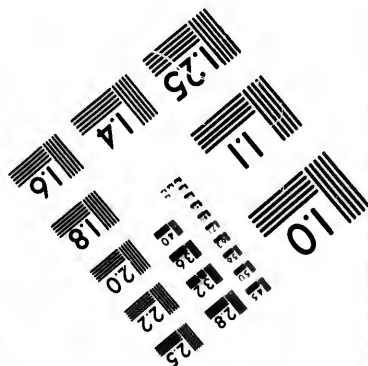
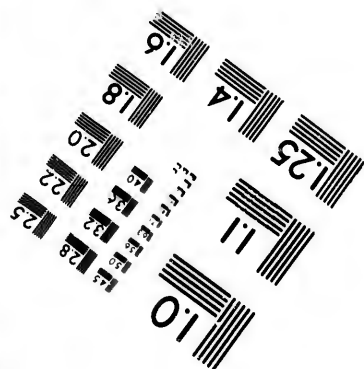
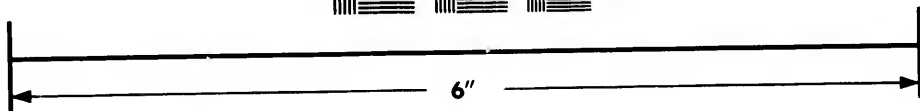
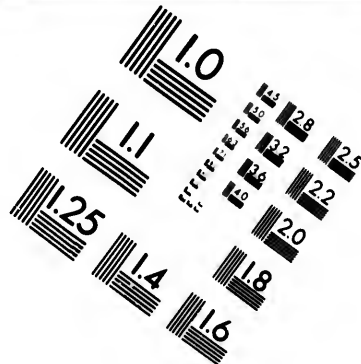




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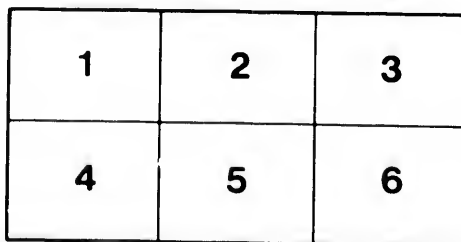
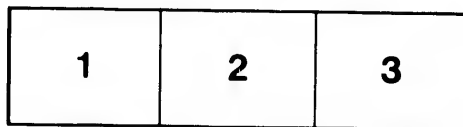
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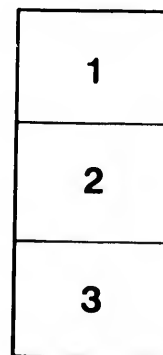
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8-73  
EARLY MIGRATIONS.

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ARCTIC DRIFT  
AND  
OCEAN CURRENTS

ILLUSTRATED BY THE DISCOVERY ON AN ICE-FLOE OFF THE

COAST OF GREENLAND

Of Relics from the American Arctic Steamer  
"Jeannette."

---

BY

CHARLES WOLCOTT BROOKS

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SAN FRANCISCO, CALIFORNIA:

Geo. Spaulding & Co., Printers.

1884.



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Member of the Academy.

Read before the California Academy of Sciences September 1st, 1884.

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# ARCTIC DRIFT AND OCEAN CURRENTS.

ILLUSTRATED BY THE DISCOVERY ON AN ICE-FLOE OFF THE

## COAST OF GREENLAND

Of Relics from the American Arctic Steamer  
"Jeannette."

---

### SCIENTIFIC IMPORTANCE OF THE SUBJECT.

It is a new and important fact, worthy of careful record by physicists of all nations, that ice-floes from north of Herald Island, opposite Bering Strait, dividing Asia from America, are drifted to the south-western point of Greenland in the Atlantic. The deep and constant interest manifested by this Academy in the American Arctic explorations of the *Jeannette*, which sailed from our port on July 8th, 1879, under command of Lieut. George W. De Long, U. S. N., and in the fate of her gallant crew, is well known to all scientific bodies throughout the world.

Humboldt, the father of modern science, that great and good man, when off the coast of Peru, first discovered the stream that bears his name. Both Humboldt and Sir John Herschel pronounced ocean circulation the greatest problem of terrestrial physics. Ocean currents, with inland water courses, have largely aided and often directed early migrations. Isothermal lines are not strictly coincident with parallels of latitude. Along the Atlantic seaboard of North America, a warm stream flows four miles an hour, which Dr. Croll tells us, conveys as much heat to northern Europe, as the entire Arctic regions obtain from the sun. Dr. Wm. B. Carpenter recently informed the British Association that oceanic currents flow northward into the Arctic, because cold water there sinks, and constantly stimulates the water from warmer regions to advance and fill its place.

Dr. Wm. H. Dall, U. S. C. S., attributes their presence to the inflow of warm fresh water, discharged by the large number of rivers flowing northward, and emptying in the vicinity of the polar basin. Atmospheric pressure, revealed by recent barometric tests, affords data for another plausible theory.

Dr. A. Geike has brought out discoveries in geology which merit consideration in the study of this subject. Earth is an oblate spheroid flattened  $26 \frac{953}{1000}$  miles at the poles; but recent geodetic measurements show it to be an unsymmetrical form, whose equatorial circumference is an ellipse instead of a circle. Its greatest equatorial diameter at sea-level, where the vertices touch the surface in longitude  $14^{\circ} 22'$  E. and  $165^{\circ} 37'$  W., is nearly two miles longer than at right angles to it. How far inequalities of earth's form may disturb the equilibrium of its surface waters, and attract them by force of gravitation or some other power yet undemonstrated, is an inquiry pertinent to this subject.

Arcs of meridians have been measured, to determine with great accuracy the actual length of each separate degree of latitude from the Equator to the North Pole. These measurements show that the measured length of a degree increases with the latitude, and that a degree at the pole, where earth's surface is flattened one 300th part of its diameter, is now 3,662 feet, (0.694 of a mile) longer than at the increasing curvature of the protuberant Equator. Earth's form being now unsymmetrical, tends to keep its surface waters in a state of unrest. Many forces are continually laboring by different methods, to attain for these, a state nearer to equilibrium, thereby giving impulse to oceanic currents.

Mathew F. Maury, by an original system of classification, adopted in the U. S. wind and current charts, did much to attract a critical exploration of maritime currents. There may be a partial truth in all the many theories advanced. The voyages of the British ships *Lightning*, *Porcupine* and *Challenger*, United States' ships *Dolphin*, *Tuscarora*, *Fish Hawk*, and Swedish steamer *Vega*, have given us reliable data for scientific study; but a carefully preserved record of

the drift of waifs borne direct on ice-floes and along ocean currents, largely supplements our field of knowledge. The British discovery ship *Resolute*, one of Sir Edward Belcher's expedition, was abandoned Aug. 26, 1854, when frozen in, not far from Beechy Island, in lat.  $74^{\circ} 40'$  N., lon.  $90^{\circ} 45'$  W., and was picked up without a person on board by Captain Buddington, of the American whale-ship *George Henry*, Sept. 11th, 1855, in lat.  $64^{\circ} 40'$  N., lon.  $61^{\circ} 30'$  W., off Cumberland Sound, on the west coast of Baffin's Bay, just south of Davis Strait. She was brought to the United States, and by Congress presented to England. In 381 days she drifted eastward in the ice-floe fully 1,100 miles, averaging about three miles each day.

Another remarkable experience of Arctic drift was that of a party of 19 persons, including men, women and children, landed on an ice-floe of five miles in circumference, with boats, stores and provisions from the U. S. S. *Polaris*, Charles F. Hall, Commander, on October 15th, 1872, in lat.  $77^{\circ} 35'$  N., not far from Littleton Island, when it was thought that vessel was about to sink. Upon this drifting floe they built snow huts in which they lived and kept their records and provisions. They were rescued by the barkentine *Tigress*, Capt. Bartlett, April 30th, 1873, in lat.  $53^{\circ} 30'$  N., which vessel was engaged in sealing.

In the light of information now received, it appears quite certain that had the *Jeannette* proved strong enough to hold together, she would have sailed safely into New York early in the Spring of 1884, if not before. In proof of this opinion, the following facts are now reported as causing great surprise and much attentive study among scientific men in the United States.

#### HOW THE NEWS WAS RECEIVED.

On Friday, August 15th, 1884, the American bark *Fluorine*, Capt. Alexander Wilson, arrived at Philadelphia, —days from Ovigut, the port of shipment for the cryolite mines, situated a few miles north of Juhans-haab, the principal place and seat of the local government of an extensive

district on the southern extremity of Greenland. It is a maritime station situated 110 miles N. W. of Cape Farewell, the extreme southern point of Greenland.

Just before sailing from Ivigtut, in July, 1884, an official dispatch, addressed to the Danish Consulate in New York, was handed him by the Danish Colonial Governor of *Juulianshaab*, who went at once to Ivigtut and gave the news to Capt. Wilson. Upon the arrival of the *Fluorine* at Philadelphia, Capt. Wilson promptly forwarded the dispatch to the Danish Consul, who kindly furnishes the following official translation, dated

[OFFICIAL COMMUNICATION OF THE DANISH GOVERNMENT.]

“THE COLONY JULIANSHAAB, IN SOUTH GREENLAND, }  
“June 23d, 1884. }

“*To the Danish Consulate in New York:*

“I hereby take the liberty to request the consulate to inform the editors of *The New York Herald* that on the 18th inst., three Greenlanders picked up on an ice-floe some effects, and some partly torn papers belonging to the American Arctic *Jeannette* expedition, among which are the following:

“1. Two end-pieces of a wooden box, on which are written with lead pencil, on one piece:

|                 |                     |
|-----------------|---------------------|
| GENERAL ORDERS. | SHIP'S PAPERS.      |
| TELEGRAMS.      | VARIOUS AGREEMENTS. |
| SAILING ORDERS. | CHARTER PARTY.      |
| DISCIPLINE.     |                     |

“The last words not very plain. On the other piece was:

BEFORE SAILING.

“3. A torn check book. On the back of one of the checks is printed, ‘For deposit with the bank of California.’

“4. A pair of oilskin trousers, marked: *LOUIS NOROS*.

"These effects, numbering twenty-one pieces (besides the papers), are in my possession. I am going home to remain during the winter. Should anybody want further information, the same can be obtain by addressing

"KOLONIBESTYRER C. LYTZEN,

"Kongl. Grønl. Handels-Kontor,

"Kjøbenhavn, K.,

"Denmark.

"Respectfully, CARL LYTZEN.

When Capt. Wilson's report of the barque *Flourne* was briefly telegraphed over the country, a few were at first inclined to doubt the truth of the report, but when fuller particulars were received, with the unqualified official endorsement of the Governor of Julian's-haab to the Danish Consul at New York, and it was learned that the articles recovered would soon follow, the information thus became authoritatively vouched for, and is now attracting that deep interest it so thoroughly merits.

STATEMENT OF CAPTAIN WILSON.

Capt. Alexander Wilson, who now resides at his home, No. 2034 South Fifth street, Philadelphia, kindly furnishes us the following statement. He says: The superintendent of the Kryolite mines at Ivigtut first informed him of this highly important discovery. A party of Esquimaux were out among the floe ice, catching seal. Late in the afternoon of Wednesday, June 18th, 1884, they approached a piece which had attracted their attention, floating in latitude 60° 36' north, longitude 46° 7' west, where they found on a large piece of drift ice, the lower part of a tent, the upper part of which had been blown away by the storms of three Arctic winters; also the ends of a provision cask, and some stores marked "*Jeannette*"—a charter party "between S. B. Peterson, managing owner of the American schooner *Fanny A. Hyde*, Capt. J. W. Jespersen, of San Francisco, California, and George W. DeLong, from Mare Island Navy Yard, to the port of St. Michaels in Norton Sound, Territory of Alaska, U. S. A., there for delivery to the Arctic steamer

*Jeannette*"—also a partially used check book on the Bank of California, with a package of cancelled checks, signed by Captain DeLong—a pair of oilskin trousers marked "Louis Noros," and a bear skin, covering something of the size and shape of a human corpse, which the Greenlanders did not remove to ascertain what was under it, owing to a native superstition rendering those temporarily unclean who handle the dead bodies of human beings.

On another piece of floe near by, quite a quantity of sailor's clothing was found. These relics the Esquimaux took to the Governor of Julianshaab, who immediately started, taking one of their number as a guide, to find the ice-floe and the supposed body; but after long search he was compelled to return without success, it having floated off.

We ought to know all about these relics in a short time. There are four American vessels at the little village of Ivigtut at present, loading with eryolite from the mines near that place, and some of them will follow the *Fluorine* very soon.

Capt. Wilson says he believes that Governor Lytzen will send all the things found on the floe to Ivigtut, in order to get them to this country as soon as possible. He wrote to the superintendent of the eryolite mines to send them to the United States on the first vessel which leaves.

"JEANNETTE" RELICS ACTUALLY LEFT ON THE ICE.

On Friday, September 5th, 1879, the *Jeannette* entered the ice pack, and became fixed in the floe, drifting northwardly past Herald Island, until she reached about latitude  $73^{\circ} 50'$  north, longitude  $180^{\circ}$ . Then the drift turned into a more northwesterly course, and kept on in that direction until at 4 A. M., Monday, June 13th, 1881, the vessel sunk in 38 fathoms of water in longitude  $154^{\circ} 58' 45''$  E., latitude  $77^{\circ} 14' 57''$  N.

The *Jeannette* drifted steadily westward up to the time she sank, and the ice-floe on which these relics were found may have been one of those upon which her party took refuge just before she sunk. It is but natural to suppose that the floe kept on drifting westward, just as the *Jeannette* had been

doing. Her course, while wedged in the ice, is a true proof of a westerly current along this unexplored and shallow portion of the Arctic Ocean north of Siberia.

In Mrs. Emma DeLong's admirable publication of her brave husband's ship and ice journal (see Vol. II, page 578) a list of 170 pieces of clothing is given in detail, consisting of over-shirts, drawers, coats, trousers, fur and woolen blankets, skin-parkies, etc., which remained on hand after the party, then on an ice cake, were clothed, and their knapsacks packed with the regulation outfit for their journey southward. These, he says, "were divided among all hands as required, much of it being in excess."

Besides landing their boats, sledges, equipment of rifles and plenty of ammunition, *sic* tents, provisions, including 3,500 pounds pemmican in 45-pound tin canisters, 1,500 pounds hard bread, canned meats, Liebig's extract, alcohol, tea, sugar, and all available equipments necessary for a retreat were securely placed on an ice-floe, distant 400 feet from where the *Jeannette* went down.

The floe bearing the *Jeannette* relics was found off Julian-saab, the first Danish settlement on the coast, just below Ivigtut, on Wednesday, June 18th, 1884, just *three* years, or 1,076 days after Capt. DeLong and his gallant band broke camp on an ice-floe in Lat.  $77^{\circ} 18' N.$ , Long.  $153^{\circ} 25' E.$  and started southward on Saturday, June 18th, 1881, hoping, as DeLong then wrote in his journal—"with God's blessing to reach the New Siberian Islands, and from there, make our way by boats to the coast of Siberia."

#### EXPLANATION BY ONE OF THE "JEANNETTE'S" CREW.

Under date of Newburyport, August 20th, 1884, Louis Philippe Noros, one of the survivors who reached Siberia with De Long's party in the first cutter, writes:—

"Before we left the *Jeannette* we carried on to the ice a lot of bear skins, which we spread out to form a floor, and in addition carried clothing, food, rifles, tobacco, etc. After the *Jeannette* was crushed we had to leave the bear skins, a lot of canned goods, cans, rifles, and 200 or 300 pounds of

tobacco behind, as we could not carry them all over the ice. We also left all the clothing except what we had on, and a suit of under-clothing, which we packed and carried in a knapsack. We carried *five* tents with us, De Long's party having two, Melville's two, and Chipp's one. I may possibly have left my sealskin pantaloons on the ice where the *Jeannette* went down, but my impression is that they were left with other clothing, ship's implements, utensils, papers, etc., in the cache left by De Long on the Siberian coast. We had four tin boxes, in which De Long kept the ship's log and valuable papers, two of which were left in the cache and two carried away by De Long when Quartermaster Nindermann and I started south for help. We also left in the cache a small bear skin, the only bear skin in the possession of the party after leaving the *Jeannette*. The account says that a *cask* of miscellaneous ship provisions was found marked *Jeannette*. Now the fact is, we did take some bread *barrels* out, but after putting the bread in bags and loading it on our sleds we left the empty barrels behind on the ice."

A native Greenlander's language may be deficient in words capable of such nice distinctions as the exact difference between our English use of the words *cask* and *barrel*. A large barrel may frequently, for purposes of general description, be called a *cask*. Noros further says:—

"What puzzles me most is how these articles now reported found could have remained on the ice so long. My experience taught me that all small articles placed on the ice in the arctic regions always attracted the sun and gradually melted down through the ice until lost to sight. Why, in a very short time a chip would be buried its own thickness under the ice by this peculiar process, and if the things found really belonged to the *Jeannette* something strangely wonderful seems to have providentially kept them so long a time on the surface of the ice."

#### WHAT DE LONG'S DIARY EXPLAINS.

Some explanation of the above may possibly be found in Capt. De Long's carefully written and minutely accurate

diary (Vol. II, pages 588 *et. seq.*) where is inserted the copy of a digested synopsis of the cruise of the *Jeannette*, up to her foundering, dated on the ice-floe, Friday, June 17th, 1881, and signed by him officially. This, it is recorded, he prepared and sewed with great care in a piece of black rubber, rendering it as impervious to moisture as possible, and caused the whole to be headed up, inside of an empty water-breaker, or small cask used for carrying water in boats. When thus securely packed, he left it with the debris of their first camp on the ice-floe to which they escaped when their vessel sunk. Capt. De Long must have observed the tendency of small articles to work their way into the ice, and it seems more than likely, that in accordance with the especial care otherwise manifest in regard to this precious record, that he had it covered over before his departure, with some of the clothing, bear skins and other material, which Noros states was left behind on the ice-floe. If covering a large surface of ice with a thick covering would protect it, what course seems more natural for a careful and scientific commander to pursue. This may account for its preservation for so long a period, in good condition.

The men first camped in *six* tents, on the ice-floe, which De Long describes (Vol. II, page 582) as follows: Tent "A., Headquarters; B., De Long; C., Chipp; D., Melville; E., Danenhower; F., Ambler;" in front of which were placed three boats and four sledges. Accepting the statement now made by Noros, "that the party carried south *five* tents, De Long's party having two, Melville's two, and Chipp's one," it is apparent that, as De Long records, *six* as landed on the ice-floe, *one* must have been left there when the retreat began.

This accounts for the partly destroyed tent which Captain Wilson says was found on the floe. He reported that the natives saw a bearskin covering something resembling in size and shape a human corpse. This probably covered some provisions which could not be carried and were abandoned on the ice, and he fully "believes that what was covered up under the bear skin, was only apparently in the

shape of a human body." May it not have been a long water-breaker? Chief Engineer Montgomery Fletcher, U. S. N., informs us that many of such a form were included in the outfit of the *Jeannette* when she left the U. S. Navy Yard at Mare Island, Cal.

#### FORCE AND DIRECTION OF CURRENTS.

Captain Wilson states that he "thoroughly believes that the articles on the piece of ice found off the coast of Greenland really floated there—borne by the identical cake of field ice upon which the *Jeannette* party encamped after the sinking of their vessel, and upon which they apportioned their outfit, and abandoned all that was unnecessary to sustain life," taking what they could, and leaving the remainder, before starting southward upon their retreat. Capt. Wilson has been on whaling ships cruising in Arctic seas for more than thirteen years. He says there is nothing improbable in this, as he knows from frequent experience that "there is a polar current found as high as eighty degrees North, which runs in a southwest direction closely along the coast of Greenland, then turns at Cape Farewell and flows thence northeasterly along the western coast of Greenland up Baffin's Bay."

Capt. Charles B. Dix, one of the owners of the *Fluorine* fully agrees with Capt. Wilson that these relics could not possibly have drifted eastward, down through the intricate series of channels leading into Baffin's Bay, and thence across Davis Straits, to the point near the coast of South Greenland where they were found. Such a circuitous route, through McClure's Strait, south of Parry Islands, and thence eastward through Lancaster or Jones' Sound into Baffin's Bay, involves a complicated drift of over five thousand miles, over 17 degrees of latitude and 149 degrees of longitude.

Capt. Wilson further says: "The ice would thus be taken between Nova Zembla and Franz Josef Land, where a strong westerly current sets against Spitzbergen, and thence southerly around Spitzbergen, where an indraught of the Gulf Stream gives a northern direction to the current. This northern course continues to nearly latitude 80°, longi-

tude  $10^{\circ}$  east, where it meets the southward current pouring from the Polar Ocean and is carried down the east coast of Greenland. Of the portion of the journey which the ice-floe probably took I can speak from my own knowledge, as I have sailed along there myself, and the ice is carried southward on the current parallel with the Greenland coast at the rate of about twenty-five miles a day. When the ice got to Cape Farewell it was, very likely, carried around that corner of Greenland by Gulf Stream influence, and floated to the very spot where it was found. In performing this journey the relics of the *Jeannette* went over forty-five hundred miles in one thousand and ninety-six days; allowing for all the twists and eccentricities which the currents may be subject to. This would give the flocs an average traveling time of about four nautical miles a day, which is just what took place.

## OPINIONS EXPRESSED BY DISTINGUISHED MEN.

Dr. Emil Bessels, the Arctic explorer and well known geologist of the Smithsonian Institution, at Washington, was at first in doubt in regard to the brief telegraphic report, but upon receipt of fuller details he gave as his opinion that to reach that point, the floe on which they were found must have drifted along the northerly part of the known coast of Greenland, and have been carried by the East Greenland ice stream, which doubles Cape Farewell, around that cape into the vicinity of Julianshaab. The currents in Baffin's Bay and Davis Straits are such that the cold current which doubles Cape Farewell runs to the northward on the inside of a branch of the Gulf Stream drift, which probably does not extend further north than Disco. He says most emphatically that "the floe *could not have come down Baffin's Bay* to where it was found, as the currents issuing from Smith Sound, Jones Sound and Lancaster Sound, closely follow the eastern shores of the North American Archipelago, bending—as all southward currents do—to the westward. Whatever channels the ice floe had come through it would necessarily have followed the course of currents along its route."

Chief-Engineer Melville, one of the survivors of the *Jeanette* expedition, after analyzing all data obtainable from the U. S. Hydrographic Office Reports, with a careful scrutiny and comparison of arrows, indicating the currents observed by various navigators and distinguished geographers, and being personally familiar with the Arctic literature in general, and the drift of the *Jeanette* up to her loss, has expressed his carefully determined belief that the drift from where they left the vessel would eventually have taken her safely out had she remained staunch and intact, proceeding south-easterly past the southern end of Franz Josef Land, thence moving at a very rapid rate when the pack impinged upon that group of land, and continuing on in the current, passing south of Spitzbergen, around Bear Island into Atlantic waters.

He says before the *Jeanette* sunk, they all felt sure their vessel would continue to drift northwest during the coming year, they having then got out of that region of Arctic doldrums, as far as drift is concerned, which whirls ice around in circles, in a locality just north of Wrangel island. The Arctic seems to be a very shallow ocean, largely studded with an island archipelago, and on the Pacific side many indications point to the possible existence of a small Arctic continent surrounding the physical pole. The greatest depth encountered by the *Jeanette* during her first year's drift was not over sixty, and the least seventeen fathoms. The bottom from which was taken many meteoric specimens, was generally uniform, averaging about thirty fathoms only. The *Jeanette* had already drifted more than half way to the longitude of the river Yenisei, a point on the northern coast of Asia visited by steamers from Hammerfest in Norway, belonging to Alexander Siberiakoff, an enterprising Russian merchant, who trades there for wheat and other local products.

Professor George Davidson, President of this Academy, who, as Assistant in charge of the Bureau of the U. S. Coast and Geodetic Survey in this city, and author of the Alaska Coast Pilot published by the U. S. Government, has devo-

ted years of patient toil to the consideration of Arctic and kindred currents of the North Pacific and Atlantic Oceans, is as well qualified to express an opinion on such matters as any one on our Coast. He says: It would seem highly probable that the preservation of these De Long relics may have been effected in this wise. After the party left the floe in boats, all relics that remained may have been covered with a blanket of snow, and thus preserved from immediate shifting or loss. This, with subsequent snows and rains, would form a *névé* or snowy body of ice, overlying them, which may have thus remained, not only all the next summer, but have been added to the following winter, more especially if the floe followed a track in the general direction of the pole, keeping thereby in a region of intense cold. This method of preservation, must have been repeated, until the floe passed into currents bearing it southward; where, encountering a warmer temperature, the protective covering of ice or *névé* would melt away three years' deposits, and just at such an opportune period, the party of Greenlanders appeared to witness these relics, and rescue all but the water-breaker, or other stores under the bear-skin and partially destroyed tent.

Nordenskiöld, the first circumnavigator of the continents of Europe and Asia, by this northwestern passage along the Arctic circle, has given us large additions to our knowledge of Arctic phenomena. He says, "In geology a knowledge of Arctic lands is an indispensable condition in determining the former history of our globe." So in physical science, a thorough knowledge of Arctic currents is needed as a key to unlock many an important question, now clouded with uncertainty.

Alfred Russel Wallace, in his work, *ISLAND LIFE*, says it is highly desirable to estimate the amount of heat stored up in currents of warm water, which proceed from the tropics to north polar basins by many large streams and rivers; and by a continual process of gradual equalization, under a dry non-conductor of ice, these operate to a certain extent in ameliorating the rigors of an Arctic winter.

Mr. Clement R. Markham, the distinguished Secretary of the British Royal Geographical Society, after commenting on the unfortunate misadventure and valuable results of the Greely expedition, expresses his firm belief that "Polar research will now continue more vigorously and wisely until this much needed scientific work has been completed."

POLAR EXPEDITIONS CONTEMPLATED AND UNDER WAY.

The Danish government expedition under Lieut. Jensen, of the Royal Navy, left in May to explore the west coast of Greenland, and is expected to return to Copenhagen in October. A similar expedition under Lieut. Holm, is about proceeding northward along the east coast of Greenland, and a third botanical and zoological expedition, under Prof. Warming, has left Denmark for West Greenland.

Through these channels we may receive additional information from the De Long records, left afloat in the direct water-breaker.

Another Danish Polar Expedition will start from Copenhagen for the frozen Northwest next summer, proceeding by the way of Franz Josef Land. It will be under the leadership of Lieut. Andreas Hovgaard, R. N. of *Vega* Expedition conjointly with Gamel.

Russia is also organizing a Polar Expedition. From St. Petersburg, under date of August 27th, 1884, we hear that the ministry of marine has issued to several learned societies a plan for a Russian Polar Expedition. The idea is to have several large parties start from Jeannette Island and proceed entirely on foot across the ice, leaving large depots of provisions in their rear. It is thought there are many islands north of Jeannette Island that could be utilized.

Lignite, suitable for fuel, is there found cropping out at the surface in large quantities, also offering facilities for manufacturing gas necessary for use in captive balloons. This is much needed for observations to determine what route to take, and for a general topographical reconnaissance.

Nordenskiöld is contemplating an expedition to explore the Antarctic continent.

The object of the Greeley expedition was to establish one of the thirteen Polar stations, suggested by Lieutenant Weyprecht, of Austria, who discovered Franz Josef Land. Simultaneous observations of all physical phenomena were taken. The complete programme was arranged by an international Polar congress, in which representatives of thirteen nations took part. Observation in which the greatest possible accuracy was to be had were those of declination and deviation of the magnetic needle, height of barometer, temperature of the air and sea, mean and maximum rise and fall of tides, the drift of ice-floes and the direction of currents. All geographical and other explorations were incidental to the main objects of the expedition.

#### SOME RESULTS AND SUGGESTIONS.

Arctic research, which has advanced about three hundred miles northward since Baffin immortalized himself in the year 1616, will now be more carefully and skilfully undertaken, by the practical application of wisdom gained through experience.

From a scientific standpoint the American Expedition at Lady Franklin Bay in lat.  $81^{\circ} 40'$  North, has accomplished noteworthy results. One of its geographical successes "is the attainment of a higher latitude than that reached by Capt. Markham in the British expedition of 1875-6. This feat was achieved by Lieut. Lockwood and Sergeant Brainard on May 13th, 1882, who reached an island off the coast of Greenland in lat.  $83^{\circ} 25'$  N., long.  $44^{\circ} 05'$  West, from the summit of which, when 2,000 feet high, they saw no land to the northward, but at the northeast a cape, which they named Robert Lincoln, in lat.  $83^{\circ} 35'$  N., long.  $38^{\circ} 32'$  W. It will be remembered that Captain Markham's farthest was  $83^{\circ} 20' 26''$  North, and about 20 degrees of longitude west of Lieut. Lockwood's farthest point.

Greeley makes the suggestive announcement, that at Lady Franklin Bay Lat.  $81^{\circ} 40'$  N., Long.  $64^{\circ} 30'$  W., the tides rise and fall 8 feet, and come from the north. They average  $29^{\circ}$  above zero Faht., which is two degrees warmer than

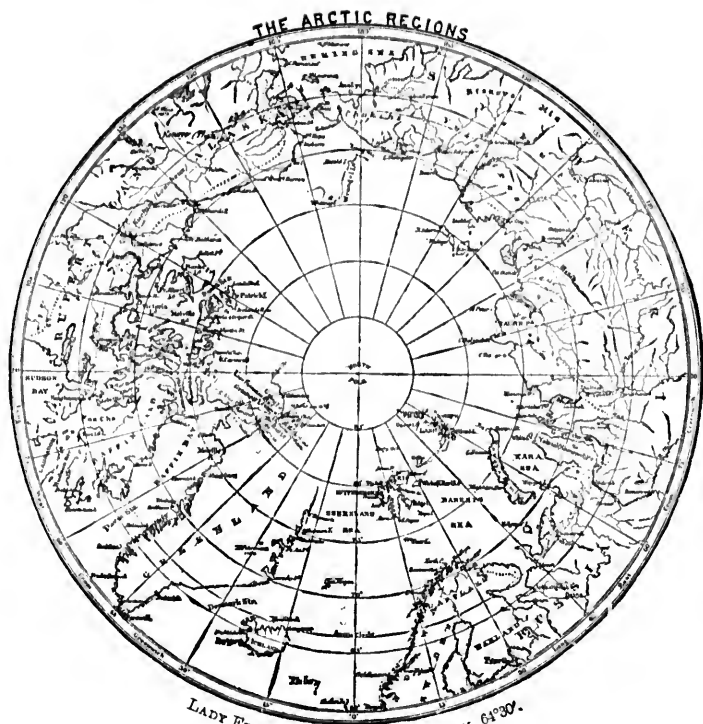
those at Melville Bay and Cape Sabine, where the tides come from the south.

Lockwood found at  $83^{\circ} 25' N.$ , about the same vegetation as at Lady Franklin Bay, and is confident that with a sufficient supply of provisions they could have reached Lat.  $85^{\circ}$  North.

All the official records of the Greely Arctic expedition, including the sledge party under Lieut. Lockwood, as well as the private journals of the entire party, are now in the hands of Lieut. P. H. Ray, lately in charge of the U. S. Meteorological Signal Station, Point Barrow, Alaska. He will compile a detailed history of the expedition, which, it is expected, may be ready for publication soon after adjournment of the next Congress.

In conclusion allow me to suggest a new and automatic method of ascertaining the drift of Arctic currents, without any undue exposure of human life. Could not an hundred or more properly constructed casks, capable of withstanding any probable ice pressure, be branded with the date and position in which they may be set adrift, coupled with a request to have all particulars of their discovery sent immediately to Washington?

CHARLES WOLCOTT BROOKS.



LADY FRANKLIN BAY, LAT.  $61^{\circ}40'$ . LONG.  $64^{\circ}30'$ .

