

an amount which might be jointly contributed by the several governments to the maintenance of mountain observatories, directed by an international commission, or of an international computing bureau for the complete utilization of the masses of observations accumulating the world over, and for the encouragement of research in theoretic astronomy, — it is certain that the deliberations of such a congress could not fail to advise governmental co-operation in the preparation of the nautical almanacs now existing. National pride aside, and this might be done in a multitude of ways, most prominently in the case of the preparation of the data relating to the moon. Take, for example, the hourly lunar ephemeris and the lunar distances as printed each year in the British nautical almanac and the American ephemeris. These data occupy about one-third of the entire number of pages of each of these publications; they are now prepared independently by the two offices, but are, when printed, substantially identical in both; and, further, the work being done at about the same time in the two countries, the results of the one do not serve any sufficient purpose as a check upon the accuracy of the other. The cost of this part of the almanac alone to each nation amounts to several thousand dollars annually, — an amount which might be reduced one-half by the preparation of these data conjointly, to say nothing of other immediate and favorable results which might be secured by such co-operation.

We should not like, however, to give the impression that this had never been thought of before, nor indeed that steps had never been taken toward securing such co-operation. It is frequently the best policy to let well enough alone; and we do not fail to recognize the fact that it is very often wise to leave a thing as it is, just because it has always been so: in fact, we are conservatives ourselves, though not that precise type of conservative, which, as we speak of the moon, recalls Douglas Jerrold's characterization as one who would "refuse to go out when there's a new moon; and all out of love and respect for that 'ancient

institution' — the old one." The wisest conservatism would appear to suggest the annual publication by the nations conjointly of a single volume of astronomical predictions, which, in addition to other improvements, should combine all those desirable features not dependent upon individual meridians, and which in some degree characterize all the astronomical ephemerides of the several governments. The contents and arrangement of the articles of such an ephemeris could only be determined by an international conference. While this may be little better than mere speculation, any one who has the four principal ephemerides in constant use will readily recognize how small a portion of each is employed, and, with extended interpolation-tables, how little the inconvenience of using the ideal ephemeris solely would be.

THE GEOGRAPHICAL WORK OF THE GREELY EXPEDITION.

THE general features of the geographical work of the Lady Franklin Bay expedition may be of interest to the readers of *Science*, in connection with the map furnished through the courtesy of Capt. J. R. Bartlett, chief hydrographer U. S. navy. The details are reproduced from photographs of charts made at Fort Conger by the late First Lieutenant James B. Lockwood, U. S. army, of his and my work.

The expedition fitted out by the war department under the supervision of Gen. W. B. Hazen, chief signal-officer, and commanded by me, left St. Johns, Newfoundland, July 7, 1881. After a remarkably successful voyage, the party landed on the shores of Discovery Harbor, just south of Robeson's Channel. The station called Fort Conger was in latitude $81^{\circ} 44'$ north, longitude $64^{\circ} 45'$ west. The site was the same as that occupied by the stores landed from the English ship *Discovery*, of the Nares expedition, 1875-76. During the autumn, as much work as possible was done towards establishing depots for use of exploring-parties the following spring. The sun, returning after an absence of one hundred and thirty-five days, found the party well and in good spirits. Parties were immediately put into the field to establish advance depots; and

shortly after, two main exploring-parties left the station.

The party under Acting assistant surgeon O. Pavy, U. S. army, which attempted a northing direct from Cape Joseph Henry, failed even to reach the 83d parallel, owing to disruption of the polar pack north of Grinnell Land.

Lieut. James B. Lockwood was ordered to explore the north coast of Greenland. Leaving Fort Conger, April 3, 1882, he crossed Robeson's Channel from Cape Beechy to Cape Sumner, where the main depot of provisions had been established. From that point across Brevoort Peninsula to Repulse Harbor, and thence along the shores of the polar ocean to Cape Bryant, he was supported by three parties of men hauling Hudson-Bay sledges. From Cape Bryant, Lieut. Lockwood and Sergeant Brainard, with Eskimo Christiansen and dog-team, travelled direct across Sherard Osborn Fiord to Cape Britannia. Midway between these capes a sounding was made, but no bottom reached at eight hundred feet. Rounding Cape Britannia Island, which was the farthest point seen even by their English predecessors, they pushed on to the eastward, and later to the north-east, until, on May 15, 1882, Lockwood Island was reached. Its assigned latitude, $83^{\circ} 24'$ north, was the mean of sets of circum-meridian and sub-polar observations. Its longitude was $40^{\circ} 45'$ west. To the north-eastward, land was yet seen, the farthest point being about $83^{\circ} 35'$ north, 38° west. To the south and east, only a confused mass of rounded, snow-covered mountains was visible. The entire coast was rugged and precipitous in the extreme. Strangely enough, but one glacier was observed, although the interior of the country was wholly snow-clad or ice-capped. Along the coast, stretching from headland to headland, was found a tidal crack, which appeared to mark the line of separation between the embayed ice and the paleocrystic pack. In the deep fiords along the coast were seen only level expanses of deep snow, devoid of heavy hummocks or marked ice-foot. In returning, the same route was followed; and on June 3 the party reached Fort Conger in good condition, with the exception of snow-blindness contracted in the last two days' travel.

In April, 1882, with three men, dragging a Hudson-Bay sledge, I succeeded in penetrating into the interior of Grinnell Land. Starting from Fort Conger, we travelled south-westward to Sun Bay, and, passing Miller Island, discovered that we were in a fiord (Chandler Fiord) which terminated to the south-westward in a bay. Passing up the north arm of

the fiord, a river was reached, having its source in a glacial lake of great extent. Crossing the lake (Lake Hazen), the farthest point reached was Henrietta Nesmith glacier. The party returned by the same route.

In June, with a party of four men, I succeeded in reaching the east end of Lake Hazen by an overland route. Following that lake to the west, Very River was reached; and following up that valley with one man, I alone attained the summit of Mount Arthur on July 4. From the top of that mountain North Grinnell Land stretched out before me. An enormous ice-cap covered the smooth-topped mountains to the northward of the Garfield and Conger ranges, through the gorges of which numerous and magnificent glaciers pushed southward. To the north-westward the trend of the mountain range indicated its connection with Challenger Mountains of Aldrich, and that the western polar ocean was not far distant.

In 1883 Lieut. Lockwood's attempt to reach the northern point of Greenland was unsuccessful, owing to open water at Black-Horn Cliffs. In consequence, I sent him, on his return, to attempt the crossing of Grinnell Land to the western sea. Accompanied by Sergeant Brainard and a dog-team, he travelled down Archer Fiord, and thence westward *via* Beatrix Bay. They succeeded in reaching Greely Fiord, and followed it some distance westward. From a high mountain, the northern shore appeared to terminate in Cape Brainard, while to the south-west very high land was seen at Cape Lockwood. This land, apparently separated from Grinnell Land, was named Arthur Land. The remarkable feature of this trip was the appearance of the southern ice-cap of Grinnell Land. It presented an average perpendicular front of one hundred and fifty feet.¹

As regards Grinnell Land, the southerly trend of coast at Aldrich's farthest, the position of Cape Brainard, and the general trend of the land seen by me from Mount Arthur, indicate that the western coast runs quite directly from Cape Alfred Ernest to Cape Brainard.

It is to be noted that Cape Lockwood of Arthur Land is nearer to Lindsay Island and North Cornwall of Belcher than to Fort Conger, our own station.

The considerable extension of Hayes Sound to the westward, by Sergeant Long's journey from Sabine, leaves but a scant hundred miles between its north-westerly point and Cape Lockwood, and but a little farther to the south-

¹ The height of this ice-cap was given at fifteen feet in *Science* of July 25, 1884.

west reaches the waters of Jones Sound in their northern extensions.

The importance of the northern work is not confined, as many think, to the mere planting of the American flag a few miles nearer the northern axis of the globe than has floated the standard of any other nation. Lockwood's journey has gone very far towards settling the much-vexed geographical question, the configuration and northern extension of Greenland. The farthest point seen is scarcely three hundred miles from the land of Lambert, sighted on the east coast in 1670, and less than four hundred and twenty-five from the most northern point of Koldeway and Payer. Of the forty-seven degrees of longitude between Fort Conger and Cape Bismarck, but twenty remain unknown. I venture the opinion that future voyages will confirm the indications growing out of our discoveries, that Arthur Land is separated from Grinnell Land by a fiord or channel connecting the western polar ocean with Hayes Sound. I also think that the northern coast-lines of the Parry Archipelago will be found trending gradually in a northeasterly direction, and terminating in Arthur Land. On these points, as well as on the remarkably fertile belt of iceless country found by me in the interior of Grinnell Land, such as Nordenskiöld hoped to find in Greenland, I trust soon to dwell at length in a forthcoming narrative.

A. W. GREELY, *Lieut. U. S. army.*

THE CONFIGURATION OF GRINNELL LAND AND ELLESMERE LAND.

THE discoveries of the Greely expedition on the west shore of Grinnell Land are most valuable and important, as there was a vast field for conjecture concerning the configuration of the coast-line of this large island. The exploration of the north shore by Lieut. Aldrich of Nares' expedition proved the improbability of any great extension to the west. The discovery of the west shore at so short a distance as Lieut. Lockwood found it, was, however, quite unexpected. From the description of Hayes Sound, obtained by Dr. Bessels from the Smith-Sound natives, and from information and drawings I received last summer during my stay on Davis Strait from natives who had crossed Lancaster and Jones Sound, and lived on Ellesmere Land, it is possible to learn something more about this long and unexplored coast.

The most exact description I received was

from an Eskimo woman whom I met at Cape Kater. She was born at Igluling in Fury and Hecla Strait, had lived some time in Repulse Bay, returned to Igluling, and afterwards crossed the land to Admiralty Inlet, which the natives call 'Tudnunirossirn.' There she lived for a number of years; and about fifteen years ago she started with a party to North Devon, which the Eskimo call 'Tudjan.' There is little intercourse between Baffin Land and North Devon, Lancaster Sound being seldom covered by a solid ice-floe. The north shore of Baffin Land ('Weevang' of the natives) is generally washed by water during the whole winter.

Crossing the sound on sledges, these Eskimo passed a very small island, most probably the rock seen by Capt. Adams in 1871, and in two or three days reached the opposite shore. They did not follow the shores of North Devon, but crossed the ice-covered island on sledges. In four days they reached the north shore, whence a long and narrow peninsula, Nedlung, stretches to Ellesmere Land (their 'Oomingmam nuna,' i.e., musk-ox land). Through the narrow passage dividing Tudjan from Nedlung runs a very strong tidal current, which keeps open a water-hole throughout the winter. All around this place the ice wastes quickly in the spring, and forms a large basin of water abounding with seals. Only that part of the peninsula which lies nearest to North Devon is high and steep, and forms a bold face: farther north it is very low. The length of Nedlung may be about forty miles; its width, three or four miles. West of it there are numerous small islands, called 'Kikkertakdjuin:' to the east there are no islands.

Having reached Oomingmam nuna, the Eskimo fell in with a small tribe residing on this shore. Here they lived for some time, as an abundance of seals was found during the whole year. Farther north-west there is a large fiord, called 'Kangirtuksiak,' off which an island is found, Kikkertakadlinang. The Eskimo did not go to the land on the other side of the fiord, as polar bears are said to be very numerous and large there.

I obtained this information by most careful and minute investigation on every point. I also heard some less detailed descriptions of the journey to Oomingmam nuna by natives of Ponds Bay, who had not been there themselves, but had heard about it from their ancestors; and I may here state that all their traditions and descriptions which I had a chance to verify proved accurate and reliable.

There can be no doubt about the identity of Tudjan and North Devon, as they say that