EK.

Glaciology
and
Meteorology

FIELD NOTE BOOK

CROCKER LAND EXPEDITION

1913 - 1915

No. 34

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Being scattered and sundry notes and observations on glaciers and glacial phenomena as observed on various sledge and boat journeys up and down the coast of Northwest Greenland and the Grinnell Land region during 1913-16.

✓ Glaciers on South side of Northumberland 90.
✓ Glaciers west of Grenville Bay.
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Ice cap from North Star Bay to Parker Snow Bay.
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Glaciers of Parker Snow Bay.
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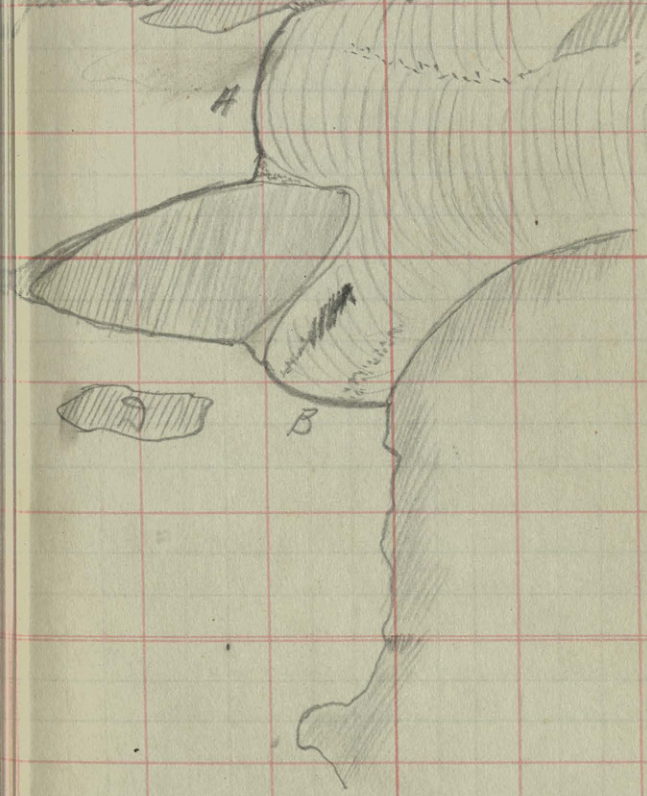
Melville Bay Glaciers.
Cape York & Crimson Cliff Glaciers.

Ask Eginqwa about
Conformation of coast of north side of head of Inglefield Gulf.
Extent and depth of snow in same area.
Winds as yet questionable.

On the Cape Alexander Glacier.

Sketch map of coast about Cape Alexander showing two mouths of glacier



A. North limb of glacier
B South " " "
C Cape Alexander
D Sutherland Island

Cape Alexander Glacier

The north limb of the Cape Alexander is almost if not quite a mile across. The slope has a gentle gradient and much of it is hummocky and rolling like the surface of old bay ice. These knobs and domes are pitted and grooved by the summer's melting and evaporation, and in much smaller measure by winter ablation and evaporation. Near the edge of the face the top is considerably ridged and creviced. The face itself is perpendicular and rises from twenty to forty feet above the water, except along the face of Cape Alexander. The face exhibits the stratification and interbedding of the ice, in places like cross-bedding in sandstone on a rather large scale. The flexures, curves, and faults in the stratification are strikingly like those of rock sedimentaries that have been considerably disturbed from their original position. The strata are of varying shades and tints of blue; the amount of debris revealed in the face is almost none.

Cape Alexander Glacier

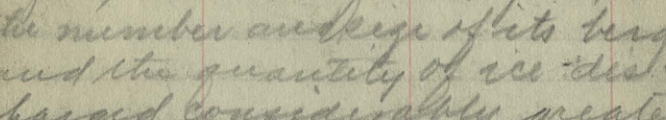
The end of the limb though extending out into the small bay some considerable distance, certainly rests upon the bottom throughout its entire width. The relatively level surface just above the face of the glacier indicates a firm base. The icebergs calved off sink into the water when they break off and float off. No very large fragments are calved, and though the number is fairly large the quantity of ice discharged in a season is relatively small.

The vertical face ends about 200 yards from the lateral moraine along the cliffs & talus slopes of the Cape and a fairly steep slope of snow has been swept out a short distance beyond the face. It is by this slope that the ascent toward the south and the descent from that direction is made by sledge travelers up and down the coast, who are always unable or afraid to attempt to go out beyond the point. Usually the water comes in to the point; when ice does form it is too dangerous to trust.

Cape Alexander Glacier

about the base of this slope small piles and ridges of terminal moraine, of englacial material is exposed. The lateral moraine here is considerable and extends no small distance above and beyond the present limit of the ice. The glacier has receded no mean distance on this side of the cape. At the time of its greater extension it undoubtedly was much higher, its vertical face higher, and the number and size of its bergs and the quantity of ice discharged considerably greater.

Profile of front of glacier



A - Face of glacier - Wall like
B = Slopes south and
C = Moraine
D - Ground rock of C. Alexander
E - Scree on slope of Ground rock

A deep trench due to the melting along the mountain slope, and the erosive and melting action of the water that flows

Cape Alexander Glacier

down from the glacier and from the slope of the cape extends all along the edge of the ice between the moraine and the ice. The moraine slope is not so steep as that of the ice and the crest of the ice wall is ~~of~~ in many places overlapped by snow that has drifted over the glacier.

This limb is swept by violent winds. Whether they be from a southerly direction when they flow down parallel to the current of the ice or from a northerly direction when they cross the limb ~~down~~ or less transversely they blow with great force, so that often except near the sled the ice is swept clear and blue. At such times travel over the glacier is difficult and both drivers and dogs seek the patches of snow that lie in the hollows between the hummocks or the drifts that lie in the beds of summer superglacial streams. Near the crest and on the crest these hummocks become large and the going correspondingly more difficult, the sledges sliding sidewise with such force down off the hummocks that the runners are often broken.

Cape Alexander Glacier.

The south limb of the glacier is much narrower, and contains in its medial portion a distinct moraine which approaches its east side near the face. The slope of this limb is somewhat terraced, and almost undulatory. The surface is quite rough and knobby except where covered by drifted snow.

The slope of the ice along the west edge is rather steep into the fosse along the cliffs. This fosse or trench, of fairly steep gradient is from eighty to one hundred feet below the surface of the ice. Though the ice at the beginning of the fosse (which, by the way, extends entirely along the cliffs around the Cape so far as the glacier does) is fairly steep, near the face the slope is very gradual. A considerable stream flows in the fosse during the summer, most of the way beneath the edge of the ice. The velocity of this stream seems adequate to bear away the considerable debris that

melts out of the ice, and would form moraine were it not removed. The fact that there is no moraine is probably due to the action of the stream, for there is no lack of material for the ice for moraine formation. The water of this stream is bright vermilion and colors the water where it discharges for a considerable distance out into the bay.

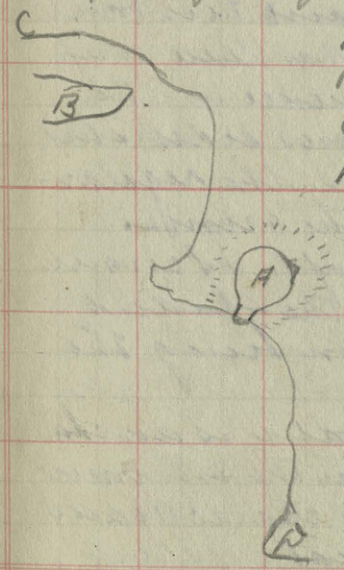
There is no true fosse along the east side for the snow drifts up against the cliffs to such an extent that they compensate for all the melting during the summer. The level of the strip between the medial moraine and the cliffs is however, considerably below that of the portion west of the moraine. The face of this limb is quite vertical and at its greatest height is some forty feet above the sea level. Near the cliffs along the east side the ~~snow~~ drifts over onto the ice forming an incline more or less easy of passage, though it always somewhat difficult for sledge and dog-team. Considerable water runs down over the surface of this limb of

Cape Alexander Glacier. Supage the glacier. ~~During~~ In the melting period of the year 1914 when I had opportunity to observe the face several times, a large englacial stream issued about midway between the sea and the top of the face and near the middle of the face. This stream ran full, discharging a large volume of brilliant vermilion water full of gravel, pebbles, and rocks. Only small fragments of ice break off the face of this limb, and most of these heavily laden with glacial debris. ~~In~~ This limb carries relatively much more englacial material than does the north limb.

I think that this limb once had a broad extended face that inveloped the horn that now is Sutherland Island, and that when this state existed the surface of the ice was much higher and extended far up the cliffs that are now free. Sutherland Island shows no sign of glaciation, but neither do other similar horns.

The Cirque between Cape Alexander and Sontagg Bay.—

Somewhat north of Radcliffe Point in the bend of the coast, a splendid example of cirque is revealed.



A Cirque
B Sutherland Id
C. C. Alexander
D. Radcliffe Pt.

This cirque is such a perfect development of this phenomenon that it is worthy of note. The sides, steep walled and snow-covered, are almost circular in form, and the basin empties by a short and relatively narrow pass onto the sea. The floor of the cirque is from one hundred to one hundred fifty feet above sea level. The sides attain an elevation of perhaps

The Cirque between C. Alexander and Radcliffe Pt.

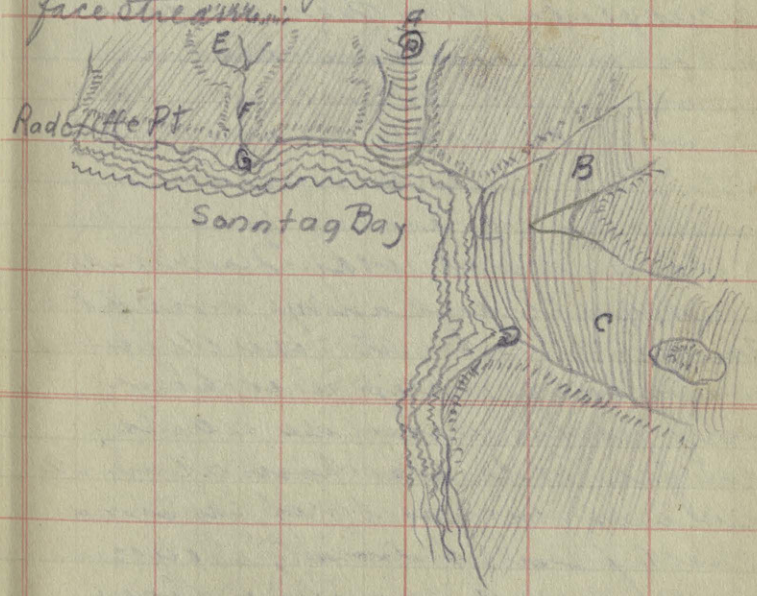
nine hundred feet. The snow blows over the plateau in which the cirque is sunk, and great quantities accumulate in the basin. The wind over the plateau here varies so in ~~great~~ direction that there is apparently little difference in the quantity on the various sides. This perhaps accounts for the regularity of the shape of the cirque.

Profile of cirque wall, the shaded portion being the snow and ice.

Considerable water is discharged from this cirque in the summer time, judging by the character and amount of material washed out over its delta. The debris is largely of large boulders. In the view one gets of this cirque from the sea it looks the very perfection of cirque. On the ~~two~~ plateau about the cirque are small local caps of ice or domed drifts. These drifts are not extensive however, but are characteristic of some of the domes.

The Glaciers and Glacial Phenomena at Sonntag B.

The glacier at Sonntag Bay, Child's Glacier is in reality three glaciers or glacier tongues. It is quite certain that the present extent of these glaciers is much smaller than it has been in the past. At present the northernmost ice tongue is distinct but the other two merge in one delta-like face stream.



A = northern glacier with lake in dimple at D.
B = Central glacier
C = Southern "
E = Cirque
F = Gorge G = Delta

The Glaciers and Glacial Phenomena at Sonntag Bay

Radcliffe Point is a bold headland that forms the southwest corner of the plateau at this point. The edge of the plateau is at a distance of about half a mile from the shore, with an altitude of perhaps some 1200 or 1300 feet. The slope is generally a talus slope of rather small fragments and some soil, saturated with water from the snow along the edge of the plateau, and is broken in a number of places by cliffs and ledges of rock. Nowhere is it particularly abrupt. The gorge that cuts the cliff west is very deep and has very perpendicular walls. Not far from its outlet upon the delta at the mouth of the stream which flows from it, the gorge widens in a roughly three-lobed cirque with exceedingly steep walls and floor with steep gradient. Even at the height of summer snow hangs about the sides of the lobes of this cirque, and great quantities lie within it in winter.

The glaciers and Glacier Phenomena at Sonntag Bay.

Deep gorges are tributary to this cirque.

The cliff from the delta to the north glacier is high and rather steep, in places covered with much grass. The north glacier is a relatively narrow stream that descends by terraces from the plateau. These terraces have steep rises and fairly narrow treads. At the dimple, so called, is a small pond. The lower terrace of the glacier has a very rough and broken surface. Along the fosse along the west side of the glacier a considerable stream flows, of which the water is red with sediment. The color of the water is like that of the water that issues in the englacial stream from the south branch of the Cape Alexander glacier. The rocks of the bed of this stream are stained with bright vermilion by the water.

This glacier discharges but a small quantity of big ice each year, and these largely bergs that topple off the front of the face. There is a large quantity of englacial material in the lower layers and considerable in the sides. I have never seen the fosse along the east side.

Glaciers and Glacial Phenomena at Sonntag Bay.

The middle and south streams come down relatively steep gradients. The terraces are not so evident but none the less certainly present. The face of these two streams forms a continuous wall, much undermined by the action of the waves; this face rises quite vertical and is almost unbroken. The surface near this face is rather broken. The surface is also touched by the furrows of a number of summer of superglacial streams. MacMillan tells me the summer of 1915 a considerable stream of water emerged from a hole in the surface with great force at an almost vertical angle and spouted far upon the glacier. He also tells me that a snug little cove is concealed between the south side of the southernmost stream and the cliff behind a morainal point.

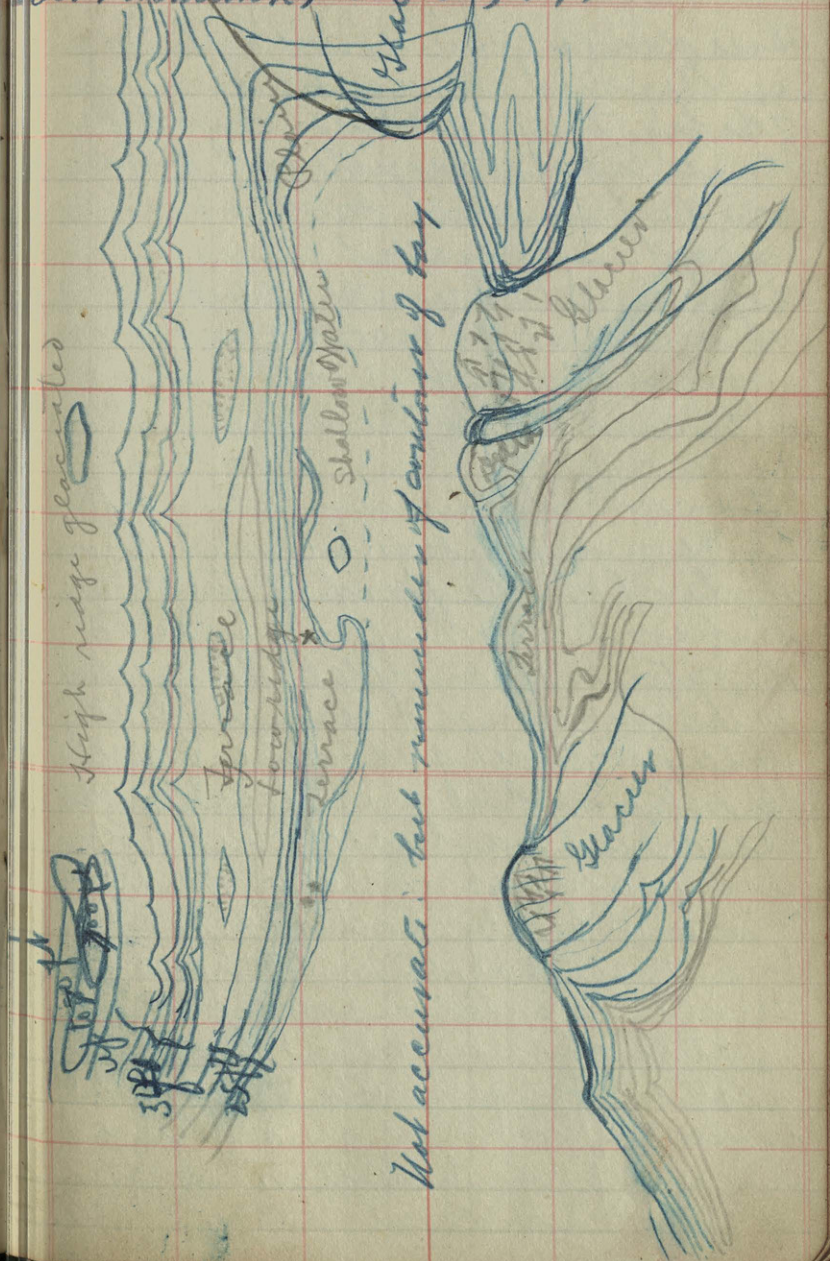
A considerable moraine marks the line of confluence of the middle and southern streams. Also some material extends seaward from the horn that rises out of the south stream.

Sonntag Bay

Later - I came down the north glacier at Sontagg Bay in the spring of 1916. It was smooth ice over much of the surface, wind swept and hard to descent from. Along the east side the surface was hummocky and somewhat ridged so more snow was logged there and we found it easier to travel. The forse along the east side is not deep, very rough, and stepped, full of large rocks fallen from the steep cliffs. The east edge of the glacier bears many such large boulders, some as large as a small house. A flat outwash plain small but distinct lies at the end of the forse. The face of the glacier along the east side has many icicles red with sediment hanging from it.

The small middle glacier has a precipitous descent, rough and broken. The ice virtually tumbles over the cliffs at the head and along the sides near the head. The whole face of the middle and southern glaciers is almost a mile, steep, and giving birth to a number of ice-bergs. From the fluted and tessellated rather flat bergs about its face, I think it has a rather large submarine foot, which gives rise to this kind of berg.

At Nelchilinik, Feb 21, 1916



At Hetchelwik, February 1916

Three glaciers come down into Borden Bay, and all reach the waters of the bay. They have their origin in the ice cap that projects out ~~from~~ over the peninsula from the main ice cap, and descend by easy slope until they near the bay when their slope becomes more abrupt and by ~~steps~~ rather steep rise and broad head fall into the sea.

Two reach the sea along the south side while one comes down the head of the fjord. Of the two that come down along the side the outer is the smallest. Its descent is through an old cirque-like valley with cirque-like branches. Its outer end is considerably crevassed and fractured, but not nearly so much as that of the inner, because it barely reaches the sea. The face is vertical, even overhanging. The inner glacier descends by a less steep gradient but because it extends far out into the fjord it is greatly broken up and fissured especially over the water. This glacier is much terraced.

At Hetchelwik, February 1916

The glacier at the head of the fjord comes down at a very gradual slope and affords an easy descent into the bay when sledging is possible giving an overland route to Booth Bay, Grenville Bay, and Olrichs Bay. Only along the north side of this glacier is any moraine visible, before its face the outwash apron of glacial debris indicates that the terminal moraine has been distributed by the streams that come down the face, along the sides, and from beneath the face of the glacier. The outer portion of this glacier is flat and wide, and much of the face is upon land toward the northern side.

Both the smaller outlet glaciers are flanked by considerable lateral moraines, especially the inner one along its west side. The bay indicates a glaciation of much greater extent at times past than at present. I am almost convinced that a glacier once occupied the whole bay, and extended far up the sides, especially along the east.

Near Netchilirik.

Just outside to the westward of the mouth of Borden Bay, two glacier tongues descend from the plateau, the inner smaller one not quite reaching the sea, the outer larger one extending into the water enough to give off bergs. Both these tongues descend by gradients of about 45°; the larger has rough surface both near the face and at several places in its course. The smaller is mantled in snow near the top, and is perhaps in reality fed by the snow that drifts over the plateau into the gulley in which the glacier lies.

Near Cape Parry another considerable glacier comes down the slope and discharges into the sea. Its gulley is not so gorge-like as is that of the two preceding, nor is the gradient so steep. Considerable moraines lie along and beneath the edges.

These three glacier tongues come from rather small local areas, the limit of the peninsular ice cap being attained by the glaciers that descend into the heads of Borden and Booth Bays.

At head of Booth Bay.

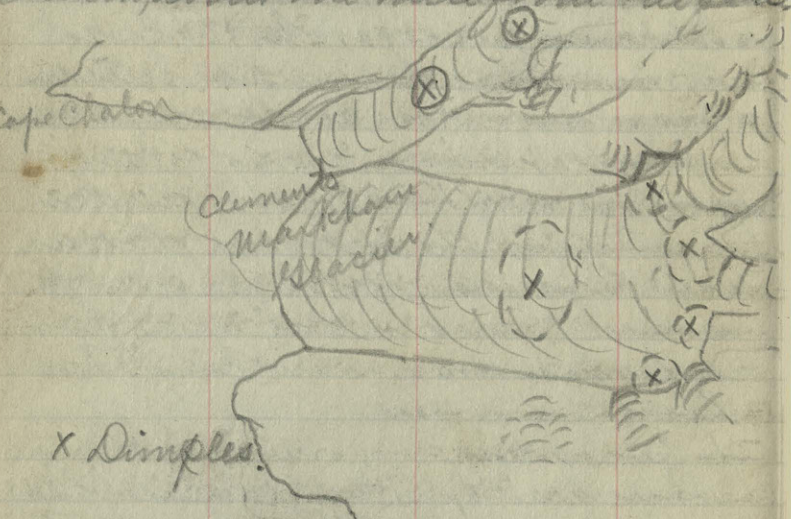
Two considerable glaciers come down the slopes into Booth Bay. Of these, the larger descends near the sea into a branch of the north side of the bay. This glacier which marks north the glacier at the head of Borden B. marks the western end of the peninsular ice-cap, is a large wide tongue that descends by easy gradient and broad terraces from the divide to the sea. This glacier has lateral moraines of considerable size and in places traces of terminal moraine where the drift has not been distributed by the outwash streams. The face of the glacier barely reaches the sea and much of the face on both sides lies on land. Not much ice is discharged by this glacier, if any.

At the head of the bay one glacier tongue with rather steep gradient and rough surface comes down from the southeast but does not quite reach the sea. It is no inconsiderable stream, and is well worthy of notice on the map. A second tongue comes down from the east but terminates far up on the slope.

Clements Markham Glacier.

Cape Chalon (Peteravik) is a high steep point with cliffike sides, held up on the south side by a wall-like dyke of considerable thickness.

The glacier is formed of two distinct tongues, the smaller one from the north-east, and the larger from the east. The two unite to form one stream, about one mile from the face.



In the spring of 1915 I walked up the north portion of the glacier some distance. A rather considerable outwash delta-like plain lies along the north side of this glacier where the extra-glacial stream converges. Along this plain the

Clements Markham Glacier

face of the glacier rises by a very gradual slope, and then rises by several terraces, rather abruptly to the cirque like head and the ice-plateau above. The surface despite its rather steep descent is fairly smooth and considerably covered with snow.

I ascended the large south branch in the spring of 1916. The face of this branch is steep indeed, but drifted snow along the south side makes the ascent of the face easy by sledge. Toward the north half of the face of this glacier the mouths of two tunnels, one much larger than the other. They are the courses of former extraglacial streams which may even now run full during summer.

For two miles or more back from the face the top of the glacier is almost flat, somewhat hummocky and ridged. The north half is much crevassed and not safe for travel; the south half, longitudinally ridged is thick strewn and set with boulders, rocks, lines and ridges of sand, and small moraines of muddy material. This has its

Clements Markham Glacier

source in the high cliffs that bordered the upper tributary glaciers of the main stream. This detritus is composed of sandstone, in the main with some igneous rock.

At the points of land between the branch glaciers are considerable dimples, several filled in part by lakes. The cliffs are capped by walls of ice often 50 feet thick that rise vertically from the edge of the rocks. Near the heads of the glaciers this ice tumbles over the cliffs in broken cascading streams that become continuous walls and slopes as the level of the lower terrace of the ice-cap is attained. A larger dimple occupies the area just below the most abrupt descent of the ice, between the steeper slopes and the flatter outer portion. The first level of the ice cap by which the plateau is covered, and from which the tongue-like glaciers originate is about 1800 feet above sea level.

A rather considerable moraine runs along the south side of the glacier, but none is seen along the north side, though a considerable force there would tend to reveal it. The morainal material along this side is probably buried beneath the margin of the ice. The trough on this side is deep and steep-walled.

Clements Markham Glacier.

The ice cap on the point like capes and nunataks is dome-like, and these rounded domes suggest that the wind currents over these surfaces pile up the drifting snow toward the center of the areas.

Cirques on North Side of C. Saumarez.

On the north side of Cape Saumarez two fairly well-formed, and well developed, cirques are of interest. Amphitheatre in shape they show all the characteristics of a true cirque; but they have no glaciers within them and it is doubtful if they ever had. Great beds of snow lie within them, deepest along their margins, and it is through nivation that these cirques have doubtless been formed, as I consider quite likely of many of the cirques along the coast.

Furthermore, it is remarkable that the floor of these cirques is in no wise smooth and does not conform at all with the curvature of the sides; instead it rises up in a roughly circular, or rather heart-shape group of hummocks rising considerably above, and irregularly, the base of the cirque, showing that ~~glacial~~ scouring by ice has not affected or formed the floor. Rather the ~~shape~~ of the cirque and the perpendicularity of its walls is due to nivation, while the floor has been modified by the water from the melting snow.

Diebitch Glacier.

Diebitch glacier closely resembles the south ~~stream~~ and larger stream of Clements Markham glacier. It flows in the same general direction; is flanked by the same character of cliffs capped by ice walls, with a major force at the north side and moraine and much ent glacial material on the south. Its gradient is perhaps some what more abrupt; ~~and~~ it turns more abruptly to the westward in its descent from the ice-cap. Larger and more numerous crevasses cross it; but on the whole these two adjacent glaciers Clements Markham and Diebitch are ~~wonderfully~~ quite similarly. Their ice is furnished rather by local neve than by the ice cap proper; ~~since~~ that piles upon the plateaus about them and in their own basins. Rather narrow they move relatively fast but they discharge relatively little ice into the sea. The face of Diebitch glacier is perpendicular, and like Childs & Clements Markham has more or less of a ~~submerged~~ foot.

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Morris K. Jesup glacier.

This glacier lies at the head of the bay between C. Saumarez and C. Robertson. The face of this glacier is of about the same width as those of Markham and Dickitsch glaciers — somewhat over half a mile but not quite a mile. The face is formed really by two glaciers the Jesup glacier, and a smaller one coming down against it near the end, almost at right angles. Jesup glacier proper is of low, flat gradient, broken & shattered above the face and on the second terrace above.

It does not flow in such a canon like gorge as do the three glaciers north — Childs, Markham, and Dickitsch for the pass opens rapidly toward the icecaps, and the cliffs on either side are relatively insignificant. The glacier narrows constantly from the ice cap to the sea, due to the shape of the pass through which it flows, but the volume of ice descending is not sufficient to cause any congestion at the narrower part of the outlet and consequently only a small rise in the surface is visible.

Morris K. Jesup glacier

An insignificant fosse occupies the north side of the glacial bed, and this fosse bears suggestions of moraine in piles of drift here and there particularly along the ice. Yet a small quantity of moraine material is noticeable along the south side.

The terraces of this glacier are insignificant compared with those of the three to the north.

The smaller branch of this glacier apparently is nourished by local snow, rather than by the main icecap as is Jesup glacier. It descends by steep gradient and pronounced terraces and is quite rough in its lower portion near the water.

From the common face of this & Jesup glacier, but little ice is given off as bergs. ~~This smaller glacier~~

Glaciers on north side of C. Robertson.

In addition to the two glaciers at the head of the Bay at Yerkre two minor ones occupy part of the south side. The innermost one represents a more advanced stage the neve lying somewhat back from the sea; from this neve not of great extent the glacier descends by a sigmoid curve in an almost even gradient into the sea, projecting beyond the shore some little distance. The lower end of this glacier rises considerably, perhaps 100 feet above the dimple back of it, and this hill like elevation is chaotically shattered and broken into sharp hummocks. Also the surface of the very end for some little distance back from the steep, cliff like face is likewise shattered and broken. Noticeable lateral moraines extend on both sides from near the source of the glacier to the sea, but no outwash delta of note is developed. The moraine to the Eastern side is much the more prominent. I took two photographs of this small glacier in the hope of getting a good picture

Glaciers on north side of C. Robertson.

The outer of these two glaciers does not reach the sea. In fact it is merely a tongue of ice coming out of a cliff cirque that has passed a little beyond the semicircular stage and begun to form a pass.

It is only a small tongue of ice but it has a terrace below the floor of the cirque proper, and considerable lateral moraines of which the one to the east is the more noticeable. This glacier represents a much earlier stage of glaciation, nivation being still the major agent and the more prominent. The cirque itself is a well-developed one, perhaps a quarter of a mile wide at the top. The sides are not so steep as the walls of the cirque just north of Sonntag Bay.

Like the face of most glaciers that do not reach the sea this face is not perpendicular but convex, with considerable overhang; the glacier does not appear to rest upon the ground at all for for a considerable distance back from the face the ice has been been melted away by a subglacial stream — like a cave it is.

Glacier in gorge back of Uerkre

About half a mile or perhaps a little farther back from the village in the gorge a glacial tongue ends. It comes from local neve on the plateau back of Cape Saumarez, and is quite snow-covered except near its end. Somewhat nearer the village a great drift of snow that becomes ice near its base extends across the gorge forming a dam which in seasons is strong enough to impound much water. A number of years ago such a season occurred and unknown to the people of the village such a volume of water was stored up that when the dam burst, a torrential deluge swept down the gorge inundating the village, washing away most of the belongings of the natives living there for the summer, and drowning two or three people. The great rocks and boulders that lie in and along the trenches stream beds across the delta offer evidence of the great transporting power of such a destructive torrent.

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Morris K. Jesup glaciers.

On the north side of the Morris K. Jesup glacier seven glacier tongues descend from the plateau ice-cap. The two nearest the sea do not reach the glacier but end, hanging, a short distance above. The third a larger stream just reaches the glacier, while the fourth, apparently the largest tributary on the north side, the fifth and the seventh all join the main glacier. The sixth is but an insignificant hanging tongue. The fourth, fifth and seventh flow in gorge-like trenches with steep walls, while the others cling to basins more like hillside gullies. All are of such steep gradient that they are much broken and shattered more or less throughout their length. Some of them begin as ice-cataracts shear off the plateau, and by steep terraces tumble down their gorges. More or less morainal material is associated with them, but never in noticeably conspicuous quantities. The ice cap lies thick and domed over C. Saumarez and wherever its edge appears at the cliffs it is wall-like

Glaciers on south side of C Robertson.

Three glacial tongues flow down the gorges on the south side of C. Robertson but none of these reaches the sea. Two lie west of the little village of Igloolualuaswit and one to the east near the head of the bay. The one farther to the west is not of much consequence and hardly noticeable. Its gradient is low, it has no moraines that are visible and though wide, presents no striking front.

The one to the west, nearer the village is a large glacier despite the fact that it does not reach the sea by as much as a mile. The face of this glacier is prominent and conspicuously typical of those that flow by fairly easy gradient but do not reach the sea. Both lateral and terminal moraines are well-developed on this tongue. The neve that supplies the nourishment is rather large. The innermost of these three tongues is of the order of the outermost, but possesses a steeper gradient, and has a much rougher surface.

See page

Mechan does not head in ice-cap

Mechan Glacier + Verhoff Glacier

Mechan glacier empties into Robertson Bay by a canon from the north. It has its neve in the ice cap itself and though not of great length has an even and fairly steep gradient. The terraces are slight. The surface is rough, and the face is much broken. This glacier has deep fossas along its sides but little morainal material.

Verhoff Glacier the most important emptying into Robertson bay derives its ice from the main ice cap by two tongues that unite a little over a mile from the face. Both these branches are terraced, ~~and~~ both seem of equal size, and apparently present much the same phenomena. They flow in steep canons and their common united bed is likewise canon-like. The surface is in many places much broken, especially so for some distance back from the face. The face is broken, steep, and flanked by dark, vertical, high cliffs. Considerable tessellated ice is given off so the underwater foot must be considerable.

There are no glaciers on south side of Robertson B.

Kissel Glacier.

Kissel Glacier, the most westerly of the striking glaciers that debouch upon Mitchelson Sound from Northumberland Island is very active. The valley in which it lies reaches quite across the island — two other glaciers one to the south, and one to the west likewise come from this valley. Several lateral feeders enter the valley by tributary valleys from both sides, in addition to the main stream that extends across the island. These lateral feeders come from both sides and augment its volume a great deal. A great dome-like elevation to the west of the valley rises far above the general level of the island; ~~and~~ covered thick with ice and snow it is a rich nevé for the glaciers that radiate from it. Between the plateau to the east of the valley, which its snow-filled cirques is no mean competitor as a source of supply.

This glacier carries a large amount of moraine material, and the lateral moraines extend far out to

Kissel Glacier

sea along the fanlike ice tongue and continue along its front for a fourth of its distance on either side. These termino-lateral moraines contain a large proportion of rather fine material, indicating considerable disintegration of the material, before it reaches the sea.

A noticeable feature of this glacier which it shares in common with all the glaciers of this side of the island is its great fan-shaped end extending out upon the sea as if after reaching base-level it spread out delta-like on a submerged terrace. This terrace may actually exist built up of the moraine material brought down by the glaciers and spread somewhat by the currents which do not remove it. These fan-shaped ends are strikingly different from the constricted faces of the glaciers that reach the sea at the heads of the bays along the mainland; likewise another difference lies in the character of the face which is not so cliff like.

Parrish Glacier and Robins glacier.

Next to the eastward of Kissel glacier lies Parrish Glacier, not so large but extending far back into the island. Except for its relatively few tributaries it is almost a counterpart of the Kissel glacier in gradient, terraces, expanded fan-front projecting into the sea and its moraines. It is perhaps, not quite so active, but still it discharges quite a number of bergs into the sea. The discharging extent of the faces of all the glaciers on the north side of the island is limited to a minor portion near the center.

Robins glacier is the smallest on this side of the island, the only one that whose neve does not appear to reach across the island. Instead this glacier seems to head in a large cirque from which it descends in terraces to its fan-front in the sea. In other respects it is like the rest of the glaciers on this side of the island, and none the less conspicuous because of its smaller size.

Other glaciers on the North Side of Kostek.

Two other glaciers descend into the sea from the north side of Kostek; they are in reality two forking distributaries of a common ice-stream about three or four miles from the sea. The westerly of these two is the smaller, and of all the glaciers on this side of the island possesses the least conspicuous fan-front. Its neve is more limited than that of the most easterly, larger stream which derives nourishment from a snow-covered dome and terrace like plateau to its eastward. Two tributary streams of considerable magnitude enter the east side of the larger glacier. One of these offer apparently seeking an outlet of its own turns toward the westward, paralleling the coast and joins the larger stream. Both these easterly streams of ice are considerably terraced; their gradient is less steep than those to the westward.

The most easterly of these glaciers has a wide semi-circular fan front projecting far out

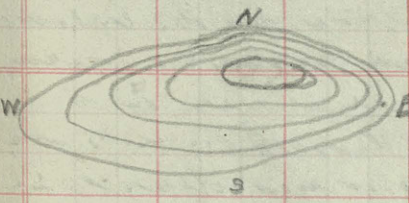
Glaciers on North side of Kratek

into the sea, an almost ideal example of a fan-front. Flanked by moraines that rise from 30 to 80 feet above sea level, and with an almost enveloping terminal moraine, one concludes that this glacier, like all the rest of those on this side of the island are not only bringing down material that falls from the cliffs about them, but are plucking and abrading their beds as well, to a large extent. The character of the morainal material of the more easterly of these glaciers bears out this idea, for it is a mixture of rounded, worn, ground material with coarser angular stuff that has not been worn. All these glaciers carry much entglacial material. The distances between these glaciers is not half so great as the width of their faces, so that they almost form a continuous piedmont fan. It is quite likely that the underwater terrace formed by these glaciers is continuous. They discharge many icebergs and have submarine feet.

Icecap and Glaciers on North Side of Herbert Island.

The northern half of Herbert Island rises some three or four hundred feet above the western end and the southern half. Over this the snow has formed a fairly thick dome-shaped ice-cap, similar to, but larger than the ice caps that lie on the plateaus and buttes of Capes Chalon, Saumarez and Robertson. The south, and west slopes are much gentler than the north and east, and the north is the steepest of all.

Diagramatic cross-section of ice dome on Herbert Id.



Rough sketch of contours of ice dome on Herbert Id.

From this ice dome two ice-tongues descend by steep gradients and abrupt terraces to terminate in rugged, small ice-fans in the sea. They flow in rather narrow gorges, and in common with all tongues of any length and steep gradient have sinuous courses.

Ice-cap and glaciers on North side of Herbert Island.

The cross-section of these tongues throughout most of their course is dome-shaped highest in the middle and dropping away in convex curves to the moraine-flanked sides. The fosses on either side are fairly deep and are filled with much angular rock debris fallen down from the cliffs. The moraines are largely of angular material, much of it large blocks of rock.

It seems likely to me that on both Herbert and Northumberland Island the ice caps, which are ~~large for the~~ large for the extent of the islands, and support so many ice-streams, must be due to a greater precipitation than on most parts of the adjacent mainland. In winter open water to the south and much southerly wind may bring relatively warm, moisture laden air up over the islands, which loses some of its moisture when passing over. A south wind over the island may nearly always be recognized by "cloud-flags" flying from them

Sun Glacier and Glaciers in McCormick Bay.

McCormick Bay is relatively shallow and bordered on the north and at the head by relatively gentle slopes and low ridges. The south side is comparatively high.

No glaciers enter the bay from the north side, but along the south side near and above the head two considerable ice tongues descend from the ice-cap of Redcliffe peninsula and terminated in steep, fanlike faces on the slope at the base, without attaining the sea. The ends of both these glaciers rest upon morainal terraces apparently of their own construction, as if, on attaining the gentler slope at the foot of their course their progress was stayed or hindered so that much of the burden of drift they were carrying were melted out and deposited before them. The surfaces of both the glaciers is quite rough and broken, and the rise on each terrace beyond the dimple is shattered.

In addition to these two

Sun Glacier and Glaciers at head of McCormick Bay

glaciers on the south side of the head of the bay, three other considerable tongues descend at the head of the bay and the valley beyond it. One of these comes in from a gorge to the north almost at right angles to the axis of the bay. This is a large stream, with an exceedingly rough surface, with a large deep medial trench down which a large stream must flow in the melting season. Though of low gradient, this glacier has a rougher surface than any I have seen with the exception of that at the head of Holstenborg Sd. It brings down much morainal material which the streams over the flat distribute as an outwash apron, in common with the ~~stor~~ drift contributed by other glaciers of the valley. This appears to be a most active glacier, and may perhaps have its far source in the main ice-cap itself.

Just beyond this is another low but broad ice-stream, in-

Sun Glacier and Glaciers at head of McCormick Bay.

tersecting diagonally and not reaching the sea. This tongue, like the preceding, has an exceedingly rough surface, ridged, and hummocked, and fluted. It too has a most gentle slope, and is fairly wide and flat with a relatively low face down which many streams run. Considerable morainal material lies along the sides and is distributed before it as an outwash plain by the numerous streams that issue from it.

Still another tongue lies far up on the slopes (Qukta glacier?) hanging like any other of the last terminating tongues but not occupying any considerable gorge. In fact from the bay it appears to lie flat on the slope. The relief as the head of the bay is much more gentle than at the head of the bays to the north, the slopes being much more gentle. According to the maps two lakes lie on the plain back of the head of the bay. The pass across into Bowdoin Bay is short and low.

Icecap and
Glaciers between Redcliffe and Kamah

Though Redcliffe Peninsula is of low relief, it supports a continuous ice-cap, somewhat rolling in outline - domed up prominences, depressed in valleys between. This icecap is not over 500 or 600 feet above sea level; the fact that it supports several considerable ice tongues indicates that the source of nourishment is considerable.

Three ice-tongues, none reaching the sea, descend from this ice cap between Redcliffe and Kamah (C. Ackland). Of these the most westerly is an ideally developed ice-tongue, regular in course, shape, and termination, marred by no roughnesses or irregularities. It descends by an easy slope in a broad stream valley; has a rounded surface with pleasing lines; and its face is a beautiful convex fronted semi-circle. The lateral and terminal moraines reach half the height, or not quite, and lie piled as regularly as if measured, except where streams issue in summer. A large delta

Ice-cap and
Glaciers between Redcliffe and Kamah

and outwash plain has been built out into the sea by the waters from this glacier.

The next glacier is a counterpart of the first, only it is not quite so large and has a more sinuous course. The interesting feature of this tongue is the sharp distinction between the upper third of the face which is of pure, clear, white blue ice without a trace of extglacial material and the lower two thirds of dirty brown ice with interstratifications of gravel, sand, and dirt-bands, more worn and corroded. The clearer cleaner upper portion extends and flush with the face of the lower, and over the eastern half of the face extends beyond it so that large masses have broken off and piled up on the snow at the base. That the upper portion is moving faster than the lower is certain, and equally certain is it that the upper portion at least has been moving during the winter for the heavy of the fragments

Glaciers between Redcliffe and Hannah

broken off have fallen upon the snow of this winter, some of them indeed, since the last snow.

The third tongue is like the other but only in miniature for it end quite a way up the slope, is small, and has but little morainal material.

All the tongues on this side lie rather flat, and exposed to the warmest rays of the summer sun, their surfaces must melt very fast, indicating the reason perhaps, why they do not reach the sea. A great volume of water forms down from each of them and from the gullies between, for large deltas are outwash grounds extend into the sea along the coast. The water for a considerable distance out, all along this shore is shallow so that the ice foot is very wide, The sea ice is very hummocky and broken, because of the shallowness, and a little distance off shore great fleets of icebergs are aground.

Cliffs and Glaciers between Hannah & Bowdoin Bay

East of Hannah a short distance a glacial tongue comes down the gorge from the ice cap but ends at an elevation of at least 900 feet. A considerable stream flows down the gorge in summer. The glacier is a local one, but characteristic of those that hang in cañon heads. The cliffs between Hannah and Bowdoin Bay better deserve the name Casete Cliffs than do those east of Bowdoin Bay, which are so named on Peary's map. They are indeed statuesque and picturesque, rising out of a talus slope at the base perhaps 100 feet, high, sheer 800 to 1000 feet, so vertical that in places projecting ledges overhang the base. The rock of which they are composed is a friable, argillaceous sandstone, well resistant to the weathering however. It is comparative thin stratification, some strata cross-bedded, lies horizontal, and bed after bed seems quite comfortable to those above and below. It is not much fractured except that one series of joints meets the line of the coast at a very sharp angle, parallel to the direction of

Cliffs and Glaciers
between Kamah and Bowdoin Bay

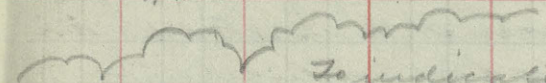
several small dykes. Along these joint planes and along the dykes the rock is not so resistant to erosion and consequently steep, gorge like depressions separate long tongues of cliffs from the main rock masses. All the gullies and stream beds are of exceedingly steep gradient, erosion being in a most infantile stage of the erosion cycle. The steep gorges bordered and separated by high wall like series of castles, spires, and turrets, make a skyline of fantastic picturesqueness as seen from the ice below.

Diagrammatic representation of cliff line but not complex enough to show extent of spurs and high points.

It is suggestive that the projecting cornices in gullies and niches are angular whereas the niches and indentations are quite rounded. It indicates to me that weathering where snow falls or blows and catches, especially on southward-facing cliffs is more active than even on exposed

Cliffs and Glaciers
between Kamah and Bowdoin Bay

points where if rain were the active denuding agent the effect would be rounded.



To indicate curvature of indentations and sharpness of projecting spurs.

The cliffs in these rounded indentations flake off so to speak whenever snow catches. It would seem that if insolation and changes from heat to cold and vice versa would demolish the cornices first. Thus snow is left as the active agent, and this seems plausible. The snow on these cliffs is piled against them by prevailing southerly winds, and as shown by the very deep snow on the ice at the foot there is very little wind from any other direction.

Nearer Bowdoin Bay a prominent ice-tongue formed by the confluence of two smaller streams descend from the ice-cap by a rather steep gradient and there noticeable terraces. It is flanked by great moraines of worn and rough material. The lower part of its surface is very rough; the face from which icebergs are being discharged projects into the sea some little distance

Ice-caps and glaciers on Kangedlukmah Pen

A considerable ice-cap lies on the Kangedlukmah Penin. toward the west end, occupying the surface of most of the western end. This ice-cap is a flat dome and several spurs and tongues project from it the former over peninsular plateaus toward the coast, the latter down the gorges. Two noticeable tongues and one minor one, do not reach the sea to the west of Hurlbut Glacier. The only true glacier that emerges from this ice-cap is Hurlbut Glacier a narrow stream that comes down a steep-walled gorge by a steep gradient and projects outward into the gulf. The lower end is much broken, hence quite rough; it discharges much ice from its face through the summer. Even in winter great blocks drop off. A considerable moraine lies along the east side while a less noticeable one is found along the east side.

A small domed ice-cap without any descending tongues lies upon the cliffs back of Cape Lea. Its vertical face above the cliffs is revealed at the head of a gully just south of the Cape.

Glaciers of Bowdoin Bay.

On the west side of Bowdoin Bay two glacial tongues descend in narrow steep-walled canons by steep gradients and terraces to the sea. On both sides they are flanked by considerable moraines. They both have vertical faces discharging bergs. Both have rough surfaces in the lower portion at at places above the rise of the terraces. These two tongues with a third broad belt that does not quite approach the sea near the head of the bay, are fed from the ice cap that lies upon Ridcliffe Peninsula.

At the head of the bay two prominent tongues of larger size descend from the plateau to the sea by a gentle uniform gradient, but have less vertical walls than those adjoining the sides of the bay though still high. The plateau from which they come down is much broken, and the glaciers are made up from a number of minor ice streams that unite with the main current. Some of the prominences of this plateau are deep covered

Glaciers of Bowdoin Bay.

with ice, but several project as nunataks. A rather steep cliff lies along the west side of Bowdoin glacier near its face, and along this cliff the morainal material is quite covered by ice, but a deep fosse persists. The branch of Tuktu glacier which descends into Bowdoin Bay (one branch descends from the divide toward the valley at the head of Robertson Bay) is not so large nor of so active a character as Bowdoin glacier. Its moraines are, however, a more distinctive feature.

I am not at all certain about the origin of the fosse along land areas, nunataks, cliffs, etc. but I am inclined to believe it due to the action of water flowing along the side of the glacier, warmer than ordinary superglacial water because it has its origin partly on warmland, and because it is warmed as it flows down over rocks. It may be due in part, I think, to the action of wind that keeps the fosse relatively clear during the winter while building a cornice over the edge of the ice-side.

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Glaciers of Bowdoin Bay.

and in part, and probably more potently by the greater effect of insolation along the land in summer, in addition to the action of the water.

I am likewise much in doubt as to the character of the following:

1. The abrasive effect of glaciers.

It appears to me that a large number of them at least are protective of their bed to a certain extent, and that subglacial streams play an important part in their lowering.

2. The projection of any considerable portion of the glacier in a submarine ice-foot.

However I am partially convinced that in some cases this does occur.

3. The change to ice being due to pressure to any extent.

Melting and recrystallization of snow is the more important.

4. The origin of cirques by Bergschrund action as narrated and advocated by Johnson, ~~and~~ Mathew, et al.

Heilprin Glacier.

Heilprin, the largest ice-tongue between Humboldt glacier to the north and Petowik glacier to the south occupies the head of Inglefield Gulf, between Umuataksuah and the Smithson Mts. The gradient of this tongue is very gentle indeed, the terraces long and flat. The surface is exceedingly rough and broken for a long distance back from the face, inclining me to the belief that the water extends back under it almost as far as, if not quite to, the limit of the rough ice. The innermost of the Harvard Isls. interposes a barrier to the middle of the ice-stream, and upon this the glacier rises for some little ways. The portion resting upon this island has a smooth top, while back of it the ice is very much broken. The face of the ice on the island is quite vertical and closely resembles that of any ice-wall upon land. These two facts seem of especial significance to me, as bearing upon the ~~[illegible]~~ criteria by which to determine whether or not the face of a glacier rests upon land. Not all the surface area of the glacier is rough and I

Heilprin Glacier

wonder if the outer roughnesses are not above water while the smooth surfaces lie above areas resting on bottom or land. A rather sharp line of demarkation between two areas of rough surface about two miles from the face suggests the head of the bay or perhaps a ridge in the valley floor transverse to the valley. The south side of the glacier lies along high cliffs, from which it is separated by a deep fosse full of rocks and boulders, and in places bordered by lateral moraine material. The moraine along the north side is almost, if not quite, buried in ice and snow.

During the summer this glacier discharges great quantities of ice in bergs of various sizes, many of them large, flat fellows with craggy tops. Some of the smaller, dark blue ones that I saw about Umuataksuah unquestionably came from some glacier underwater South, and from their situation I feel sure they came from Heilprin. So numerous are the bergs in the upper half of the gulf in summer that the Eskimo find difficulty in threading

Heilprin Glacier.

their way among them in their kayaks.
Needless to say, it is evident from its position that Heilprin Glacier is fed from the main ice-cap, but even so, I think that its dominant course lies in a valley bed, the extension inward on the land, of Inglefield Gulf. Along its sides beyond the last visible land rounded shoulders of ice, often rough as if tumbling over cliffs, indicate the contour of the rock bed beneath. It is pertinent to repeat here that the marginal glaciers of this coast that are continuous with the ice-cap, really arise from neve that is distinct, and that though some of them are in part sustained by overflow from the ice-cap, in part by these local neve, ~~the~~ many of them are nourished by ice and snow that form no part of the main ice-cap. Local ice caps lie upon nearly all the plateaus often extending across the valleys that separate them; sometimes quite separated. Nearly every point and peninsular between Foulke Fjord and Melville Bay support iceaps; but the glaciers extending from them are distinctly valley glaciers.

Leidy Glacier

Leidy glacier at the head of Academy Bay is really the the north distributary of a glacier formed by three principal glacial streams and several smaller ones. The south fork of the glacier empties into Olrich's Bay and is called the Marie Glacier. It projects into the bay a considerable distance; though it lies close to the cliffs on the south it leaves a small bay on the north, which extends landward as a small outwash plain with some morainal material along the sides and in the bed of the valley of the little stream ~~of~~ water that flows down along side. On this north side no cliffs dismit it, but a fairly gentle, though rugged slope extends along for some distance, considerably farther than the map indicates. Rough shoulders of ice farther up the glacier indicate barely buried cliffs, and one more considerable nunatak emerges than the map indicates. The ridge of ice connecting Marie and Leidy glaciers is very rough.

Tracy Glacier—

Tracy Glacier, to the north of Heilprin glacier, is a large stream of ice that descends by a low gradient from the icecap and flows in a relatively narrow canyon in its upper course, a canon that seems continued beneath the waters of the gulf as far as Josephine Peary Island. The stream which it flows in the valley proper almost fills the valley so that the land rises above the ice but little and then by gentle slope. In the lower part of the valley the glacier surface is far above the low point that projects out from the land on which the Smithson Mts lie. The north side, east of Farquhar glacier lies along steep, high, black cliffs.

Farther down the glacier near its face no land retainer rises above the sea, but that there is some underwater is evident from the way in which the lateral face along the south side maintains itself without giving off any icebergs except as fall off the overhanging sides. This lower portion is making, not only of the Tracy stream but also that of the Farquhar glacier which joins it at right angles from the north.

Continued on page 76.

The Warm Spell of Late November 1915

The first ten days of November had been unusually warm with general temperatures from 0 to 30°F above with only one reading below zero -2° on Monday Nov. 8. On the twelfth the temperature began falling and fell gradually but continually until the fifteenth when it reached 24 below 0. From this minimum the temperature began rising slowly with a change from the general northerly winds that had prevailed during the period of fall of temperature to a southerly that barely rose above a calm, until the twenty-third but never rising above -5°. During this cold period of temperatures continually below zero, the sky had been generally clear, in fact almost cloudless throughout.

About four o'clock of the afternoon a decided change in weather conditions took place. Fog and clouds began pouring over the cliffs to the South of us, down the glacier, and around the point, a brisk wind of about 25 or 30 miles an hour began blowing down

The Warm Spell of November 1915

the fjord, and the temperature began rising rapidly. The clouds and fog above the land were moving almost due north, though the downdraft on the glacier and fjord were toward the mouth of the fjord. The air felt decidedly damp and warm and the snow began melting on the deck of the ship, and on the ice. A snow-house that Capt. Comer had built near the ship began settling, and the snow banked about the sides of the ship sank away several inches.

By six o'clock the temperature had risen to + 25° and the wind increased to a 35 or 40 mile velocity. During the night the wind continued blowing at about this velocity with occasional flurries of snow; but as morning approach the wind died down, and instead of snow, ridges and drifts of fog, and suspended ice particles hung about the fjord, over the mountains and over the glacier. The air was damp, and a very moist rime frost collected on the rocks, along the tidal crack, and

Parker Snow Bay, Northwest Greenland.

on the clothes of any one out walking.

Until about noon of the twenty-fourth the conditions of the preceding morning prevailed; then an abrupt change occurred. While the temperature remained constant, and the sky continued overcast, the wind increased to a 30 mile velocity, and a heavy, sharp-flaked snow began driving, so dense that it was impossible to see the ship a hundred yards. The snowstorm continued intermittently through the day, with sporadic gusts of gale and intervals of strong wind.

At night the wind abated somewhat but otherwise conditions remained much the same. The midday of the twenty-fifth brought no change in conditions except that a slight barge made itself fast about the ship. After noon however the wind began rising again and the fogginess increasing so that by night the conditions of the morning of the 23rd were repeated. During the night the wind blew at high velocity but with morning it ceased so

The Warm Spell of November 1915

that the twenty-sixth opened calm, mild, and damp. The whole day remained thus, with unchanged direction of wind, temperature, and cloudiness. The night of the 27th was windy, the wind attaining its maximum velocity about 3 a.m when it was about a 25 mi. wind, but very gusty. With the coming of morning the wind ceased in the fjord, — the clouds were breaking up, the sky clearing and the temperature falling. From 9:30 to 11 a.m it fell from +17 to +13 and from 11:00 to 1:30 from +13 to +7. About noon fogs hung about the mouth of the fjord, but the sky was almost clear, and the air has lost in large measure its damp feeling.

At three o'clock the sky was quite clear but a heavy fog that condensed in an inch-thick rime on the rigging of the ship, lay low over the whole bay. At five o'clock a heavy fog rolled in again, but was soon dispelled. The final remnants of it lay up the slope about 1000 feet above the sea. The sky

at Parker Snow Bay, North Greenland

became brilliantly clear, and continued so all night. At nine o'clock the next morning the temperature was five degrees below zero. At ten o'clock the sky became overcast, and by three o'clock the temperature had risen to +3°, only to sink to -6° F. by 9 nine o'clock the next morning when the sky again was clear. After this the temperature ~~kept~~ sinking to a normal point reach -10 at four o'clock of November 29.

Nov		Dec.	Jan	Feb
2	29.61	2	2	2
3	29.58	3	3	3
4	29.32	4	4	4
5	29.72	5	5	5
6	30.20	6	6	6
7	30.50	7	7	7
8	30.44	8	8	8
9	30.17	9	9	9
10	30.20	10	10	10
11	30.10	11	11	11
12	29.89	12	12	12
13	29.77	13	13	13
14	29.62	14	14	14
15	30.02	15	15	15
16	30.12	16	16	16
17	29.55	17	17	17
18	29.70	18	18	18
19	30.00	19	19	19
20	30.14	20	20	20
21	30.50	21	21	21
22	30.54	22	22	22
23	30.19	23	23	23
24	29.94	24	24	24
25	29.89	25	25	25
26	30.00	26	26	26
27	30.05	27	27	27
28	30.16	28	28	28
29	30.27	29	29	29
30	30.50	30/31	30/31	

Another warm Spell Beginning the Evening of November 30, 1915.

At nine o'clock of the morning of November 29 the temperature was -6. It fell steadily so that at 7 in the evening it ~~sank~~ had sunk to -10°.

The next morning at nine o'clock the temperature had risen to + 8½ with no other apparent change in conditions except that the skies seemed less brilliant and not so near. By noon however the sky began to be hazy, ~~the~~ a few clouds appeared in the sky, and a noticeable movement of the air down the fjord set in. These phenomena increased so that by midnight the wind was blowing hard, the sky was overcast, and fine snow was drifting along the fjord.

At nine o'clock the next morning a genuine warm blizzard was in progress. The temperature at 9 a. m. of this day the first day of December was + 11, the wind was blowing a gale, the sky was overcast, and the lower levels of the air were filled with fine snow. These levels seemed

at the most to reach but a short distance above the face of the cliffs along the fjord. All day long these conditions prevailed, the temperature slowly but gradually rising. The wind did not abate during the night but the snow continued, but at ~~nine~~ o'clock of the morning of December second the wind began slowing down ~~until~~ by nine o'clock it had quite ceased. The temperature at this time was +27, the sky was still overcast, and a slight fine snow was falling. The wind in the fjord was directly toward the sea but the clouds up above where visible seemed moving north by west.

During the night of the second the temperature fell considerably, and no wind blew at all. A fluffy, dry, soft, snow fell continuously, so that by morning the ice was covered level to a depth of four or six inches.

At nine o'clock of the third the sky was overcast, a light breeze up the fjord indicated a north-

west wind in Smith Sound, and the air was full of an impalpable haze of fine snow or ice particles. The air felt soft and damp and warm. Heavy fog hung over Cape Dudley Diggs and Conical Rock. The temperature was 16½° the minimum for at least the preceding twenty four hours.

All day long these conditions pertained, and through the following night with but slight fall of temperature, so that at nine o'clock of the fourth the temperature stood at 13+, the wind barely noticeable was south, and the sky was nearly heavily overcast.

At noon, however, conditions change, so that a brisk north wind unnoticeable at the ship, drove the clouds all to the south, the sky became clear as crystal, and the temperature fell to zero.

These conditions remained permanent for ~~almost~~ twenty four hours, the minimum temperature being -4.

About noon of the fifth the sky again became overcast from clouds moving up from the south, and the temperature rose fast to +6. At seven o'clock of the morning of this day the clouds were gone so that the stars were easily discernible, but a low-lying dense impalpable mist of ice particles hung about so that it was impossible to see any distance. The morning of the sixth gave no change in conditions. The same impalpable mist hung in the fjord, though the sky above was clear. No wind blew. The temperature had fallen to -2 during the night, and at nine o'clock was +1. During the day, the weather conditions remained, the temperature rising somewhat but very little indeed. During the night the temperature rose again, and the fine mist continued. At nine o'clock the temperature had risen to +8 and a dense fine mist of suspended ice particles filled the air, and the sky was overcast. The air became clearer during the day but

the sky remained overcast. This state continued throughout the day. The temperature continued high and the sky overcast throughout the night. At nine o'clock of the 8th the temperature stood at +8, the sky was overcast. The minimum for the preceding 24 hours was +4. ~~Friday~~ Friday, Dec. 5 to Thurs. Dec. 8 inclusive were days of continued calm with just occasional light breezes down the fjord that were most pleasant.

Glacier on east side of Bowdoin Bay.

Southeast of the head of Bowdoin Bay a glacial tongue descends from the icecap into a valley that opens out into the bay. Though it does not reach the sea by a mile or more it is a noteworthy ice-tongue because of the great moraines that flank it, and the considerable terminal moraine that lies at the foot of its face. Much morainal material has been washed down the valley.

Warm Spell Beginning Dec 14.

On December fourteenth another unusual warm spell began. At nine o'clock the temperature stood at 0 having risen from -8 since midnight. The sky was relatively clear, the air calm, the light cirrus clouds high in the sky moving slowly southward. It continued rising slowly during the day until about midnight when it took a sudden jump a strong wind began blowing and a thick mass of low dark clouds swept in from the south, bringing with it a damp fluffy snow. During the night these conditions prevailed and until midnight of the 15th. The maximum temperature 30° occurred shortly before noon, when the wind blew half a gale and flying snow blurred the whole harbor. At midnight between the 15th and 16th the wind ceased, though the sky remained quite cloudy, and a fine soft snow continued falling. At nine o' clock of the 16th the temperature was +15.

Inglefield Gulf more calm than shallower bays.

Perhaps controverting the hypothesis of winds flowing out from the glacier ice-cap of Greenland, the continual calm weather at the head of Inglefield Gulf is worthy of note. Except along the cliffs from Hurlbut glacier to Cape Parry along the south side of the gulf, it is calm from Bastion Pt. inward. Along the southern cliffs, winter south wind blows hard at times and packs the snow. From Bastion Pt. on Herbert Sd. when the wind blows more frequently and harder than farther in, as far as C. Ackland on the north and Hurlbut Glacier on the south the south wind blows with diminishing strength. Likewise a gentle breeze blows sometimes down Academy Bay enough to make a crust on the snow. Most of the Gulf then is calm, for any but south winds are exceptionally rare. Deep snow lies over the areas not wind-swept, and piles up to great thicknesses along the north side.

+ Likewise in Melville Bay and Peabody Bay, Hobbs hypothesis would postulate wind whereas there is none

See pages 100 et seq.

Windswept Areas and direction of strongest winds

Cairn Pt. N.
Foulke Fjd. N.
C. Alexander - N + S
Sonntag Bay N.
Robertson Bay N. + S.
McCormick Bay - N + S
Whale Sd. - S and N.
Wolstenholme Sd. - S.
Parker Snow Bay - S.
Along Crimson Cliffs - S + N.
Cape York - N. - NE - S -
Rensaellaer Bay - N. + E.
Lafayette B. - North

Calm Areas.
Peabody Bay.
Force Bay (relatively)
Inglefield Gulf

Questionable as yet
Olrich's Bay
Grenville Bay
Booth Bay

Eskimo calendar

January	First light
February	" sun
March	" light all day (darkness gone)
April	" sun all day
May	Birds come
June	" lay eggs
July	" hatch; fledglings
August	" leave
September	Ice forms
October	" freezes fast in bay from oil & villages
November	First news - Ice every [illegible]
December	All darkness

Other Nature - calendar - dates.
When rabbits mate - Later April.
" auklets leave - Late Aug. and early Sept.
" gulls lay eggs - June. - Bad weather time to keep birds on nest.
Various moons.
When auklets moult to adult plumage.
Blows hard before light comes all day.
When ice-foot creaks and cracks lights is returning - about Dec. 21.
When young seals are born - go bear hunting - Early April.
When snow - bunting comes - move into tupiks.
When birds all leave. - move into tupiks.

 Several tributary branches contribute to the ice of Tracy glacier, ~~[illegible]~~ both sides but the largest enters from the north.

Tracy glacier (continued from p. 60)

Throughout the length of Tracy glacier its surface is made up of a central band of smooth ice - about one third its width, that remains unbroken from the dimple near the head to the face. Flanking this smooth strip on either sides are bands of very rough broken ice. Nowhere else previous to this have I seen this appearance developed so as to arouse my attention. Taiguahs, and to a lesser degree, Melville Glaciers present this same central band of smooth ice flanked on either side by rough ice. I am at a loss to account for the phenomenon.

The gradient ~~of~~ which this glacier descends is gentle and uniform.

The combined bulges of Tracy and Taiguahs glaciers ends in a steep rough face, from which many large icebergs are discharged. This face with the face of Heilprin glacier give birth to most of the ~~of~~ icebergs which every summer ~~float~~ out of the gulf, or stay in the ice over winter. The icebergs from both these faces are of hard clean ice, ~~though~~ often the upper portions is softer and whiter.

Melville Glacier

Melville glacier is so well concealed behind Josephine Peary Island that I could not see its lower portion. The upper portion comes in as a fan shaped stream converging between cliffs between which it flows to the gulf. Nowhere except at the very mouth do these rise far above the ice. From the rolling ice-cap above to the mouth is a distance of perhaps three miles. The fan shape of the upper portion of the glacier is probably due to the fact that it is formed in the main from the glaciers in two confluent valleys with the point between so covered with ice as to make a continuous glacier. This is substantiated by a hummock of rough broken ice above a decided dimple. Below the dimple a central smooth band of ice, bordered by two sides of rougher ice forms as much of the glacier as I could make out.

The Eskimo say that the face of this glacier is steep, and that it does not abut Josephine Peary Id. as the map indicates, but that they can sledge around the island on sea ice in winter, or paddle around in water in kayaks in summer.

The Ice Cap North and Northeast of the Head of Inglefield Gulf.

Back of the lands and mountains lying to the north and north-east of the head of Inglefield Gulf the ice-cap for a considerable distance, before it assumes its characteristic somewhat terraced dome-slope, is quite rolling and in places somewhat broken, shattered, or gullied. This is probably due to its not being of such depth that the contour of the land on which it lies is not quite concealed. If this be so, then the land upon which it lies in this direction was more maturely dissected than the south side of the Gulf, or the plateaus bordering Bowdoin and Academy Bays. In this respect it is like the major portion of Ridcliffe Pen. and the region just back of Marshall and Rensselaer Bays, probably resembling them in origin & history as well as in appearance. Part of Thule though more maturely dissected, is not of such a rolling character.

A small ice cap lies on the land on which the Smithson Mts. (so called) stand. It is characteristically dome shaped.

Sharp Glacier. Hart Glacier.

Sharp glacier is such a glacier as Markham, Dubitsch or Jessup glaciers, extending down from the ice-cap through a deep gorge bordered by cliffs that rise higher and higher above its surface as the glacier descends steeply to the sea, and emerging through a high-cliffed mouth. It is rough and broken above its somewhat pronounced dimple and again as it approaches the sea. Its moraines lateral are largely buried beneath ice.

Hart Glacier.

Hart Glacier is much like Sharp Glacier but its lower portion is formed of two confluent streams, one coming in from the west and one from the north, uniting at right angles.

Both these glaciers are decidedly active, so the Eskimo say, and discharge many icebergs of somewhat smaller size. Both their faces are vertical, rough, and steep. Deep snow lies along their faces; ~~and~~ this indicates that no wind to speak of flows down these streams.

Hubbard Glacier.

Hubbard glacier is a large stream of ice descending from the ice cap back of Castle Cliffs and Mts. Putnam & Daly by two streams that unite two or three miles from the sea to form one large tongue that descends by low gradient and gentle terraces to the sea. It has a central very smooth band along which more broken bands lie. Near its face and back from it almost a mile or perhaps more its surface is much broken and fissured.

It is not bordered by very high cliffs, the slopes between which it flows being rather comparatively low. Both sides have great moraines of ill-assorted material, and considerable streams flow down along this glacier in summer, and carry away much material; the face is steep and discharges bergs, not so large as those of the greater glaciers up the gulf farther.

Mts. Endicott, Asserson, Field, Lee, and Smithson - and land to west.

Mts. Endicott, Asserson, Field, Lee and Smithson are really prominences of varying size, Smithson being much the largest. They are plateaus with steep sides, their tops are of fairly uniform height above sea-level - some 700 to 800 feet on the average, and their surfaces are dissected by valleys and gullies perhaps a third as deep as the plateau is high. None of these lands has any conspicuously high peaks, though a rounded snow-capped dome rise above the general level of Smithson, which extends westward ending in a long low point.

Harvard Id. is about 600 feet high in its eastern portion but its western half is much lower.

Josephine Peary Island is a high plateau about 700 feet high bounded by steep cliffs that drop sheer into the sea.

The land just west of Hart Glacier is rather rougher. Its two most conspicuous peaks are Mt. Adams and Mt. Daly that rise 300 or 400 feet higher than the land about them. Mt. Putnam is neither so conspicuous nor so high. Large valleys intersect it but their level is at least 100 feet above sea-level.

Glaciers along cliffs of Whale Sound from mouth of Ulriks Bay westward to Borden Bay.*

Perhaps nowhere along the coast are glaciers more numerous than along the coast from the mouth of Ulrik's fjord to the mouth of Borden Bay, and this largely in the portion near the mouth of Ulrik's bay. All told there are 15 glaciers tongues of varying size that drop from the plateau to the sea in this stretch of coast and with the three in Borden B. make a formidable array all told. And they are interesting indeed and would most richly repay careful study. This careful study should be done later in the season when so much of the attendant phenomena are not so deeply covered with snow as at present.

The most easterly of the glaciers in this stretch of territory that reaches the sea is a most active one, discharging much ice from its wall-like face. It is bordered by noticeable moraines but it has no terminal moraine, has rough lower surface

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Beside it on the cliffs lie two noteworthy tongues that do not reach the sea, and several lesser projections extend down from the ice-cap, but are not significant. The lesser of these is a pretty tongue of ice with smooth top, rounded sides flanked by pronounced lateral moraines, and terminated by a complete crescent of terminal moraine. Its slope is not steep nor does it have particularly distinct terraces. It stops far up from the water. The larger tongue is a wide tongue that abuts at its end against a ridge formed of an uneroded dyke, and this makes it spread out in a fan shape. It is flanked by considerable lateral and semiterminal moraines. It has one distinct terrace but otherwise descends by a moderate gradient to the terrace. These with the smaller tongues lie east of the Studlek glacier. I could not see farther up the bay, but undoubtedly several tongues descend from the

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ice-cap varying distances on the slope. In fact, one can see halfway up the bay a large tongue that must come really down to the sea, if not quite.

The Stordlek glacier itself over which the route lies to Grenville Bay is the most important glacier along this coast, physiographically as well as economically. It comes down from the divide from which the large glacier near the head of the bay (not at the head) descends. Two very distinct terraces and a generally steep slope characterize this glacial tongue. Toward its face it becomes fissured and broken along the east side, and clear across ridged and hummocky. It emerges from a steep-cliffed pass and then spreads out fanshaped. Across its entire semi-circular face stretches its terminal moraine narrow, comb-ridged and single toward the west half, wider, hilly more or less rough, and with two distinct ridges - an outer and an inner along the east half. The marginal moraine extends for

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some distance up along the east side where a large fosse bearing much debris from the cliffs also lies. Much interglacial material of diverse character and various size characterizes the eastern side. Since the face of this glacier is quite surrounded by the moraine it naturally gives off no bergs. The water for over a quarter of a mile off the face of this glacier is very shallow.

Westward from the Stordlek Glacier eleven tongues all told descend from the ice-cap. From ~~east~~ to west numbers 2, 4, 5, 6, 7, 8, 9, 10, and 11 have their termination in the sea, while 1 and 3 end on the slope some 50 to 100 feet above the water.

Numbers 1 and 3 that do not reach the sea descend by steep gradient through narrow passes and have distinct and noticeable lateral and terminal moraines. Both are steeply terraced, with much broken surfaces - fissured, shattered, and broken. Fig. 3 has a large piece broken out from

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the western portion of its face as if the large piece had slipped down into the sea. The outwash material in front of the face substantiates this, being evidence of a slide. The faces of both these glaciers, otherwise, are those characteristic of such hanging glaciers. Numbers 2 and 4 reach the sea through deep canons with cliff walls; their slopes are steep with abrupt terraces and rough lower portions. No. 2 is almost or quite surrounded by a moraine similar to that about the face of the Stordlek glacier. Only near the western end of this chescentic moraine does the ice threaten to break through. Some shallow water lies off this glacier too but not so much as off the Stordlek glacier. No 4. is an actively discharging glacier that leads far back into the plateau.

Nos. 5 and 6 become diminishingly important but otherwise resemble closely No. 4. They are not of any particular significance

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Nos. 7 and 8 are more significant because they both appear to have been much larger in times past than they are now. No. 7 sends in a number of smaller tongues that descend from the ice-cap into a cirque like basin upon which they cling salamander-like, some of them not joining the main stream, none of them very large. Between them are smooth polished surfaces that indicate old erosion by ice. The flatter terrace just above the face is brown-black with entglacial material especially along the west side. Two tongues in the upper portion of the cirque like basin are worthy of note. The most westerly of them is a comb-like ridge of ice projecting out a distance greater than its width and ending some little distance above the "cirque-floor." The steepness of this tongue is itself remarkable for it would seem that the ice could not in any wise cling to the cliff. The other tongue comes down in a very narrow cleft in the rocks, looking like a vein of ice.

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No. 9 is an insignificant tongue in an almost vertical gorge, snow at the top, ice for a short distance above the water into which it descends.

No. 10 is a more significant tongue more like No. 4 than any of the others except that it comes down by a steeper gradient.

No. 11. Differs from the rest in that it does not come down by a steep gradient as through a narrow, steep-walled cliff. Instead it rather flows in almost no valley at all, down over a relatively gentle slope. This slope is a part of a gradual slope that almost entirely surrounds a little bight a few miles east of the mouth of Borden Bay. It has no noticeable terraces and its surface is relatively smooth. Its moraines are unimportant probably because it is so wide and flat that it has overridden the debris it has brought down. Its face is steep, somewhat broken and apparently discharges considerable ice in summer.

Glaciers on south side of Northumberland

On the south side of Northumberland Island three glaciers descend from the ice-cap that lies on the divide.

The most easterly of these is that that descends along the little Eskimo village of Keatek. It is a rather narrow stream descending by fairly steep gradient and step terraces through a fairly steep walled valley. The glacier is flanked by high moraines on either side. These moraines are of all sizes and character of debris, a mixture of material fallen from the cliffs and brought down by the ice. The lower terraces of the glacier are very hummocky and, near the face, much fractured and broken. The moraines extend far out beyond the face of the glacier indicating a greater extension in the past. Deep trenches lie between the eastern moraine and the cliffs and a considerable stream flows down here in summer. It is upon the outwash delta of this stream that the village stands. The ice of the face of this glacier is discolored a great deal by brown silt and sand mixed in the ice and

Glaciers on South Side of Northumberland

the water of the streams along the sides of the glacier is likewise deep brown almost red. This discoloration is due to the iron derived from the sandstones which are impregnated and cemented by iron oxide. In fact some of the layers about the island are so rich in iron content that I believe the percentage may run up to 50%. No terminal moraine lies along the face of the ice.

Two glaciers lie to the westward of this one. The easterly one comes down by a relatively easy gradient through a broad valley at the mouth of which a fairly large stream issues. Considerable lateral and terminal moraines mark the edge and edges of both this moraine and the one farthest west. This most westerly glacier descends to the sea by a series of very steep terraces through a most gorge like valley.

The numerous glaciers of this island indicate how close the balance is between precipitation and melting. Not a great deal of ice is discharging yet nearly every glacier reaches the sea.

Glaciers between Booth & Grenville Bays.

Two glacier tongues of considerable magnitude come down north of the Three Sisters Bay and south of Blackwood Point. In reality they are but two distributaries of one large glacier that comes from a large nev on the south half of the peninsula, a nev that sends down glaciers also into Booth and Grenville Bays. About a mile from the ends of the two tongues the main tongue is split by a semi-nunatak much like the butte at Umanak. Both these tongues fail to reach the sea, but end at a very short distance from it. The nunatak is almost surrounded by the ice but on the side toward the point, and opposite the division of the main glacier it is exposed and a considerable plain extends from its base to the sea. The face of the glacier tongues is not rough but quite smooth, with an even curve to both sides. On both sides of both are rather deep trenches, the trenches around the nunatak being much the deepest. The lateral moraines are inconsider-

Glaciers between Booth & Grenville Bays.

able, and except for a few small piles of debris at the face there are no terminal moraines. The outwash apron at both faces is considerable.

These two tongues represent the normal type coming over a slope of low, even gradient, in a wide valley with rather sloping sides - except at the very mouth where the side walls are steep -. Such tongues are smooth, have an easy slope, usually they terminate on the land not far from the sea in a low steep face, often somewhat undermined. This type is but slightly terraced, and is generally rounded so that the highest part of the surface is about in the middle. The edge is generally not high but steep and possible of ascent only where snow has drifted over them. Not much morainal debris is scattered over the surface and not a great deal is revealed anywhere; in fact I think but little is carried anywhere within it.

Glaciers of Grenville Bay. -

Nowhere within a limited area are so many forms of glaciers and types of glacial action and phenomena represented as along the shores of Grenville Bay. Not so much near the mouth as in the interior of the bay, are these phenomena revealed. I have seen no other place where the glaciology compares in interest with this, except for the stretch of coast between Itivdlek and Netchilivik.

On the east coast of the bay a large wide valley at present at least unglaciated occupies much of the outer half of the shore within the first highlands. Within the bay beyond this valley steep cliffs form the shore. It is in the gulleys and valleys of these cliffs that the glaciers form. The first gully next the wide valley is small and but little snow drifts into it; it also faces the highest sun. Then to the northeastward as the shore gradually curves to an almost east and west direction the gulleys become more and more filled with drifted snow, the gulleys face lower and lower sun,

Glaciers of Grenville Bay.

more of the snow turns to ice, and larger and larger glacier tongues develop. The first in the series of these gullies, contain apparently only snow-cirques from which the water escapes without freezing, but these soon change to a form with a lower ice rim that gradually occupies larger and larger proportion of the cirque and sends longer and longer tongues of ice downward toward the sea. Just at the middle of the cliffs - at the shoulder of the bend the transition has gone so far as to show a complete glacier with its amphitheater cirque, and a steep, step-broken glacier of considerable size. This glacier cascades over two igneous ledges and breaks out over the sides of its gorge (see photograph) so that huge blocks break away and tumble into the sea. This glacier reaches the sea. The next glacier that comes down on this side of the bay grades into the type with a valley of flatter gradient, does not reach the sea, is smoother, flatter, and

Glaciers of Grenville Bay.

is a transition from the cliff type to the wide valley type that lies at the head of the bay. This great glacier is flat and of low gradient with low walls. It is smooth because it does not extend out over the water of the bay but even to its end lies on land. It comes from the local neve of the peninsula but has a considerable field from which to draw sustenance.

The innermost two glaciers on the north side are similar in that they come from the same neve, down over the same slope, and do not reach the sea. The most easterly of these is confined in a rather narrow valley in its lower course whereas the the westerly extends down over the slope almost parallel to the sea. Of this latter I have several good photographs. At the northwest bend in the bay a considerable glacier face is formed by the junction of two glacier streams from the northwest, with a continuation of the face of another that comes in from the west. The first mentioned

face is masked by a great terminal moraine of sandy detritus and by great lateral moraines of sand, rock, and gravel. Just to the north of this angle lies the pass to Inglefield Gulf. This pass is occupied by two glaciers one of which debouches upon Grenville Bay, the other upon Inglefield Gulf. They arise in common neve which is fed in upon the divide in the pass from the plateaus to the east and to the west, and which afford roads of travel over the icecap to Kangerdluksuah and Netchilwik. In crossing over from Grenville Bay to Inglefield Gulf by this route, one first travels in a stream bed that lies at the base of the lateral moraine. This lateral moraine is at first a single ridge contiguous to the glacier, but it soon spreads into a series of ridges, and kamls, and drumlin-like hills. When this confusion of moraines comes in one ascends to the glacier and drives for some dis-

tance along the near edge. All along the series of moraines is present, and the outer moraines which lie higher, and higher up on the slope of the inclosing mountain indicate that the glacier is not now nearly so large as it once was.

When the inclosing mountain begins to have steep walls and the moraines merge into one that is continuous with the edge of the glacier, the route lies well in on the middle of the pass, which on the left is flanked by steep cliffs, on the right by snow-neve-covered slopes. About half-way across the pass tributary valleys, glacier filled come in from both sides, and it is from these that the chief sustenance of the outflowing glaciers is derived.

The descent into Inglefield Gulf is by a fairly steep slope over the glacier which I have described elsewhere. Both to the east and west the neve is continuous to Booth and Borden Bays on the one hand and Ulrichs B. and Wolstenholme Sd on the other.

Glaciers of Grenville Bay.

The neve is however, according to the Eskimo, broken by many crevasses of varying sizes especially to the Eastward of Grenville Bay.

A considerable outwash apron of small, water worn boulders and pebbles lies at the mouth of this stream and off the face of the glacier, much of it submerged in shallow water. This apron is studded with a number of huge erratic rocks and boulders, probably left there by the glacier when it extended beyond its present limit, or by icebergs floating in the sea at a time of greater submergence of the land - a submergence adequately proved by terraces all along the coast. And in these bays and fjords with high steep shores, large blocks of rock upon the ice; or on the icebergs born from valley glaciers with gorge like valleys similar and larger blocks; are no uncommon sight. The glacier at Sonntag Bay is a particularly fine example of

Glaciers of Grenville Bay.

these huge blocks.

Back of the outwash apron a sort of lateral-terminal moraine of low hills, ridges and piles lies next the glacier face. These are made up of unassorted material, though in the gullies and hollows between the material is somewhat assorted. In these places it is chaotically cross-bedded.

The lateral face of the glacier is much filled with rocks, gravel, sand, so that the lower strata particularly are quite black the icicles hanging from it dirty, and the water from it muddy, besides cloudy with rock flour.

Across the sea face of this glacier lies a terminal moraine of dark gray, uniformly granitic sand, with an admixture of some gravelly rock.

The last part of the glacier face that of the distinct glacier from the west is low and flat, a typical low-gradient tongue, with smooth surface, evenly curved, and but little moraine material.

Glaciers on West side of outer half of Grenville Bay.

Along the west side of the outer half of Grenville Bay two glaciers having their origin in the same nevé but of entirely distinct type, come down from the plateau. The inner one of these is a broad, flat, smooth tongue, typical of a low gradient, that does not reach to the sea, and is not bordered by a terminal moraine of any size. It enters the basin of the bay almost at right angles to the shore. Its face is almost, if not quite, a mile from shore.

The outer glacier is of the steep gradient type of rough surface and steep vertical walls, and reaches the sea. It is evidently increasing in size for a lateral tributary that tumbles over the cliff at the side, is considerably larger now than it was two years ago when first I saw it. I have secured at least one good negative - if not two - of this glacier. It resembles the other across the bay to the north east.

7

slip - nerve
deadfalls
steel - trap
bar - trap
bird - catching
marre - cliffs
cutting
iceceaks
frothock
ice - conditions
fore - shoulders
fore - legs

ice-rimmed
ice-clad
ice-covered
ice-free
ice-hunting
inshore
keystone
killer whale
kayak-hunting
killing-lances
land-ice
low-lying
lamp-bench
land-birds
motorboat
midnight
mid-October
midday
muskoxen
noonday

(2)

hunting-fields
home made
harpoon-lines
hair-seal
high water
hard-packed
hunting-grounds
hunting equipment
icefoot
icefield
iceberg
iceflow
icecap
icepack
icerim
icelay
icewater
icecover
icetongue
ice-navigation
ice-capped

(3) 99

needlelike
nestful
out of doors
out-doors
offshore
onshore
overestimate
over-rudder
overnight
pack-ice
postglacial
plant life
pan-ice
per cent
"piblokto"
run-off
rock ledge
ringed plover
ringed seal
rime-frost
ring-shaped

rock fragments
snowdrift
snowstorm
snowhouse
snowshoe
snow bunting
snowknife
snow-mason
snowchimney
shore-line
skyline
sleeping-bag
soapstone
stone-igloo
shipload
sledgeload
slow-snowing
shore-birds
snow-ice
snowglasses
snowblindness
salmon-spear

all - fours
airtight
base - level
bladderwrack
blue grass
boot - soles
bed - platform
bell - like
bird life
bird cliffs
breathing holes
bear wheat
bird-snare
blubber lamps
bearskin
crow's - nest
canyonlike
carload
caribou - bow
camp site
cooking utensils
dog traces
down - draft

downpour
doorway
dog-teams
dog-biscuit
dark-gray
dog-harness
drying-racks
dog-sledge
dog-traces
eider-duck
firearms
fur-seals
flood-tide
foot-gear
framework
fox-trap
flower-patch
grass-covered
gunshot
half-brother
half-breed

(4)

skin-scrapers
snowbeaters
sun-warmed
sledge trail
snow-water
sea-ice
sea-level
sail-like
sharp-angled
sea-game
sea-coast
soil flow
sledge-lashings
sea-bottom
sea-floor
sealskin
snow-white
storeroom
storehouse
seal meat
soil flow
talus slopes

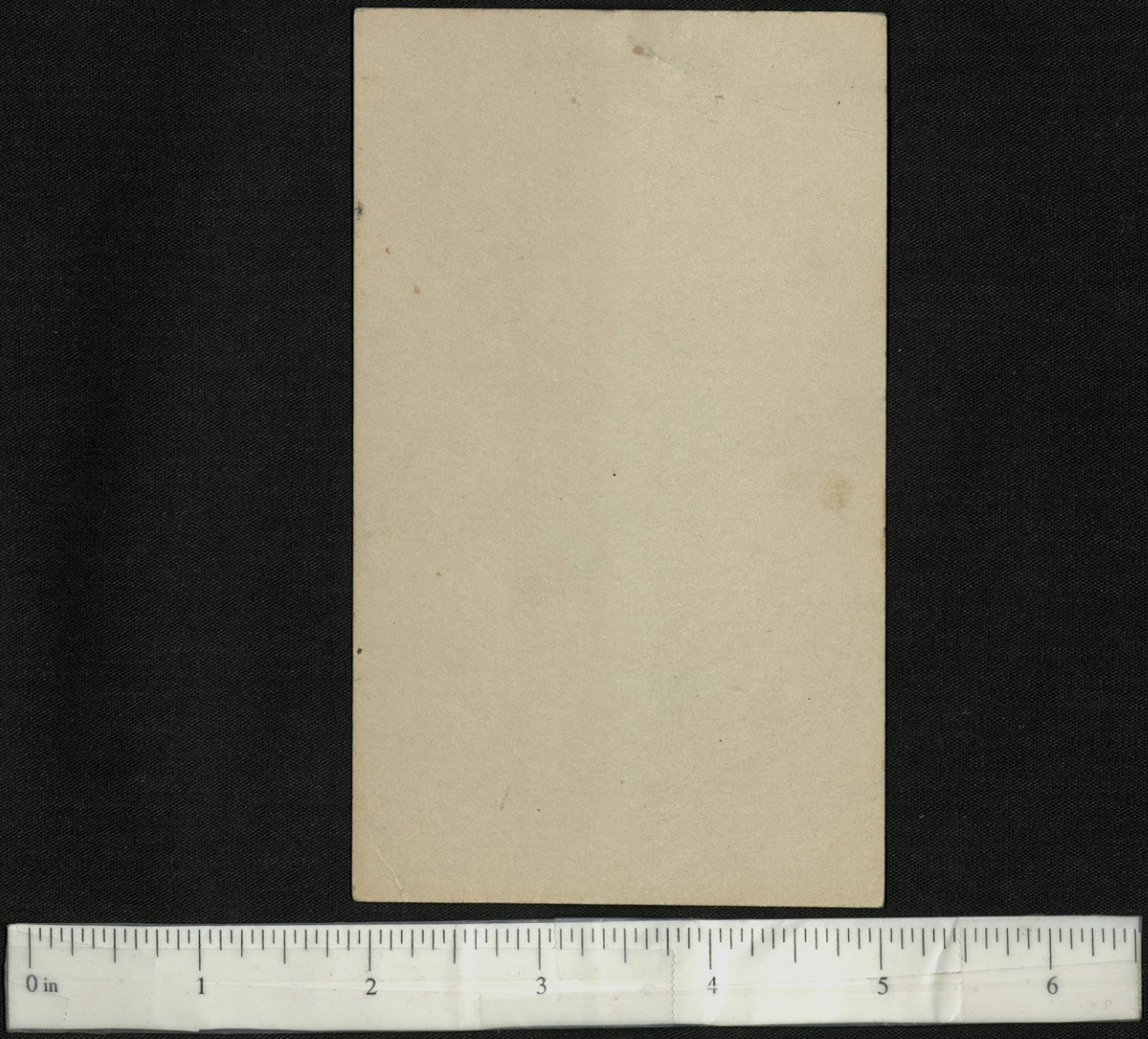
tide-flat
tableland
tidal-crack
tide-worn
tupik
underparts
whaleboat
wagonload
watercourses
wheelear
willow-grown
white-clad
windswept
widespread

---

travel-routes
bearded seal
tasiusak
snow-covering
birdskin
sledge route

windproof
seal-hunting
brown-yellowish
cheekbones
red poll
bird forms
storm cloud
nesting sites
food supply
dog food
field-glasses
shot-gun
dog whips
underseas
food plants
bear-hunting
sea-hunting
muskoxen

sledgeskins
whiplashes
equi-dimensional
half-demolished
peep-hole
gutskin
block-maker
willow-down (adj)
oil-saturated
wind-packed
semi-permanent
new-killed
hunger-satisfying
strength-giving
flipper-shoulders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slip-nooses
deadfalls
steel-trap
box-trap
bird-catching
murre-cliff
Outlying
icecakes
foothold
ice-conditions
fore-shoulders
fore-legs

Glaciers on West side of outer half of Grenville Bay.

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two years ago when first I saw it. I have secured at least one good negative - if not two - of this glacier. It resembles the other across the bay to the north east.

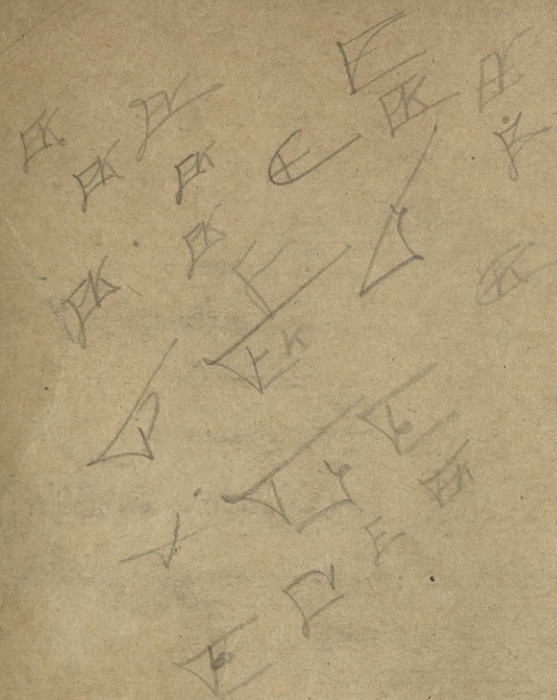
Glaciers on West side of outer half of Grenville Bay.

Along the west side of the outer half of Grenville Bay two glaciers having their origin in the same neve but of entirely distinct type, come down from the plateau. The inner one of these is a broad, flat, smooth tongue, typical of a low gradient, that does not reach to the sea, and is not bordered by a terminal moraine of any size. It enters the basin of the bay almost at right angles to the shore. Its face is almost, if not quite, 1 mile from shore.

The outer glacier is of the steep gradient type of rough surface & steep vertical walls, and reaches the sea. It is evidently increasing in size for a lateral tributary that tumbles over the cliff at the side is considerably larger now than it was two years ago when first I saw it. I have secured at least one good negative - if not two - of this glacier. It resembles the other across the bay to the north east.

January (moon) - First light
February - " sun
March - " light all day (darkness gone
April - 24-hr sun.
May - Birds come
June - " lay eggs
July - " are hatched - fledgling
August - " go south
September - - Ice forms
October - Ice freezes solid in bays
November - First news from other villages
December - All darkness.

Other nature - calendar dates.
When rabbits mate (last april)
" little auks go (" August [illegible] Sept)
" gulls lay eggs - Bad weather [illegible] (to keep
Different moons - birds on nest)
When auks moult to adult plumage
Blows hard before light comes all day.
When ice-foot begins to crack light is coming
that is about Dec. 21.
When young seals are born. (go bear-hunting)
" snow-bunting comes (move into tupeks)
" birds are all gone (move into igloos.)



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Nov Mon 1	B	Satur 13	C9	Thur 25	C10	Tues 7	B		
E3	10	NE1	-9	S2	+17	No	-1		
22	26	4		+25		+6	Dense Mist		
Tues 2	C2	Sun 14	C10	Fri 26	C8	Wed 8	C9		
SE1	13	NW2	-10	S1	+20	No	+4		
21	23	-10		+22		+8			
Wed 3	C10	Mon 15	B	Satur 27	C5	Thurs 9	B		
SE0	11	N2	-24	S1	+17	No	-2		
20	26	-21		+17		-2			
Thur 4	C10 Snow	Tues 16	B	Sun 28	C10	Fri 10	C2		
S0	20	No	-22	No	-5	S4	-4		
24	28	-17.5		-5		+8	Beautiful		
Fri 5	C10	Wed 17	B	Mon 29	B	Satur 11	C1		
NE0	12	SE	-22	N1	-6	S2	+4		
13	30	-16		-6		+17			
Satur 6	C10	Thurs 18	C10	Tues 30	B	Sun 12	C1		
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13	22	-6		+8½		-1	Fine Feeling		
Sun 7	B	Fri 19	B	Dec Wed 1	C5	Mon 13	B		
NE1	5	S1	-18	S6	+11	No	-8		
14	20	-13		+11	Blizzard	-8	Slight Fog		
Mon 8	B	Satur 20	B	Thurs 2	C8	Tues 14	C2		
N2	-2	0		S8	+11	No	-8		
12	20	-14	-14	+27	Snow	0			
Tues 9	C9	Sun 21	B	Fri 3	C9	Wed 15	C10		
SE9	6	NE	-20	S1	+16½	S5	+4		
19	20	-15		+16½	Snow	+28	Snow		
Wed 10	C10	Mon 22	B	Satur 4	C9	Thur 16	C9		
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Thur 11	C10	Tues 23	B	Sun 5	B	Frid 17	B		
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18	25	-17		0		+7			
Fri 12	C1	Wed 24	C11	Mon 6	B	Satur 18	B		
NE0	-4	S5	+12	No	-2	NW0	-7		
5	13	+25	Snow	+1		-7			

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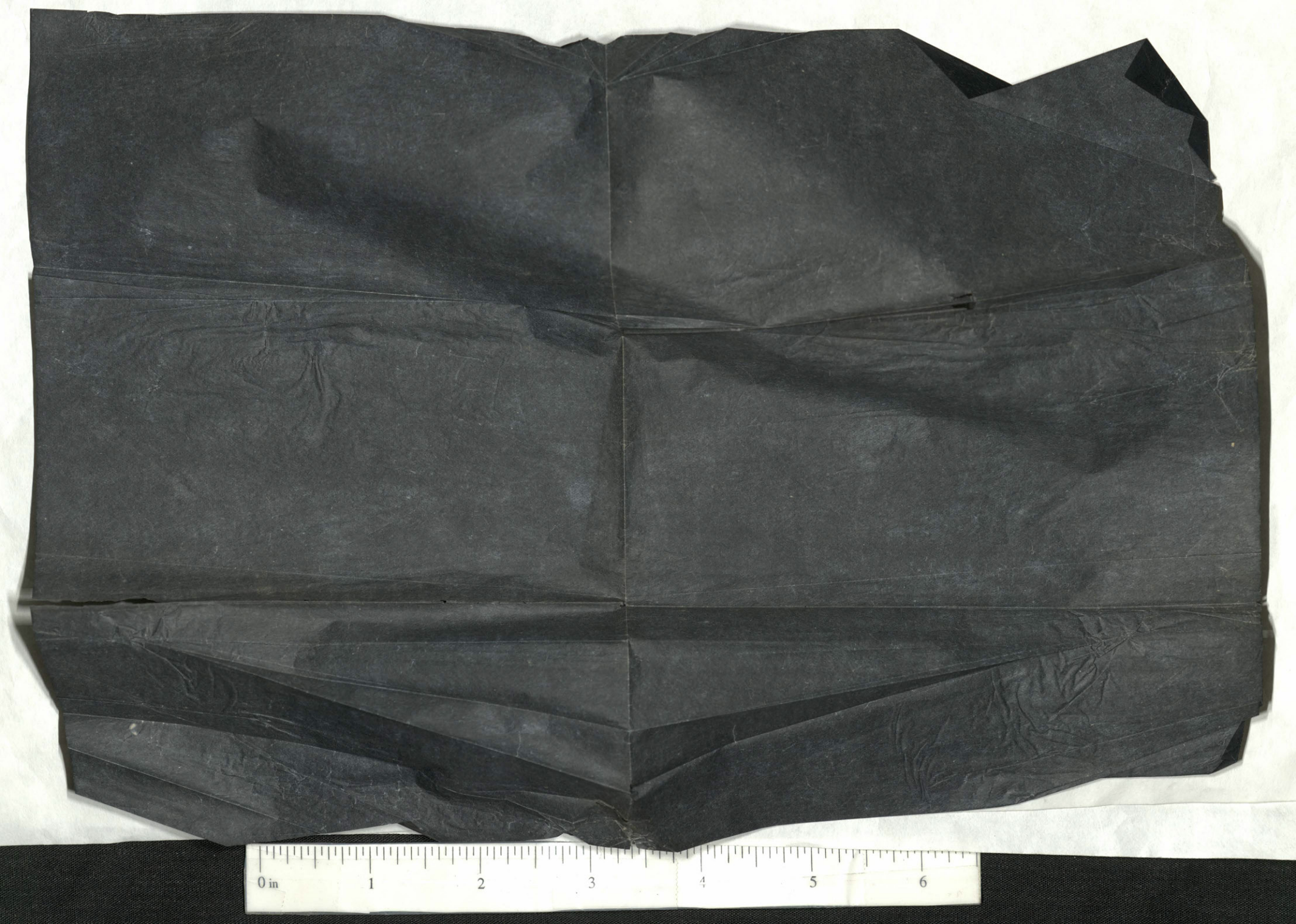
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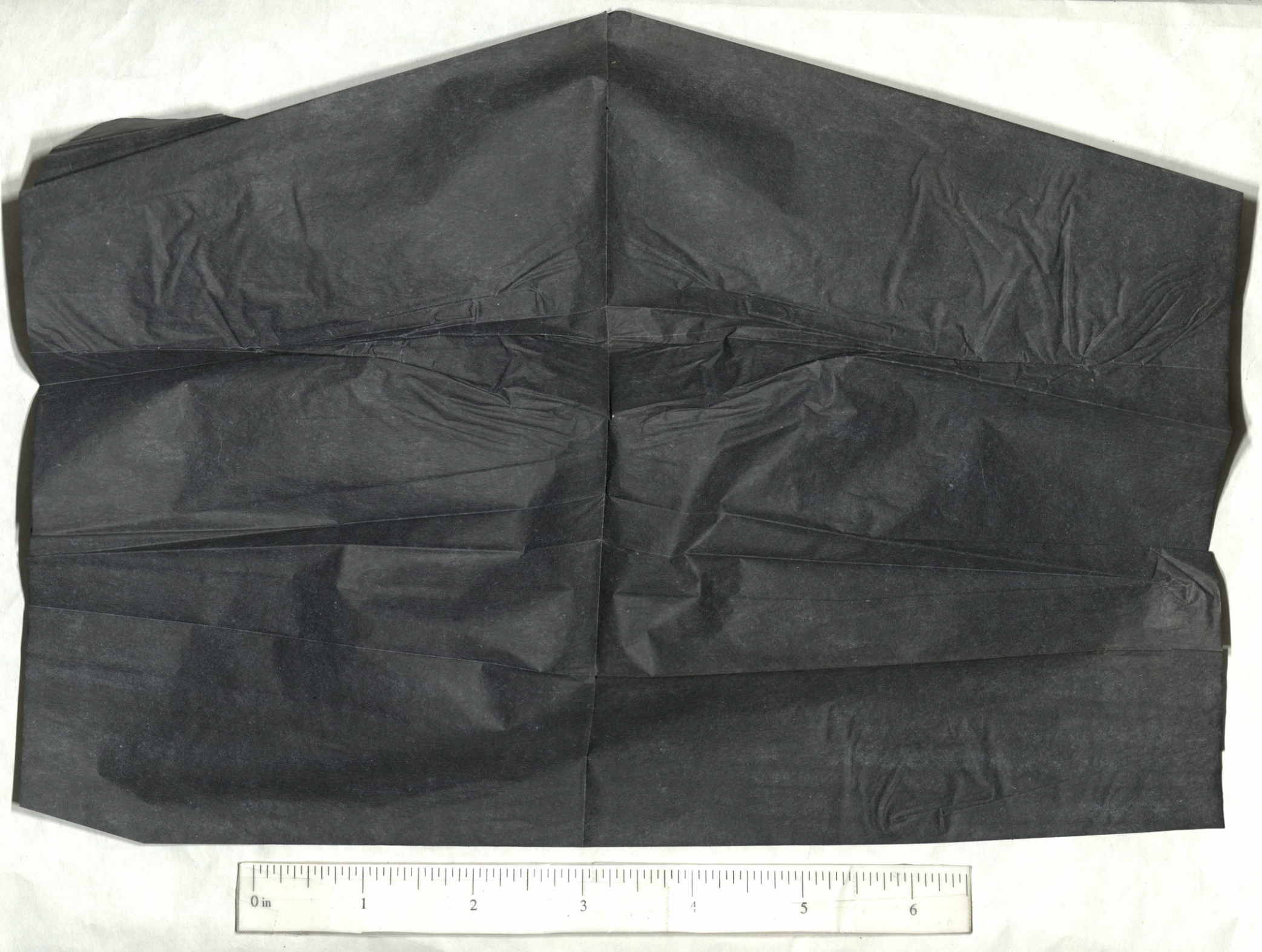
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