



*Photo: J. J. Languepin*

The ablation zone of the Ice Cap in August 1948: some five miles inland (altitude 2500 ft.)

# THE FRENCH EXPEDITION TO GREENLAND, 1948

By Paul E. Victor

**O**UR idea of an expedition to the Greenland Ice Cap, for the purpose of studying its characteristics and its influence on the atmospheric circulation of the northern hemisphere, dates from the years before the Second World War.

Leaving France in July 1934, I had spent one year at Angmagssalik on the East Coast of Greenland, in company with Robert Gessain, Michel Perez and Fred Matter. Gessain, Perez and I then returned to Greenland in April 1936, and made a dog sled journey over the Ice Cap from near Christianshaab to Angmagssalik. On this journey we were accompanied by Count Eigil Knuth of Denmark, who is at present the leader of the Danish expedition to Peary Land. During this west-east crossing we were constantly confronted by the challenging problems of the Ice Cap, which the Wegener Expedition of 1931 had shown to be in places between one and two miles in thickness. In particular, our glaciologist, Perez, became eager to make a traverse of the Ice Cap on which it would be possible to take sufficient equipment to obtain the necessary data for drawing profiles of the substratum.

During the war, I was an officer in the U.S. Air Force, and was stationed with the Search and Rescue Squadron in Alaska. Here I became familiar with parachuting techniques and the performance of aircraft and weasels under northern conditions. I soon realized that by the use of an aircraft and mechanized vehicles it would now be possible to transport the heavy equipment necessary for the work we had contemplated in Greenland.

At the end of the war I put my name down for some surplus weasels, and immediately after my return to civilian life, with four others I began to make plans for an expedition to study the Greenland Ice Cap. In addition to Gessain and Perez, the group included Raymond Latarjet and André F. Liotard. The idea was widened and to make our ice study more complete we planned that an Antarctic Expedition with Liotard as leader should be made simultaneously with the Greenland project.

All the necessary authorizations for the expedition were generously granted by the Grønlands Styrelse, in May 1947. The expedition was to be a private one but we received official financial aid from the French Ministry of Education, Department of Scientific Research, and assistance from other interested persons.

The research program was discussed and adopted by a scientific commission presided over by M. Charles Maurain and R. P. Pierre Lejay, both of l'Institut de France. The research program, which was approved

by l'Académie des Sciences, was as follows:

To obtain profiles of the surface of the Ice Cap by precise methods.

To obtain profiles of the substratum by seismic soundings.

To study problems of glaciology particularly:

accumulation and ablation of the névé;

the temperature, density and stratigraphy of the surface and deeper layers of the ice.

To make gravity measurements and obtain gravimetric profiles.

To make meteorological and climatological observations.

To study atmospheric optics.

It was also hoped that research would be possible on a number of biological problems.

The detailed organization of the expedition was begun on 1 October 1947. It was planned to divide the operation into two successive stages: a preliminary expedition in the summer of 1948 and the main expedition which would take place during 1949, 1950 and possibly 1951.

The members of the expedition were to be divided into two main groups:

*A Summer Group* working inland during the summer season occupied with geodetic surveys, seismic soundings, gravimetric measurements, and certain problems of glaciology. A small party would carry out coastal researches for the expedition. The Summer Group would consist of twenty to thirty scientists and technicians. The technicians were to be responsible for radio, machines of all kinds, vehicles, and photography. The Summer Group would spend the summers of 1948, 1949, 1950 and, if possible, 1951 in Greenland.

*A Winter Group* of from 6 to 10 men who would make year-round observations at the Central Ice Cap Station. This station would be erected as close as possible to Wegener's 1931 *Eismitte* station (approximately  $71^{\circ}\text{N}$ .,  $41^{\circ}\text{W}$ .), in order to benefit from the records obtained by Georgi, Loewe and Sorge during their almost complete year of observations there in 1930-31. The researches of the Winter Group would mainly relate to climatology and meteorology and to certain glaciological and geophysical problems. It would spend the year 1949-50 at the Central Ice Cap Station, and, if possible, would be succeeded by another group for the year 1950-51.

This paper will deal mainly with the work of the 1948 preliminary expedition. The objectives of this expedition were to bring up to the Ice Cap the heavy equipment necessary for the main expedition in order that work might start as early as possible in 1949, and at the same time to familiarize the members of the main expedition with the region. This would enable them in some cases to initiate their research programs and also to improve their instruments and technical methods during the

following winter in France. The purpose of this preliminary expedition, it should be stressed, was to ensure that everything and everybody would be thoroughly prepared for the main undertaking during 1949-50.

### THE PRELIMINARY 1948 EXPEDITION

On 14 May 1948, some six months after preparations were begun, the



25 members of the expedition, with their 90 tons of equipment, sailed from Rouen aboard the Norwegian freighter *Force*, which had been chartered for the purpose. To permit our gravity expert, Jean Martin, to make comparison of the relative values of gravity between Europe and Greenland, the *Force* put in at Edinburgh, Godthaab, Godhavn and Jakobshavn. Some scientific observations were made on board ship, particularly by Philippe Pluvinauge our geophysicist and Michel Bouché our meteorologist.

We had the choice of four main landing places on the West Coast of Greenland:

J. P. Kochs Land ( $72^{\circ}30'N.$ ,  $54^{\circ}W.$ ), where Koch and Wegener came down from the Ice Cap after their crossing in 1913.

Kamarujuk Glacier ( $71^{\circ}N.$ ,  $51^{\circ}W.$ ) which had been Wegener's starting point on to the Ice Cap in 1931, and Arne Hoygaard's starting point for his crossing in the same year.

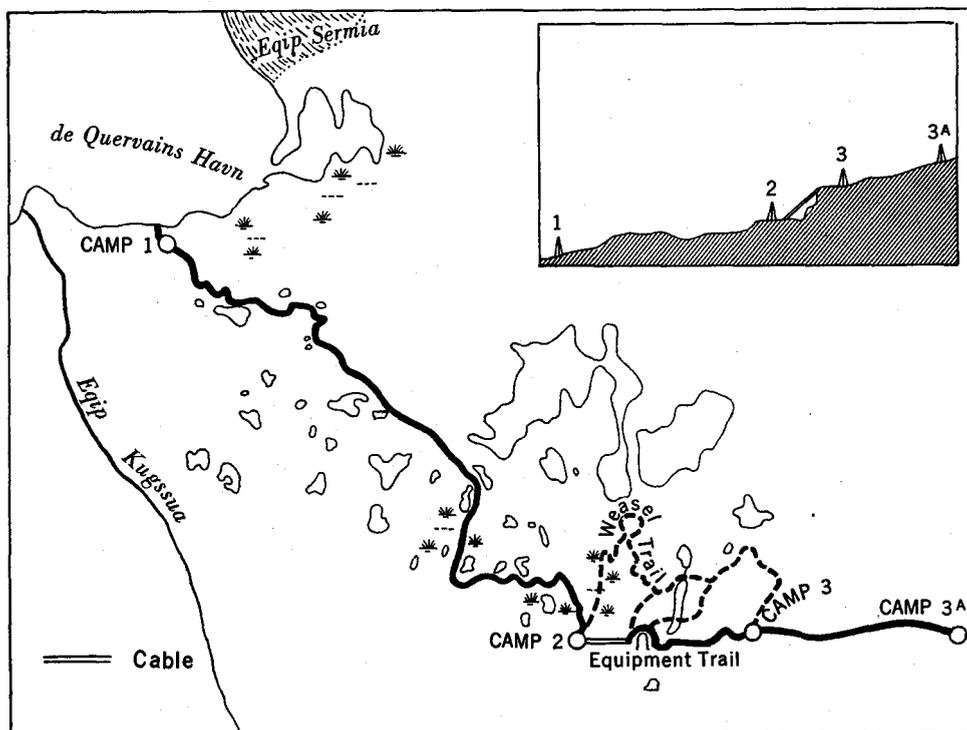
De Quervains Havn ( $69^{\circ}48'N.$ ,  $50^{\circ}15'W.$ ) from which de Quervain in 1912 and Lindsay in 1934 had started for their crossings of the Ice Cap.

Akugdliit ( $68^{\circ}40'N.$ ,  $57^{\circ}W.$ ) where my companions and I had begun our crossing in 1936.

At our request, several Eskimo parties had made numerous reconnaissance trips by dog-sled to these different points during the winter of 1947-48. Their findings had been reported to the local Danish authorities, then radioed to the Greenland government in Copenhagen, who in turn had passed on the information to us. These reports and the infor-

mation collected locally as we sailed north decided us to visit first the point where de Quervain had landed in 1912. There we hoped to find good anchorage and fairly good landing possibilities. This point moreover is only six miles as the crow flies from the Ice Cap.

On June 1 the *Force* dropped anchor in front of the Eqip Sermia Glacier ( $69^{\circ}46' N.$ ,  $50^{\circ}15' W.$ ) in a fjord almost free of ice. Although 600 miles farther south the land was still covered by snow, here it was remarkably bare.



The route from Camp I to Camp IIIa.

Reconnaissance parties set out immediately to examine possible routes to the Ice Cap. These proved to be very difficult because of the abnormal absence of snow and it was soon evident that the route followed by de Quervain in 1912 would not be possible for weasels. After forty hours of continuous reconnaissance we discovered a new route which would, with some improvements, be practicable for our ascent. The most difficult obstacle was a 500-foot cliff, but we had foreseen this and had brought with us a specially constructed cable-way for lifting supplies.

#### *Landing Operations*

We began unloading our equipment on June 3. The rocky coast and the great waves caused by the blocks of ice which calved from the glacier

made our task difficult. But with the exception of one of our landing boats, which capsized when struck by a wave, and a weasel, which was lost when its raft hit a submerged rock, the 90 tons of equipment were all unloaded safely. The twenty-five members of the expedition, with the assistance of fifteen Eskimo, built two landing piers and completed all unloading in six days. On June 8 the *Force* was able to leave for the summer cod-fishing off Iceland.

The expedition was to be entirely mechanized, and in addition to

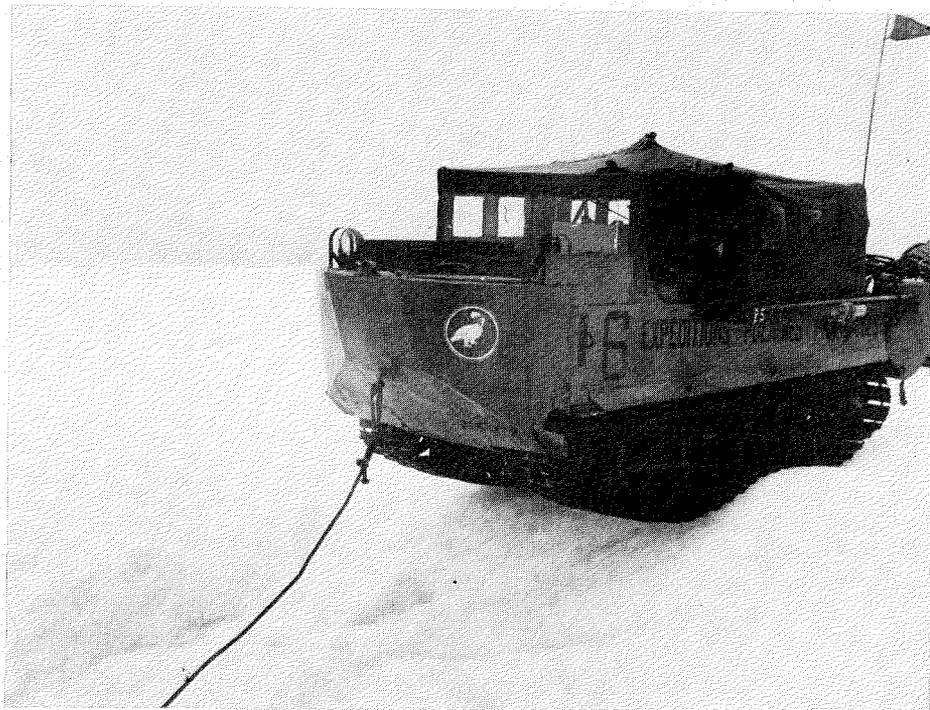


Photo: J. J. Languepin

Weasel on the Ice Cap: heavy going in the ablation zone, July 1948.

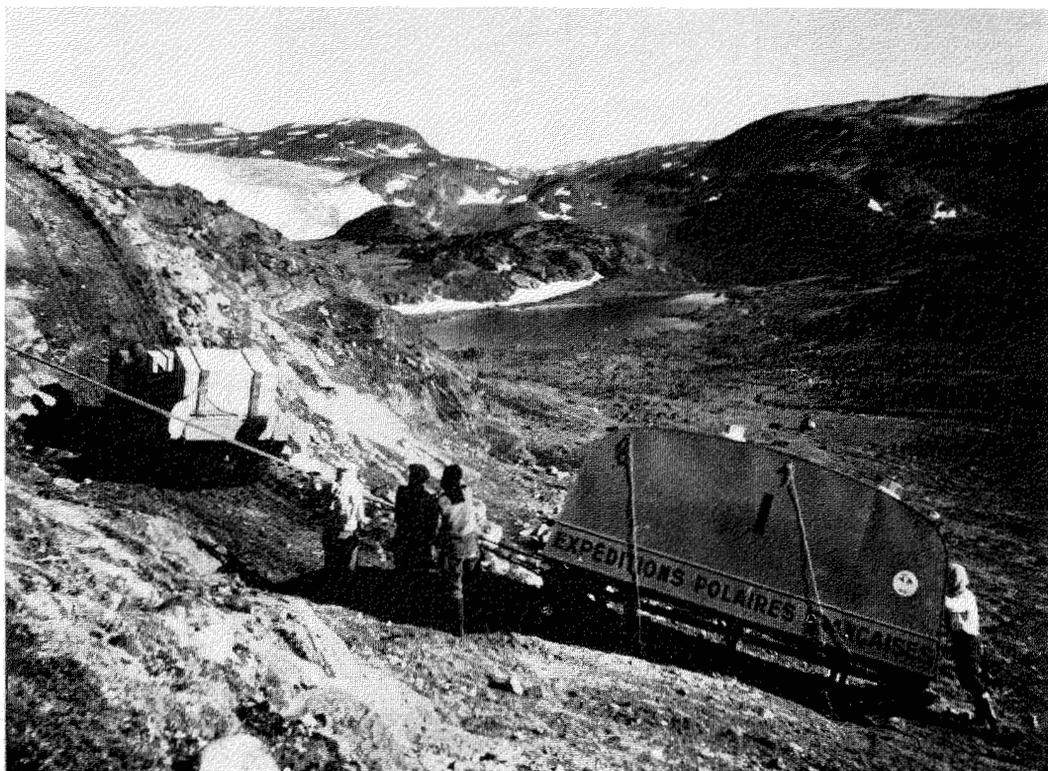
scientific instruments and camping material our equipment included:

- 7 weasels (M 29C): one lost in unloading
- 14 duraluminum sledges, approximately 13 x 6½ ft., to be towed by the weasels
- 3 trailers on sleds, approximately 13 x 6½ x 5½ ft., for use as laboratories
- 3 winches
- 12,000 ft. of various metal cables for the cable-way
- 5,000 gals. gasoline
- radio sets
- food for 25 men for six months on a scale of 5,000 cal. per man per day.



*Photo: J. J. Languepin*

Surveyors at work near the coast. In foreground snout of the Eqip Sermia, June 1948.



*Photo: J. J. Languepin*

Laboratory trailer being towed up to Camp II, some two miles distant, July 1948.



*Photo: J. J. Languelin*

A load being hoisted up on the cable-way, 13 July 1948.

### *Camp I*

The site selected for Camp I was on a platform some 150 feet above sea level. This was to be the permanent camp of the 1948 and 1949 Summer Coast Parties. We planned to sort out equipment intended for the Ice Cap at Camp I and to use it as a depot for reserve stores for the 1949 expedition.

All our equipment was carried up to Camp I with the aid of a winch, which could take one ton at a time. On June 9, while this work was in progress, two members of the expedition and five Eskimo set out in a weasel to survey the proposed route to the Ice Cap. We had decided that some 43 tons of supplies would have to be carried up from Camp I to the Ice Cap. This great weight of supplies combined with the necessity of keeping the weasels in good condition for 1949 required our building a reasonably good trail.

Our method was for a few men on foot to stake out the most suitable route. Another group travelling by weasel then marked the trail with cairns, approximately 16 feet apart, on the driver's side going inland, to enable travel in fog, and also removed the largest rocks and stones. Finally several teams improved the surface of the trail, blowing up rocks and building necessary bridges and piers.

The five miles of trail from Camp I to the site for Camp II were completed by June 19. The route traversed many different types of terrain, and many natural obstacles such as rock-bars, small lakes and swamps were safely negotiated.

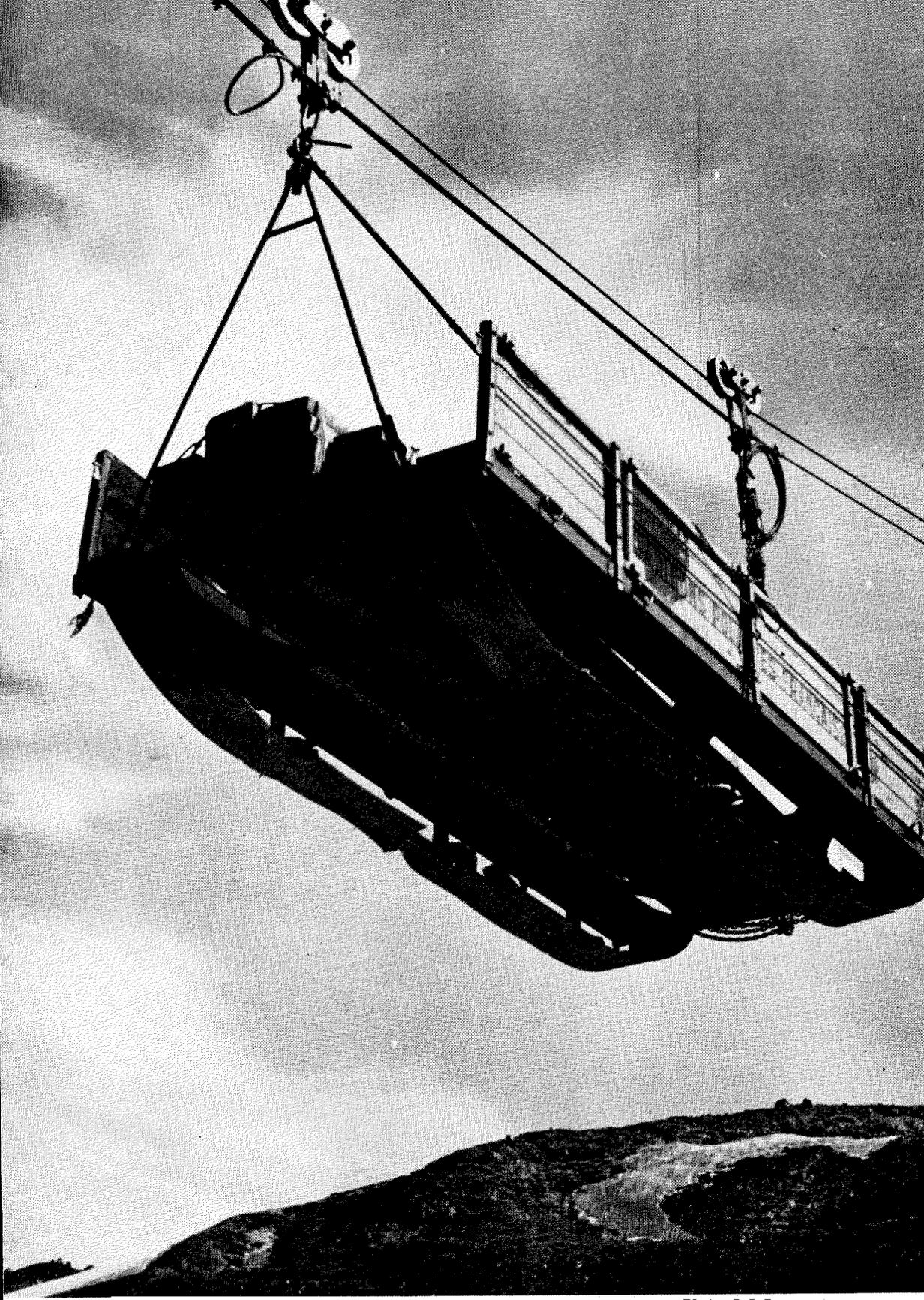
### *Camp II*

On June 20, the first convoy, consisting of four weasels with two tons of supplies, left for Camp II. Camp II was planned as an intermediary camp and was set up at the foot of the 500-foot cliff mentioned earlier. The weather, which had been very good, deteriorated at this point, and we were further hindered by the appearance of innumerable mosquitoes. In spite of this the remainder of the supplies was brought up in fifteen convoys of six vehicles each, working on a schedule of 6 hours driving and 8 hours rest, the latter including loading and maintenance. It took as much as 40 consecutive hours of work to transport the three trailers to Camp II.

Work was started on the route from Camp II to the site selected for Camp III, on the Ice Cap, as soon as the earlier stretch had been completed. This part of the route necessitated the construction of two separate trails: the first, for the transport of equipment, by cable-way to the top of the cliff, and then across one mile of trail to Camp III; the second, for the weasels, which had to find a way round the cliff, by some  $2\frac{1}{2}$  miles of trail from Camp II to Camp III.

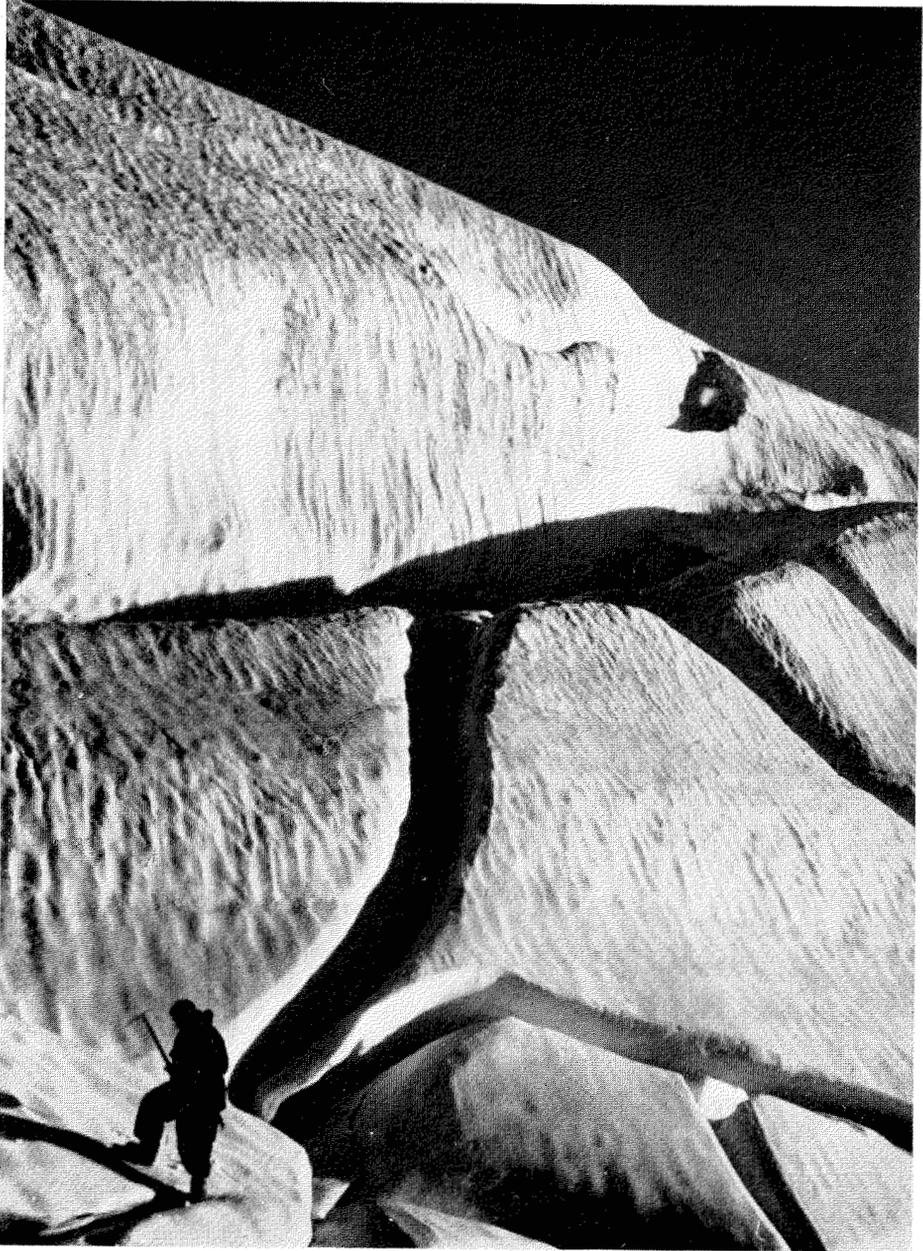
The cable-way had been specially built for us in France by the *Compagnie française des Funiculaires de montagne*, at Chamonix. As its installation involved calculations which could be made only by the builders we radioed the necessary information to our office in Paris, which telephoned it on to Chamonix. As soon as the calculations were worked out they were relayed back to us through the same channels. On July 10, less than a week after construction was started, the cable-way successfully made its first lift. In all it was some 2,300 feet long and bridged a difference of over 500 feet in altitude. The cable-way proved entirely adequate for our purpose and all the 43 tons of equipment was lifted without any accident. The usual load was between 1000 and 1500 lbs., but it successfully lifted the 1800 lb. trailers though it took us 36 hours of work to get them up the cliff.

The second stage of the Equipment Trail to Camp III proved more difficult than anticipated. We had planned to winch supplies across the one mile from the top of the cliff to Camp III, but our winch proved defective. The first part of the trail ran round the edge of a small lake, and supplies were carried by our weasels; the next part involved crossing névé and a large moraine, which we managed by the weasels towing the loaded sleds on cables as much as 150 feet long; for the third section from



*Photo: J. J. Languepin*

Sledge being hoisted up on the cable-way. Note runners worn out by heavy going on trail.  
July 1948.

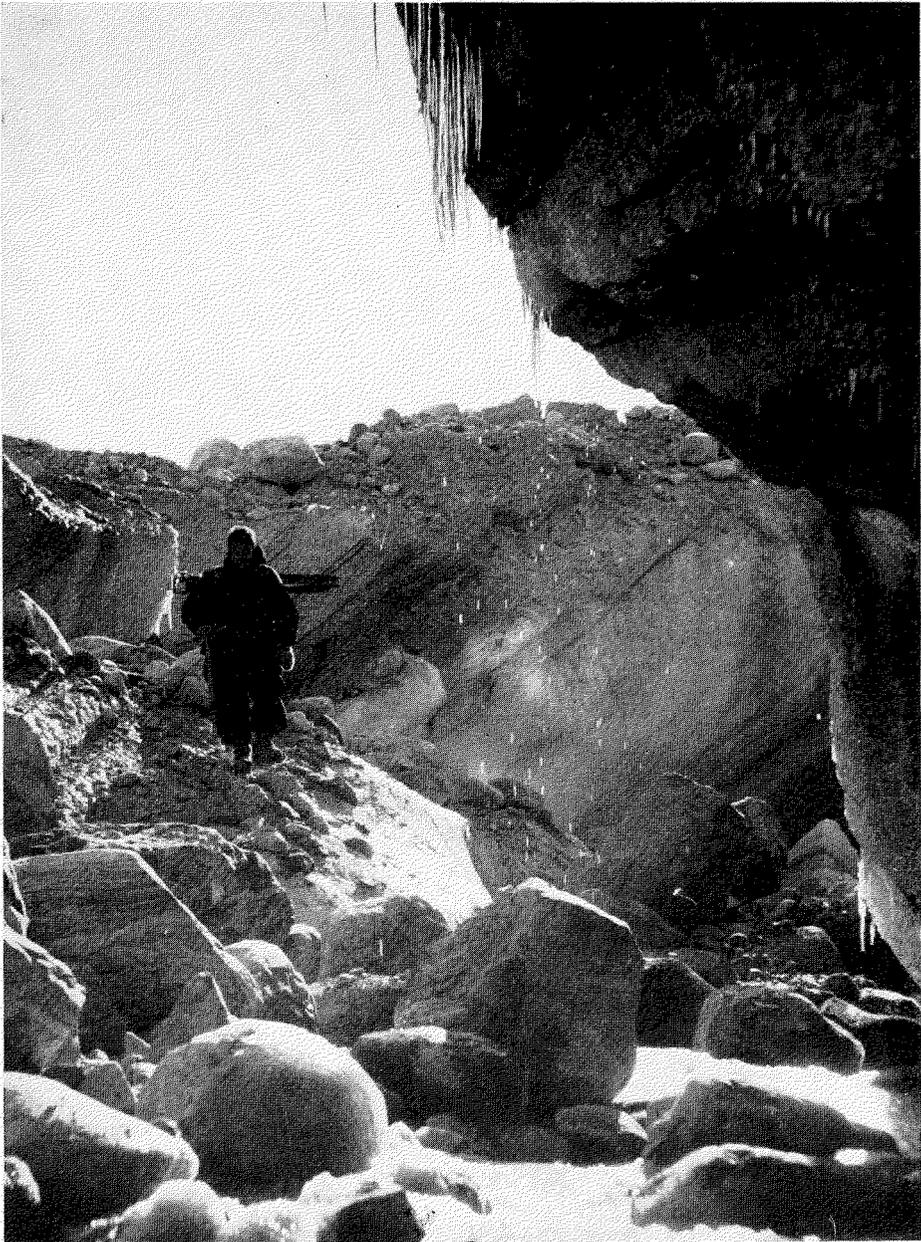


*Photo: J. J. Languepin*

The ice cliff at the edge of the Ice Cap, July 1948.

the top of the moraine to the Ice Cap the weasels again carried the supplies. In this manner all the equipment was successfully transported to Camp III.

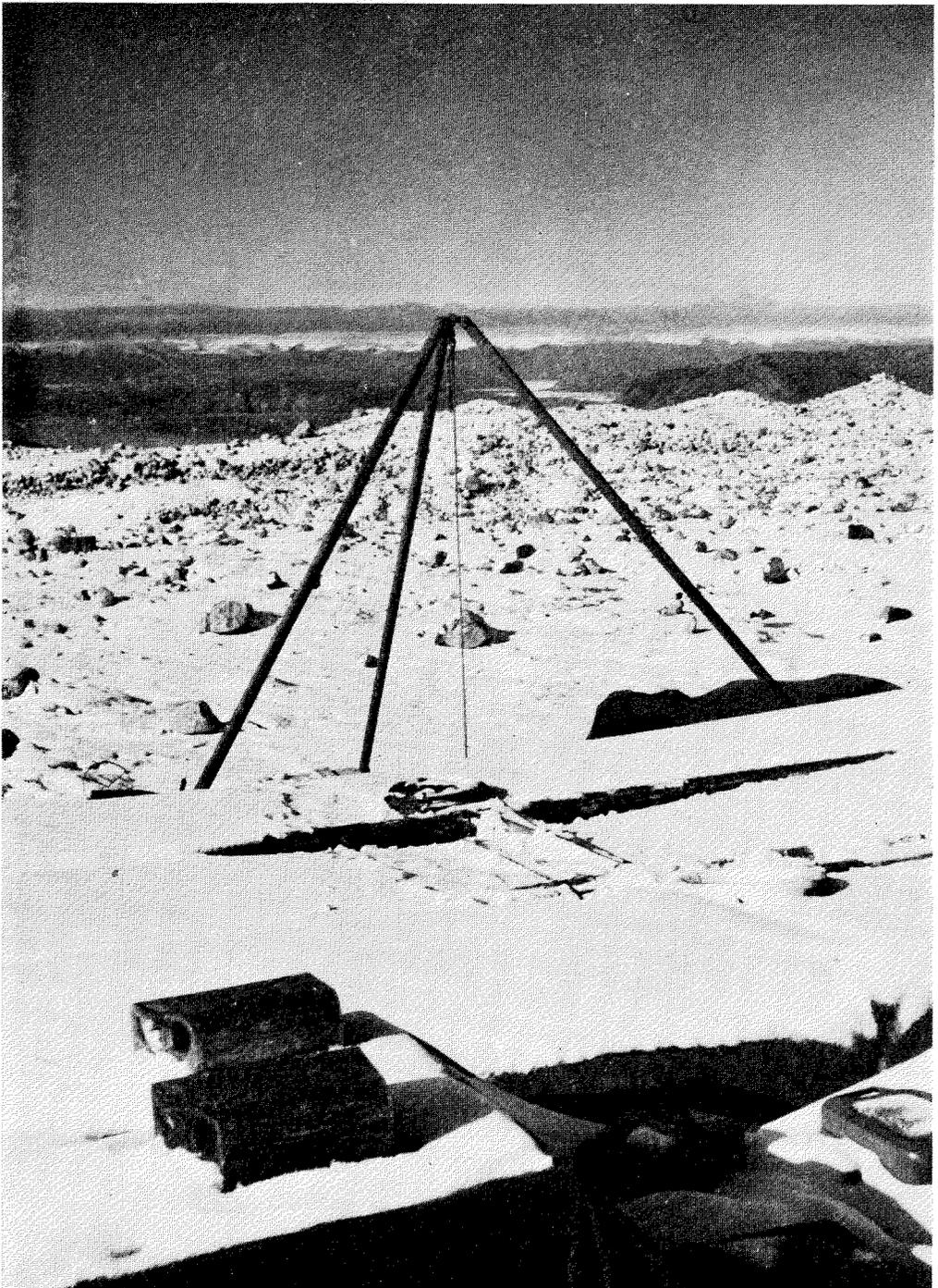
Meanwhile the first weasel reached the Ice Cap on July 9 and the



*Photo: J. J. Languepin*

Ice and morainic debris at the edge of the Ice Cap, July 1948.

remainder by July 13. The Weasel Trail crossed very rough and difficult ground but it was of a more temporary nature than the other trails as all the heavy stores were to be carried on the Equipment Trail.



*Photo: J. J. Languelin*

Stored equipment at Camp III, covered with first autumn snow: Nugsuaq mountains in the background, September 1948.

### *Camp III*

By July 25, after 46 days of work, all the stores had been successfully brought up to Camp III and some 9 miles of trail had been made. The 43 tons carried up had had to be moved by hand as many as fourteen times on the journey.

We were now ready for any reconnaissance work that might be possible on the Ice Cap. A small party had already penetrated some 10 miles inland along the 69°45' N. parallel and had explored the ground between the main areas of crevasses of the Eqip Sermia, the glacier to the north, and the glacier to the south from which the Eqip Kugssua flows.

On July 29 the first convoy reconnaissance of two weasels set off, towing three sledges with 4 tons of equipment. The latter was intended for a station for meteorological, geophysical and glaciological research, which was to be set up on the Ice Cap some distance inland. It was already late in the year and the weather was exceptionally warm. The sledges slipped on the melting surface and overturned frequently, which combined with bad weather and very rough going made progress extremely slow. In 9 hours the convoy only covered 1½ miles. We therefore decided to set up Camp IIIa at this place.

### *Camp IIIa*

On July 30 the two weasels, towing only one sledge, left Camp IIIa to set up a light meteorological station. The following day they reached a distance of about 10 miles inland from Camp III and were halted by a depression, some ten miles square, cut up by an intricate network of glacial torrents running in canyons up to 45 feet deep. These rivers finally disappeared under the ice. Progress was also rendered more difficult by "cryoconite holes", varying from a few inches to several feet in diameter, caused by the melting into the ice of dust blown inland from the ice-free areas.

After seven days of general reconnaissance work we decided not to continue farther, but to spend the remaining time in research work. Any advance would have required considerable time and might have resulted in serious damage to our equipment. If the 1949 expedition managed to get into the field as early as we hoped, melting would not have started and progress should be much easier.

### *Storage of equipment*

On August 27 the final storage of equipment was started at Camp III. Some of the members were employed dismantling, oiling and packing the equipment in a cache near the camp, while others carried down some 5000 lbs. of scientific instruments and personal possessions to Camp I.

By September 7 the cable-way had been made ready for the winter and we were able to leave Camp III. Packing of stores was already under way at Camp I and we completed this task by September 10.

The twelve days remaining before the arrival of the ship were spent in research work near the coast.

The Norwegian ship *Brandal* arrived on September 22, our 4 tons of equipment were loaded in as little as four hours, and the expedition was able to leave for France. On the way back we put in to Ata, Jakobshavn, Godhavn, Sukkertoppen, Godthaab, Prins Christians Sund and Edinburgh for various scientific reasons. Finally, after five months away, the expedition returned to Rouen on October 13, having accomplished the greater part of all it had set out to do.

### THE 1949 EXPEDITION

The main expedition sailed from Rouen on 13 April 1949, aboard the Norwegian freighter *Fjellberg*. Except for a few, whose professional duties prevented them from returning to Greenland, the party included practically all the members of the 1948 expedition. A number of additional technicians and scientists were included, as their services would be necessary for the research work planned during the winter months. In all, the expedition comprised 33 men and 110 tons of stores. Approximately 70 tons of equipment, food, and fuel were left at Keflavik, the main airport of Iceland, to be flown in later.

On June 1, after a delay of three weeks owing to very severe ice conditions, the expedition was able to land the remaining 40 tons of equipment at the same West Coast landing place as in 1948.

We reached the central region of the Greenland Ice Cap on July 17, and at 70°54N., 40°42W., we decided to set up our Central Ice Cap Station, approximately on the same site as Wegener's *Eismitte* of 1931. Forty tons of necessary equipment that could not be parachuted in were carried up by land convoys of weasels towing sledges, and from July 27 to August 5 parachute operations brought to us the 70 tons landed at Keflavik.

The Summer Group, who were to return to France, left the Central Ice Cap Station for the coast on August 24. The eight men of the Winter Group, who remained at the Station, will be isolated for nine months until the return of the Summer Group in 1950. Their main work consists of making weather observations, including radiosonde ascents every second day when possible, and a program of physical research. The meteorological observations are being transmitted four times a day and are channelled into the international network.

*In a future number of Arctic we hope to give further information about the work of the 1949 Expedition. Ed.*