island. The breadth of this ice field is seldom great, and north of it the open sea extends clear of ice as far as latitude 80° . Farther north it is impossible to penetrate the compact ice fields. North of Spitzbergen the ice fields are so closely packed that even a boat cannot force its way through. This ice field is prevented by the gulf-stream from drifting any considerable distance southward, but the heat of summer and crushing of the ice by the sea diminish it somewhat towards autumn, at which time the southern boundary of the field moves, after long southerly winds, considerably to the north.

At some period of almost every year vessels can sail along the northern coast of Spitzbergen, and in September or October it may happen that from the northern coast an open sea extends as far north as the eye can reach.

Although a ship can sail around the northern shore of Spitzbergen almost every year, yet the east coast is nearly always blocked up with ice; and the east coast of Northeast Island offers special obstacles to the circumnavigation of the whole islands.

The bays of Spitzbergen are generally clear of ice during the summer. Wybe-Jans Water and the south part of Henlopen Strait have, however, been so closed up with ice for several years as to prevent the walrus hunters from entering. These are general condition of affairs in that region; but, of course, greatly modified by the seasons, which are precarious.

You will try to obtain a pilot at St. John's, Newfoundland, who is familiar with the coast of Iceland.

On your arrival at any port in Iceland, try and obtain a pilot who is familiar with the coast of Norway. At Hammerfest, in Norway, obtain a pilot, if possible, who is familiar with the coast of Spitzbergen; and on your arrival off the coast of Spitzbergen, try and obtain from the walrus and seal hunters some one who can pilot you along that coast and into the best harbor. If the Jeannette should possibly get through from the direction anticipated, she would probably sight Spitzbergen, and make for the coast of Norway; you will, therefore, cruise backward

and forward between Greenland and Spitzbergen, under sail as much as possible to save your coal.

Remember, your ship is not fitted for Arctic explorations, but is sent only as a relief ship.

You will not remain longer than the 25th of September in the region where you are directed to cruise, and if the ice-pack commences to form south of you, you will leave sooner than that.

On your return you will land your pilots at the nearest point to their homes, paying their expenses to such places as it would be inconvenient for you to visit, and stopping at such places as may be most convenient to procure supplies of coal and provisions.

The foregoing directions are given you as a general guide, but a great deal must be left to your discretion, with the exception of the time when you are directed to return home.

While on this duty you should make such observations as opportunity will permit for the benefit of navigators and in aid of science. A list of observations to be made and instruments to be used will be sent to you before sailing, together with any other particulars which, in the judgment of the department, will be of service to you on the voyage.

Respectfully, yours,

WILLIAM H. HUNT,
Secretary of the Navy.

Commander PHILIP H. COOPER,
Commanding U. S. S. Alliance, Norfolk, Va.

[NOTE.—Commander Cooper was detached on account of ill-health, and Commander Wadleigh ordered to succeed him.]

ITINERARY.

	Miles.	Days.
New York to St. John's, N. F.	960	6
Stay in St. John's		3
St. John's to Iceland	1,400	14
Stay in Iceland		5
Iceland to Hammerfest	1,000	8
Stay in Hammerfest		3
Hammerfest to Bear Island	250	3
Bear Island to Spitzbergen (5th pt.)	150	2
About Spitzbergen and to latitude 77°, longitude 0°	400	7
Latitude 77°, longitude 0°, to Cape Brewster	500	3
Cape Brewster to Iceland	425	3
Stay in Iceland		5
Iceland to Halifax	1,750	14
Stay in Halifax		3
Halifax to New York	480	4
		83

CRUISE OF THE ALLIANCE.

INSTRUCTIONS TO COMMANDER GEORGE H. WADLEIGH.

NAVY DEPARTMENT,
Washington, D. C., June 14, 1881.

SIR: As you are going into a high northern latitude, you will have an opportunity to make observations of an important character which will be useful to future navigators and interesting to the scientific world.

The department has, therefore, prepared the following list of obser-

vations which you will make, provided they do not interfere with the main object of your cruise.

First, you well ascertain the limits of the pack-ice extending between Greenland and Spitzbergen, and on your return to the United States present for the use of the Hydrographic Office a chart containing all the information under this head you can obtain, with a drawing of such field-ice, icebergs, &c., as you may encounter, with the track of your vessel laid down.

The temperature of the surface of the sea, and 5 fathoms beneath the surface should, be recorded at short intervals, especially when your vessel is under steam, and the usual barometrical and thermometrical observations should be taken with the greatest care.

It is desirable, if possible, to establish a bench-mark in some known and accessible locality in Spitzbergen, as proposed by the International Arctic Commission for hypsometrical and tidal observations, the height of this mark above mean tide to be determined as nearly as possible.

While your vessel remains in port these observations should be made with the greatest care, and the bench-mark so accurately described that vessels visiting the station in the future would have no difficulty in identifying it.

Where the vessel is quiet at sea for any length of time, the deep-sea thermometer might be advantageously used, especially in the vicinity of the ice-pack.

Drag-nets should be used to obtain specimens from the surface of the sea, which specimens are easily preserved in alcohol. In moderate deep water there are many organisms that could be obtained, with deep-sea drag-nets, from the bottom.

For such researches, the northern waters offer a fine field, as few of the organisms of that region are found in American collections. Consequently, even if not new to science, any inhabitants of the waters, properly preserved, would be exceedingly welcome to our national collections.

Full descriptions should be preserved of all aurora, and particulars notice taken of any crackling noise which may accompany them.

The different degrees of phosphorescence in the water should be constantly noted.

The specific gravity of the water, say at the depth of 10 fathoms, should be frequently noted.

Collections of fauna, flora, &c., should be made at every convenient landing in Iceland, Greenland, and Spitzbergen.

The above observations, although simple, are highly important to the scientific men of our country and the world, who frequently deduce great results from very small material. Our naval officers should, therefore, do everything in their power to aid the cause of science and the progress of useful knowledge.

Very respectfully,

WILLIAM H. HUNT,
Secretary of the Navy.

Commander GEORGE H. WADLEIGH,
Commanding U. S. S. Alliance, Norfolk, Va.

Reports of Commander G. H. Wadleigh.

U. S. S. ALLIANCE, 3d rate,
St. John's, Newfoundland, June 26, 1881.

SIR: I have the honor to report the arrival of the Alliance, under my command, in this port June 24, after a passage of eight days from Hampton Roads, most of which was made under steam on account of light and variable winds; sails were used to assist the engines whenever practicable.

I have secured a supply of anthracite coal, and shall take about sixty tons on deck in order to have enough to carry the ship to Hammerfest, if anything should prevent me from getting coal in Iceland.

I have not been able to obtain a pilot for Iceland; the communication between here and that country is exceedingly limited, and nothing is known here in regard to that coast.

The engines require slight repairs, which will be made by our own force as far as possible; and, should nothing prevent, I shall sail from here on the 29th instant.

No other ships of war and but two American fishing schooners in this port.

Very respectfully,

G. H. WADLEIGH,

Commander, U. S. Navy, Commanding U. S. S. Alliance.

Hon. WM. H. HUNT,
Secretary of the Navy.

U. S. S. ALLIANCE (3d rate),
Reykjavik, Iceland, July 12, 1881.

SIR: I have the honor to report the arrival of the U. S. S. Alliance, under my command, at this port, on the 9th instant, at 10 p. m.

The day after leaving St. Johns we encountered a gale from the southeast, with a heavy sea, which stove in a bow port and broke one of the lower booms; the gale lasted twenty-four hours, after which, with the exception of two days' fresh southwest wind, we had light variable airs during the passage. No indications of ice were seen, though a southwest current was felt within two days' sail of this port.

We have been very kindly received by Governor Finssen. The parliament of Iceland being now in session, he has made many inquiries of the members in regard to the currents, driftwood, &c., setting on the coasts. I shall endeavor to send, through the members, a description of the Jeannette, printed in Icelandic, to the districts of the island they represent, with the offer of a reward for any reliable information in regard to that ship.

The French corvette Dupleix, 10 guns, Capt. Dunas Vence, is in port. She has been around the island surveying for about a month, and will continue her work through the summer. Captain Vence has politely placed at my disposition the result of his surveys.

A Danish ship of war left a few days before our arrival to look after the fisheries of the north coast. I am informed that coast is now clear of ice, which was very heavy there in the spring, and is so now 30 miles off the coast.

Two firms are engaged in the coal business here, and from one of

them I shall take about seventy tons and arrange to have a supply here for the ship about the last of September; prices moderate.

I propose leaving here about the 15th instant, and shall stop at Seidis Fiord, on the east coast of the island, where I hope to find a man acquainted with the northwest coast of Norway, as that part of Iceland is frequented by Norwegian fishermen.

The health of the ship's company continues excellent.

Very respectfully,

G. H. WADLEIGH,
Commander, Commanding.

Hon. WILLIAM H. HUNT,
Secretary of the Navy.

U. S. S. ALLIANCE (3d rate),
Hammerfest, Norway, July 26, 1881.

SIR: I have the honor to report the arrival of the Alliance at this port, on the 24th instant, nine days from Reykiavik.

The day before we sailed Governor Finssen visited the ship and was received with the proper honors. The governor has directed the mayors of the different districts of Iceland to report to him everything in the shape of driftwood, &c., which may be discovered on the northern coasts of the island, and also forwarded to them copies of the description of the Jeannette, and has in every way manifested the greatest interest and good will in the object of this cruise, which has been suitably acknowledged.

Supplies to a limited extent may be had in Reykiavik, except in the early spring, when they have been exhausted by the winter, and others have not arrived from England. There are two mails a month from Leith, Scotland, during the summer, and one a month the rest of the year, except in January and February. I was informed that lumber was much needed, as all the lumber in Iceland comes from Norway, and is of poor quality, and that two or three ship loads of good quality would meet with a ready sale.

The usual observations for deviation of the compass were made in Faxe Bay, just outside of the harbor of Reykiavik, showing a large increase of easterly deviation.

From Reykiavik we went to Seidis Fiord, by way of the south coast, passing to the north of the Vestmaunaeyar Islands, meeting on the way a number of French vessels engaged in the cod fishery, to one of which we rendered medical assistance. Arrived off Seidis Fiord July 17, and communicated with a Norwegian fishing vessel, but finding from the master that all the Norwegian vessels on that coast were from the south of Norway, and the weather being foggy, I did not consider it advisable to go to the head of the fiord (about 20 miles), but left for this port.

On the south coast of Iceland had fresh westerly winds, but after passing the southeast point of the island had northeast winds and a cold southerly current. From Seidis Fiord to longitude 8°, east, calms and light variable airs; from there, strong northeast winds and short rough sea to this port.

I have been cordially received by Governor Blackstat, of this province, who returned my call in person, and has offered to do everything in his power in circulating a description of the Jeannette among the fishing vessels of this province.

I have obtained such supplies as were needed, and also a pilot for Spitzbergen, though it is too late in the season to get the best men.

I have had a description of the *Jeannette* printed in Norwegian for distribution among the walrus hunters we may meet.

The ice is reported very heavy to the northward, and several of the vessels that left for Spitzbergen have returned, reporting that they were unable to get through; but by proceeding more to the westward, probably less difficulty will be experienced, as the majority of the vessels that have left here are still absent.

No ships of war or American shipping in port. Mail communication with Christiania twice a week.

I expect to leave here on Thursday, the 28th instant, weather permitting, for Bear Island and Spitzbergen. The health of the ship's company is good.

Very respectfully,

G. H. WADLEIGH,
Commander, U. S. Navy, Commanding U. S. S. Alliance.

U. S. S. ALLIANCE (3d rate),
Green Harbor, Spitzbergen, August 24, 1881.

SIR: I have the honor to report the arrival of the *Alliance* in this harbor to-day. We left Hammerfest July 29; sighted Bear Island on the 31st, but found it surrounded by ice. Thence went to Bel Sound and Green Harbor, and as far as latitude $80^{\circ} 01' N.$, longitude $8^{\circ} 15' E.$, where we found the ice limit; ran to the eastward and were again stopped by the ice, immediately north of Smeerenburg Bay. We then went into south latitude, and while there established a bench-mark, and made such observations as the weather permitted.

After cruising along the edge of the pack ice until August 20, we succeeded in getting to $80^{\circ} 10' N.$, longitude $11^{\circ} 22' E.$, and as far east as longitude $13^{\circ} 15' E.$, latitude $79^{\circ} 58' N.$, about ten miles northwest of Welcome Point, beyond which points the ice was impenetrable.

Thence I came to this harbor, following the ice to latitude $78^{\circ} 57' N.$, longitude $7^{\circ} 15' E.$, hoping to be able to get some coal from the steam-fishing vessel *Forsog*, but she could not spare any, and was ready to sail for Trömsö, which has prevented my making a more extended report.

We have had a succession of calms and light airs which has rendered the use of coal necessary, and I expect to be in Hammerfest to fill up with coal in about ten days, after which I shall again come north to carry out the instructions of the department. The health of the ship's company is good.

Very respectfully,

G. H. WADLEIGH,
Commander, U. S. Navy, Commanding.

Hon. WILLIAM H. HUNT,
Secretary of the Navy, Navy Department, Washington, D. C.

U. S. S. ALLIANCE (3d rate),
Hammerfest, Norway, September 13, 1881.

SIR: I have the honor to report the arrival of the *Alliance* in this port September 11.

As I informed the department in my brief report of August 24, from Green Bay, Ice Fiord, Spitzbergen, forwarded by the fishing steamer *Forsog*, we left here July 29, and after making the usual observations for compass deviation, stood to the northward, and on the 31st sighted

Bear Island, which was so surrounded by ice that it was impossible to get nearer than three miles to the land, although I remained in the vicinity until the afternoon of August 1 to see if the wind would not open a channel. The same day spoke the fishing vessel Haabet, of Aalsund, and learned from the master that he had been around the island for a week, but had been prevented by the ice from getting nearer than three miles.

South Cape was sighted August 2, and on the 3d we steamed into Bel Sound, and found it partially obstructed by ice; therefore, after communicating with fishing vessels, went on to Ice Fiord, and anchored in Green Bay August 4. This is the most frequented harbor of Spitzbergen. We found twenty vessels in and near it, all engaged in cod-fishing. The bay is well protected from all but NE. winds; but, like most of the Spitzbergen harbors, is very deep, and vessels of any size must anchor in from 25 to 30 fathoms of water, and then within a cable's length of the shore. From the steamer Forsog I obtained a pilot for the north coast.

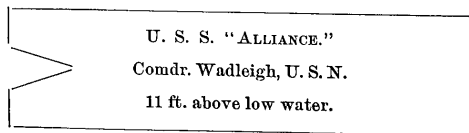
August 5 we left Green Bay and crossed Ice Fiord to Safe Haven, which was found nearly full of ice. Lieutenant Perkins endeavored to find the tide-mark left there by Professor Nordenskold in 1864, but was unsuccessful in his search, probably from the crumbling of the rocks. Lieutenant Perkins left a tide-mark on the SE. side of the same small islet, "just off the east entrance to Saxe Haven," as described by Nordenskold, consisting of a copper plate with the ship's name and date of visit; the spike holding the plate being 9 feet above the sea at low water, 1 p. m. August 5.

Leaving Ice Fiord the same day, we stood to the northward until stopped by the pack ice August 6 in latitude $80^{\circ} 00' 36''$ N., longitude $8^{\circ} 14' 30''$ E. From this position there was no lead in the ice or water. Sky visible from SE. to WSW. Sounded in 282 fathoms, bottom black, clay ooze.

August 7, after swinging ship for compass deviation, which was found to have considerably increased, we ran through drift ice to the eastward until stopped in latitude $79^{\circ} 52'$ N., longitude $11^{\circ} 15'$ E., by the pack ice extending from Vogelsang Island to the westward. We spoke the walrus hunter Eleiser, of Tromsö, and were informed by the master that he had been waiting several days to get to Leipde Bay, but found the ice impenetrable.

I found Smeerenburg Bay and Fair Haven, in one of which harbors I had expected to be able to watch the ice and establish the bench-mark, full of fast ice, therefore went into south latitude and anchored.

There we were detained by thick weather until the 12th, during which time Lieutenant Perkins and Master Schwenk established a bench-mark in the small bight west of Hakluyt's Headland, Amsterdam Island, latitude $79^{\circ} 49'$ N., longitude $11^{\circ} 15'$ E. (from chart). On a boulder in middle of bight was spiked a copper plate marked thus:



The cut in left side of plate being 11 feet above low water. On the cliff, bearing NE. by N. from the plate, there is a natural tablet, in

which a spike was driven, 184 feet above low water, and the cliff was marked with white paint:

⊕ U. S. S. "Alliance," 1881.

The time of high water, full moon, was found to be August 10, 1 hour and 44 minutes a. m.; rise and fall of tide, 4 feet and 11 inches. The dip of the magnetic needle at same place was $80^{\circ} 31' 13''.5$. The variation of the compass on Moff Island, south latitude, was $17^{\circ} 30' 45''$ W., and the dip of magnetic needle, $80^{\circ} 32' 48''$.

While in south latitude we were much bothered by drift ice from Smeerenburg Bay. A fishing vessel anchored near us lost an anchor, and would have been set on shore but for the assistance of a boat's crew from this ship.

With the gig I pulled through south latitude into the bay, and found about six miles of fast ice, which was constantly breaking up and coming through the Gad with the current or strong ebb tide, the flood tide being hardly noticeable. On this account I should think Kobbe or Magdalena Bays to be preferred, though in other respects the anchorage is good, and the land in the vicinity good hunting ground.

August 12, the wind having hauled to the northward, and the fog being much lighter, we again attempted to get to the north coast; but, on passing Hakluyt's Headland, found the ice in nearly the same position as on August 6 and 7, extending from Vogelsang Island to the westward, with about four miles of open water just north of Amsterdam Island. Thick weather coming on, I stood to the westward, and until August 20 we were cruising under sail along the pack ice and between the ice and the land. During the greater part of this time the weather was foggy, with calms and light airs from the southward, accompanied by frequent snow squalls, which kept the ship coated with sleet.

On August 20 the ice appeared more open, and we succeeded in getting to $80^{\circ} 10' N.$, $11^{\circ} 22' E.$, where the ice again brought us up. From there we stood to the eastward until in longitude $13^{\circ} 15' E.$, latitude $79^{\circ} 58' N.$, beyond which point the ice was impenetrable. After following the ice and land as far as Vogelsang Island, we kept along the edge of the ice to the westward and southward to latitude $78^{\circ} 57' N.$, longitude $7^{\circ} 15' E.$, and from there proceeded to Green Bay, Ice Fiord, where I was in hopes to obtain some coal from the steamer Forsog, or from the coal vein near the bay.

The steamer could spare none, however, and I found that without proper tools it was useless to attempt mining; also that the vein was so situated in a bluff about 40 feet high, overhanging the fiord, that without first doing considerable heavy blasting it was dangerous to work it. About two tons was obtained by three hours' work, during which part of the cliff fell near the working party. The coal burned well, with about 25 per cent. of waste.

We left Green Bay August 27, and cruised under sail until September 8, during which time we found very heavy pack ice in latitude $77^{\circ} 2' 52'' N.$, longitude $2^{\circ} 01' 18'' E.$; also had a moderate gale from SW., lasting two days, in which, to avoid the land, I was obliged to stand well to the southward and eastward.

On the 8th instant, being about 300 miles from this port, with calms and light westerly winds, and a small amount of coal, I came here to fill up the bunkers and procure fresh provisions, and shall leave on Friday, the 16th, to return to Spitzbergen to cruise until the 25th, in obedience to the orders of the department, and shall then sail for New

York, by way of Iceland and Halifax. The health of the ship's company continues good.

Very respectfully, *

G. H. WADLEIGH,

Commander, United States Navy, Commanding U. S. S. Alliance.

Hon. WILLIAM H. HUNT,

Secretary of the Navy, Navy Department, Washington, D. C.

U. S. S. ALLIANCE (3d rate),

Reykjavik, Iceland, October 12, 1881.

SIR: I have the honor to report the arrival of the Alliance at this port October 10. We left Hammerfest September 16, and proceeded to Spitzbergen, cruising under sail until the 25th, and getting as far north as 79° 3' 36". In obedience to the department's orders not to remain on my cruising ground later than September 25, on that date I started for this port, following the ice limit as much as the weather permitted, and locating the ice at several points, finding it far to the eastward of the ordinary limit.

The weather since September 20 has been a succession of gales, snow, sleet, and dense fogs, so that I found that, with the limited amount of coal and provisions in the ship, it would be unsafe to attempt to reach Cape Brewster, even if the condition of the ice, which usually extends from 70 to 130 miles from the Greenland coast, would permit of our doing so. In my opinion no ship should attempt to force a passage to the east coast of Greenland without being fitted to pass at least one winter in the ice.

Off the north coast of Iceland we spoke the fishing steamer Nord Cap of Bergen, Norway, and I was able to send my Spitzbergen ice pilot home by her.

I am informed by Governor Finssen, who has been very kind and taken much trouble to obtain information in regard to drift-matter on the coasts of this island, that last June part of the mast of a large vessel, with considerable copper or metal of some sort attached, was left by the ice on the northeast coast, near Haganaes. The governor has given orders to have it carefully examined, and if any marks or means of identification are found, he will send the information to the Danish minister at Washington.

The ship Jamestown, of Boston, loaded with lumber, drifted on shore the 26th of June, north of Cape Reikanes, about 30 miles from here. I transmit herewith all the particulars obtainable in regard to the ship, with translation.

From my own observations and the information I have been able to obtain, the ice this year has been much heavier and farther to the south than usual. The Norwegian walrus hunters, who ordinarily go to Kenlopen straits, and even farther on the north coast of Spitzbergen without much trouble, this year did not get as far north and east as this ship. Wybe Jans water, on the south coast, was full of ice, which extended east from Hope Island nearly to Cape Pettermann, Nova Zembla. Kara sea was also reported full of ice. This southerly position of the ice is accounted for by the last very severe winter and the fact that, during the months of July and August, the usual southerly winds did not prevail and force the ice north.

When in port we have obtained specimens of the bottom with such

means as could be improvised on board ship, and the beaches have been searched for drift-wood, &c. Floral and geological collections have been made by Past Assistant Surgeon Echstein, and several specimens of birds and animals collected by Lieutenant Elliott, U. S. M. C., and Master Schwenk. At sea near the land or ice, a careful watch has been kept for anything that would throw any light on the object of the cruise, and fishing vessels have been communicated with and furnished with a description of the Jeannette.

The ship's position, in a sealed bottle, has been thrown overboard every day, the temperature and specific gravity of the water noted every two hours, and all observations made as carefully as possible with the means at our disposal.

Great interest in the search has been shown by the officers, and generally by the crew, and I think it my duty to ask the attention of the department to the unusual expense to which they have been subjected.

The ship has been particularly fortunate in having the services of Lieut. C. H. West, executive officer, Lieut. C. P. Perkins, navigator, and Chief Engineer Burnap. I take pleasure in commending them to the department for the very efficient manner in which their duties have been performed.

I expect to leave here for Halifax on the 15th. All well on board.

Very respectfully,

G. W. WADLEIGH,

Commander, U. S. Navy, Commanding Alliance.

Hon. WILLIAM H. HUNT,

Secretary of the Navy, Navy Department, Washington, D. C.

[Translation.]

On the 26th June, 1881, a large merchantman stranded on the rocks just outside of Thorshaven (midway between Reykjanes Light and Skagen). Her crew had deserted her, and her size was estimated at 1,200 tons.

In the governmental examination and investigation it was found that the mizzenmast had been cut away close to the deck, and there were axe marks on the mainmast. From this it is supposed that the intention was to cut this mast away also. The rudder, with all attachments, had entirely disappeared. Most of the ship's rigging hung over the side and was in poor condition. Forward were found two large anchors, with wooden stocks, and two anchor chains. On the bows was the name "Jamestown," and near it, in almost obliterated letters, "Boston, Mass.," or something like this. On a brass plate over the cabin door was the name "Jamestown" again, and on one of the three windlasses found was the inscription, "Improved, 1869, H. N. Stone," and on another, "Edison's Patent, August 21, 1866. H. N. Stone, Boston."

On a beam in one of the two large cabins which were built on the deck was written with chalk "19½, 81," and on another place, "84." It is supposed that these last marks were made, not by the regular crew, but by persons who visited the ship at sea after it was deserted, for all hatches were open and all loose articles removed, with the single exception of a small piece of spoiled pork. Before the ship stranded her decks had grass growing on them, which would lead one to believe that the ship had drifted about for a long time on the ocean.

The ship appeared to be built out of pitch-pine. In the sale of the lumber which was brought on shore, one-third was allowed to the wreckers, and the remaining two-thirds sold at auction, bringing about 10

krones. Shortly after the auction on the secured portion of the lumber, the ship went to pieces, and drifted, with the remainder of her cargo, on the beach. It is estimated that only one-half of the entire cargo has been secured.

The Hamburg schooner *Germania*, Capt. A. Krech, which arrived here on the 4th of June, reported that when about 150 miles south of the Farøe Islands, he passed close to a large ship drifting about with her mizzenmast cut away. But as the night had already set in, and the ship failed to answer his signals, he was compelled to continue his course owing to the gale blowing at the time and the high sea running. The next morning the ship had passed out of sight.

Captain Svendsen, master of the Copenhagen schooner *Nancy*, also reports that on the 20th, or 21st of June, 1881, when about 24 miles south of Orebak, he boarded the supposed same ship and found no traces of people or papers, or articles of clothing. He remained on board only a short time, and noticed that all the fancy wood-work of the cabin had been removed, and that there were no loose articles whatever lying about.

U. S. S. ALLIANCE, 3d rate,
Halifax, Nova Scotia, November 1, 1881.

SIR: I have the honor to report the arrival of the Alliance in this port to-day. We sailed from Reykiavik October 15, had a gale from SE., then strong NW. winds until the 25th to latitude 48° 30' N.; longitude 47° 58' W. From thence SW. winds, including one heavy gale of 48 hours, to this port.

The engines require some repairs, and as soon as they are completed, which will probably take four or five days, I shall sail for New York, in obedience to orders.

Her Majesty's ships *Northampton*, *Druid*, and *Contest*, under command of Vice-Admiral Sir Leopold McClintock, sailed this noon for Bermuda, leaving the gunboats *Phantom* and *Forrester* in port. No other ships of war, and no United States shipping in port.

Very respectfully,

G. H. WADLEIGH,
Commander, U. S. Navy, Commanding Alliance.

Hon. WILLIAM H. HUNT,
Secretary of the Navy.

REPORT OF THE JEANNETTE RELIEF BOARD.

NAVY DEPARTMENT,
Washington, D. C., March 29, 1881.

SIR: I have the honor to inclose herewith the report of the Jeannette Relief Board.

Awaiting your further instructions,

I have the honor to be, very respectfully, your obedient servant,

JOHN RODGERS,
Rear-Admiral, U. S. N., President of the Board.

Hon. W. H. HUNT,
Secretary of the Navy.

WASHINGTON, D. C., *March 26, 1881.*

Hon. WILLIAM H. HUNT.

Secretary of the Navy, Washington, D. C.:

SIR: The Jeannette Relief Board has the honor to make the following report in regard to the matters embraced in your instructions of the 10th instant:

You refer three main objects to the consideration of the Board.

“1st. The direction of the search.”

To ascertain the direction of the search, it is proper to find where the Jeannette proposed to go.

The captain, in a letter to his wife, written at sea August 17, 1879, said that he proposed to proceed north by way of the eastern coast of Wrangell Land, touching at Herald Island, where he should build a cairn and leave records; thence landing on Wrangell Land, and leaving records on the eastern coast, under cairns, at about 25 miles apart.

While in pursuance of this plan apparently, he was seen by the whaler *Sea Breeze* on the 2d of September, 1879. Captain Barnes, in command of the *Sea Breeze*, said she was about 50 miles south of Herald Island. The vessels were only about 6 miles apart. The sea was comparatively clear of ice where the *Sea Breeze* was, but the *Jeannette* was seen entering a lead or channel through thick ice, steering up towards Herald Island. Next day, thick black smoke was said to be seen issuing from her smoke-stack; but the hull was invisible—below the horizon. The *Jeannette* left San Francisco with anthracite coal, but at Oonalaska took in 150 tons of bituminous coal.

The whalers *Vigilant* and *Mount Wollaston* were last seen October 10, 1879, about 80 miles, NE. by E., from the spot where the *Jeannette* was seen on September 2 and 3. The *Mount Wollaston* and the *Vigilant* were together. The *Mercury* and the *Helen Mar* were near them. The two first-named vessels sailed off to the northwest; the other two did not change their place. In a few hours the ice under the influence of a sudden change of temperature, owing to a northwest breeze, began making, and grew so fast that in 12 hours it had become some 6 inches in thickness. The *Mercury* and the *Helen Mar* recognized their danger. The crew of the *Mercury* abandoned their vessel and went on board the *Helen Mar*, as the newer and the more able vessel, and in her the crews escaped to clear water after sailing some 60 miles through ice. The *Mercury* has not since been seen.

The *Mount Wollaston* and the *Vigilant*, with their crews, numbering about 30 people each, have not since been heard from. They were in all probability caught in the ice which formed so suddenly around the other vessels, and did not succeed in breaking their way out.

The meteorological records of the Arctic for 1879, though not complete, show that in September and October strong gales prevailed, such as would render very perilous the situation of vessels caught in the pack ice, and protected by no harbor.

Captain Cogan saw a very heavy pack, he thought 100 feet thick, through which the missing vessels would have to make their way, and against which they would have to defend themselves, unless they were fortunate enough to get into some harbor. Against such immeasurable force as thick pack ice, driven by a current, skill in handling a vessel would avail nothing. The ship would be carried with the ice. No floating structure made by man could resist it; and as the coast was encumbered with ice, there seems little probability that they made a harbor. But in case the vessels were lost, the crews might make their

way over the ice to Wrangell Land, where only they can be sought, since the Arctic is too vast to be explored with any rational hope of success in finding the vessels, except upon some definite information as to whither they were driven.

But the information of the purpose of Captain De Long to land on Wrangell Land is very definite. He proposed to land there frequently, and to build cairns. On Wrangell Land, then, and on Herald Island, where he proposed to go, information of him is to be sought.

Captain Cogan said before the Board that "the pack ice around Herald Island was such as would keep the Jeannette from landing, since even though they succeeded in sending parties over the ice, it would take them a good while; their vessel would be drifting off all the time, and they could not get back. They could not steam back and hold their place; they could not hold up against that ice. The Jeannette was in the ice, and going along with it. It inclosed her, for she steamed right into it. I do not think it would be proper to send people away from her, as they might not be able to get back."

From all the foregoing, it does not seem probable that cairns will be found on Herald Island, and, we fear, scarcely on Wrangell Land. It will be proper to look for them, however.

"In the event of disaster to the ship," says Captain De Long, in his letter of July 17, 1879, after leaving San Francisco, "we shall retreat upon the Siberian settlements or the natives of around East Cape, and wait for a chance to get back to our depot at St. Michael's. If the ship comes up merely for tidings of us, let her look for them on the east side of Kellett Land, and on Herald Island. If I find we are being carried east against our efforts to get north, I shall try to push through into the Atlantic by way of the east coast of Greenland, if we are far enough north; and if we are far south, then by way of Lancaster Sound into Melville Bay."

Captain Cogan, who has a very high reputation for experience and intelligence in arctic matters, saw the pack ice into which the Jeannette had gone the day before his arrival. He estimated its thickness at about 100 feet; he said the current had already commenced running NW., at the rate of about 20 miles a day, and this current was carrying the ice in the same direction.

Captain Cogan's remarks are worth quoting :

There appears to be a strait between Wrangell Land and some land to the north-east that forms a kind of sluice-way, and when there is ice on both sides, there will be a little stretch where the current runs about 20 miles a day, so that in whaling we have to run south every day after that hole opens, to hold our position. In cutting in a whale to the southeast of Herald Island, I found we were drifted 20 miles to the northwest. If you get farther to the eastward of Herald Island you get out of this current.

He says :

I did not see the smoke of the Jeannette. I was there when they reported smoke, but I did not call it smoke. I think it was frost rising from the holes in the ice. There were twenty different places where it looked as if smoke was rising. I did not call it smoke, but it might have been.

The smoke, however, is unimportant. The captain of the Sea Breeze saw the Jeannette the day before the smoke was reported. Nor would a whaling captain mistake the Jeannette steamer, plainly seen, for a whaler. What the captain of the Sea Breeze saw was undoubtedly the Jeannette. Her smoke was reported on the 6th of September, farther north than when seen by the Sea Breeze; but if this were really her

smoke, it only proves that she was still going towards Herald Island, which we should naturally assume without proof.

As preliminary work, the *Mary* and *Helen* should visit Petropaulovsky for arctic clothing, for dogs, sledges, and dried salmon for dog food. Thence to St. Michael's; to St. Lawrence Bay; to East Cape; to Cape Serdge Kamen; to Kumotschin Bay, for tidings of the *Jeannette*; to Herald Island; thence to the south and southeast coasts of Wrangell Land, for cairns or other notices, and to examine the harbors for winter quarters on the south or southwest of Wrangell Land, or in Siberia, near some Tchuktchi village.

To give time for visiting the various places named, the *Mary* and *Helen* should leave San Francisco about the 1st of June, so as to arrive at Herald Island near the middle of August, for it does not appear that any earlier arrival will be useful; it is only late in the season that the ice leaves Wrangell Land.

Congress, it appears, had no will to risk another exploring vessel (see Commodore Jeffers's letter, appended). The *Mary* and *Helen* should not be caught in the ice away from a harbor, except from accidents beyond control. If she winters on the southeast coast of Wrangell Land, or on its southern shore, she would easily return home next year, after having usefully spent her time available for the purpose in examining the coast by means of sledge journeys.

"2d. The means best adapted to the search."

The available means best adapted to the search is the employment of the *Mary* and *Helen* fully officered, thoroughly supplied with stores, and the necessary appliances, and sledges, with 25 dogs in all, with natives to drive them.

The *Mary* and *Helen* is new, strong, and has a speed of 8 knots under steam, and is fast under canvas. It is believed that the *Mary* and *Helen* is the only fit vessel which could be procured in time for the search, after the appropriation was made. It would have been better perhaps had the propeller been made to hoist and the rudder to unship readily; but special provision had been made for strengthening these parts so that in practice the *Mary* and *Helen* is the very best means within reach of the government. She was specially built for arctic navigation.

"3d. The details of the search expedition."

The details have been carefully considered, and will be found in the appendix, giving ample clothing lists, the Navy ration for two years, with other food added, amounting in all to supplies which can be made to last three years; with suggestions from the Surgeon-General of the Navy in regard to scurvy, snow-blindness, and such other matters as occur to him as useful.

Suggestions are added by the Board to guide the shipping-officer in the physical selection of fit men for the peculiar service.

A list of medical supplies, a list of articles for trade with the natives, an officer-list, and a crew-list are also added.

It would be advantageous, possibly necessary, to have coal—say 200 tons—landed at St. Michael's, to fill up the vessel previous to entering the arctic circle. At St. Michael's the Signal Service will have a meteorologist stationed, and the Alaska Fur Company have there a trading station.

A letter should be obtained from the Russian Government, either through the Russian minister at Washington, or through our minister at St. Petersburg, so that the necessary facilities may be extended from the commanding officer in Petropaulovski to the captain of the *Mary*

and Helen, the better to enable him to make such purchases as he may desire for the purposes of the expedition.

Dogs and sledges have been mentioned in the outfit, with a couple of drivers from Petropaulovski, and some natives from the Tchuktchis, as drivers, as hunters, and as men experienced in traveling over ice.

The drawing made by Capt. Thomas Long, of the bark Nile, of Cape Hawaii, on the southeast coast of Wrangell Land, indicates a formation of outlying islands, making fiords inside of them. Captain Cogan speaks of "quite a harbor on the southeast end. Whether this southeast end is an island or a deep bay like St. Lawrence Bay, I am not sure."

Accordingly, some harbor on the southern or southeastern end of Wrangell Land has been selected as offering far greater advantages than any other for examining the locality where the people of the Jeannette and of the missing whalers are to be sought, if their vessels have been abandoned. But failing in this purpose of getting into such harbor, the Mary and Helen should find some secure place in Siberia for wintering, as near to Wrangell Land as is possible, for the purpose of making sledge journeys on the east coast of Wrangell Land, if it be possible to cross the strait.

The sledge journeys, from what we can learn of the ice which fringes Wrangell Land, seem the most ready means of carrying out the purpose of the expedition, viz, that of succoring the Jeannette's and the whaler's people, without inordinate risk of losing the vessel sent to help them.

The mission of the Mary and Helen will be finished when she has examined the points indicated, and has extended what help can be given, and obtained by means of sledge journeys all the information which can be had of the missing people and vessels. She is not to winter in the Arctic, except to promote the search for which she is sent out, nor then except in a secure harbor; nor is she to remain more than one winter away from home.

Whatever instructions may be given, it shall be clearly understood that much must be left to the judgment of the commanding officer. It is impossible to foretell the exigencies which may arise, and which may demand other action than that which has been provided for.

In conclusion, the Board would add that the whole history of arctic exploration is marked by great dangers, by wonderful escapes, by success where appearances forbade any rational hope. We will believe that the Jeannette and her gallant crew are safe, until we shall know that disaster has occurred. In the north men are full of energy and courage, and so far necessity for action has never failed to bring forth daring skill, nearly always with admirable results.

We have the honor to be, your obedient servants,

JOHN RODGERS,
Rear-Admiral and President of the Board.
JAS. A. GREER,
Captain, U. S. N., Member.
A. S. KENNY,
Paymaster, U. S. N., and Member.
J. H. KIDDER,
Surgeon, U. S. N., and Member.
A. C. WHITE,
Lieutenant-Commander, U. S. N., and Member.
WM. P. RANDALL,
Lieutenant, U. S. N., Member.
R. M. BERRY,
Lieutenant, U. S. N., Member and Recorder.

PROCEEDINGS OF THE JEANNETTE RELIEF BOARD.

NAVY DEPARTMENT, MARCH 29, 1881.

LIST OF PAPERS.

1. Report of Board.
2. Record of proceedings.
 - A. Order convening Board.
 - B. Letter from Commodore Jeffers explaining views of Congress on relief expedition.
 - C. Statement of Mr. George Kennan.
 - D. Statement of Prof. W. H. Dall.
 - E. Statements of Lieutenant Greely and Professor Abbé.
 - E'. Secretary authorizes the inviting of experts to appear before the Board.
 - F'. Letter to engineer-in-chief, asking that a distiller and steam pump be put in the Mary and Helen.
 - F. Extracts of letters from Mr. De Long to his wife.
 - G. Letter of ex-Secretary Thompson.
 - H. Statement of Prof. T. B. Maury.
 - H'. Statement of Capt. B. Cogan.
 - I. Proceedings of California Academy of Sciences.
 - K. Letter of Capt. W. M. Barnes, of whale-ship Sea Breeze.
 - M. Request to Surgeon-General to furnish suggestions for prevention of scurvy and snow-blindness.
 - N. Dietary list for sledges.
 - O. Recommending detail of crew.
 - P. Recommending detail of officers.
 - Q. Provision list.
 - R. Clothing list.
 - S. Directions for examining volunteers physically.
 - T. List of medical stores.
 - U. Chart accompanying report.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 14, 1881.

The Board for suggesting the best plan for carrying out the recent act of Congress, which authorizes the fitting out of a relief expedition to be sent to the Arctic regions, met in obedience to an order of the Navy Department of March 10, 1881. Said order is appended, marked A.

Present: Rear-Admiral John Rodgers, U. S. N., president of Board; Capt. James A. Greer, U. S. N., member; Paymaster A. S. Kenny, U. S. N., member; Surgeon Jerome H. Kidder, U. S. N., member; Lieut. Comdr. H. C. White, U. S. N., member; Lieut. William P. Randall, U. S. N., member; Lieut. R. M. Berry, U. S. N., member and recorder.

Numerous letters from parties offering to be of service in various ways were read and discussed by the Board.

Several charts of the North Polar Sea were examined, and the positions of the Jeannette as reported by the whaler Sea Breeze, Lat. 70° 06' N., Long. 175° 40' W., September 2, 1879, and the whaler Northern Light, from smoke seen Lat. 71° 20' N., Long. 175° 30' W., September 6, 1879, were plotted.

At 3.30 the Board adjourned to meet the following day at 11 a. m.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 15, 1881.

The Board met pursuant to adjournment at 11 a. m., all the members present.

The proceedings of the previous day were read by the recorder.

In default of the appearance of Prof. W. H. Dall, of the United States

Coast Survey, whose presence had been requested by letter, the morning was devoted to examining charts, books, and the discussion of the subject under consideration.

A letter from Commodore William N. Jeffers, U. S. N., Chief of Bureau of Ordnance, stating the views entertained by Congress in making the appropriation for the search under consideration, was appended to the record and marked B.

At 2 p. m. Mr. George Kennan appeared before the Board, and was examined about sledging in Siberia and about the means of that country to facilitate the search for the *Jeannette*. His statement is appended, marked C.

At 3.20 the Board adjourned to meet the following day at 11 a. m.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 16, 1881.

The Board met pursuant to adjournment, all the members present, at 11 a. m.

At 11.45 Prof. W. H. Dall, United States Coast Survey, appeared before the Board and was examined on the winds and currents of Behring's Strait and the Arctic Ocean north of them; also, the facilities of Alaska and Siberia to promote the search for the *Jeannette*. His statement is appended, marked D.

At 2.15 Lieut. A. W. Greely, U. S. A., and Prof. C. Abbé, Assistants to the Chief of Signal Bureau, were examined on the meteorology of Alaska and Siberia. Their joint statement is appended, marked E.

The subject of provisioning the expedition was next discussed.

At 3.20 the Board adjourned to meet the following day at 11 a. m.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 17, 1881.

The Board met pursuant to adjournment at 11 a. m., all the members present.

The proceedings of the previous day were read by the recorder.

Authority was obtained of the honorable Secretary of the Navy by letter to invite experts to appear before the Board to give information on arctic matters. (Letter appended and marked E.) Capt. B. Cogan, of Newark, N. J., and Prof. J. B. Maury, of Philadelphia, Pa., were invited by telegraph to appear before the Board.

Paymaster Kenny and Surgeon Kidder were excused from attendance for the remainder of the day, that they might arrange the list of medicines and provisions required for the expedition. A letter was written to Engineer-in-Chief William H. Shock, U. S. N., requesting that steam-heaters for warming purposes, a distiller for furnishing fresh water, and a steam-pump for freeing the vessel of water in case of emergency be put in the *Mary* and *Helen*. (Copy, marked F')

At 1.20 p. m. the Board adjourned to meet the following day at 11 a. m.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 18, 1881.

At 11 a. m. the Board met pursuant to adjournment, all the members present.

The proceedings of the previous day were read.

Next, extracts from private letters from Lieutenant Commander De Long to his wife were read and the matter contained therein was discussed. (A copy of the extracts is appended, marked F')

Ex-Secretary of the Navy R. W. Thompson submitted a letter to the Board, which is appended, marked G.

At 12.20 Prof. T. B. Maury appeared before the Board and gave his views on the meteorology of Behring's Strait and the waters and lands, &c., north from there. His statement is appended, marked H.)

Paymaster A. S. Kenny, Surgeon Jerome H. Kidder, and Lieutenant Commander H. C. White were appointed a committee to determine what Arctic clothing would be needed for the search.

The official correspondence between Lieutenant-Commander De Long and the Navy Department was considered; also the portion of the report of the Secretary of the Navy for 1880 which refers to the voyage of discovery of the *Jeannette*.

At 4 p. m. the Board adjourned to meet the following day at 11 a. m.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 19, 1881.

The Board met pursuant to adjournment at 11 a. m., all the members present.

The proceedings of the previous day were read by the recorder.

The committee on clothing continued their work.

Fuel, stoves, and various matters pertaining to fitting out an arctic expedition were considered by the Board.

At 1.15 the Board adjourned to meet on Monday, the 21st instant.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 21, 1881.

The Board met pursuant to adjournment at 11 a. m., all the members present.

Proceedings of previous day read.

At 12 m. Capt. B. Cogan, a whaling captain, appeared before the Board and was examined on the ice, its drift and kind, the currents, &c., of the Arctic Ocean north of Behring's Strait. His statement is appended, marked H'.

The list of provisions prepared by the committee for the search was again discussed by the Board and a smooth copy ordered.

At 1.15 the Board adjourned to meet the following day at 11 a. m.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 22, 1881.

The Board met pursuant to adjournment at 11 a. m., all the members present.

The proceedings of the previous day were read.

The lists of clothing and provisions were considered and approved.

The report to be made to the honorable Secretary of the Navy was discussed.

The proceedings of the California Academy of Sciences, including a paper read before the Academy December 6, 1880, on the *Jeannette* Arctic expedition and the missing whalers, have been considered by the Board, and are appended, marked I.

At 3.05 the Board adjourned to meet the following day at 12 m.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 23, 1881.

The Board met pursuant to adjournment at 12 m., all the members present.

The various matters connected with the fitting out of the expedition were discussed by the Board.

A letter from Capt. W. M. Barnes, of the whale ship *Sea Breeze*, relative to the last seen of the *Jeannette* and state of the ice, currents, &c., at that time, was read and discussed, and appended to the record, marked K.

The Board adjourned at 3.20 to meet the following day at 1 p. m.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 24, 1881.

The Board met pursuant to adjournment at 1 p. m., with Lieut. Comdr. H. C. White absent by permission, and the remainder of the Board present.

The report to the honorable Secretary of the Navy was discussed.

A letter requesting the Surgeon-General to prepare suggestions for the prevention and treatment of scurvy and snow-blindness, &c., was addressed to the Bureau of Medicine and Surgery; a copy of which is appended, marked M. The dietary list, marked N, and appended, is suggested by the Board for sledge expeditions.

At 3 p. m. the Board adjourned to meet the following day at 1 p. m.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 25, 1881.

The Board met pursuant to adjournment at 1 p. m., with Lieut. Comdr. H. C. White absent by permission, and the remainder of the Board present.

A rough draft of the report to the honorable Secretary was read and discussed.

The number and rating of the crew as recommended by the Board is appended, and marked O.

At 3 p. m. the Board adjourned to meet Monday, March 28, at 11 a. m.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 28, 1881.

The Board met pursuant to adjournment, with Lieut. Comdr. H. C. White absent, and the remainder of the Board present.

The smooth copy of the report to the honorable Secretary of the Navy was read and agreed to.

At 12.15 Lieutenant-Commander White returned and rejoined the Board.

The following papers were appended to the record, viz: A letter to the honorable Secretary of the Navy recommending the detail of officers for the *Helen and Mary*, &c., marked P; list of provisions, marked Q; list of clothing, marked R; directions for examining physically volunteers for the expedition, marked S.

At 2.30 the Board adjourned to meet the following day at 11 a. m.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 29, 1881.

The Board met pursuant to adjournment at 11 a. m., all the members present.

The proceedings of the previous day were read.

The report to the honorable Secretary of the Navy was signed, and, with the proceedings of the Board, transmitted by letter.

This Board, having finished the business for which it was convened, adjourned *sine die*.

Very respectfully, your obedient servant,

R. M. BERRY,

Lieutenant, U. S. N., Recorder of Board.

Hon. WILLIAM H. HUNT,
Secretary of the Navy.

Approved.

JOHN RODGERS,

Rear-Admiral and President of Board.

A.

NAVY DEPARTMENT,
Washington, March 10, 1881.

SIR: You are hereby appointed president of a Board which will convene at the Navy Department (room 168), at 11 o'clock, on the 14th instant, for the purpose of suggesting the best plan for carrying out the recent act of Congress which authorizes the fitting out of a relief expedition to be sent to the arctic regions. The following-named officers will be associated with you on the Board, and have been directed to report to you accordingly: Capt. James A. Greer, Paymaster Albert S. Kenny, Surgeon Jerome H. Kidder, Lieut. Comdr. Henry C. White, Lieut. William P. Randall, and Lieut. Robert M. Berry, the last named as recorder.

The main subjects for the consideration of the Board will be:

- 1st. The direction of the search.
- 2d. The means best adapted for it.
- 3d. The details of the search expedition.

The Board will give the subjects mature consideration, and report as early as practicable, so that the department may be in possession of all necessary information to enable it to organize and send out a suitable expedition for the relief of the *Jeannette* and the whaling vessels in the arctic.

Very respectfully,

WILLIAM H. HUNT,
Secretary of the Navy.

Rear-Admiral JOHN RODGERS,
Superintendent Naval Observatory, Washington, D. C.

B.

BUREAU OF ORDNANCE, NAVY DEPARTMENT,
Washington City, March 14, 1881.

SIR: Referring to the objects and limitations of the search for the *Jeannette*, as I prepared the estimates on which the appropriation was based, and have taken an active part in urging its favorable consideration, I have to state that in reply to question of the Appropriation Committee it was avowed that the expedition was designed and no other object contemplated than to search for, and, if necessary, relieve the missing party; that there was no intention of prosecuting further exploration or of wintering the relief ship in the ice unless unavoidable.

This was, also, evidently the intention of Chief Justice Daly, who suggested sending a ship of war on this mission—a class of vessel manifestly unfit to encounter ice or the exposure of an arctic climate in winter.

The committee emphasized their views by requiring that the relief vessel should be 'wholly manned by volunteers from the Navy.'

I am, sir, your obedient servant,

WILLIAM N. JEFFERS,
Chief of Bureau.

Rear-Admiral JOHN RODGERS, U. S. N.,
President of Board on Jeannette Search Expedition.

. C.

JEANNETTE RELIEF BOARD.

*Statement of Mr. George Kennan, of Washington, D. C.*NAVY DEPARTMENT,
Washington, D. C., March 15, 1881.

Mr. GEORGE KENNAN, of Washington, D. C., appeared before the Board and gave information in answer to questions as follows:

By the PRESIDENT, Rear-Admiral John Rodgers:

Question. What arctic experience have you had?—Answer. Three winters in Siberia; two in Northeastern Siberia, between the Okhotsk Sea and Bering Strait. I was there three years altogether, including the trip I made home across Siberia from the Okhotsk Sea to St. Petersburg; but my arctic experience proper covers only the two winters which I spent between the Okhotsk Sea and Bering Strait.

Q. Will you please go on and state anything you think would be of interest to us in our inquiry?—A. I do not know anything about ice navigation; I have had no experience whatever of that kind, and I know nothing about the north coast of Siberia. My explorations were all in the interior. I went out under the Russian-American Telegraph Company, and we landed at Petropaulovski. I can probably tell you anything you want to know about the method of dog-sledging in Northeastern Siberia; also with regard to the best place to fit out on the Asiatic side. It seems to me that there are only two places in the North Pacific; one is St. Michael, where the Jeannette fitted out, and the other is Petropaulovski. My preference would be for Petropaulovski. I think it is the best point in the North Pacific for getting dogs, dog food, and furs. The only disadvantage is that it would be somewhat difficult to fit out there, unless you spoke Russian. I think it is doubtful whether you would find anybody there who spoke any other language, although you might.

Q. Would they not speak French?—A. They might; I am not certain. The captain of the port, when I was there, spoke French. He is dead, and there is another man there now; whether he speaks French or not, I cannot say. There is an American merchant there named Captain Hunter, in the fur trade. Of course he speaks English, but every summer he goes on a trip in a ship around the Okhotsk Sea, and he would probably be absent when this expedition reaches there. I think you can get as many dogs there as you would want, and I think you could get a pretty good supply of furs, but probably not as many as would be required for the entire crew unless you can wait long enough to have them made. You probably would not find a sufficient supply of furs ready made.

Q. Is it not easy to order them in advance, by telegraph?—A. You cannot reach them in time by telegraph.

Q. The Russian Government can reach them, can it not?—A. Yes; but not in time for your purposes. The nearest point to Petropaulovski that can be reached by telegraph is Nicolawski, at the mouth of the Amoor.

Q. Can we not reach them by couriers?—A. Couriers could not reach them in time. They would have to go entirely around the Okhotsk Sea and down through Kamtschatka. I don't think the trip would be practicable in the summer. I don't think a courier could get there; certainly not before this expedition will get there.

Q. Any instructions, then, would have to be carried by the captain himself?—A. Yes.

Q. About what is the population of Petropaulovski?—A. I should think three or four hundred; not more than that. It is the principal settlement in Kamtschatka. That is about what its population was when I was there. I have learned by letters since then that the importance of the place has rather declined of late years, a great many of the people from Southern Kamtschatka removing to the mouth of the Amoor. There is another quite large settlement on the west coast of Kamtschatka, on the Okhotsk Sea, called Tigil, but it would be out of your way to go there.

Q. It is proposed to get into the Arctic region by the middle of July; how about the dog-food?—A. I don't know whether you would be able to get a large supply of dog-food in Petropaulovski by that time or not. I think it is doubtful. They don't finish their salmon fishing there till late in August, and I doubt whether this year's catch of fish would be sufficiently dry by the time you would get there; if not you would have to rely upon what was left over from the previous season. Whether that would be large enough, I don't know. I think you would have no difficulty in getting as much dog-food as you wanted in St. Michael. I never have been there myself. Mr. Dall can probably tell you about that. They catch and dry a great many fish in that neighborhood everywhere. You could get an abundance at Petropaulovski if you were a little later—when they have finished their catch for this summer and dried it.

If you took fish imperfectly dried and just caught, they would be very likely to decay and become offensive.

Q. What quantity will a dog require?—A. About two pounds a day. They feed the Siberian dogs generally an average-sized salmon a day. It is split and the backbone taken out and the two sides are hung over a pole to dry. I don't think it weighs over two pounds, and I think that would be about the average that a Siberian dog requires. I don't think it is possible to feed the Siberian dogs in the way the Greenland dogs are fed, that is, every two, or three, or four days as the case may be. I don't think a Siberian dog will stand that kind of treatment. I think he should be fed every day. If he is not, he loses his strength. In cases of emergency we have driven dogs three days without food and worked them hard every day.

Q. Their ration is nothing but dried salmon?—A. Nothing else, except that when the weather is very cold, and especially when there is a high wind, we give our dogs a piece of blubber in addition to the dried salmon to enable them to keep to work—a piece of blubber as large as my two fists; I don't know what it would weigh. We give them that on bad, windy nights, when they would be likely to suffer from cold. We ate the same thing ourselves. The Siberian dogs are driven and trained in a manner entirely different from that practiced on the Greenland coast. The Greenland dogs are driven in a pack, each one with a separate trace to the sledge. The Siberian dogs are universally driven in couples. The Greenland dogs could not be managed at all without a whip. The Siberian dogs are never driven with a whip under any circumstances, and can be managed so perfectly that you can drive a team right into the open door of a house, or you can drive them through a dense forest, guide them on either side of the trees in a given line that you select, and make them thread their way just as you please. Dr. Hayes told me if the wind blew so hard that he could not throw out his lash he could not do anything with his dogs. I have driven my Siberian dogs without a whip into a wind they could hardly stand up against, with their eye-sockets so packed up with flying snow that they were blind.

By Paymaster KENNEY:

Q. How are the dogs guided?—A. They are guided by the voice entirely. They are harnessed with a leader which is specially trained. A leader is worth three or four times as much as an ordinary dog. The efficiency of the team depends very largely upon the lead dog. If he is well trained the rest of the team will do far better work, pulling better and running faster. The lead dog will find the faintest trace of a sledge track at any time, even at night; and if your team is inclined to run away after wild game, such as reindeer, the lead-dog will hold them back and keep them straight if he is well trained. I have seen a whole team of dogs after a reindeer, dragging the leader, he doing the best he could to get back to the track and the rest of the team carrying him away. As a rule, they will follow their leader.

By Surgeon KIDDER:

Q. Are the Siberian dogs and the Greenland dogs the same kind?—A. I think they are; they look alike. The Siberian dog looks almost exactly like a large gray Siberian wolf. You can hardly tell one from the other; at a distance you cannot tell. Indeed, they say the only test is that if it runs away it is a wolf and if it does not run it is a dog. I have been speaking of the pure breed. This has been somewhat crossed with European breeds. The Siberian dogs and the Greenland dogs have the same pricked-up ears.

Q. The differences are differences of education?—A. That is about all. They have the same bushy tail, carried up over the back, and the same erect ears, and all the characteristics of a wolf. They never bark, but howl, and always howl in packs, rarely separately. They have all the wolfish instincts which impel them to run after any wild game that they see.

By the PRESIDENT:

Q. Are they at all affectionate?—A. I think they would be if they were treated with any affection, but the Siberian dog is governed entirely by fear. The natives do not pet them or use any familiarity with them whatever.

By Captain GREER:

Q. How many dogs are required to a team? A.—They use from nine to thirteen ordinarily; always an odd number, the odd dog being the leader.

Q. Can sledges be obtained at Petropaulovski?—A. They can.

By Surgeon KIDDER:

Q. What is the weight of a full sledge load for a full team of thirteen dogs? Is there a fixed standard?—A. There is none. It depends altogether upon circumstances; the season of the year, the kind of snow you have to go through, &c. It is impossible to say what is a full sledge load for a team. With what I should call a comparatively light load I have been unable to make more than five miles a day in deep, soft snow.

On the other hand, I have driven a team of dogs more than a hundred miles inside of twenty-four hours, in the spring, with about the same load.

Q. Is it usual for the men to be drawn by the dogs, or are the dogs used only for drawing the supplies?—A. The men are always drawn by the dogs, except in bad places; going up the side of a mountain, or in deep, soft snow, the driver walks; otherwise he rides on his load.

By the PRESIDENT:

Q. Is there any danger of the man getting a little away from his team, or having it run off?—A. Not a loaded team. Sometimes a team will run off after a reindeer or something of that kind, but it is always stopped within a mile by the capsizing of the sledge. The friction is then so great that they soon get tired out. With a very light sledge a team might give you a good deal of trouble by getting away. I have lost my own sledge a good many times, and had it dragged half or quarter of a mile away; but the sledge, having nobody to take care of it, would capsize, and they would get tired dragging it, and I would overtake them.

By Surgeon KIDDER:

Q. I presume, from what you say, that there can be only one man to each full team of dogs?—A. That is all, ordinarily.

Q. Each man will require at least nine dogs, then, that being the smallest team?—A. I have seen seven dogs used for short journeys, but I never took so small a team when I expected to make several hundred miles. I have seen as few as five dogs driven, but that was only a pleasure excursion from one village to another. On a long journey of several hundred miles, when it is necessary to take quite a large supply of food and dog-food, it is usual to increase the number to nine, eleven, or thirteen, and I have even had more than that. The larger the team becomes the more difficult it would be to manage it in broken ice, for instance, or in a forest, on account of the distance the team occupies, stretched out two and two. If you have thirteen dogs your lead dog is a good ways from you, and the team is more likely to get tangled up if you have to make short turns here and there.

By the PRESIDENT:

Q. Will a team of dogs obey one man as well as another?—A. No, sir; it is necessary to accustom them to the voice and manner of driving. It can readily be done in a short time; but no one can drive a team of dogs as well as the man who has trained the team. I have tried to drive the dogs of other men, and could do so, but not so successfully as they could. They would get much more work out of them in a day than I, because I did not know in what words the drivers had been accustomed to speak to them. There is a great deal in allowing them to stop and rest every little while. They get accustomed to being allowed to stop and rest. There are a great many personal idiosyncracies of every driver, to which the dogs get accustomed, and if not driven in that way they do not do as well. But there is no trouble about a man's accustoming a team of dogs to him in a very short time, so that he can drive them well.

By Lieutenant-Commander WHITE:

Q. These sledges, as I understand, can be obtained at the northern settlements?—A. Yes, sir.

Q. Are they shod with bone?—A. Only in the spring. After the snow begins to thaw they put bone shoeing on; not in midwinter. These sledges are rarely more than 12 feet long.

Q. Can they be taken apart?—A. Yes; they are all lashed together. I do not think the heaviest of them would weigh over 30 or 40 pounds.

By the PRESIDENT:

Q. They are strong, of course?—A. They are very strong; at least, they are adequate to all the purposes for which we ever used sledges. I do not know how they would do on ice. Of course, that is much harder on a sledge than travel overland. Whether these sledges would stand the banging they would have to get in going over hummocky ice or not, I do not know.

Q. They are made of wood?—A. Yes; birch.

By Paymaster KENNEY:

Q. What weight do they ordinarily carry on the sledges?—A. If the snow is in pretty good condition, the largest supply of dog-food and provisions I have ever been able to take was for 35 days.

Q. For yourself and dogs?—A. Yes; and including my furs. That was on an occasion when I went to the mouth of the Anadyr River. I had no idea how long I should be gone or how great the distance was, and I carried 35 days' dog-food and provisions. That loaded them about as heavily as they could be loaded, both as regards weight

and bulk. They were piled up so high that if the height had been increased any more they would have been unmanageable." The fish had to be built directly up so that they made a sort of wall that was nearly chin-high. By loading any higher it would be impossible to keep a sledge on an even keel.

By Captain GREER:

Q. How many dogs did you have then?—A. I had eleven.

Q. And seventy pounds of fish for each dog?—A. Yes. Then I had my own provisions for that whole trip for myself, because I expected to get some on the road by killing wild deer and falling in with wandering tribes.

Q. Altogether there must have been a load of about a thousand pounds?—A. I should say so. That was a heavier load than it would be practicable to carry under all circumstances. I was going over one of those great level steppes, and had no mountain range to cross, no hummocky ice to go over, or anything of that sort.

Q. Then the weight was diminishing daily?—A. Yes, sir.

By the PRESIDENT:

Q. When there is so much difficulty caused by the sledges sinking in the soft, deep snow, is it not possible to use snow-shoes?—A. O, yes, sir; we always use them in deep, soft snow, and we always walk ahead on snow-shoes and break a road for our sledges.

Q. Can you not put on snow-shoes or spread skins under the runners of a sledge, so as to keep the runners from cutting through?—A. That was done by Payer. He had sledges with very sharp runners that cut through, and the idea occurred to him of shoeing them with Norwegian snow-shoes, and he found it an excellent plan. It is necessary to make the shoes on purpose, on account of the great length of the runners. You would have to take a plank, steam it, and bend up the end to the proper shape, so that you can put it on when necessary. I know that deep, soft snow is one of the greatest obstacles that arctic sledges have had to contend with. It is one of the most disheartening things in the world to attempt to travel through deep, soft, freshly fallen snow. I have struggled all day long and only made five miles, with sledges not heavily loaded, through snow just fallen and about waist deep. The dogs couldn't get any footing; they sunk in up to their bellies and half floated, as they would in water. In such a case they merely flounder along in the snow and get discouraged after a while, seeing they cannot make any progress, and are inclined to give up; and it is hard to make them go. We always send one or two and sometimes three men ahead on snow shoes to break down the snow as much as possible and also to encourage the dogs.

Q. Have you any idea of the relative value of meat or blubber and salmon as food for dogs?—A. I have not. I never have fed the dogs anything except dried fish and a piece of blubber occasionally, as I told you. I do not know which is the most economical.

Q. What is the greatest distance you have known a dog team to go in 24 hours?—A. I made a little over 100 miles inside of 24 hours in Northeastern Siberia, late in the spring—I think in April—when the snow was hard. It thawed during the day and froze at night and formed a hard crust on which the dogs could get a perfectly good footing, and at the same time allow the sledge to run over it with the greatest ease. That was in a case of emergency. I was out of food, and I had to drive my dogs until I could get some. I drove all day and all night, with the exception of about an hour's rest. I don't remember the exact distance. It was a little over 100 miles. When the snow is crusted and the day is almost continuous (this was in April, and I had light both day and night) it is possible to drive a good team of dogs 100 miles.

Q. They were very much exhausted from this long drive?—A. Yes, sir; they were. I never yet saw a team of dogs entirely tired out, or in such a condition that you could not get more work out of them. They may get in such a condition, but I never saw it.

Q. What is the character of the natives—the Tchucktchis?—A. I think they are more like our Indians than like the Esquimaux. I speak of what are known as the wandering Tchucktchis, the nomadic tribes of the interior. I do not know the natives of the Northern Siberian coast, who are a sort of mixture between the Esquimaux and the interior Tchucktchis. The Tchucktchis of the interior are rather above than below the average height of Americans, I should say. I have repeatedly seen men who are more than 6 feet high, broad-shouldered, athletic fellows. Their character is very different from that of the Esquimaux. They are extremely independent; you cannot order them at all. You can persuade them. They resent ordering at once. Most of them are wealthy, as they estimate wealth. They own herds of domesticated reindeer, varying from 3,000 to 10,000, and they want nothing of the world. They live upon the reindeer entirely, and move from place to place at their own will. They are guided by their own will, recognize nobody's authority, and are dependent upon nobody; and by centuries of this sort of existence they have acquired an independent, bold

character. I do not think they are hostile or inclined to molest anybody simply for the sake of having a fight, but at the same time they resent any attempt to domineer over them. That is my experience with the Tchucktchis we met?

Q. Are they treacherous?—A. No; I don't think they are. I think their character, on the whole, is pretty good for savages; as good as any I know. Some of them have treated me with very great kindness and generosity.

Q. Will they get drunk on every occasion when they can get liquor?—A. The interior tribes we met cannot get liquor, and many of them have never tasted it. They use a poisonous mushroom that produces a sort of delirium, but very few of them use that to any excess. On extraordinary occasions some of them will eat it. There are two classes of these Northern Siberian natives; one known as the wandering and the other as the settled. The wandering tribes own large herds of reindeer, and live in tents. The settled tribe live on the coast in houses made of drift-wood, and subsist on fish. Of the two, the wandering tribes are the best in character, trustworthiness, stature, and everything else. The settled tribes get liquor as often as they can from whalers, &c., and they are an ugly, obstinate, hard set of men to deal with. They gave us more trouble than all the rest of the natives of Siberia together. Wherever these Siberian natives have been visited by whalers or by trading ships with liquor, they are invariably the worst behaved of all the natives. That is on the coast where they have gotten the vices of civilization. The first things they seem to learn from the white man, where they meet him, is to lie, steal, drink whisky, and get up a row generally. The best natives I ever met were those the farthest removed both from the Russians and from the coast, those far back in the interior.

By Lieutenant-Commander WHITE:

Q. Did you employ them?—A. I did.

Q. Did they go with you into the interior?—A. O, yes, sir.

Q. And work for you?—A. Yes; after a fashion. They are not as good as the Russians.

Q. What remuneration did they require?—A. We gave them tobacco generally.

Q. Money is of no use?—A. No; tobacco is about the only thing they want from civilization.

By Lieutenant RANDALL:

Q. What language do they speak?—A. A good many of them speak Russian, because they are in the habit of going to Russian fairs.

Q. Do they not use the reindeer there for sledging purposes?—A. O, yes; the wandering tribes use the reindeer almost altogether.

Q. What kind of blubber do they use for feeding the dogs?—A. Seal blubber—seal and walrus. They do not kill a great many whales. They get carcasses of whales that drift ashore, but as a rule they do not kill whales. These tribes in the interior get their blubber by exchanging their reindeer meat and skins for it with the coast natives. The wandering tribes use the blubber principally for heating purposes.

By Surgeon KIDDER:

Q. That is, they burn it?—A. Yes, sir; in lamps, just as the Esquimaux do.

By the PRESIDENT:

Q. How are the deer fed?—A. They live entirely upon moss, which they find for themselves under the snow. The reindeer moss grows all over Northern Siberia, and as these wandering tribes exhaust one pasture they move to another. I suppose they never camp twice in the course of their lives in the same spot.

Q. Are these deer sufficiently tame to be controlled by them?—A. Yes, sir; they have deer especially tamed to drive, but the great mass of them are tame enough to stay around the tents without constraint, unless they are stampeded by wolves.

Q. What makes the warmest clothing?—A. Reindeer skin, for its weight.

Q. Is it warmer than dog skin?—A. I think so. It is used by all the natives of Northeastern Siberia, with the exception of the Yakonits. The latter use sheepskin altogether.

By Lieutenant-Commander WHITE:

Q. Did you use sleeping bags?—A. We did; we used wolf skin, reindeer skin, and several other furs.

Q. Did you ever have any of these things made by the native women?—A. O, yes; in all those settlements you can get anything made that you want. We introduced the sleeping bag into Northeastern Siberia. It had never been in use before. They had bags made for themselves after they saw us make them. If the weather was very cold, so that they could not lie down at full length, they slept squatting. They would get right down on their heels, pull themselves inside of the big, loose coat they wear, and sleep with their back resting against a sledge for an hour and then get up and walk around. Their object in squatting is merely to protect the feet. In all ordinary

temperatures they simply lie right down in the snow. I had a woman in the party on the first sledge journey I made from Northern Kamtschatka. I had a tent then and was sleeping in it. I looked at this woman with a good deal of curiosity to see how she was going to spend the night, as the thermometer fell to 40° below zero. She sat around the camp fire until three or four hours after dark, then went away and dug herself a little sort of shallow grave in the snow to fit her body. Then she collected some twigs of a sort of half tree, there known as the trailing pine. With these she lined the interior of this little grave. Then she simply rapped the snow off her fur boots, laid down in the grave, pulled herself inside of her coat, and went to sleep. She was quite a good-looking woman, and when I got up the next morning she was sitting by the camp fire, as bright and fresh as a daisy. In the evening we were discussing the question of whether a decent regard for the gentler sex should not cause us to invite her into the tent and go outdoors ourselves. The drivers assured us that there was no necessity for it, and that the woman would take care of herself.

Q. How about game? Is there any there?—A. Yes; there is a good deal of game in the interior. There are a good many reindeer, and the white arctic hare. There are a good many wolves, but you rarely see them. They never attack a camp or anything like that, but they will stampede your deer if they have the slightest opportunity. We used reindeer sledges a great deal, and sometimes reindeer sledges and dog sledges together. Then we had to watch our deer all night, or have somebody do it. You are not obliged to carry food for the deer. He finds his own food wherever he is.

By Surgeon KIDDER:

Q. What part of the clothing would the expedition be likely to find at Petropaulovski?—A. Every part that was needed would probably be found there.

Q. Sleeping bags, for instance?—A. No; you would have to have them made. If I were in your place I should simply buy the furs and have my bags made on board ship.

Q. There would be no difficulty about getting an ample supply of furs there?—A. As I said before, I don't think you would get an ample supply.

Q. But you believe that to be the best place?—A. I think it is.

(Mr. Kennan here pointed out on a chart the places he had visited and the territory over which he had traveled.)

By the PRESIDENT:

Q. What are the articles to be taken to trade with the natives?—A. Tobacco is the principal thing, and I should say the usual trading goods that are taken for savages anywhere. They care most for tobacco. Of course if you want to trade in liquor they will give almost anything for that on the coast, but I should not advise doing it except in case of emergency. I think it is well to have it to use if there is a great emergency. I have done it myself in order to get dried fish. There had been a famine, and fish were extremely scarce, and they would not sell any for anything else. But it is a dangerous experiment, unless you have a good many men, because the natives will drink it as soon as they get it, and then are apt to become ugly. I came near getting myself into a very serious scrape in this way once.

By Lieutenant-Commander WHITE:

Q. In these two settlements, is money of any value?—A. It is good at Petropaulovski and St. Michael. When I said money was of no use, I referred to the Tchucktchis of the interior.

By the PRESIDENT:

Q. But would not 50 cents' worth of tobacco buy more than 50 cents in money?—A. O, yes; far more.

By Lieutenant-Commander WHITE:

Q. What were the prevailing winds when you were there—were they generally northerly or southerly?—A. My impression is that the winds in the vicinity of Anadyrsk were mostly from the northwest or west-northwest. I can give you definite information about that from some records kept by Mr. Bush at Anadyrsk during one or two winters; I am not certain whether it was two or one. I know he has records of one winter, both thermometer and barometer and wind.

Q. What years were those?—A. Part of 1865 and 1866.

There is one matter that has not been mentioned—the question of dog-drivers. I doubt very much whether you could get any dog-drivers at Petropaulovski; you might, but I think the chances are against it. Whether you could at St. Michael's or not I don't know. The Jeannette only got one man at St. Michael's.

By the PRESIDENT:

Q. Did she want more?—A. She wanted more, but could only get one. She had two Esquimaux, and she got one of the natives on that side. I am inclined to think that you could not get any at Petropaulovski, although you might. They look upon what

they call the Icy Ocean with a good deal of apprehension. They would be afraid they would never get back. It seems about as far away to them as it does to us here. They have not been accustomed to live on it as the natives of the settlements further north have, and they have more fear of it.

Q. What would be the chances of getting Tehucktchis?—A. That I do not know. I have gotten Tehucktchis to go with me as guides, &c., but I never had occasion to go out over the ice, or on board of a ship.

By Captain GREER:

Q. At St. Michael's they are more familiar with both, are they not?—A. Oh, yes; much more so than the Siberian natives. The only thing that would operate against you would be that one man went from there nearly two years ago and nothing has been heard from him, and they would know that this expedition was going to look for the other, and they would naturally reason that if the first man did not come back they might not, and so would not consent to go. At the same time, I think it is very important to get them. Nobody can manage the dog-sledges as well as those who are accustomed to it; and as far as I know you are not going to have anybody who has had experience of that kind.

By Surgeon KIDDER:

Q. I should like to ask you something about the food for the men on these sledge journeys. What kind of food would you take, and how much would you allow to a man per day?—A. The first winter I spent in Siberia we lived entirely upon the country. We were landed from a little trading ship at the south end of Kamtschatka, and had only a very limited supply of food which we brought from America. Most of it we used up or lost in getting through Kamtschatka, so that when winter overtook us in North Kamtschatka we had only 16 pounds, I think, of hard white bread left. We kept that for sickness, and did not eat it.

Q. Had you any pemican?—A. I know nothing about that; we never used it. We lived almost entirely on reindeer meat. We got, at a settlement at the head of the Okhotsk Sea, a small quantity of black rye bread, partially dried in an oven after being baked, and broken into chunks. It is not an article of food I can recommend. We lived principally on reindeer meat, which was abundant everywhere.

Q. You had no scurvy there?—A. No, sir; I never heard of a case in Northeastern Siberia.

Q. Do they use salt provisions?—A. No, sir.

Q. You never knew it to be sought for?—A. No, sir; the natives of Northeastern Siberia would not eat anything on which salt was sprinkled.

Q. They have no scurvy?—A. No, sir; I never heard of a case.

By Lieutenant-Commander WHITE:

Q. Did you go by the compass at all?—A. We did the second winter. The first winter we could not because we did not know the bearings.

Q. Do you recollect what the variation is up there?—A. It runs from 12 to 18 east; something like that.

By the PRESIDENT:

Q. Had you no maps?—A. No maps of the interior that we could use. The first winter we were directed by the natives; but after we learned the country we were able to get along all right.

By Captain GREER:

Q. Do you know anything about the game which might be found?—A. I know there is game. The reindeer migrate north every summer, and cross the Anadeer river in great droves, and many of them are killed. The North Siberian coast is very rough. There is only about a month that it does not freeze.

By the PRESIDENT:

Q. Do the deer prefer the cold weather, apparently?—A. I think one reason why the reindeer migrate from place to place is to escape the mosquitoes, which are very troublesome. I think you would be much more likely to find deer on the North Siberian coast in summer than in winter. As to the mosquitoes, they are so bad that I have been compelled to live for three days at a time in a calico tent that I made for myself in my house.

By the Recorder (Lieutenant BERRY):

Q. Do you know about the native boats?—A. Yes; I have seen a great many of them and been in them. I have never had to use them.

Q. Have they large boats as well as the small ones?—A. Yes.

Q. Made of skins?—A. Yes; I have seen boats used by the settled Koraks that were 40 feet long and, I should say, 7 feet beam—very large ones, in which they had I don't

know how many rowers or paddlers. The usual size is perhaps 25 or 30 feet long, made over frames lashed together, of walrus hide. If they are going out into a rough sea they frequently inflate skins and fasten them around the sides, so as to make a sort of life-boat out of it.

By the PRESIDENT:

Q. What is the size of the sleeping-bag? Is it as long as a man?—A. Yes, sir.

Q. Is it tied over his head?—A. No; it is left open at the top. My bag was about seven feet long, long enough for me to get into it entirely and cover my body and head.

By Lieutenant RANDALL:

Q. Would not rubber be good for the outside of those bags?—A. I am inclined to think that rubber would crack in those very low temperatures.

By Surgeon KIDDER:

Q. Dr. Kane used rubber without its cracking.—A. If I recollect rightly, the Nares expedition had a good deal of trouble about the cracking of rubber.

Q. We have a rubber blanket in the Navy lined with wool. I do not know that they have ever been tried in such a low temperature.—A. I do not know about that. We never used rubber in the winter. In the summer I used it up through Kamtschatka.

Adjourned until to-morrow morning at 11 o'clock.

E. D. EASTON,
Stenographer.

D.

JEANNETTE RELIEF BOARD.

Statement of Prof. William H. Dall, assistant, United States Coast Survey.

NAVY DEPARTMENT,
Washington, D. C., March 16, 1881.

Prof. WILLIAM H. DALL appeared before the Board, and gave information in answer to questions, as follows:

By the PRESIDENT:

Question. What is your employment?—Answer. Assistant in the United States Coast Survey.

Q. Please tell us anything that you think will be of interest.—A. I suppose your object is to get information of any kind bearing on the general subject of an expedition to the Arctic regions? You do not want any opinions as to what I think about the Jeannette, or where it is best to go, but simply facts in regard to the country, &c.

Q. I want both. I would like your opinion as to the whereabouts of the Jeannette, and also any other information you can give.—A. I presume that if an expedition is fitted out, you would expect not only to provide a vessel suitable for navigating in those seas, but you would wish to make some provision for land explorations or land parties, to be sent out from the vessel in case she reached land.

Q. The vessel has been provided, so we can omit that question. Now we want to inquire as to the best fitting for land journeys.—A. If land journeys are contemplated from the vessel it is usual to rely upon dogs as a means of draught. Those dogs can better be got in Kamtschatka than anywhere else. I think you can get as many dogs as will be needed at Petropaulovski, and also dog-food, by purchase, without any delay or difficulty. They have very large stores of dried salmon, which is what all those northern dogs live on; generally they have a great deal more than is used, and it is exceedingly cheap and can be bought, I think, without any delay. At least that was the case when I visited that place, and I believe it has not changed in many respects. I think you can be certain of getting as many dogs as are needed. Obtaining dogs and dog-food on the American side without making preparations beforehand is uncertain and difficult. You may be able to get the dogs and dog-food, but there are years on the American side when, if they do not anticipate any special use for it, they do not put up any more salmon than they need for their own use. There are other years when the dogs are attacked by a disease called by the Russians cholera, of which Dr. Kane spoke, which carries them off by hundreds. I have never heard of that disease occurring on the other coast. For that reason it seems to me it would be advisable to obtain them on the Kamtschatka side. I think there is no doubt but what they can

be obtained. Probably at the same time men can be got who are accustomed to managing those dogs. The natives on the Asiatic side have changed a good deal since I first visited them in 1865, and of course still more since you [the president] were there. They have not become exactly civilized, but they have from time to time bought large quantities of American clothing from the traders that come up from the Sandwich Islands and elsewhere. They have now a money value for their goods, and make up native boots and mittens for men on the whalers. They make them up by the cas-kful in the winter, preparing to sell them to the whalers in the spring. They have a regular price for them, and while, of course, they do not take money for them, yet money is used as a basis. They have very few dogs. Many of the dogs die; and the killing of large quantities of walrus about that coast by whalers in default of being able to get whale oil has resulted in the scarcity of walrus and seal, so that in some places the natives have been obliged to eat their dogs. While I was in Plover Bay in 1865 and 1866, they had great quantities of dogs, but they were small, of an inferior breed, and not nearly as good as the Kamtschatka dogs. Last summer I was there and there was not a single dog in the place; and I was told they had all been eaten in times of scarcity, and that the same was true of most of the adjacent villages. Of course there may be other villages on that coast where there are still plenty of dogs, but in any case they are remarkably inferior to those from Kamtschatka. They are smaller and not so strong. I don't think you can rely on getting any dog-food to speak of on the Asiatic coast anywhere north of Petropaulovski.

Q. How many dogs make a team?—A. We used to have five; but it depends upon circumstances—the weight to be carried and the character of the team. A man who likes to travel fast and make a display will have eight dogs, perhaps.

Q. Where was that?—A. In Petropaulovski. I think five dogs are an average team. It depends somewhat on what they have to do. If they have only to take a man and his baggage it is an easy task for five dogs. For drawing a heavily loaded sledge, of course a large number of dogs are needed. We calculate that a dog would pull 125 pounds.

Q. Under what circumstances?—A. Under ordinary circumstances of good going; such going as one might expect to get along shore and on ordinary ice. They will pull 125 pounds on one dried salmon a day.

Q. How much would a dry salmon weigh?—A. About a pound or a pound and a quarter, perhaps. That is the regular ration.

Q. Where have you been in these regions?—A. I have been from Plover Bay, on the Siberian coast, $64^{\circ} 15'$, to East Cape, about 66° . Off East Cape the shore was bordered with ice from four to twelve miles broad—pack ice—and it was impossible to land. We intended to land at East Cape. Our landing was confined to the islands and to portions of the American coast after we left Plover Bay.

Q. Was the American coast clear?—A. Entirely so.

Q. Did you cross over to Diomedes Islands in the middle of the straits?—A. Yes, sir; we came to Cape Prince of Wales and ran down into Port Clarence, with a gale behind us. It is a winter village. There was no one there when we were there except some King Island natives. They were there about a week.

Q. From there you went up the coast of America, making frequent landings?—A. From Plover Bay we first went to Cape Lisburne in latitude about 69° , and from Cape Lisburne to Icy Cape, $70^{\circ} 20'$, and from there to a short distance beyond Point Belcher, $70^{\circ} 45'$. There we found the ice close onto the land, so that it was not advisable to go any further with our vessel, which was only a sailing vessel and not prepared to cope with the ice. From Point Belcher we returned along the coast and entered Kotzebue Sound, after which we went to East Cape, then to Port Clarence, and returned to Plover Bay.

By Lieutenant-Commander WHITE:

Q. Did you go there in a government vessel?—A. Yes, sir. I had one of the Coast Survey vessels.

By the PRESIDENT:

Q. Do you find this coast well laid down on the map?—A. Very well laid down. There are some discrepancies, but not a great many. The most important variation we found was the variation of the needle, which has altered very considerably since these charts were made.

Q. Have you any idea as to the winds and currents there?—A. Yes, sir.

Q. What winds prevail there?—A. The winds are nearly always northerly in summer, north-northeast; and in the winter the winds are almost constantly northwest and north-northwest; that is to say, in this general region *here* [indicating on chart], We have not any information further west, except the reports of the whalers in summer.

Q. What are the currents as far as you know?—A. The matter of currents is one about which I have not fully prepared my material to state definite conclusions; but

I went up there supposing after Beechey and the other explorers who had been there that there was a permanent current setting northward during summer through Behring's Strait, and expected to find it, but our observations in the strait, although they showed that at times a current would pass through the strait in that way, showed it was not constant, and varied with the tides. For instance, when we were anchored near the Diomedes, in the center of the strait, with rising tide, our vessel swung to the north-northeast, and with falling tide to the southwest. The current changed in the same way, and the attempt to see if there was any submarine current running in any other direction did not reveal anything of the kind. The water in the strait, as far as it moved at all, moved as one body. We always found that the current running through there was very variable in its strength, and depended considerably upon whether the wind was favorable.

Q. Favorable to what?—A. Supposing the wind was blowing from the northward, it would be favorable towards the increasing of the ebb-tide; and, consequently, the ebb-tide would be stronger than the flood while that state of things continued. If there was a southerly wind, which, however we did not see a great deal, the northerly current through the strait was increased and the ebb-tide was less marked. In all cases the flood was the strongest, except when it was interfered with by the wind. The ebb was comparatively weak. North of the strait I found very much the same state of things all along the American coast. We would have very strong currents with the flood and rather weaker currents with the ebb, but running in opposite directions. Very often before the tide turned off-shore it would turn in-shore very remarkably, so that while the vessel, anchored three or four miles off-shore, would be turning in one direction there would be a strong current in the opposite direction along the beach. We saw a dead whale one morning, and afterwards we anchored, and this whale was carried up by us a considerable distance by the tide; and in the course of the evening it floated down, and floated some little distance to the southwest of us, showing that the current there was dependent a good deal on the tide. There was no wind to speak of at that time that would affect it in either way.

By Lieutenant-Commander WHITE:

Q. What is the rise and fall of the tide there?—A. It is very small, and differs very much in different places. As far as we could see on the open Arctic coast the rise and fall of the tide was about two feet and a half. In *this* region [indicating on chart] there is only six or eight inches of tide from December to July. Whether it is different in summer or not, we have no information. In the strait there is more. In Port Clarence we had four or five feet of tide at the extremes. We were not there at the spring tide; but the greatest extreme we saw was about five feet, I think. The character of the tide is very largely solar. In making tide tables for Behring's Sea we found that the amount of tide due to the attraction of the sun was very slightly different from that due to the attraction of the moon, and consequently we had a certain high water about noon every day.

Q. The tides must be somewhat irregular?—A. They are.

Q. And that accounts somewhat for the irregularity of the current?—A. Yes, sir; after passing through the strait the warm water seems to divide into three branches, one of which goes to the westward, another to the northwest, and the other to the northeast. That is indicated, so far as I was able to discover, more by the melting of the ice than by any strong current. Last summer Captain Hooper found a point of ice extending up a considerable distance, which remained a large part of the summer. It seems to be not uncommon. There is more or less open water and broken ice extending between the north coast of Siberia and Wrangell Land. This appears to break up sooner than in the region *here* [indicating on chart]. There is almost always ice on Herald Shoal, but to the westward it is generally open water, and that extends, differing with the different seasons, up towards Herald Island. Ordinarily, on the American coast, Icy Cape is almost always accessible. Beyond that, it is a question. I do not remember any case when Icy Cape has not been accessible. On an average year I think it is usually practicable to get to Point Barrow. It often has been the case that parties are not able to get further than Point Belcher, and sometimes not further than Icy Cape.

Q. Was there any marked current at Point Belcher?—A. Yes, sir; the flood tide ran with the current to the northeast (that is, it turned in with the shore), but not very strong; I should think perhaps about half a knot an hour; not to exceed that.

Q. That was not constant?—A. No, sir; it varied with the tide; but the tendency to swing the ship to the northeast was stronger than to the opposite direction, when the tide fell.

Q. Was the current lost entirely with the ebb tide?—A. Entirely, so far as we could see by the swinging of the vessel.

By Lieutenant RANDALL:

Q. I would like to ask you what you think of the 33 whale-ships that were lost right in by Blossom Shoal?—A. It was rather to the northward, near Wainwright Inlet.

Q. Nothing has been seen of them. Would you not interpret that as the result of the setting in of a northerly current?—A. No, sir; those ships were caught by the ice coming in from the sea and grounding on the shoal, leaving insufficient water for them to get out. They could not get away, and it was so late in the season that there was no safety in staying, so the captains held a meeting and decided to abandon the ships as they were, and get down while they could to two vessels which were below the shoals and which would leave in a few days, the season being over. The ships when they were left were in perfectly good condition. There was nothing whatever the matter with them. They threw overboard all the liquor they had, but in every case they did not throw overboard the medicine chests. Some of the medicine chests were forgotten. After the ships were abandoned the natives went on board and took whatever they wanted. Some of them drank what they found in the medicine chests, and it is said that one or two of them died. At all events, they became very much incensed, and after having gotten whatever they thought of value out of the vessels they set them on fire. Most of the fleet were burned up. Others, that were at a little distance from those that were burned, remained during the winter and were forced up on to the shore or into shallow water by the movement of the ice, and two of the vessels were rescued in the spring by parties who went up after them as soon as the ice opened, and were taken to San Francisco in good condition. One of them, the bark Florence, I think, has been lost since; the other, I think, is still at sea.

Lieutenant RANDALL. The Minerva was so situated that the pack-ice could not get to her. She is whaling yet.

Professor DALL. I know the shore is covered with wrecks.

Lieutenant-Commander WHITE. Right where they were caught?

Professor DALL. They were destroyed there.

Lieutenant RANDALL. Although ships have been up there every season since, I have gotten the impression, from whalemens I have talked with, that nothing has been seen of them.

Professor DALL. I think that there is a little confusion with regard to the matter. There was another set of vessels beset by ice off-shore, and they drifted northward with the general drift of the ice in winter. I think of those nothing has been seen, except one, which is said to have come ashore near Point Belcher and been crushed. There is an immense amount of wreckage there; I do not know what vessels it came from. I always ascribed it to the large fleet lost in 1872. The whole shore is covered with wreckage for miles and miles.

Lieutenant RANDALL. They lose some ships there every season; but there have been two great losses, one of thirty-three and the other of thirteen ships. I have asked whalemens who have been there every season for thirty years, and they say there has never been anything heard of them.

Professor DALL. My sailing master was on one of the vessels, and the next spring he went after the Minerva and brought her down. He has been with me quite a number of years, and we have talked about it a good deal; so I feel that in general my idea of it must be somewhat near correct. As for the wreckage, I saw it myself; there is no doubt about that. We filled up with wood for our galley stoves from the beach, and a great quantity of it was wreckage. There would probably have been more, only so many vessels were burned. The ships that were beset by ice off Point Barrow were already out of the region where their remains would have been thrown on that coast. If their wreckage had been thrown on the coast, it would probably have been to the eastward of Point Barrow. The men that were saved from that smaller party of vessels came over the ice to Point Barrow, where they succeeded in getting out on the Florence. The vessels were then somewhat to the northward of Point Barrow already, and there is no doubt that the general motion of the ice, so far as there is any, is to the northward. As to the general motion of the current, if it were due to nothing but the tides alone, the flood being the stronger the tendency is to carry material to the north and northeast. The mass of wood would go in the course of a day probably sixteen miles to the northeast. The ebb, being so much weaker, would probably carry it not more than ten miles to the southwest, and so the general motion in every case would be to the northeast.

Q. I have talked with captains who lost their ships there. They tell me that they drifted some two weeks in the ice before concluding to abandon the vessels, and that the ice carried them 27 miles a day, on an average?—A. I think it is quite likely. Of course such matters can be definitely settled.

Lieutenant-Commander WHITE. The wind may have had something to do with it.

Professor DALL. There is no doubt that off Point Barrow during the summer season there is a current NNE. that runs in the teeth of the prevailing wind. We did not get to the point where that was felt, because it was not practicable for us to do so on account of the ice. All the authorities I have looked up in regard to the matter have mentioned this current, but there is a great divergency of opinion with regard to the current farther south. Beechey, King, Cook's Expedition, and a number of other early navigators, speak of this northerly current through Behring's Strait and northward of

the strait, and from that the general idea, which you find in nearly all the pilots and treatises on northern currents, has been derived. I have been looking over that literature lately with reference to this question, being employed in working up my current and temperature results, and I find that the officers of the *Herald*, under Commander Kellett, and of the *Plover*, under Moore, found exactly the reverse state of things, and they speak of it in the *Nautical Magazine*. There are several articles contained in what are termed the proceedings of the *Plover* and *Herald*, and other Franklin search expeditions. In looking through those, I found statements in which they referred to the opinions of Beechey and others, and say that to their surprise they found exactly the reverse state of things, not only on one occasion, but when they went north and returned, on two occasions; and that the southerly drift in that case was so uniform and was so evenly distributed over the different days that they felt that there could not be any mistake or error about it. Of course, with regard to our own observations, I can only state as a matter of fact, and they are not sufficient to base a theory upon except taken in connection with the material we can get from others. There is certainly nothing that I have yet been able to obtain that shows any definite, fixed current northerly through the strait. There is a tendency to a northerly current, and occasionally, perhaps during a part of every day, for all I know, the current does run in that direction. Of that there seems to be no doubt. But as to its character, to what it is due, and its strength at different seasons of the year, which may be very different, those are all matters about which we have not yet sufficient information to be at all positive either one way or the other. I found that the temperatures (by which we can sometimes trace the currents when we cannot by the drift of the water) in Behring's Strait and in Kotzebue Sound were considerably warmer than they were anywhere in Behring's Sea to the southward of St. Lawrence Island. I have been engaged for several weeks in compiling all the available temperature records covering Behring's Sea and the region south of the sea and the strait, and, of course, the Arctic Ocean. So far as those temperatures are yet plotted (I am about half through) there is no indication by curves of temperature of anything like a current coming from the southward. What current there is would seem to come rather from Norton Sound and from the Yacam River toward the strait between St. Lawrence Island and the peninsula. [After indicating location on chart.] The Okhotsk Sea is actually warmer, so far as the observations go, than Behring's Sea, and both Behring's and the Okhotsk Sea are colder in summer than this region *here* [indicating]. This comes partly I suppose from the fact that the waters of the Yacam, which is a comparatively shallow river and often spread out over an area 15 or 20 miles in width and only a foot or two in depth except in the channel, are warmed by the sun; and that Norton and Kotzebue Sounds, being also shallow, and the sun being very hot during the summer, are heated to a greater extent than the deeper water farther south. Whatever the reason may be, the fact is beyond question that the mean temperature for July was something like 58 in Norton Sound. There is no such temperature recorded anywhere else here. So it would seem as if the tides and the current coming from the Yacam carry this water through the strait, and the returning ebb takes the equally warm water from Kotzebue Sound, for after the ice melts the same conditions prevail in Kotzebue Sound as in Norton Sound. We took serial temperatures from top to bottom at intervals right across the strait, and the warmest temperature we found about the first of September was between 48 and 50, and it ran from that to 35, which was the lowest, and which was found around the pack-ice still remaining near East Cape.

By the PRESIDENT:

Q. Was Emma Harbor clear of ice when you were there?—A. There was no ice in Plover Bay. I do not think the ice remains there during the summer at all. About Plover Bay and in that immediate vicinity there are several villages of natives, a good many of whom speak very good English. Many of them have been repeatedly and spent the summer in the Arctic with the whalers. When the whalers come down they sometimes bring along some of the whale meat, which is not useful for oil, and give it to these people, and it is sufficient to keep them through the winter. Of late years they have found it difficult to get through the winter without some starvation, owing to the destruction of the walrus.

By Lieutenant RANDALL:

Q. Would not those natives be good to take on the expedition?—A. Yes; first-rate. They are better than the East Cape natives.

By the PRESIDENT:

Q. Are they dog drivers?—A. No, sir; I do not think they know enough about it to be of any special use. They have eaten up their dogs. They never used them very much for driving. They made the dogs go along with them; but they do not drive them as white men do.

By Lieutenant RANDALL:

Q. Do not the King's Island natives drive dogs?—A. They have some dogs, but I

do not think they have very much use for them. They live on the island nearly all the winter, and in the summer there is, of course, no use for them. Some King's Island natives were at Port Clarence when we were there last summer and they had three or four dogs with them.

By the PRESIDENT:

Q. Is there any harbor at King's Island?—A. No, sir; we could only get ashore there at favorable times.

By Lieutenant RANDALL:

Q. There is a harbor at Cape Serdze, where Nordenskjold was?—There is an ice harbor. There is no land. There were heavy floes outside of them that protected the vessel. They had an observatory on the shore. What I mean by saying that there is no harbor is that there is no protecting spit of land or bay.

Q. An English ship wintered up near Blossom Shoal once. Do you know about that?—A. I do not. I never heard of any vessel wintering there. Vessels have wintered in Kotzebue Sound, and also around Point Barrow. There is a harbor, a large shallow bay, and in the middle of that bay there is a small spot of water which is deep enough for good-sized vessels. I think the Franklin search expedition vessels wintered there several times.

Q. There is a spit in St. Lawrence Bay where you can make an anchorage?—A. Yes; there is quite a tolerable harbor, when you can get into it. There is a much better harbor right inside of Cape Sütke, but last summer that was one sheet of ice. It is not on most of the charts. It is only large enough for one vessel, but it is a very nice place indeed for a vessel to go in and refit. There is an excellent sand beach.

Q. Is it generally packed with ice?—A. No, sir.

By the PRESIDENT:

Q. Now as to the temperature generally?—A. [After first producing a Coast Pilot embracing the region in question.] I do not know but that I can say in general that the temperature in summer on shipboard will be about 50. That is about the average temperature. We find it sometimes higher, seldom very much lower. I do not think we had it below 40 at any time, even at night, except up on the edge of the ice, near Point Belcher, where it went down to 33, I think, one night. The summer temperature is generally about 50; the winter variable, of course, but generally severe. We had it as high as 80 last summer. I recollect very well one Sunday I sat on the deck in my shirt-sleeves and read a novel, and was perfectly comfortable. This was a little above Icy Cape. We had a good many days when the weather was real warm, but an average would be, I think, about 50. The nights were cool. The trouble is that there is so much fog that it cuts off a good deal of the sunlight and we do not get the benefit of it.

By Captain GREER:

Q. From your experience, how late can vessels stay with safety in the Arctic Ocean?—A. I should say about the 20th of October would be an extreme time. That is about the average time when whalers return after having had a bad season and staying as late as it is prudent. Of course there may be seasons when it would be prudent to stay longer, and others when it would be necessary to get way before that.

By Lieutenant RANDALL:

Q. Do you think this winter has been severer than usual in the Arctic?—A. I think it is likely that they have had a severe season.

The PRESIDENT. I should not be surprised to find that warm, equatorial air from the south has come in and displaced the colder air—that this cold weather has only spread through Europe and America, and that the cold air in the arctic regions has been displaced by warm air. Whether that is a fact, it is difficult to say.

Professor DALL. It is impossible to say; but that may be the case. There is a difference of opinion as to the Jeannette; she burned anthracite coal, which makes no smoke. It is said she was seen by a whaler, who could only see smoke from the mast-head, and could not see the vessel. They saw what they supposed to be smoke in the distance, and could not see anything else. I have seen that phenomena repeatedly myself, and have been deceived by it. Unless something more than smoke was seen, I would place no dependence on the observation. If there is a small opening in the ice, where the air can get at the open water, a vapor will arise having all the appearance of coal smoke.

[NOTE BY THE STENOGRAPHER.—Captain Greer stated at a subsequent meeting that it had been ascertained that the Jeannette had taken on board some bituminous coal.]

By Lieutenant-Commander WHITE:

Q. Was it not the Northern Light that saw the Jeannette on the 2d of September,

1879?—A. Yes, sir. This [indicating on chart] is the position where she was actually seen, I believe. The original newspaper reports, which I examined before I came down, state that it was about 173 in latitude '70.

By the PRESIDENT:

Q. What fuel is there?—A. In that region there is a good deal of drift-wood on the American coast; and along the other side of Cape Lisburne there is an abundant deposit of good coal quite near the water's edge, just to the north and east of Cape Lisburne. The coal is of good quality. The whalers commonly use it to burn in their stoves. I have had pieces of it. It is bituminous coal of the carboniferous age, the same as the Pennsylvania coal; and it is the only carboniferous coal there is on the entire west coast.

Q. How is the Asiatic coast?—A. It is entirely bare of wood and coal. The bottom of the sea a little farther north of the point I mentioned, seems to be made of coal. I noticed in places that the ice had shoved up on the land blocks of coal half as large as that desk [indicating desk], and the whole beach, in places, was made of fragments of coal. Up by Point Belcher, where I saw that, the coal does not come to the surface on the shore.

Q. Have you found fossils to any extent along there?—A. There are a good many carboniferous fossils, mostly corals. I brought down quite a number, and they are now at the Smithsonian, but I have not examined them particularly. They were reported by Beechey and also by Greene, and in the appendix to Beechey's report some of them are described.

Q. What do you think is the best arctic clothing?—A. I think that good, warm underclothing of some stout, heavy woolen material is the best, and outside of that there is nothing that is equal to deer-skin dressed with the hair on.

Q. Is it easily found?—A. No, sir; not very. I have no doubt that you can get in New York a certain number of deer-skins before starting, but in Alaska, and particularly at St. Michael's, which has been the general depot for deer-skins, the supply fluctuates. Some might be got there; but I do not think it would be safe to rely upon it.

Q. Can they be gotten at San Francisco?—A. No, sir; I think not, unless you happen to be there in the autumn. Then those deer-skins that are received from the north come into San Francisco and are taken possession of by the various fur companies and immediately sent away to be tanned or otherwise used. At this season you would not find any deer-skins there, I presume, except dressed ones. I think a good deal of the outfit can be got in Petropaulovski. If the vessel went there it would be early in the summer when they would not be needed, so that the inhabitants could dispose of what clothing they had on hand and could supply themselves before the winter came. If a party were going out and wished to provide themselves as they ought to be provided, I should advise them to take along a quantity of sheep-skins. They are not so good-looking as deer-skins, and not quite so comfortable, but they are practically as good for the purpose, and you can get them anywhere in good condition and have them tanned before you go, and they can be made up by the natives, who make up clothing well.

Q. Where would you get the sheep-skins—in San Francisco?—A. I presume they could be obtained there; but I imagine the easiest way would be to get them in New York and send them.

Q. What is the disposition of the natives?—A. The natives along the Asiatic coast are very harmless and generally very friendly. When they get liquor they are not reliable and are liable to do almost anything. The natives at East Cape have a bad reputation. I do not know whether it is deserved, or not; but they are supposed to be rather ill-inclined. I never have had anything to do with them without getting along very easily. I think there will be no trouble at all. I think they would be disposed to be suspicious of a large body of people coming into their country without being told what their object was. I think that unless a party came to them in such a way as to make them understand what they were after, they would be very likely to refuse to supply them with food and would carry their deer off into the country. But so far as they have food and their suspicions are not aroused by something they do not understand, they are generally very hospitable, friendly, and disposed to help in every way. From them Nordenskjöld derived the larger amount of his fresh provisions. They catch fish through the ice in winter (a sort of fish somewhat like a codfish) and they have large herds of deer. Of those Nordenskjöld used to supply his table with fresh provisions at least once a week through the winter by purchase from them.

By the RECORDER:

Q. What are the best articles to use in purchase?—A. Very few, and those of good quality. Heavy unbleached cotton drill a yard wide, powder, lead in small bars (the people supplying material to the traders have it, soft lead), shot, caps, gun-flints, fish-hooks, needles, camp-kettles, a few axes and knives, and tobacco. You can buy anything you want with liquor; but respectable people do not take that, and I do not

suppose that would be taken into consideration. Black navy tobacco—and also a poor quality of tobacco—that comes in ounce plugs is very good for trading, and they will also take a little Kentucky leaf tobacco, which they grind up into snuff.

By the PRESIDENT:

Q. Do they care for tea?—A. No, sir; very few of them have ever seen any tea. They do not seem to care for anything in the way of food, except hard bread. Hard bread is a very good article to trade, but a party going up there would probably want to keep it themselves. The whalers trade away large quantities of hard bread every year. It does not cost them very much, and the natives are quite fond of it. It does not buy much in proportion to its bulk, and it is really worth more, in exploring expeditions, to eat than to trade.

Q. How about subsistence by hunting game on shore?—A. There is not very much except in the spring. After the spring commences and before the ice opens—from May until the middle of July—there is a good deal of game in the way of wild fowl. Large quantities come to breed on the low flats along the Arctic coast. But the deer are nearly all tame and belong to the natives. Those can be bought, but they cannot be hunted. There are wild deer, but they are not very abundant. There are wild sheep in the mountains, but I am taking into consideration the fact that the party will be near the northern coast. In Plover Bay there are wild sheep very much like our Rocky Mountain sheep; bears, foxes, and I think a few wild deer, but not many of them. At all events there is good hunting, but that is in the mountainous regions. On the open plains off the upper part of the Arctic coast those animals are not found. There are some polar bears, but they live more on the ice, where they can get seals, and do not come on land very much.

Q. You think there would be no difficulty in getting some natives to go along with the sledges and dogs.—A. I think there would be no difficulty at all; but I would not rely on the natives that live in that vicinity for driving.

Q. Have you been in Petropaulovski?—A. Yes. I think likely you could get men there. It is not very difficult to drive dogs, and most people learn how in a short time; but it would be well to have some one along who understood it.

By the RECORDER:

Q. What is the style of harness?—A. The natives use one kind and the Russians use another. The native harness is the best. It consists of three loops coming together. I can illustrate it with a piece of string. [After doing so.] You will have no difficulty in making it. Anybody can make a harness out of a piece of seal-skin in five minutes after seeing it. You can make them with a piece of canvas, also. I think very likely there are some specimens at the Smithsonian. At all events it is something that requires no provision. You can make them at any time. They are generally made out of a piece of bear-skin, or something with fur on it, so that it will not chafe the dogs. I have made them out of canvas covered with flannel. That did not catch the ice and snow as the hair of the native harness does. I found in my own case that the dogs pulled better by harnessing them tandem as the English do—a band over the neck, two traces, and a piece coming between the legs attached to the trace on each side, and a belly-band—all, of course, being quite loose. That is the way the Hudson Bay men harness the dogs. But the natives have the more simple harness. Where you have a large number of dogs attached to one sledge, the native harness is the only one that is not likely to get tangled up.

By Surgeon KIDDER:

Q. What weight is it considered prudent to put upon a single sledge for long expeditions, lasting some days or weeks?—A. That depends entirely upon the kind of sledge. The English expedition loaded themselves down with, I think, something like 1,800 pounds on each sledge.

Q. With only 8 dogs?—A. They had no dogs at all; the men pulled them.

Q. You are speaking of the Nares expedition?—A. Yes. I think their plan was entirely unsuited to accomplishing anything. They had too many unnecessary things, and what they had was too heavy. They do not seem to understand making anything light and strong at the same time. Everything I have ever seen of the English has been too heavy and inconvenient.

Q. What weight can we prudently put on one sledge with one man?—A. We used to count 100 pounds to a dog and 100 pounds for each man that went with the dogs. If you had 5 dogs you could take 600 pounds on the sledge, without counting the weight of the sledge. That is good, easy traveling weight. They can take a little more. They can take 125 pounds. If they are not pushed too hard and are properly fed there would be no difficulty in taking that amount. If they are going to be worked hard, and you have not dogs enough, it is rather too much.

Q. Bearing in mind the great importance of economizing space and not increasing the number of articles, what kind of food is best to take on sledging parties for the

men to eat? What has experience shown to be the staple?—A. The English have made a good deal of use of pemican, and I think that something of that kind is a very good staple. I do not mean exactly English pemican.

Q. Have you used it?—A. I have not, but I have always heard it was very disagreeable and at the same time sustaining. Good pemican can be made that is not disagreeable. A little spicing or flavoring in it will make all the difference between its being barely eatable and refreshing. I think it is very important to be able to have something hot. It is not necessary to have the pemican hot, but there should be a little portable arrangement, with an alcohol lamp, or something of that kind, by which you can give the men hot chocolate or hot tea. It does them more good than anything else they have.

Q. From your own experience which should you prefer, chocolate or tea?—A. I should say tea.

Q. Is it more sustaining, as well as more agreeable?—A. When a person is worn out with a hard day's work and is cold, chilly, and damp, a cup of hot tea is worth more than anything else in the world that I know of.

Q. What food did you take?—A. We usually lived on the same food that the dogs had; dried salmon; but it destroyed my digestion and I have never had any stomach since.

Q. Are outfitting supplies of this sort to be procured in San Francisco? Is there any place where they can make pemican there?—A. I do not know; but I presume there would be no great difficulty in making it anywhere. I think it would be cheaper to have it made here, and it could be made probably under more strict supervision. Everything in San Francisco, that is intended for a government expedition especially, is very dear, and there is always a tendency not to furnish the best quality, or the quality called for by the specifications.

Q. It is not so good a market on the whole?—A. You can get good things there; but they are not disposed to give them to the government if they can get anything else off. I think it would be advisable to procure the supplies east.

By the PRESIDENT:

Q. Can you think of anything else to say?—A. I might say something about the use of stimulants. I believe that for the good of all it is very desirable not to have them, or at least only to have them in the way of medical stores, and that they should not be habitually given out. The only men who escaped from scurvy on the Nares expedition were one or two teetotalers they had along.

By Surgeon KIDDER:

Q. Did you use alcohol for your cooking?—A. I never was so situated that I could not get wood.

Q. Do you know anything about the use of petroleum, or whether it has been used?—A. I do not know whether it has, or not; but there is this advantage in alcohol, that it does not vitiate the atmosphere in the way petroleum does. If you are confined in a little tent with a number of people put together in a small space for warmth, you want to keep the air as pure as is consistent with warmth. I never have seen any petroleum arrangement that did not render the air almost unbreathable. Alcohol does not do it. I presume some sort of spirit can be provided for burning that would not be suitable for drinking.

By Lieutenant-Commander WHITE:

Q. Where do you think the Jeannette is?—A. Of course my opinion is worth very little, but I think the Jeannette is to the southward of Wrangell Land, rather than to the eastward. I had some conversation with Lieutenant De Long before he started, and from that I gathered that his intention was to reach the southwest extremity of that land if he could, and proceed from there overland. I know that the general result of the instruction from Mr. Bennett was that if De Long could thoroughly explore Wrangell Land he would be perfectly satisfied; and I think that was pretty much all De Long had in view, and that if he could he would go to the westward of Wrangell Land instead of to the east. He did not reveal his plans to me or to any one, but the inferences I drew from his conversation were to that effect.

By Lieutenant RANDALL:

Q. Would not Herald Island be about the position he would look for assistance to come from? Would he not be likely to work down in that vicinity if he got on shore, knowing that whale-ships go there every year?—A. I think very likely he would. I do not think he would attempt to reach the island, but probably to get to the nearest point on Wrangell Land to Herald Island. Captain Owen, of the Mary and Helen, told me last summer that he was with De Long as mate when he made a trip there, and he was near enough to see the shore of Wrangell Land very distinctly. Although there was broken ice between them and the land, still he was near enough to see from the masthead what the character of it was. Up there you can always tell by one un-

failing sign of the presence of a village, whether it is now inhabited or has ever been perhaps within five hundred years. Wherever a village has been, there is an immense quantity of dirt, bones, rubbish, and filth of all kinds, and that makes a mass of material which is more fertile than any of the natural soil. Upon that the grass first turns green in the spring and stays green all summer, whereas, ordinarily, it is yellow and brown very soon. In these spots it is green until the snow comes. Anybody who has ever seen one will recognize them as far as he can see. I have found them in the Aleutian Islands and other places, where the villages have not been inhabited in the historic period at all; and yet the bones, &c., made a great mass like an immense manure heap, which kept the vegetation green all summer. I asked Captain Owen, particularly, and he said that although he looked sharply he saw none of these green places and no evidence of any inhabitants. He is one of the most intelligent whalers I ever met, and the only one I ever heard of who had enterprise enough to take the sea temperatures occasionally. I have some of his log-books.

E.

JEANNETTE RELIEF BOARD.

Statements of Prof. Cleveland Abbé and Lieut. A. W. Greely, U. S. A., both of the United States Signal Service.

NAVY DEPARTMENT,
Washington, D. C., March 16, 1881.

Prof. CLEVELAND ABBÉ, of the United States Signal Service, and Lieut. A. W. GREELY, U. S. A., Acting Signal Officer and Assistant to the Chief Signal Officer, appeared before the Board.

Lieutenant GREELY. I have had considerable experience in tracking storms and in examining the tracks of those that have been charted by the men in our office. Among those have been many that have passed northward over the Aleutian Sea into the Arctic region. I have here a series of maps which have been published by our office from month to month. On examining them it will be seen that, as a general rule, storms in that region move from the southwest to the northeast. They pass almost invariably to the eastward of Behring's Strait. As a natural consequence the winds that prevail north, where the Vega lay, near Wrangell Land and Herald Island, and in that region, should be between the north and west. The prevailing wind there should be a northwesterly wind. That is also shown from Professor Dall's charts of the meteorology of that region. The opinion is further borne out by the published reports of the expedition of the Vega, to which allusion is made in the Weather Review, and also in a German publication which Professor Abbé has. In the Review it is stated that the surface winds were almost constantly between NW. and NNW. That covers from October, 1878, to June, 1879. The observations are supplemented by other data showing that the storm tracks which passed by the Vega went, as our charts here show, to the eastward. Those are the essential points. The mean temperature during the winter of 1878-'79 was very low north of Behring's Strait, being for the months of January and February, 1879, on an average 13° below zero. That winter was an exceedingly severe one, as is shown by the report of our observer at St. Michaels, Alaska.

Lieutenant-Commander WHITE. That was De Long's first winter.

Lieutenant GREELY. Yes. Here is what the signal observer reports [reading]:

"The past winter was one of unusual severity. Long-continued cold weather prevailed during January, February, and March, 1880, accompanied by severe gales and much snow during the two latter months. The natives report that no winter of such severity has ever been known by them. The temperature at Fort Alliance, 400 miles south of Fort Yacoun, reached -69° . * * * The natives barely escaped starvation, being compelled in some cases to eat their dogs. * * * The spring was from 10 to 15 days late."

The PRESIDENT. What do you use for recording the temperature?

Lieutenant GREELY. As far as possible, a mercurial thermometer. In very cold weather, say 40° below zero, we would have to use a spirit thermometer. Such temperatures are not common.

The PRESIDENT. Was not that excessively cold winter exceptionally mild here?

Lieutenant GREELY. I cannot say with regard to that. The temperatures for February, 1880, were decidedly below the normal on the entire Pacific slope to the westward of the Rocky Mountains. To the eastward the temperature was above normal, but not markedly so. January, 1880, was an unusually warm month in the eastern part of the United States. On the Pacific slope it was about on an average, taking

the whole slope through. During the same months, though, it was unusually cold on Hudson's Bay. In December, 1879, the temperature was decidedly below on the Pacific coast and decidedly above on the eastern half of the United States. I do not think that we have sufficient data to say that there is any constant relation between the temperature of Alaska and of the interior of the United States. Professor Abbé has had more experience and has studied more on that subject than I have, and he is better able to say. I would not like to say from my own studies and examinations. I have done considerable work in that direction, but not nearly so much as Professor Abbé.

Professor ABBÉ. As I understand it, you wish information, as far as possible, with regard to the winter that the Jeannette has experienced. I suppose it will be best for me to confine myself to deductions from actual observations made in that neighborhood rather than to give any theories. I think we have observations enough to give us some knowledge of what has been going on up there in the last two years, beginning with the winter of 1878-'79. We have for that winter the full daily reports (hourly observations, in fact) of the Vega, commanded by Nordenskjöld, which wintered within a few hundred miles of where the Jeannette may be supposed to be—in a spot called Serdgekamin, in latitude $67^{\circ} 3'$ north, longitude $171^{\circ} 32'$ west of Greenwich. The vessel was in the ice there from September 28, 1878, until July 18, 1879. I believe the Jeannette must have gone into winter quarters in the autumn of 1878.

Lieutenant-Commander WHITE. 1879.

Professor ABBÉ. Then that simplifies the question. This is as regards the winter before her first. As regards the winter of 1878-'79 we have very full details. That is one of the very few winters of which we have details. We cannot say that the winters of 1880-'81 was colder or milder than the average, simply because we have nothing to give us an average except the three years. Then we need only remark with regard to the winter of 1878-'79 that it does not appear to have been unusually severe in the region where the Vega wintered, which was near where the Jeannette afterwards was. The highest temperature during this winter was, according to their reports, $+3^{\circ}$ centigrade on the 24th of June, 1879. The lowest temperature was $-42^{\circ} 07$ centigrade on the 25th of January. That is about -45° or -50° Fahr. The winds in that region were between the WSW and WNW, and the average would be very nearly WNW. The reports of this expedition, as well as of previous explorers who have been there, and all our theoretical considerations, show that, that region is one of extremely variable weather. There are no five or ten days of uniform weather at any season of the year, especially in the winter. The days are reported to be of remarkably great variety, on one day the highest possible pressure and on another day the lowest—up and down. The statistics given in some detail show a remarkable variety of weather. The abnormal irregularities are so great that it would be impossible to get an average of pressure and temperature for the months and years, unless you combine a great many years of observation. My statement is based upon the semi-official report of the meteorological and physical observations made during the wintering of the Nordenskjöld expedition near Behring Strait in 1878-'79, published in the eighth volume of the *Annals of Hydrography and Maritime Meteorology* for 1880, by the Hydrographic Office of the Admiralty. So much as regards the winter of 1878-'79. With regard to the winter of 1879-'80, I think that Lieutenant Greely has already given you the statement of our observers up there which is conclusive that in Northern Alaska (and we may safely presume that would also be true of Wrangell Land and the sea between) that winter was one of unusual severity. The natives reported that no winter of such severity had ever been known by them. The temperature at Fort Alliance was -69° Fahr. Migrating birds were from 8 to 10 days late. This severe weather relates almost entirely to Alaska and the land, and the only circumstance which would make us think that Wrangell Land and the Jeannette may have had a less severe winter would be the fact that when severely cold winds are drawn over the interior of Alaska they must be drawn thither from the SE. by reason of storm-centers to the NW. of them. That implies, I think, that the Jeannette must have experienced during the winter of 1879-'80 severe storms of wind, and I should have every expectation of finding that she had severe changes of temperature. We have no actual observations from that region since March, 1880, to my knowledge.

Lieutenant GREELY. We have only one that is later than that.

Professor ABBÉ. Our communication with that regions is but once a year, and these reports came down last autumn.

The PRESIDENT. Do you keep a man there to observe the weather?

Professor ABBÉ. We have had a man at St. Michaels for five years, I believe. We have another man in the southern part of Alaska, on the Aleutian Islands. We have sent another up to Sitka, and another is about starting for Point Barrow. We are occupying Alaska as fully as circumstances seem to require.

Lieutenant GREELY. I made the abstract from the report of the observer at St. Michaels, to which Professor Abbé has referred. The observer wrote at considerable

length with regard to the severity of the weather, but I only selected such points as I thought more especially of interest. He dwelt strenuously and particularly upon the extreme cold. He is a man of very unusual intelligence, and an enthusiast in the way of research. He was selected especially for this work by Professor Baird, of the Smithsonian, and used unusual efforts to obtain data regarding the winter and climate; and I think his statement is entitled to a good deal of weight for that reason. At Unalaska, in April, there were a number of storms of quite marked violence, which passed up over the Aleutian seas.

Professor ABBÉ. I have come down to the winter of 1879-'80, which is, I think, the last for which we have reports from our own observer in Alaska. For the present winter the best we can do is to refer you to the daily international weather maps for the whole northern hemisphere. Here is a bundle [producing them] for the months of March and April, 1879, showing the actual weather prevailing throughout the northern hemisphere, so far as reports have been received.

The PRESIDENT. Who co-operates with you in these reports?

Professor ABBÉ. Every civilized nation of the globe, and every department of the United States Government. Besides these maps we also publish a separate chart showing storm tracks of the storm centers; and this chart would show us about how many storms have passed up into the region of Behring Strait. The paucity of our information from that neighborhood would, I think, prevent us from making any estimate of the relative weather that they may have experienced. We have another way of looking at the weather—by means of monthly averages: the average pressure and temperature over the globe for each month. As near as I can form any estimate of the weather in that out-of-the-way part of the world, the winter of 1879-'80 was unusually severe; and the winter of 1880-'81 was not more severe than that experienced by the Vega in 1878-'79. There are three winters in succession, the middle one severe, the two extremes not remarkably so.

The RECORDER. Have you data enough to state the prevailing winds?

Professor ABBÉ. Yes. They vary slightly between W. and WNW. I think, without doubt, they would always be W. or WNW.

Lieutenant RANDALL. Do you consider that the cold increases as rapidly after reaching 70° north as it does this side of that latitude?

Lieutenant GREELY. I do not think it does.

Professor ABBÉ. The most rapid increase is between 40° and 70°.

Lieutenant RANDALL. Do you not suppose that between 70° and 80° there would be very little difference in the temperature?

Lieutenant GREELY. I think the temperature between 70° and 80° depends largely upon the surroundings. One locality in 80° may be as warm as another in 70°. The configuration of the surrounding country has much to do with that.

Lieutenant RANDALL. Would not the fact of wind coming off of the ice increase the temperature?

Lieutenant GREELY. I think that temperature coming entirely from the ocean would be warmer than that from the land.

Professor ABBÉ. I think there is no doubt but that the coldest part of the northern hemisphere is in Northern Siberia, on the northern part of British America, and not in the Arctic Ocean region.

Adjourned until to-morrow morning at 11 o'clock.

E. D. EASTON,
Stenographer.

E'.

NAVY DEPARTMENT,
Washington, March 17, 1881.

SIR: I have received your letter of this date, in which you say that the Board of which you are president would like to consult certain experts in regard to Arctic matters, and ask if their actual expenses will be paid if they come to Washington for that purpose.

As the number will probably not exceed half a dozen, the department will pay the actual expenses of those whom you may desire to consult and who may come to Washington, at your request, for that purpose.

The Board will detain them only so long as may be actually necessary, and the term "actual expenses" will cover such expenses as are usually allowed.

Very respectfully,

WILLIAM H. HUNT,
Secretary of the Navy.

Rear-Admiral JOHN RODGERS, U. S. N.,
President of Board Relief of the Jeannette, Navy Department.

F.

NAVY DEPARTMENT,
Washington, March 17, 1881.

SIR: Please have put into the steamer *Mary* and *Helen* steam-heaters for the purpose of warming the vessel; also a small distiller to give fresh water for the crew, both to be connected with the donkey-boiler.

Please also have a steam-pump so fitted that it can be used in cases of emergency to pump out the vessel.

As the appropriation for all purposes is small, economy is necessary in all expenditures.

The length of the vessel is 154 feet with 30 feet beam.

Very truly yours,

JOHN RODGERS, R. A.,
*President of Board.*Engineer-in-Chief WM. H. SHOCK,
United States Navy.

F.

Copy of extracts from letters written by Lieutenant-Commander De Long.

AT SEA, latitude 41° 58' N., longitude 136° 01' W., *July 17, 1879.*

Then, if the season is still favorable to an advance northward, I shall make for Kellett Land, and follow along its *east* coast as far as we can go.

If everything is all right with Nordenskjöld, and I hear of it, there will be no necessity for our going to St. Lawrence Bay at all. In this case I shall push through Behring Strait at once and make for the *east* side of Kellett Land, following it as far as possible and getting to as high a latitude with the ship as we can before going into winter quarters. If our progress is uninterrupted for some distance, I shall content myself with one landing, at first on the southeast point of Kellett Land, where we will build a cairn and leave a record of our progress to date. If our progress is interrupted, we shall no doubt make frequent landings on Kellett Land, and build several cairns, but, generally speaking, I shall endeavor to build cairns and leave records every 25 nautical miles of our track.

Of course you will understand how impossible it is for us to make any plan when we do not know what we are going to find. But as a ship might be sent for us next year, I must try to give you some idea of how we shall work. If we winter in a harbor, I shall make efforts to get further north with sledges in the fall and spring, and as soon as the ice frees us next summer I shall push the ship still further, wintering again wherever God lets us. Of course, if we get no harbor this winter, and have to winter in the pack, no one can tell where or how we shall bring up, or where to look for us.

In the event of disaster to the ship we shall retreat upon the Siberian settlements or the natives of around East Cape, and wait for a chance to get back to our depot at St. Michaels.

If the ship comes up merely for tidings of us, let her look for them on the east side of Kellett Land and on Herald Island. If she comes up to follow us, when she gets to the last of our records on Kellett Land, she may be sure we have been drifted off to the eastward, unless otherwise informed. If I find we are being carried east against all our efforts to get north, I shall try to push through into the Atlantic by way of the east coast of Greenland, if we are far enough north, and if we are too far south, then, by way of Lancaster Sound, into Melville Bay.

ST. LAWRENCE BAY, SIBERIA,
August 27, 1879.

I have interviewed the chief who saw the steamer several times since, and I have about come to the conclusion that it was Nordenskjöld's steamer that he saw. * * *

When I telegraphed the Secretary asking if the rumors concerning the Swedish expedition were reliable, he referred to the Secretary of State. This Secretary telegraphed to our minister at Stockholm, and the minister telegraphed back that Nordenskjöld, when last heard from, was at Cape Serdge Kamen, and was to leave in May. Now, Cape Serdge Kamen is 130 miles from here, and there is a settlement on the cape. I have decided to go there and make an inquiry, and if I find the Swedes were there and have left, I shall push for Wrangell Land at once.

We have nearly 160 tons of coal and all our provisions in the ship, and we can afford to steam a great deal yet.

G.

WASHINGTON CITY, *March 18, 1881.*

Rear-Admiral JOHN RODGERS, U. S. N.,
President Jeannette Relief Board:

DEAR SIR: I have just received your letter of yesterday, wherein you inquire whether I gave any written or verbal instructions to Captain De Long for his guidance during his voyage in the Arctic Sea with the *Jeannette*, or whether I gained from conversation with him any definite idea of his plans such as would guide the relief expedition in its search.

On June 18, 1879, I issued official instructions to Lieutenant De Long, reciting the action of Congress and directing him to proceed with the *Jeannette* to Behring Strait, leaving the details to his experience, discretion, and judgment. At that point he was instructed to inquire concerning the fate of Professor Nordenskjöld, and, if he had reason to believe him to be safe, to proceed upon his voyage to the North Pole, that being considered the great solar problem to be solved by the expedition; if otherwise, he was directed to extend to him all necessary aid and relief in his power, according to his discretion.

It was not deemed practicable by me to designate, in the instruction to Lieutenant De Long, any point at which he should touch after leaving Behring Strait, as his course beyond there would necessarily depend upon circumstances which could not be anticipated. In conversation with him, however, it was understood by me that he expected to reach Wrangell Land before the winter of 1879-'80 set in, and that he would employ his best energies to accomplish that object. If he succeeded in doing so he expected to winter there, and when the spring of 1880 opened to advance into what he hoped would soon turn out to be the open waters of the Arctic Sea.

I refer you to my last annual report as Secretary of the Navy for my opinion with reference to his probable movements since he was last heard from. That opinion, of course, is not sufficiently reliable to become the basis of further official instructions, but it was formed upon what seemed to me the best information within my reach.

Very respectfully yours,

R. W. THOMPSON.

H.

JEANNETTE RELIEF BOARD.

Statement of Prof. Thompson B. Maury, formerly of the United States Signal Service.

NAVY DEPARTMENT,
Washington, D. C., March 18, 1881.

Prof. THOMPSON B. MAURY, formerly of the United States Signal Service, appeared before the Board and gave information as follows:

Professor MAURY. I have been engaged mainly in the study of international meteorology and geography for the last few years; and I thought that possibly I might be of some little service with regard to questions that might arise concerning the meteorology of the regions north of Behring Strait.

The PRESIDENT. We are a Board assembled to devise some plan for the relief of the *Jeannette*, and we should like to know something of the meteorology and currents of the Arctic regions as you know them.

Professor MAURY. I ought to apologize to the Board for coming before it without having had an opportunity to study carefully the international weather maps for September and October, 1879, when the *Jeannette* was seen moving toward Wrangell Land; I think she was last seen the 3d of September. My studies, so far as I have been able to follow them up on that point, amount to about this: I think that in September the *Jeannette*, after she was last seen by Captain Kelley and the whalers that were then around that part of the coast, encountered two or three southerly gales. We know that the Austro-Hungarian exhibition observed the advance of the gales late in the fall of 1873 on the other side of the continent, and Wæikof, the Russian meteorologist, in his Smithsonian contributions states that southwesterly gales advance over Russia even in the autumn as far as Yakoutsk. While I have not been able to examine the September international weather charts, I think that the *Jeannette* must have had, after the 3d of September, two or three southerly gales. Probably, in the long run of the month of September, the winds were very nearly balanced. I do not think that northerly winds prevailed off the east and south coast of Wrangell Land in September; I think the winds were very nearly balanced.

The PRESIDENT. What do you mean by balanced?

Professor MAURY. That is, the northerly and southerly winds. I think they exceeded the easterly and westerly ones. But I think that towards the close of September the northerly winds began to be ascendant. In October, I think, we can define pretty accurately what were the wind conditions on the coast of Wrangell Land. The barometer all through October was exceedingly low along the Pacific coast so far as the observations extended, and over the northern part of this continent as far as we have any information. I have not any doubt that the Jeannette experienced, during the early part of October, a considerable fall of temperature and strong northerly and northwesterly winds. Before any information had been received from the Jeannette as to the prevalence of northwesterly winds at that time, I wrote an article based on the barometric reports from the Pacific coast and the interior of North America, showing a remarkably low condition of the barometer all over the continent in the month of October. I wrote an article predicting that she would have northerly and northwesterly winds in that month. We know that Captain Bauldry of the *Helen Mar*, and several of the whalers, reported the prevalence of northwesterly winds off the SE. coast of Wrangell Land. I think that the effect of those northerly winds undoubtedly was to open a navigable sea for her during the first ten or fifteen days in October, 1879. I think she must undoubtedly have made some progress, although I do not share in the opinion that has been expressed that she made any latitude as high as 78° . I do not think that is likely. I think she certainly made some progress up the eastern coast of Wrangell Land in October, if not in September, 1879. The question that has interested me largely has been that of the geographical extension of Wrangell Land. I have made some little effort to get at that in a rough way; the materials are very scanty. I suppose that Wrangell Land undoubtedly extends somewhat to the east of any point that is marked down for it on the charts. There are a number of reasons for such a proposition. I might apologize for making the statement with this remark, that it is not original. It was made by the president of the Royal Geographical Society in 1850. You will find that in his annual address. Captain Smith, afterwards Admiral Smith, I think, reasoning upon Kellett's and Moore's observations of those seas, suggests, and very strongly, too, that Wrangell Land, or some land in that longitude, extends across nearly to Bank's Land. Indeed, he says it is by no means improbable that there is a continuous coast line from New Siberia, in the west, to Bank's Land, in the east. That is, of course, somewhat, and perhaps entirely, conjectural. If we notice the fact, pointed out many years ago, first, I believe, by Von Buch and Beaumont, that all the land in both hemispheres tends to form peninsulas pointing to the south, we might suppose that Wrangell Land, as now known, is the peninsular extension of a considerable body of Arctic land. I notice that the Ural Mountains, as they approach the Arctic Sea, throw out an extension in the form of Nova Zembla. You will observe that Nova Zembla is manifestly an extension of the Ural chain. Now, the Kalloni Mountains approach the Arctic coast somewhat as the Ural do, and I think on analogy it is to be expected that this chain of mountains, as it approaches northeastern Siberia, throws out a body of land to the northeastward. I have sought to get at that question from another point. In 1850 Collinson ran up, I think, to 73° or 74° . We have nothing definite from him that I know of, though that is a point which I think ought to be carefully investigated—what observations he made when he was at a point north of Icy Cape to about 73° . He probably had some wind observations, and also some ice observations. I throw that out for your information, as I suppose you can get Kellett's and Collinson's dispatches published in 1850 in London.

But there is one other fact to which I would like to call your attention. In 1851, when McClure was running up on the east side of Bank's Land, his winter, he says, commenced the first of September. He thought they were going to have winter then, as it began to look pretty ugly. He goes on to say that from the 1st to the 10th there was no improvement, and the weather was very cold, but in the middle of October, after he had made the highest point that he made in 1851 on the east side of Bank's Land, they had a spell of very warm weather, with northeasterly winds. He observes that those northeasterly winds indicated very distinctly the warm air that came from Barrow's Strait and Melville Sound; that is, the body of water lying south of the Parry Islands. He could not get up Prince of Wales Strait and had to return, and in the summer of the next year he went back, rounded the southwest point of Bank's Land, and passed up on the west side of Bank's Land. He says that on the 1st of September the wind struck him keen and severe from the northwest—a fresh northwest wind—and that steadily, as September passed on, the weather became colder and severer. The November temperature was excessively low, lower than I have ever seen recorded for any such latitude in the arctic regions. I think it was -40 . In January, 1852, the temperature was still lower—almost incredible. He had on the 9th of January -69 . For 24 hours the thermometer was never above -40 , and the cold was nearly equal to what Nares found at Floeberg Beach, which is the lowest recorded temperature of any Arctic expedition we know of. Now, how could they get such a low temperature on the northerly coast of Bank's Land? I have seen it stated that they did have that

low temperature with southerly winds. I can understand how Nordenskjöld reported that some of his lowest temperatures were with northwest winds from the Siberian plain, but how McClure could get -69 with southwest winds is, I think, incredible. He could only get such a temperature with southwest winds from Arctic America. But the conditions were entirely different in Mercy Bay from what they were in Nordenskjöld's winter quarters. I think that that low temperature undoubtedly indicated the absence of any open sea northwest of Bank's Land; and while there may be a paleocrystic sea at that point, I think the indications rather are that there is a high, mountainous land to the northwest of Bank's Land in the Arctic Ocean, and that that temperature came to him pretty much as the low temperatures come on the eastern side of the Rocky Mountains, in the Missouri Valley. Of course these are all conjectures. I think you will see why I throw them out. To put together what has been said, if one or two equinoctial gales struck the Jeannette on the south and east coast of Wrangell Land, in September, 1879, she possibly made some northing. If in October the east coast of Wrangell Land was cleared of the drift-ice, supposing she made some progress in that direction and got up to 75° north latitude, the question arises whether the search expedition, instead of going over from Behring Strait to Herald Island and then striking the southeastern extremity of Wrangell Land, and working by sledges up along that coast, would not be more likely to succeed if the vessel left Behring Strait in June or July early, struck off to the east of the meridian of Behring Strait (I would not say quite as far east as the meridian of Icy Cape, but at any rate somewhere to the east of Behring Strait) and then moved up to strike the coast of Wrangell Land, if it projects in this direction as Nova Zembla does, and is a counterpart of Nova Zembla. The Jeannette must have made as she went around some progress up that coast in October, 1879. I think if open water could insure her progress, that she had it. I hope you will excuse my strong language; I use it simply to make myself understood, and do not wish to appear dogmatic.

There is one other consideration that I would add to this. If the vessel passes Behring Strait in June, I believe that she could then take a course to the east. I would not say to the east of Icy Cape, but she could run due north of Behring Strait, I believe, better than she could to the westward, from Behring Strait to Herald Island or Wrangell Land. In June and the early part of July the pressures on Arctic America and on the whole continent have just begun to give way—that is, they have just begun to break up with a rush—and up to about the middle of July I suppose that southerly winds would drive the ice north of Behring Strait, and north of Icy Cape, very much out of the track of a vessel. I do not say a vessel would escape all ice. I believe she would get into a good deal of ice; but it seems to me more reasonable for her to expect to make latitude due north of Behring Strait, or even as far east as the meridian of Icy Cape, than to go west of Behring Strait. If you will notice the charts you will observe that almost all the advances of Wrangell Land have been made in August. [To the President.] I believe your visit was in August.

The PRESIDENT. We did not see it.

Professor MAURY. You approached it in the month of August?

The PRESIDENT. Yes.

Professor MAURY. I think we can easily see why it is that the east coast of Wrangell Land is freer in August than in June. The pressures over the continent here are then getting to their minimum, and of course there are northeasterly and northerly winds becoming more frequent. They drift the ice to the SW. McClure notices that fact—a dense accumulation of ice to the SW., at the mouth of the Mackenzie and just above, in 10 miles square there. I think that if a vessel started from Behring Strait in June and made a direct course toward Wrangell Land she would probably be greatly delayed and encounter a good deal of ice—a great deal more than she would in August. I think she would encounter less ice to the east of Behring Strait in June than she would to the west of Behring Strait in June.

The PRESIDENT. I have no doubt that is true. That is the experience.

Professor MAURY. I am not competent to say just exactly what the experience of navigators has been, but I only draw that deduction from meteorological premises. I would add one word: John Richardson refers with a good deal of emphasis to the fact that the great Polar stream passes north of Parry Island and down here [indicating on chart], and that that is the descent of the Polar stream. Why does it not descend here [indicating] instead? There is a good deal of ice, but I do not think there is as much ice here [indicating] as there is over there [indicating]. That, I think, is an indication that there is some land there, some insular region that obstructs the flow of ice to the southward. You have probably conferred with Professor Dall with respect to the currents in Behring Strait and the supposed extension of the Kuro-Siwo. I read with a good deal of interest his communications, one in the Royal Geographical Society Report, I think, for December, and another in the American Journal of Sciences, I think. I do not understand that he assumes to cover all the ground, but considers that the observations are not yet sufficient to settle the question. I have noticed two things that bear somewhat upon this point. Behring Sea is, on a small scale, just

what the Gulf of Mexico is—the birthplace of an ocean current. The whole wind system of the North Pacific coast, it seems to me, would tend to force a slight head of water up into Behring Sea. But there is this remarkable fact to be noticed: the mean barometric pressure of the North Pacific, and especially the eastern side of the North Pacific, in summer is about 30.10, whereas all north of Behring Strait the pressure which we know anything about is not above 29.70. Now we know, too, that in July, 1879, for instance, a permanent area of high pressure rested upon the northeast side, and in fact on the whole eastern side of the North Pacific. You will find a notice of it in the Signal Service Monthly Weather Review. The data they had at least justified them in saying that if they could be relied upon as conclusive, they showed a permanent area of high pressure in July, 1879, of 30.50. That is a very high pressure. We know from Buchau's charts, which were very carefully compiled, that the pressure on the eastern side of the North Pacific, west of California and Oregon, averages in all years about 30.10, or a little over that. The pressure in Behring Sea is a good deal less, and there is still less pressure north of Behring Strait. I do not see, therefore, how we can avoid the belief that there is a current from the Kuro-Siwo. I do not say that that current is due to the Kuro-Siwo itself; but if the Kuro-Siwo were a motionless sea, if we could suppose that every atom of its water was brought to a state of absolute rest, I believe that, under the barometric conditions that exist, the water from the Kuro-Siwo would move towards the north, towards Behring Sea, and through Behring Strait. That, of course, does not bear very directly upon this question, but I believe, as Professor Dall suggests, that the Arctic Ocean north of Behring Strait may be regarded as a somewhat closed sea. I think that the circulation through Behring Strait and in that part of the Arctic Sea, from the meridian of Herald Island to that of Point Barrow, is an intestinal circulation; that is, a circulation not derived so much from forces outside of the Arctic as due to forces that are present there. The current, whatever it amounts to, whether it is sent through Behring Strait by tidal action or by wind action, undoubtedly passes through Behring Strait. Now, what effect would that independent current have as it passed north of Behring Strait? It would be a sort of polar Gulf Stream in itself, although a miniature and very feeble one, Behring Sea acting, as the Gulf of Mexico, as a feeder to this movement. Of course, I do not believe for an instant that that current amounts to anything in the way of opening a gate-way to the pole. I think the chief importance of that current is as a basis for determining the direction of the counter-current. What would be the counter-current to such a body of water flowing through Behring's Strait to the northeast. Professor Dall says there is no return under-current in Behring's Strait. That does not at all touch the question of whether there is a return current somewhere. There must be a return current somewhere. That return current, I suppose, must flow along the eastern coast of Wrangell Land—very feebly, perhaps imperceptibly, and not reported by the whalers. But if there is a current through Behring's Strait, a flow of water, a drift-current to the northeast, it appears to me that there must be a movement to balance it on the western side, and that that return current would move down very feebly and very slowly, perhaps imperceptibly, on the east coast of Wrangell Land and pass over Herald Island.

Lieutenant-Commander WHITE. Why could not this current to the northeast under-run the ice, if necessary, and then come down?

Professor MAURY. I think it does.

Lieutenant-Commander WHITE. What deflects it and brings it to the east of Wrangell Land?

Professor MAURY. I do not think it is necessary that that current should turn around and come to Wrangell Land at all. I use the words "return current" not as of the same body of water, but as a balance to that movement. If there is a certain amount of water projected into the Arctic basin from Behring's Strait to the northeast, upon a mechanical law there must be an equivalent body. [To the President.] Has there been any thought of the Jeannette moving west of Wrangell Land?

The PRESIDENT. We have not yet decided.

Professor MAURY. Mr. Bennett asked me to come to New York in September last. There had been some newspaper story of the loss of the Jeannette, and he wanted to talk with me about her. I noticed that he made this remark during the conversation: That he thought it likely Captain De Long attempted to get to the south and west of Wrangell Land. I did not attach full credence to that, because his remark was possibly suggested by a remark of my own to the effect that a number of the charts indicated a good deal of open water to the west of Wrangell Land, and that a voyage aiming at very high latitude might, with a good deal of reason, be directed along the western side of Wrangell Land. I did not know how much weight to attach to his remark, but he said that he had spoken with Captain De Long, and he suggested that he had attempted that route.

The PRESIDENT. We have inquired to know whether Mr. Bennett gave any instructions to Mr. De Long, or whether he has any opinion as to where he went. We have letters from De Long's wife inclosing letters from De Long himself, which indicate

that he was going to the eastward. This information is later than any Mr. Bennett could have except by letter.

Professor MAURY. I assume that he went to the east, and have been discussing altogether on that supposition. I thought that perhaps one question might be decided by the weather that he had on the 3d of September. If he had a southerly gale at that time I suppose he had no option, and could hardly have gotten—

The PRESIDENT (interposing). The chance weather that he may have had is too vague to shape a course by.

Professor MAURY. I suppose so; but I think in the absence of any definite information that might be one clew.

H.

JEANNETTE RELIEF BOARD.

Statement of Bernard Cogan, master of a whale-ship.

NAVY DEPARTMENT,
Washington, D. C., March 21, 1881.

BERNARD COGAN appeared before the Board and gave information in answer to questions as follows:

By the PRESIDENT:

Question. What is your occupation?—Answer. Master of a whale-ship.

Q. Have you seen the Jeannette?—A. No, sir; she went into the ice the day before I got there.

Q. When she was last seen she was going into the ice?—A. Yes, sir.

Q. Was that near Herald Island?—A. Yes, sir; close by; about southeast.

Q. About how far from there?—A. I think about 25 miles; somewhere along there; I could not say exactly, but I think it was about that.

Q. What is the character of the east coast of Wrangell Land as regards ice?—A. The ocean on the east coast is generally covered with ice.

Q. Do you think De Long had any chance to get in to shore on the east side of Wrangell Land?—A. He might have been carried there by the ice. I do not think he had any chance to steam in shore there.

Q. Then he had no chance of finding a harbor on that east coast?—A. I do not think he had at that season.

Q. The harbors would have been encumbered with ice?—A. Yes, sir.

Q. How would it have been on the south shore?—A. I think he could have got there later—to the southeast end.

Q. Is there a harbor there?—A. There is quite a deep one there. Whether this southeast end is an island, or whether it is a deep bay, like Saint Lawrence Bay, I am not sure.

Q. You think it is one or the other?—A. Yes, sir. Cape Hawaii is the only end of the island I ever saw. You can look into a deep bay there. I thought probably the end of the land was an island; still I am not sure.

Q. Has anybody been pretty close along there?—A. Nobody that I know of except Captain Long.

Q. He is now dead, I believe?—A. Yes, sir.

By Lieutenant RANDALL:

Q. Was not Captain Phillips with him at the time in the bark Roscoe?—A. In the bark Nile. Phillips was with him part of the way. I forget what vessel Phillips had.

By the PRESIDENT:

Q. Was the harbor, or supposed harbor, in the southeastern extremity of Wrangell Land, encumbered by ice when you saw it?—A. No, sir; there was no ice there.

Q. How far north have you been?—A. 73° 10' is the farthest north I have been.

Q. Was that in open water?—A. Yes, sir.

Q. Were you stopped by the ice?—A. Yes; we got up to the ice there.

Q. What was the character of the ice?—A. It was field ice.

Q. Was it pretty solid?—A. Yes, sir; quite compact.

Q. You could not have navigated through it?—A. No, sir.

Q. Could a steamer have gone through it?—A. I do not think she could have gone far into it. She could have gone a little way.

Q. In what year was that?—A. I think that was in 1862.

Q. Did you cruise along the ice, or just make the barrier and go back again?—A. We cruised up a little way to the eastward, but not far.

Q. Did the ice extend to the south, or was it in a straight line east and west?—A. It was jogging in pieces, but to the westward it was all ice.

Q. In what month did you see Cape Hawaii, at the southeast of Wrangell Land?—A. In October.

Q. How late have you ever remained in the Arctic?—A. Until the 18th of October.

Q. Is it not dangerous to stay so late?—A. Not always. If there is no ice south it is not dangerous.

Q. Was the season when you got up to 73° 10' a very open one?—A. Yes, sir.

Q. Did you ever have scurvy in your vessels?—A. I have had it on board when I wintered there.

Q. Where did you winter there?—A. I wintered in Saint Lawrence Bay.

Q. That bay is a very good one, I believe?—A. Yes, sir; it is a splendid bay.

Q. Did you enter in this little harbor protected by the sand spit?—A. Yes, sir.

Q. There was no floating ice inside?—A. No, sir.

Q. And no current?—No, sir; if the ice does come in it does not hurt anything. There is no danger from it.

Q. Is that coast often so encumbered with ice that it is difficult to make a landing there?—A. Not in the summer months. It is always clear in summer. Along about September the ice drifts down, and it is sometimes difficult to get into that bay in September and October.

Q. From your experience in the Arctic, if you were to put provisions on shore in any place for a vessel to get them that was retreating, or a party retreating from a lost ship, on which side would you put them—on the American side or the Asiatic side?—A. It would depend a good deal on where I expected the parties to come from.

Q. If they were expected to come down from Wrangell Land, or Herald Island, or along there, where would you put them?—A. On the Asiatic shore. They could not get to the other shore very well.

Q. Is not Clarence Bay, on the American side, generally more clear than the other side?—A. It is, late; yes, sir. That is generally clear until it freezes up. On the other side the ice drifts down when the current is setting north.

Q. Would you not prefer the American side?—A. They could get there very well.

Q. Coming down with a vessel or with boats, how would it be?—A. You could get to the Asiatic shore best, I think.

Q. If the harbor is filled up with ice, how could they get in?—A. You can travel among the natives if you land on the Asiatic side. We never go to the American shore if we can help it, on account of the weather. It is a bad place to lie. It blows very hard, and we have lost several anchors there, and we have got so we don't go there. We prefer the western shore when we have to get water or any business to do. We generally go to either Plover Bay or Saint Lawrence Bay.

Q. Plover Bay is more apt to be open than Saint Lawrence Bay, is it not?—A. Yes, sir.

Q. Are Plover Bay and Saint Lawrence Bay equally good harbors?—A. Yes, sir.

Q. What means do you take to keep your people from having scurvy?—A. We carry plenty of vegetables with us.

Q. What kind of vegetables?—A. Potatoes, beets, and such things.

Q. Do you carry the potatoes natural or preserved in any way?—A. We carry them natural.

Q. In old times I have been told that they would take a cask, and having first filled it with potatoes, then fill it with molasses in the interstices and put it away until they wanted to use it, and then serve out one of these potatoes every day to each of the crew. Did you ever hear of that?—A. I have seen it done, but I do not think it amounts to a great deal. We have kept potatoes in our ship all winter in Saint Lawrence Bay.

Q. Would you trust the natives to keep them?—A. O, yes.

Q. If you were to land stores there, would you trust the natives to keep them?—A. There are some natives there that would take good care of them.

Q. Do you think we will find any difficulty in getting as many skins as we want for the Mary and Helen, say 30 suits?—A. I think not, on the American side. That is the best place to get furs.

Q. Where?—A. Up around Kotzebue Sound, on the Diomedes, and up the American coast.

Q. Won't the whalers have carried off these things before the Mary and Helen gets there?—A. No, sir; they don't go there much. You can get moccasins in Saint Lawrence Bay and at the Diomedes.

Q. Can you get any quantity of them?—A. Yes, sir. They are only for summer use, though, and are not warm enough for winter.

Q. Will they keep the feet dry?—A. Yes; they will keep the feet dry.

The PRESIDENT. That was not my experience. They would not keep my feet dry, but let the damp through.

Mr. COGAN. We use them pretty much altogether instead of leather boots. They are far preferable to leather boots.

Q. Have they many dogs on the Asiatic side?—A. Not a great many.

Q. Have they eaten them?—A. Yes, sir; mainly.

Q. Is that also true of the American side?—A. O, no, sir; they have plenty of dogs there.

By Captain GREER:

Q. Where is the best place to get them on the American side?—A. At all the settlements.

By Lieutenant RANDALL:

Q. Can you get any at King's Island?—A. You can get a few there. You can get them on Cape Prince of Wales, Cape Espenberg, Cape Krusenstern, and all the way up to Point Hope, Cape Lisburne, and every settlement along the American shore; you can find a number at each settlement.

By the PRESIDENT:

Q. Are they ever sold?—A. Yes, sir.

By Lieutenant-Commander WHITE:

Q. What do you pay for them?—A. The natives want cartridges for them.

Q. What kind of weapons do they use?—A. They use all kinds of rifles that they have in this country.

By the PRESIDENT:

Q. Do they want the fulminating cartridges that go off by concussion?—A. No, sir; the Henry cartridge.

By Lieutenant-Commander WHITE:

Q. Do you know the caliber?—A. Forty-four.

By the PRESIDENT:

Q. How many cartridges do you suppose it would take to buy a dog?—A. About 50. A good, full-grown dog would probably take 100.

By Captain GREER:

Q. When were you last there?—A. Last year.

By the PRESIDENT:

Q. In trading with the natives, what is the best material to use?—A. Well, they want rifles, if they can get them, and cartridges. Those are the principal articles that the traders use. Also tobacco, knives, hatchets, saws, axes.

Q. Hardware generally?—A. Yes, sir; and some calico.

Q. What kind of calico, printed calico?—A. Yes, sir.

Q. Are they any judge of quality?—A. No, sir; not much, as long as it is a fancy figure they don't care much. They use it for overcoats to keep the snow from getting in among the hair of the deer-skins. If it is close enough for that, it suits them.

By Paymaster KENNEY:

Q. Are beads good as an article of trade?—A. Yes; and a little flour occasionally, and bread.

By Lieutenant RANDALL:

Q. Could an expedition get men there to drive a dog-team?—A. Yes, sir.

By the PRESIDENT:

Q. Would there be any trouble in getting a man or two in case they are wanted?—A. No trouble whatever. There are plenty of them that are anxious to go on the whale ships, around Plover Bay, St. Lawrence Bay, on Indian Point, and Cape Tchouplin.

By Lieutenant RANDALL:

Q. Some of them speak English, do they not?—A. Yes; almost all of them speak English.

Q. Can you get food for the dogs there?—A. You can get plenty of that up in the Arctic Ocean by just shooting a few walrus for them.

By the PRESIDENT:

Q. Is there any difficulty in getting walrus enough for dog-food?—A. No, sir.

Q. Have not the whalers killed them off pretty much?—A. O, no; there are plenty of them there yet.

Q. Is it not in consequence of the shooting of the walrus that these people in St. Lawrence Bay starve?—A. Yes; that and having too much whisky together is the cause of it.

Q. Do whalers generally carry whisky for trade?—A. No, sir; there are folks that go up there trading in small vessels that carry it, and go for that purpose.

By Paymaster KENNEY:

Q. Is not tobacco a good article for trade?—A. Yes.

By the PRESIDENT:

Q. You would advise carrying hardware, tobacco, and some calico?—A. Yes; and beads.

Q. Do they care for them?—A. Yes, sir; and powder, shot, and caps.

Q. Percussion caps?—A. Yes, sir.

Q. They don't have many flint-locks, then?—A. They have not any now. A rifle or a gun of any kind does not usually last those Indians longer than two years at the outside. They let them rust, and that destroys them quickly. They do not take care of them. They use mostly Henry rifles. Almost every Indian up there has one.

Q. A Henry rifle ought to buy a good dog-team?—A. O, my, yes. A rifle would buy a good team; that would probably be six dogs.

By the RECORDER:

Q. Do you know whether these dogs are well-trained? Do they drive them much?—A. O, yes; they drive every dog they have that is large enough.

By Captain GREER:

Q. Is that on both sides?—A. Yes.

By Surgeon KIDDER:

Q. You say six dogs is a good team. Do they drive them abreast in pairs?—A. They generally put about four abreast and then two ahead of them.

Q. Four abreast next to the sledge and then two?—A. Yes; and when they have seven, one ahead.

Q. When six dogs are driven in the way you speak of, there is no lead dog, is there?—A. They generally have a lead dog.

By Lieutenant RANDALL:

Q. You have been there for 25 or 30 years almost every season, have you not?—A. 27 years.

Q. Have you ever missed a season?—A. Yes, sir; I have been through Behring Strait twenty seasons.

Q. Did you ever lose a ship?—A. No.

Q. Were you up there when all the ships were taken into the ice at the time they lost thirty-three?—A. No; I was not there that year.

By the PRESIDENT:

Q. What became of those vessels?—A. Some of them were shoved up on the beach and some of them were carried off by the ice.

Q. Where was that?—A. Off Point Franklin.

Q. Where were they carried?—A. Off to the northeast.

Q. You believe the current runs to the northeast?—A. Yes.

Q. How does the current run as far north as you have been?—A. There appears to be a strait between Wrangell Land and some land to the northeast that forms a kind of sluice-way, and when there is ice on both sides there will be a little stretch where the current runs about 20 miles a day, so that in whaling we have to run south every day, after that hole opens, to hold our position. In cutting-in a whale to the southeast of Herald Island I found we were drifted about 20 miles to the northwest. If you get farther to the eastward of Herald Shoal you get out of this current.

Q. Can you see that opening?—A. O, yes; almost every year. It opens late.

By Lieutenant RANDALL:

Q. Out of the thirty-three whale ships that went ashore, how many were on the beach?—A. Eight or ten. There were thirty-two lost there and one down in the straits.

By Surgeon KIDDER:

Q. There is a story that a good many of them were burned by the Esquimaux. Is there any foundation for that?—A. Yes, sir.

Q. They went aboard and drank some of the medical stores and some of them died, and so they burned the ships?—A. Yes, sir.

Q. That was the first lot of ships that were wrecked?—A. Yes; in 1871. The bottoms of those that were seen there afterward. I was up there in 1876 when they had the last loss.

By Captain GREER:

Q. Do you have many heavy gales in September?—A. We generally have about one.

Q. How was it in 1879, when the Jeannette went up?—A. Nothing very bad.

Q. Did you see the smoke of the Jeannette?—A. No, sir; I was there when they reported smoke, but I did not call it smoke. I think it was frost rising from the holes in the ice. There were twenty different places where it looked as if smoke was arising. I did not call it smoke, but it might have been. Captain Barnes, of the Sea Breeze, is the only one that saw her.

By Lieutenant RANDALL:

Q. Do you know what date he saw her?—A. No, sir.

By the PRESIDENT:

Q. Do you recollect what day you got there?—A. No, sir.

The PRESIDENT. It must have been about the 4th of September, because she was seen on the 2d of September.

Lieutenant-Commander L. WHITE. That is the last time she was really seen. The other time only smoke was seen. Captain Barnes saw the Jeannette on the 2d; the smoke was reported on the 7th of September.

By Lieutenant RANDALL:

Q. Do you not think Wrangell Land is accessible almost every year along the first of October?—A. Yes, sir.

Q. Do you think there would be any doubt about it?—A. You cannot get there some years.

Q. As a general rule you can get to the south of Wrangell Land?—A. Yes, sir.

By Surgeon KIDDER:

Q. You said some time ago that you should have no alarm about staying up there late in the season if there was no ice to the southward. Did you refer to new ice or to the field ice?—A. The field ice; drift ice.

Q. From what direction do you expect that ice to drift in and close the straits upon you?—A. It comes down from Wrangell Land to the Asiatic shore.

Q. And closes in upon the straits?—A. Yes, sir.

Q. Then I understand that there is a southerly set to the ice late in the season along the shore of Wrangell Land?—A. Yes, sir.

By the PRESIDENT:

Q. Have you any opinion in your own mind where the Jeannette may be? Have you given much thought to the matter?—A. Well, I do not like to express my ideas much about where she is. I do not think she got into any harbor. If she got into this strait when the current was running, and there happened to be a gorge, I do not think she would stand it. If there was no impediment offered by the ice she might drift through this strait and fetch up against the barrier somewhere.

Q. You do not think she could get a harbor in Wrangell Land?—A. No, sir; I do not think she could go to Wrangell Land unless the current carried her there. No vessel can move that ice, especially where it is packed, when it gets into this current.

By Captain GREER:

Q. Have you noticed that current prevailing there at all months of the summer season?—A. No, sir; late.

Q. As early as September?—A. Yes, sir.

Q. Was that at about the time the Jeannette is reported to have been within twenty-five miles of Herald Island? Was she there in time to feel the effect of this current?—A. Yes, sir.

Q. It had commenced to run then?—A. Yes, sir; that current was running very fast the next day and closing in the ice so that we had to back out with our ships.

By Lieutenant RANDALL:

Q. You were in there with the Sea Breeze, were you not?—A. Yes, sir; we spoke her next morning.

By the PRESIDENT:

Q. The ice was closing in?—A. Yes, sir; it was closing in from both sides.

By Lieutenant RANDALL:

Q. Did not the ice shut up near Herald Island?—A. Yes, sir.

Lieutenant RANDALL. I have got the idea that the ice closed in, and that the Jeannette staid there and was closed in with it.

Mr. COGAN. The ice sweeps off in points and laps around and drifts in from each side until it makes a solid mass.

By Captain GREER:

Q. That was to the southeast of Herald Island?—A. Yes, sir.

By the PRESIDENT:

Q. That was when the Jeannette was there?—A. Yes, sir.

By Lieutenant RANDALL:

Q. Was the ice heavy?—A. Yes, sir.

Q. Was it pack ice?—A. Yes, sir; regular field ice. Some of it drawing one hundred feet probably.

By Captain GREER:

Q. Was it very hummocky?—A. Yes, sir.

By Lieutenant RANDALL:

Q. Not fit to sledge over?—A. It would be hard work to sledge over it; you can sledge over it by going around. Some of the natives that understood it could go over it.

Q. They had natives on the Jeannette. Could they not have taken sledges and gone ashore?—A. I think they could have done it.

Lieutenant RANDALL. I have thought that they would hear from people on the Jeannette, but would never hear from the ship.

Mr. COGAN. I think they could get with the sledges to Wrangell Land if they could carry provisions enough to live on.

By the PRESIDENT:

Q. What is the chance of getting game on Wrangell Land?—A. They could get a few seal and bear. There are no walrus there.

By Captain GREER:

Q. Were you up there in 1880?—A. Yes, sir.

Q. Did you go up as far as Herald Island?—A. Yes, sir; as near as we could get to it.

Q. How was the season compared to the one in which the Jeannette was last seen?—A. There was more ice last season.

Q. Then, if they had been on Wrangell Land, there was no chance of their meeting a whaler?—A. No, sir.

Q. You did not see Wrangell Land last season?—A. No, sir. Captain Hooker got up about as near to it as anybody. He steamed into the ice a little way.

By Surgeon KIDDER:

Q. Do you know of any one ever having landed on Herald Island?—A. No, sir; none of the whalers.

Q. Is the shore very precipitous?—A. Yes, sir.

Q. Rocky?—A. Yes, sir; and steep. No one could get to Herald Island last year.

By Captain GREER:

Q. In your experience do you find a great alternation in the seasons; for instance, an open season one year, a closed one the next year, and then an open one?—A. They are irregular.

Q. Is there no law governing them?—A. No, sir; we never can make any calculations on it at all.

Q. Is it your experience that calculations are of no use and that you have to wait till you get there in order to tell about the weather?—A. Yes, sir. Sometimes we predict an open season and get up there early and find it is the iciest season we have had for years.

By Lieutenant RANDALL:

Q. If you were going north this summer would you expect to find any worse weather there because it has been cold here?—A. I think not.

Q. Is it just as likely to be a good season there?—A. Yes, sir.

Q. Would there be any trouble about keeping the walrus meat if they shoot walrus to feed the dogs?—A. No; walrus is the best food for them, and it makes the best fuel to heat the houses or huts. That is what the natives use.

Q. Would there be any trouble about getting the native boots?—A. No, sir; sometimes they are troubled about getting big seal-skins for the soles of the boots. I think if I was going to spend a winter there, I should stop down south around the Fox Islands and shoot a few seals for their skins to use for this purpose.

By the PRESIDENT :

Q. Does anybody interfere with the seals on these islands ?—A. Indians live there, but there are plenty of seals there.

Q. Can we not get the skins from the natives ?—A. I guess so ; or you can shoot them.

Q. Shoot them on the land ?—A. Yes, sir ; on the rocks. Sometimes when we are going past in a fog we hear them, although we cannot see the land.

By the RECORDER :

Q. What is the best style of water-proof suits to take up there ?—A. Rubber.

By the PRESIDENT :

Q. Will rubber remain pliable in the winter ?—A. I do not know. You do not want any in the winter. There is no rain there then, and everything is dry.

Lieutenant-Commander WHITE. It is so cold that the snow does not melt.

Q. Do you ever use oil-skins ?—A. Yes, in the summertime. When it gets too cold for rubber you do not want any oil-skins, it is so dry. Even if the water flies up and strikes you, it freezes right on the outside and does not go through.

By Lieutenant RANDALL :

Q. If you were going up in that country would you feel very sure that you could get dogs ?—A. Yes, sir.

By the PRESIDENT :

Q. What do they feed their dogs on ?—A. Almost anything ; walrus meat or seal meat.

Q. Do they not give them fish ?—A. No, sir ; whale meat, if they can get it, or any kind of meat.

Q. Do they get salmon as high as Kotzebø Sound ?—A. Yes, sir ; plenty of them.

Q. Do the natives have them in abundance ?—A. Yes, sir.

By Captain GREER :

Q. Do the natives have sledges and use their dogs much for them ?—A. Yes, sir. In the summer time they use their dogs to draw their canoes, and in the winter time to draw their sledges.

By the PRESIDENT :

Q. How do they draw the canoes ?—A. They have a rope led out onto the beach and draw them as canal-boats are drawn.

By the RECORDER :

Q. Are the skin boats of the natives very strong ?—A. Yes ; they are pretty good.

Q. I mean the large ones that they carry their provisions, &c., in ?—A. Yes.

Q. What is the comparative weight between them and a whale boat ?—A. The canoe is the lightest. It will carry as much or more than a whale boat.

By Lieutenant RANDALL :

Q. How much lighter would a canoe be than a whale boat ?—A. I think at least one-third lighter ; probably more than that.

Q. Which would be the better to carry on a sledge over hummocky ice, a whale boat or one of the Esquimaux boats ?—A. The canoe is the lightest ; but if you get it out of repair it is a good job to repair it again.

Q. Which would stand the most wear and tear ?—A. The whale boat. If we get half of the side of a whale boat knocked in we can patch it up so that it will last quite a while. New ice will cut right through a canoe ; it will cut through a boat, too, unless you have a piece of copper to put on the water-line. They dare not go in the ice with a canoe. I should certainly prefer the boat.

Q. All the walrus and whale go south out of Behring Strait in the winter ?—A. Yes, sir.

Q. And the seal too ?—A. The seal stay up there through the winter.

By Lieutenant-Commander WHITE :

Q. What are those seals, fur or hair ?—A. Hair.

By the PRESIDENT :

Q. What are those on Fox Island—hair ?—A. Yes. There are fur seal there too, I suppose. The fur seal come all the way down to San Francisco and to the equator. On Nunivak Island, Bristol Bay, there is a great place for deer.

Q. What is there on St. Matthew's Island ?—A. Plenty of walrus.

Q. Is the island inhabited ?—A. No, sir.

By Lieutenant RANDALL:

Q. Have you any idea where it was that they last saw the Mt. Wollaston and Vigilant?—A. It was to the west of Herald Shoal, I think.

Q. Do you understand that it was calm when the Helen Marr and the Mercury got frozen in?—A. There was a light breeze.

Q. The ice made 8 inches in 12 hours?—A. Yes.

Lieutenant RANDALL. And he ran the ship 60 miles in a gale of wind, I have heard.

The PRESIDENT. I suppose that must be taken with a grain of allowance, unless the ship was ironed. I once saw a little schooner coming down about five miles with the ice not thicker than a dollar, and when she had sailed to the end of the five miles she sank.

Lieutenant RANDALL. A vessel was sunk at her wharf, by ice, in New Bedford, this winter.

Q. The stems of all these vessels are ironed, are they not?—A. The Helen Marr had a metal casting on her stem.

Q. Is it not the experience that oak stands it as well as anything around the bow?—A. Yes. The space that comes in where the end of the plank is fastened on is filled into the end of the cutwater.

By the PRESIDENT:

Q. Have you ever had your ship nipped by the ice?—A. Oh, yes; many a time; but I never have lost a ship up there yet.

By Surgeon KIDDER:

Q. Is it customary for whalers to take lime-juice in going up there?—A. No, sir.

Q. They do not intend to winter there, but to run to the southward for the winter, into warmer seas, where they can get fruit, &c.?—A. Yes, sir.

Q. Are there many English whalers up there?—A. None.

By the PRESIDENT:

Q. Did you winter there voluntarily?—A. Yes, sir.

By Lieutenant RANDALL:

Q. What ship were you in?—A. I was in a Sandwich Island brig.

By Surgeon KIDDER:

Q. Were any of your crew Sandwich Islanders?—A. Yes, sir; all of them.

By Lieutenant RANDALL:

Q. How did they stand it—as well as white men?—A. All the foremast hands died.

By Surgeon KIDDER:

Q. Did they die of scurvy?—A. Yes, sir.

Q. Did you have plenty of fresh meat?—A. Yes, and plenty of potatoes. Filth was the cause of their scurvy. I could not get them to keep clean or to take exercise. We had men aft that kept themselves clean and were not sick at all. All died but two, and they were drawn up into a terrible shape, but got well.

Q. How do you preserve your fresh potatoes through the winter?—A. We let them freeze.

Q. Does not that spoil them?—A. No; we keep them frozen until we are ready to cook them, and then draw the frost out.

By Paymaster KENNEY:

Q. How is that done—by putting them in cold water?—A. Yes, sir.

Q. Then do they taste natural, as a potato that has not been frozen?—A. I do not think they are as good.

Q. Do you cook them simply by boiling?—A. Yes, sir.

By Captain GREER:

Q. If you were going on a relief expedition, how early in the season would you think it best to pass through Bering Strait on your northern voyage?

By the PRESIDENT:

Q. How early would you try to be at Herald Island?—A. About the 15th of August.

Q. Would it not be advisable to go at an earlier date—to be at Bering Strait previous to the 1st of August?—A. You cannot get near Wrangell Land any earlier—probably not before the last of September; certainly not before the 15th of August.

Lieutenant RANDALL. They could not get to Herald Island until the 1st of October last year.

By Paymaster KENNEY:

Q. Did you not say that you thought the year the Jeannette went up there—1879—

it would not have been possible to land at Herald Island?—A. They could not have landed at Herald Island that year.

By the PRESIDENT:

Q. Could they not reach it by sending parties over the ice?—A. They might; but it would have taken them a good while, and their vessel would have drifted off to the north all the time.

Q. Could they not steam back and keep their place?—A. No, sir; they could not hold up against that ice.

By Lieutenant-Commander WHITE:

Q. Then you take it for granted that the Jeannette was nipped in the ice about the time she got to Herald Island?—A. She was in the ice and going along with it.

Q. In other words, the ice had inclosed her?—A. Yes, sir.

Q. Under those circumstances I do not suppose they would consider it proper to send the people away from the ship onto the island when they were constantly going to the northward, because they could not get back again?—A. No, sir.

By the PRESIDENT:

Q. When the Jeannette was seen was she inclosed in the ice?—A. She steamed right into it and went out of sight. That was in the night, and they could not see much of her.

Paymaster KENNEY. The chances are, then, that Captain DeLong was not able to make a cairn on Herald Island.

The PRESIDENT. So it would seem.

Mr. COGAN. I did not see the Jeannette that night.

By Lieutenant-Commander WHITE:

Q. You say the ice you saw was drawing about 100 feet?—A. Yes, sir.

Q. Would you judge it was about 16 feet out of water?—A. No; I do not think it was over 10 or 12 feet out of water.

Q. Did the ice have the appearance of having been shoved together hard? Were the edges broken where it had come together, and was it hummocky, showing that the currents were severe?—A. Yes, sir; all the ice up there is that shape.

Q. That shows the current must be powerful?—A. Yes, sir.

K.

NASHUA, March 22, 1881.

DEAR SIR: Yours of 17th instant came to hand from New Bedford last evening. I take pleasure in replying to your questions, and would gladly give any information in my power. In the summer of 1879 the ice pack on the American side of the Arctic Ocean was unusually far to the south, and was most of the time close down upon Icy Cape. During the month of August strong winds from N. prevailed, so that we did not feel the usual current running to NE., but, instead, the set was to SW., and the scattering floes of ice were driven down nearly to Cape Lisburne. The whole whaling fleet was in the vicinity of Icy Cape in the latter part of August. On the 30th of the month the Sea Breeze left the eastern shore and steered westward along the ice toward Herald Island. The southern edge of this ice was quite open, and was much farther south than usual. But when we reached W. Lon. 173° 45' we found the ice trending to NNW., and during the afternoon and evening of September 2 we steered to NNW., with a fresh SSE. wind. At 9 o'clock of that evening we saw the topmasts of a vessel to the westward of us, heading to the north. When it became dusk we shortened sail and lay aback till light; then kept away again to NNW. When it became quite light, at 3½ o'clock, a sail was seen a few miles ahead, and she was soon made out to be a steamer under sail, steering about north. The weather, which had been fine, began to be foggy, with snow; and we found that we were getting into a bight in the ice, with scattering cakes all around. So at 6 o'clock a. m. we luffed to the wind under short sail to wait for clear weather. At that time the steamer was, perhaps, six miles north of us. Shortly after the fog settled down and shut her in from our sight; but twice during the forenoon it cleared a little, and we saw her, also close hauled, first on one, then on the other tack. In the afternoon it became very thick, and remained so for twenty-four hours. During the fog I worked a little to the westward over to the pack ice, and when, on the following day, I headed to the eastward, we soon ran out into clear weather, and the steamer had gone out of sight. I imagine that he had the clear weather some hours earlier than we did. We last saw the vessel, that must have been the Jeannette, about 11 a. m. September 3d, about 50 miles SSW. from Herald Island. In a day or two after the other whalers began to arrive here from Icy Cape, and some of them crowded up toward the island (then well

in sight) as far as possible, and two at least saw what seemed to them to be the smoke of a steamer in toward the island. In a short time after this the ice that was to the east of this open space began to close in upon the western pack, and we whalers had to fleet fifty miles farther south and to the east, where we began to see whales, and so did not get near Herald Island till near the end of September. During all the time we were cruising here we found the current setting strongly to NNE. In the first days of October there was but little ice south of Herald Island.

As we become more acquainted with our cruising ground in the Arctic, we learn more of the movements of the ice and the varying conditions of winds and currents. We know that there is a general set of water north through Behring Strait unless checked by strong north winds. But when these strong north winds prevail in this part of the Polar Basin, as they did in the summer of 1879, they create a current that runs southward, along the western side of Behring Strait, at the same time that a strong current is running up the eastern side. And in 1879 this latter current, when it reached Point Hope and Cape Lisburne, was met by a set from the NE., and turned off westward till near the longitude of Herald Island, when it turned to N. and NE. In the month of September the body of ice here moved nearly fifty miles north; and, at the same time, the ice fields had been moving down along the west shore and filling up nearly the whole of the southern Arctic as far north as Point Hope. So I cannot believe that the Jeannette could follow the Siberian coast, but that when we saw her she had been tracking along the ice from the Siberian shore toward the island, and that as soon as the weather became clear she pushed her way in toward Herald Island and Wrangell Land. At that time the ice did not seem very close in that direction, and I have never doubted but that she would be able to reach the latter place. Of course, if she became packed in the heavy pack she would be helpless, and would be drifted at the mercy of the current. And the same would happen to any vessel that might be searching for her. In my opinion, nature has set bounds to the investigations of mankind in this direction, at least so long as we are confined to land and water. We may be more successful whenever we can dispute with the birds for the empire of the air. And it seems to me that the only way to achieve much in this direction will be to fit expeditions in several successive years, so as to take advantage of favorable ones.

I trust, dear sir, that you may have all the success you can desire in your northern cruise. I shall anxiously await news from you. Please excuse these hasty lines, and believe me,

Very truly, yours,

WM. M. BARNES.

Lieut. WILLIAM P. RANDALL,
Navy Department, Washington.

L.

ENLISTMENT.

The volunteers selected for service in the proposed search expedition should be not more than 35 years of age nor less than 23; not only free from present disease or functional disturbance, but, so far as can be learned by the examiner, from tendency to disease, inherited or acquired. Their body weights should not exceed 2½ pounds to the inch of height, nor fall below 2 pounds to the inch. And it is enjoined upon the medical examining officer that no applicant should be accepted as to whose physical condition there is just ground for doubt or suspicion.

M.

NAVY DEPARTMENT,
Washington, March 24, 1881.

GENERAL: I have the honor to request that you will furnish to the Jeannette Relief Board, for the information and guidance of the officers of the proposed expedition, especial information and suggestions relating to the causes, prevention, and treatment of scurvy and snow-blindness under the circumstances of Arctic exploration, and with such other information and suggestions as will be likely, in your judgment, to conduce to the health, comfort, and safety of the ship's company.

Very respectfully, your obedient servant,

JOHN RODGERS,
Rear-Admiral and President of the Board.

Surgeon-General P. S. WALES, U. S. N.

N.

PROPOSED SLEDGE DIETARY.

[Per day, per man.]

	Lbs.	Ozs.
Lime-juice	0	1
Pemmican	1	0
Biscuit	14	
Cheese	2	
Dried potato	4	
Dried onion		$\frac{1}{2}$
Tea	1	
Sugar	2	
Condensed milk	1	
*Alcohol (or petroleum)	4	(?)
Tobacco		$\frac{1}{2}$
Salt		$\frac{1}{4}$
Pepper		$\frac{1}{2}$
Curry powder		$\frac{1}{4}$ (?)
Total weight	2	$14\frac{1}{2}$

The average load hauled by each man on leaving the ship should not exceed, for rough traveling, 165 pounds.

Load for dog-sledges, 100 pounds for each dog and 100 pounds for the man. For a team of seven dogs, therefore, the load would be 800 pounds on starting.

J. H. K.

O.

Number and rating of crew as recommended by the Board for the Mary and Helen.

- One ship's yeoman and master-at-arms.
- One pay-yeoman and captain of hold.
- One cabin cook.
- One cabin steward.
- One ship's cook.
- Two carpenter's mates.
- One engineer's blacksmith.
- Three machinists.
- Three first-class firemen.
- Four quartermasters.
- Two captains of fore-castle.
- Four captains of top.
- Three seamen.

It is not the intention of this Board that these men should do only the work pertaining to their rates, but may be required to do any work which may be assigned them by those having authority, and the Board recommend that they be required to sign articles to that effect.

P.

NAVY DEPARTMENT (ROOM 168),
Washington, D. C., March 22, 1881.

SIR: As preliminary to its general report, the Jeannette Relief Board begs leave to recommend the following detail of officers for the Mary and Helen:

- One commanding officer.
- One executive and navigating officer.
- Three watch officers.
- Two medical officers, one of whom will take charge of paymaster's stores, clothes, &c.
- One engineer.

The Board further recommends that the commander, the executive officer, and the engineer be ordered as soon as possible, in order that the vessel may be examined while she is empty as to strength, and in order to make such small detail arrangements of the store-rooms as may be necessary for the service the vessel is to be employed upon. Also, that such small appliances as may be necessary to heat the vessel and to pump her out by steam may be fitted.

Respectfully, your obedient servant,

JOHN RODGERS,
Rear Admiral, President of Board.

* Four ounces of 75 per cent. alcohol will weigh about $3\frac{1}{2}$ ounces avoirdupois.

Q.

Estimate of clothing, small stores, and sundries for trade purposes for the the Mary and Helen.

Article.	Quantity.	Estimated price.	Estimated amount.
Mattresses (2 covers each)	40		
Double blankets	80		
Navy-blue undershirts	150		
Navy-blue flannel drawers	150		
Navy-blue socks	500		
Navy boots, specially selected	50		
Navy-blue cloth trousers, heavy	50		
Navy-blue caps	70		
Black silk handkerchiefs	100		
Handkerchiefs	300		
Paymaster's duck	1,000		
Long rubber boots	40	\$4 75	\$190 00
Rubber patches for same	40	25	10 00
Sheepskin mittens	80	2 50	200 00
Sheepskin stockings	80	5 00	400 00
Sheepskin jumpers	40	40 00	1,600 00
Sheepskin trousers	40	17 00	680 00
Spare sheepskins	50	2 50	125 00
Sheepskin sleeping bags (7 feet long, 36 inches wide)	15	12 00	180 00
Buffalo robes	15	10 00	150 00
Deer or sealskin suits (jumper, trousers, and boots, to be bought on Pacific coast from the natives)	40		
Army regulation fur caps	100	1 00	100 00
Rubber coats and trousers	50	15 00	750 00
Hats, "sou'westers"	40	1 00	40 00
Knives	400		
Shears	200	50	100 00
Scissors	200		
Sewing silk, heavy	10		
Linen thread, black	50		
Linen thread, white	50		
Cotton thread, white	50		
Brass buttons, Eagle (for trade), large, medium, and small	50		
Needles, assorted (for sewing skins, &c)	50	50	25 00
Shoemakers' kits	2	25 00	50 00
Snow-shoes (to be bought from natives on the coast)	20		
Extra skin boots (to be bought from natives on the coast)	30		
Moccasins (to be bought from natives on the coast)	60		
FOR TRADE.			
Hatchets	100	50	50 00
Rifles, Henry	10	20 00	200 00
Cartridges, Henry, caliber .44	2,000	26 00	per M. 52 00
Saws	25	1 00	25 00
Axes	50	1 50	75 00
Beads	100	50	50 00
Calicoes, figured	1,000	05	50 00
Soft bar lead	500	05	25 00
Shot	500	08	40 00
Powder	500	40	200 00
Bullets	250	05	12 50
Small mirrors	100	25	25 00
Shot-guns	6	75 00	450 00
Cartridges for same (metal case)	4,000		
Sporting powder for same	8	11 00	88 00
Perforated chamois suit	8	40 00	320 00
Long beaver overcoats	8	25 00	200 00
Monkey jackets	16	12 00	192 00
Beaver trousers	16	10 00	160 00
Beaver double-breasted vests			681 45
Add 10 per cent. for contingencies			
Total			7,495 95

R.

Estimate of outfit of Mary and Helen, based upon a strength of 40 men for two years, with an allowance for the establishment of depots of provisions.

N. B.—The articles whose prices are not given are included in the regular paymaster's stores.

Article.	Quantity.	Estimated price.	Estimated amount.
Biscuit, in barrels.....	pounds..... 24,000		
Salt beef, in barrels.....	do..... 4,000		
Clear salt pork (fat), in barrels.....	do..... 16,000	\$0 09½	\$1,520 00
Flour, in barrels, 150 barrels.....	do..... 23,400		
Rice, in barrels.....	do..... 2,000		
Dried apples, in boxes.....	do..... 2,000		
Pickles, assorted, in kegs.....	do..... 3,000		
Sugar, in barrels.....	do..... 10,000		
Tea, in chests.....	do..... 2,000		
Coffee, in tins.....	do..... 5,000		
Butter, in tins.....	do..... 3,500		
Dried vegetables, Alden or Smith process.....	do..... 3,000	15	450 00
Canned tomatoes.....	do..... 3,000		
Beans.....	gallons..... 1,000		
Molasses.....	do..... 260		
Vinegar.....	do..... 500		
Preserved beef.....	pounds..... 12,000		
Fresh beef.....	(*)		
Fresh vegetables.....	(*)		
Pemmican, in tins.....	pounds..... 20,000		13,000 00
(Of two qualities—one-half at 75c. and one-half at 55c. To be packed in like proportions of large and small tins.)			
Canned soups.....	cans..... 1,000	{ 880 at 20 120 at 70 }	{ 260 00
Canned meats.....	pounds..... 12,000		1,800 00
Sauer kraut (imported), in kegs.....	kegs..... 100	3 50	350 00
Split peas.....	pounds..... 2,000	04	80 00
Lard.....	do..... 5,000	13	650 00
Cheese, in tins.....	do..... 4,000	20	800 00
Hominy, in tins.....	do..... 2,000	02½	50 00
Corn meal, in tins.....	do..... 2,000	02	40 00
Oat meal, in tins.....	do..... 2,000	05	100 00
Macaroni.....	do..... 1,000	16	160 00
Onions, fresh.....	(†)		
Onions, dried (Alden's, or similar process).....	pounds..... 1,000	7½	730 00
Smoked tongues.....	do..... 500	12	60 00
Smoked hams.....	do..... 1,000	11½	115 00
Condensed milk.....	do..... 1,500	17	255 00
Oysters, in tins.....	do..... 500	10	50 00
Chocolate.....	do..... 1,000	30	300 00
Dried herbs.....	do..... 24	33½	8 00
Celery seed.....	do..... 20	50	10 00
Raisins.....	do..... 1,000	20	200 00
Gooseberries, dried } or other fruits, cherries, {	do..... 1,200	20	240 00
Rhubarb, dried } or currants, etc. {	do..... 1,200	20	240 00
Cranberries, in barrels.....	do..... 1,200	08	96 00
Baking-powder (Royal).....	do..... 100	50	50 00
Mustard (Coleman's).....	do..... 50	50	25 00
Black pepper.....	do..... 50		
Red pepper.....	do..... 20		
Spices, assorted.....	do..... 50		50 00
Salt (table).....	pounds..... 500	01	5 00
Seeds, mustard, cress, radish, cabbage, &c.....	do..... 50		
Lime juice, in kegs (small).....	gallons..... 250	1 00	250 00
Lime juice (concentrated).....	(‡)		
Buckwheat flour.....	pounds..... 100	03	3 00
Dried prunes.....	do..... 300	16½	50 00
Pepper sauce, pints.....	bottles..... 300	12½	37 50
Tomato catsup.....	do..... 200	25	50 00
Tobacco, Navy.....	pounds..... 2,000		
Tobacco, smoking.....	do..... 100	1 50	150 00
Sardines.....	do..... 1,000	25	250 00
Olive oil, quarts.....	dozen..... 30	10 50	315 00
Shaker corn (Smith's).....	pounds..... 1,200	10	120 00
Pipes, brier-wood, with stems.....	gross..... 1		50 00
S. W. soap.....	pounds..... 1,000		
Hops.....	do..... 10	1 00	10 00
Orange and lemon peel.....	do..... 45		20 00
Currie powder, ½-pound bottles.....	bottles..... 100	15	15 00
Whisky.....	barrel..... 1		140 00
Add 10 per cent. for contingencies.....			23,154 50
Total.....			2,315 45
			25,469 95

* Discretion of commanding officer.

† As many as possible.

‡ Await experiment.

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Medical outfit of U. S. S. Mary and Helen for two years' service in arctic regions, 1881.

MEDICINES.

Articles.	Quantity.
Anacis pulvis, 8-oz. bots	lb. 1/2
Acidum aceticum, 8-oz. bots	lb. 3/4
Acidum carbol. cryst., 2-oz. g. s. bots	lb. 3/4
Acidum carbolicum, imp., 1-lb. bots	lb. 4
Acidum citricum, 8-oz. bots	lb. 6
Acidum muriaticum, 4-oz. g. s. bots	oz. 4
Acidum nitricum, 4-oz. g. s. bots	lb. 1
Acidum salicylicum, 2 1/2 gr. pills	500
Acidum sulphuricum, 4-oz. g. s. bots	oz. 8
Acidum sulphur. aromat., 4-oz. g. s. bots	lb. 1/2
Acidum tannicum, 1-oz. bots	oz. 1
Acidum tartaricum, 8-oz. bots	lb. 4
Aconiti radiceis ext. fluid, 2-oz. bots	oz. 2
Ether, 8-oz. tins	lb. 6
Etheris spiritus comp., 4-oz. g. s. bots	lb. 1
Etheris spiritus nitros, 8-oz. g. s. bots	lb. 1/2
Alcohol, pint bots	pts. 4
Aloin, 1/2 gr. pills	500
Alumen, 8-oz. bots	lb. 1/2
Ammonie aqua, 8-oz. g. s. bots	oz. 2
Ammonii carbonas, 4-oz. bots	lb. 1/2
Ammonii chloridum, 8-oz. bots	lb. 1
Ammonie spirit. arom., 4-oz. g. s. bots	lb. 1/2
Antimonii et potass. tart., 1-oz. bots	oz. 1
Argentii nitras, 1-oz. bots	oz. 4
Argentii nitras fusa, 1-oz. bots	oz. 4
Atropie sulphas, 1-dr. g. s. bots	dr. 2
Bella-lon. ext. alc., 1-oz. g. jars	oz. 1
Bismuth, subcarb., 2-oz. bots	oz. 2
Buchu ext. fluid, 8-oz. bots	lb. 1
Camphora, 4-oz. bots	lb. 1/2
Cannabis indic. ext. alc., 1-oz. g. jars	oz. 1
Cantharidis (plasters)	no. 20
Cantharidis tinct., 2-oz. bots	oz. 2
Capsici ext. fluid, 4-oz. bots	lb. 1/2
Chloral hydras, 1-oz. g. s. bots	oz. 4
Chloroformum purificat., 1-lb. g. s. bots	lb. 2
Chloroformum impurum	lb. 8
Cinchona ext. fluid comp., 8-oz. bots	lb. 1
Colchici sem. ext. fluid, 4-oz. bots	oz. 4
Collodium, 1-oz. bots	oz. 2
Cococynth ex. comp., 1-oz. g. jars	oz. 2
Copaiba, 1-lb. bots	lb. 5
Creta preparata, 8-oz. bots	lb. 1
Cupri sulphas, 2-oz. bots	oz. 2
Digitalis tinctura, 2-oz. bots	oz. 2
Ergotae ext. fluid, 4-oz. bots	oz. 4
Ferri chloridi tinctura, 8-oz. g. s. bots	lb. 3
Ferri et potass. tart., 8-oz. bots	lb. 3
Ferri subsulph. liq., 1-oz. g. s. bots	oz. 8
Ferri sulphas, 5-lb. box	lb. 10
Filicis oleo-resina	oz. 4
Gentiana extractum, 1-oz. g. jars	oz. 4
Glycerina, 8-oz. bots	lb. 6
Glycyrrhizae ext. paper	lb. 1/2
Glycyrrhizae pulvis, 4-oz. bots	oz. 4
Hydrarg. chlor. corros., 1-oz. bots	oz. 2
Hydrarg. chlor. mite., 2-oz. bots	lb. 1
Hydrarg. iodid. viride, 1-oz. bots	oz. 2
Hydrarg. nitrat. unguent, 2-oz. jars	lb. 8
Hydrarg. pilul., 3 gr. each	no. 500
Hydrarg. unguent, 8-oz. jars	lb. 2
Hyoscyami ext. alc., 1-oz. g. jars	oz. 1
Iodinum, 1-oz. g. s. bots	oz. 1
Iodoformum, 1-oz. bots	oz. 1
Ipeacuanha pulvis, 4-oz. bots	lb. 1/2
Ipeacuanha pulvis comp., 8-oz. bots	lb. 1
Jalapae ext., 1-oz. g. jars	oz. 1
Lavand. spirit comp., 1-lb. bots	lb. 1
Lini farina, 5-lb. tins	lb. 25
Linum, 5-lb. tins	lb. 5
Magnesia, 4-oz. bots	lb. 1/2
Magnesii sulph., 8-lb. tins	lb. 16
Menth. pip. ol. 1-oz. bots	oz. 1
Morphiae sulphas, 1-dr. bots	oz. 1
Morrhuae oleum, 1-pt. bots	pts. 40
Myrrha, 2-oz. bots	oz. 2
Nucis vomice ext. alc., 1-oz. g. jars	oz. 1
Olive oleum, 1-pt. bots	pts. 20
Opii pulvis, 2-oz. bots	oz. 4

MEDICINES—Continued.

Articles.	Quantity.
Opii tinctura, 1-lb. bots	lb. 4
Opii tinctura camph., 1-lb. bots	lb. 4
Pepsina, 1 oz. bots	oz. 2
Pilul. cathart. comp., 1-oz. bots	no. 500
Pilul. rhei comp.	no. 200
Plumbi acetas, 8-oz. bots	lb. 1/2
Podophylli resina, 1/2-oz. bots	oz. 1/2
Potass. arsenit. liq., 4-oz. bots	oz. 4
Potass. acetas, 8 oz. bots	lb. 1/2
Potass. bicarb., 8-oz. bots	lb. 1/2
Potass. bichromas, 8-oz. bots., battery	lb. 3
Potass. bitart., 8-oz. bots	lb. 1
Potass. chloras, 8-oz. bots	lb. 1/2
Potass. et soll. tart., 1-lb. bots	lb. 4
Potass. nitras, 8-oz. bots	lb. 1/2
Potass. permanganes, 1-oz. bots	oz. 2
Potassii bromidum, 8-oz. bots	lb. 2
Potassii iodidum, 8-oz. bots	lb. 2
Pruni virg. ext. fluid, 8-oz. bots	lb. 1/2
Quinae sulphas	oz. 4
Resinae ceratum, 1-lb. tins	lb. 2
Ricini oleum, 1-pt. bots	pts. 20
Rhei ext. fluid, 4-oz. bots	oz. 4
Rhei pulvis, 4-oz. bots	oz. 4
Sapo	lb. 5
Saponis linimentum, 1-lb. bots	lb. 5
Scilla syrupus, 1-lb. bots	lb. 2
Senega ext. fluid, 8-oz. bots	lb. 1/2
Senna ext. fluid comp., 8-oz. bots	lb. 1/2
Sinapis pulvis, 2-lb. tins	lb. 10
Sodii bicarbonas, 1-lb. bots	lb. 4
Sodii boras, 8-oz. bots	lb. 1/2
Sodae chlor. liquor, 1-lb. g. s. bots	lb. 5
Sulphur	lb. 1
Terebinth. oleum, 1-pt. bots	pts. 2
Theobromae oleum, 2 oz	oz. 8
Tigllii oleum, 1-oz. bots	oz. 1
Valeriana ext. fluid, 8-oz. bots	lb. 1
Vaseline	lb. 10
Zinci carb. precip., 1-oz. bots	oz. 8
Zinci sulphas, 1-oz. bots	oz. 2
Zingiberis ext. fluid, 8-oz. bots	lb. 2

Additional.

Simonis oleum, pur	oz. 4
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HOSPITAL STORES.

Brandy, 1-pt. bots	pts. 24
Corn-starch, 2-lb. tins	lb. 10
Extract of beef, 2-oz. jars	lb. 5
Nutmegs	oz. 2
Sugar, white, 5-lb. cans	lb. 10
Tapioca, 2-lb. tins	lb. 6
Tea, black, 8 oz. tins	lb. 1
Whisky, 1-pt. bots	pts. 36
Wine, port, 1-pt. bots	pts. 12
Wine, sherry, 1-pt. bots	pts. 12

SURGICAL INSTRUMENTS.

Aspirator	no. 1
Bougies, gum	no. 12
Bougies, o. p.	no. 6
Catheters, gum	no. 6
Catheters, o. p.	no. 3
Catheters, silver	no. 3
Case, dental, No. 1	no. 1
Case, expeditionary and boat	no. 1
Case, general operating, small	no. 1
Case, pocket	no. 1
Case, urinary	no. 1
Cupping-glasses	no. 12
Galvanic battery	no. 1
Laryngoscope	no. 1
Ophthalmoscope	no. 1
Razor	no. 1
Razor-strop	no. 1
Scarificator	no. 1

