Yellow arnicas and ferns near Cape Lambton, Banks Island.

A BIOLOGICAL EXPLORATION OF BANKS AND VICTORIA ISLANDS*

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A WELCOME opportunity to carry out a much needed reconnaissance of the flora of Victoria and Banks Islands presented itself last spring when Dr. A. L. Washburn, Executive Director of the Arctic Institute, extended an invitation to the National Museum and the Geographical Bureau to join in a summer's field season in Banks and Victoria Islands. Dr. Washburn intended to continue his geological work in Victoria Island[1] and, if time permitted, to carry out some preliminary work in Banks Island. He had already completed arrangements with Canadian Pacific Airways to charter a Norseman aircraft which was to be piloted by the veteran northern flyer, Ernie Boffa, who had had considerable flying experience over Victoria and Banks Islands.

Dr. Washburn had originally planned to commence this season's work at Cambridge Bay in May. When quarantine followed the influenza epidemic there, he chose Holman Island Post instead where Ernie Boffa landed him and Mrs. Washburn at the end of May. It was on the return from this flight that Ernie Boffa had a forced landing some fifty miles north

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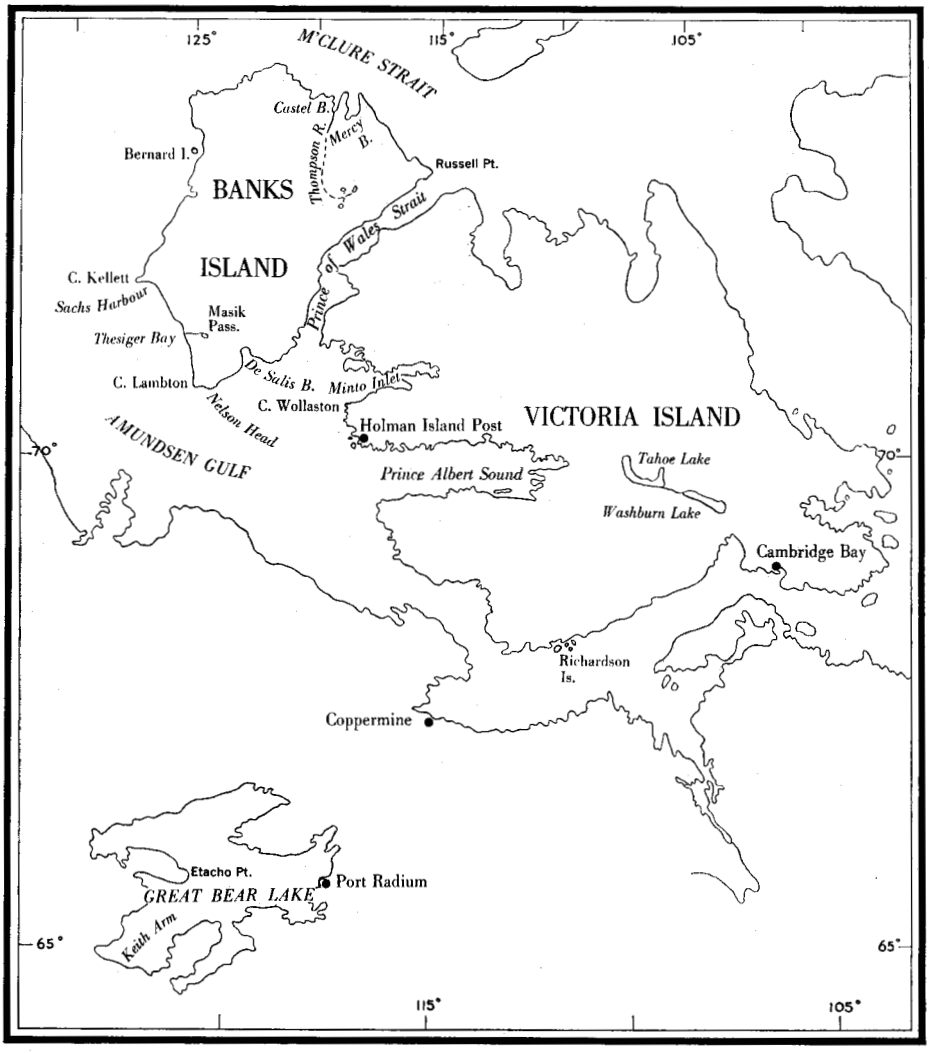
[1]See: Washburn in *Geol. Soc. Amer.* Mem. 22, 1947.

of Coppermine when his aircraft became a total wreck. Fortunately, owing to expert handling, neither Ernie Boffa nor his mechanic was hurt, and both were rescued a few days later as the result of a most successful R.C.A.F. search directed by W/C D. R. Miller.

Accompanied by Mr. J. L. Jenness of the Geographical Bureau I left Ottawa on July 5 for The Pas, Manitoba, in an R.C.A.F. Canso piloted by



F/O Cuthbertson, which was taking north a magnetic survey party headed by Ralph Hutchison of the Dominion Observatory. At The Pas we transferred to an R.C.A.F. Dakota, which landed us at Yellowknife on July 7.

At Yellowknife we received the discouraging news that the season north of Great Slave Lake was unusually late; reports from Holman Island

Post even indicated that it would not be possible for an aircraft on floats to land there until the end of the month, or fully two weeks later than anticipated.

The delay afforded a long hoped for opportunity to visit the Scented Grass Hills—the 2,100-foot high peninsula, which separates the two westernmost arms of Great Bear Lake. In late August 1928, at the conclusion of six months of exploration on Great Bear Lake, my brother Robert and I had made a brief visit to Etacho Point. Lack of time, and a brewing storm without safe anchorage for our boat, permitted only a hurried ascent. However, the botanical discoveries we had made strongly suggested that the summit of the peninsula might have escaped glaciation, or at least that its upper levels might have stood above the latest advances of the ice, acting as a refuge for a number of plants not known to occur elsewhere in the area.

The ice on Great Bear Lake was still unbroken but Ernie Boffa believed that he might find enough open shore water, or a suitable lake, where he could land us with our equipment. Accordingly we left Yellowknife on July 9, stopping over at Port Radium to pick up some supplies and a light canoe. Crossing the lake, we circled the Scented Grass Hills. The hills are dotted with small lakes, a few of them large enough for a small aircraft to land on, but all were still ice-covered. Along the south shore of the peninsula was a narrow lead, where Ernie Boffa managed to land us, eight miles west of Etacho Point.

Except for one day when the ice moved out from the shore, Keith Arm remained choked with ice during the next two weeks. Jenness and I spent this time making a botanical survey of the limited area which we could reach on foot. On July 20 Ernie Boffa returned and succeeded in landing us on a lake near the summit of the peninsula. A few hours on the ground convinced me that, although there was abundant evidence of glaciation, the composition of the flora strongly supported my earlier contention that the plateau might have escaped the last advances of the ice and have remained a nunatak refuge for a group of plants otherwise of Cordilleran range.

After returning to Radium we learned that Holman Island Radio now reported open water on the lakes near the post and on the 25th we were able to resume our journey. Arriving at Holman Island Post on the 28th we were warmly greeted by Link and Tahoe Washburn, and by the Hudson's Bay Company's Post manager, Bill Calder who, with Father Buliard of the Roman Catholic Mission, and a few Eskimo families, made up the entire population. Most of the natives of the district were at their sealing camps at Minto Inlet and elsewhere. Even Father Buliard was at the time living at his sealing camp ten miles up the coast, where he had

200 large seals temporarily buried in the sand of the beach. In this manner the seals keep tolerably well preserved.

Although the sea was still icebound, as far as we could see from the air, summer appeared to be at its height in the Holman Island area and the landscape, which from the air had appeared rocky and barren, on closer inspection was ablaze with colour. In full bloom on the hillsides back of the Post were masses of creamy-white mountain avens, purple loco weeds, and magnificent yellow cinquefoils. On south-facing slopes we

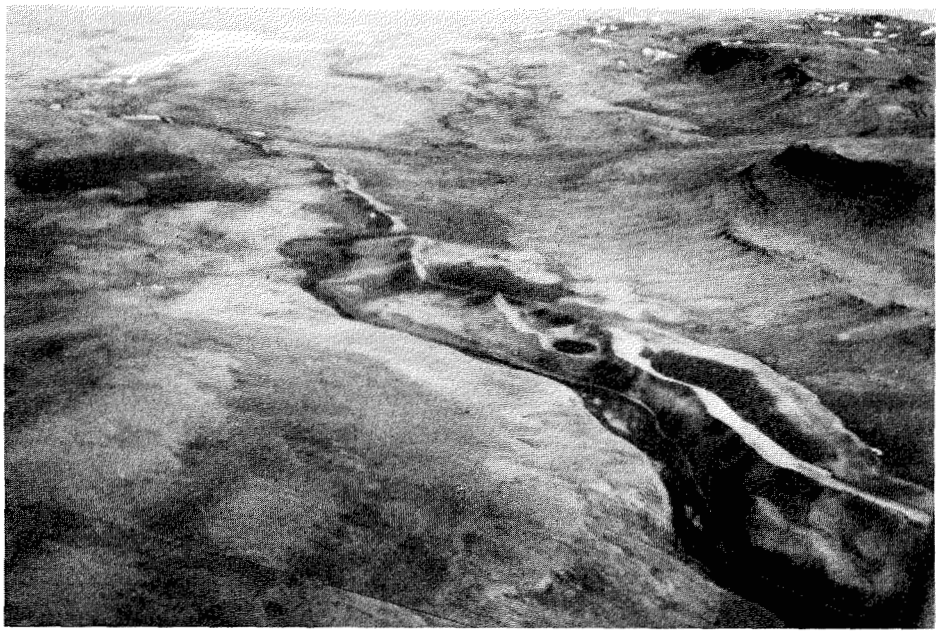
Cliffs at southern end of Thesiger Bay, Banks Island.

could even find miniature "rock gardens", all gay with purple gentians, daisies, and Lapland rhododendrons, yellow arnicas, and in rock crevices even three kinds of rock ferns.

With the season so far advanced time was at a premium. Fortunately, two weeks of exceptionally fine weather followed, and together with the continuous daylight made it possible to do a good deal of flying. Our first excursion took us to southern Banks Island. Crossing from Cape Wollaston to De Salis Bay we saw open leads far to the south. Southern Banks Island looked quite summerly with scarcely any snow left on the land and most of the lakes free of ice. Flying through Masik Pass we saw open water in Beaufort Sea as far north as Cape Kellett. After a brief landing at Sachs Harbour on the west coast we continued along Thesiger Bay. To the south of this bay the coast is spectacular with perpendicular cliffs rising sheer from the sea to heights of 1500 feet. We landed on a

small lagoon to inspect the trap-sedimentary sequence which characterizes the cliffs. On the south-facing talus, below a cliff where a colony of herring gulls and a pair of peregrine falcons nested in apparent harmony, we found a lush vegetation in part composed of plants that had not been recorded from Banks Island.

A second flight from Holman Post took us first to the head of Minto Inlet, thence south to the head of Prince Albert Sound and east by way of Tahoe and Washburn Lakes to Cambridge Bay. The return trip was



Esker at head of Minto Inlet, Victoria Island.

by way of the south coast as far as Richardson Island from where we crossed to Prince Albert Sound, thence north and west back to Holman Island Post along the strike of the probable contact between the trap-sedimentary sequence of the Holman Island area and the sedimentary rocks to the south-east.

The weather thus far had been good; but with the long overdue breaking-up of the sea ice we entered upon a period of unsettled weather with frequent fogs and overcast. During the remainder of the month, Dr. Washburn continued his study of geomorphological problems in western parts of Victoria Island while, on August 10, Jenness and I set up an advance base on a small, unnamed lake in northeastern Banks Island, about thirty miles west of Russell Point. After landing us there Ernie Boffa returned to Holman Island Post for a load of gasoline. Bad weather prevented his immediate return and not until the 21st were we able to set

out on a flight to the northwest and north coasts. During the preceding ten days northerly wind had prevailed causing a low overcast over the northern part of the island. Poking his way through this overcast, with occasional landings when the visibility became too low, Ernie Boffa got us through to the west coast on the 22nd, landing on the south shore of Bernard Island, which lies off the combined deltas of two large rivers. From 2,500 feet up Beaufort Sea appeared to be clear of ice as far north as Bernard Island, from where the edge of unbroken polar ice stretched in a northwesterly direction. After a brief stop we followed the coast north but we soon encountered dense fog again which forced us a considerable distance inland. Through the broken undercast we looked down on a plateau of sedimentary rocks cut by a complex system of broad canyons and river valleys that now carried very little water. In many of the canyon walls we saw fine exposures of well stratified sedimentary rocks, and in one place a thick, black band which might have been coal. Unfortunately, the absence of large lakes prevented landings, so we were unable to examine this interesting landscape more closely. Flying along the southern edge of the overcast, Ernie Boffa at last picked up Thompson River which he was able to follow to Castel Bay on the north coast. Castel Bay, as well as the nearby Mercy Bay, was open as were narrow leads along the south shore of McClure Strait while to the north the strait itself appeared unbroken.

We landed at the foot of Mercy Bay abreast of a conical hill which is a prominent landmark, approximately 500 feet in height. The lateness of the day and the threatening fog, which was slowly creeping in from the Polar Ice pack, made it inadvisable to remain here long enough to explore the foot of the bay for remains of McClure's winter quarters of 1851-2 and 1852-3 where his ship, the *Investigator*, was abandoned, later to be broken up by Eskimo. On the beach I picked up bits of flotsam that undoubtedly were from the *Investigator*. The surface of the wood was bleached white, but scraping revealed one piece to be English oak and another to be mahogany; both were perfectly fresh and sound after nearly a hundred years on the beach. Climbing the hill to the east we could not but wonder how many times McClure and his men, during the two years they were frozen in here, had climbed this identical hill to look toward the Polar Sea that never opened enough to release their ship. In the steep cliffs facing the bay we found beautifully preserved fossil corals in beds of Devonian rocks.

On the return flight to our base camp west of Russell Point we ventured a short distance out over the Polar Ice for a glimpse of the high and forbidding cliffs which, between Russell Point and Mercy Bay, where we crossed the coastline, rose sheerly to heights approximating 600 feet. In deep river canyons cut to sea-level were fine exposures of well stratified

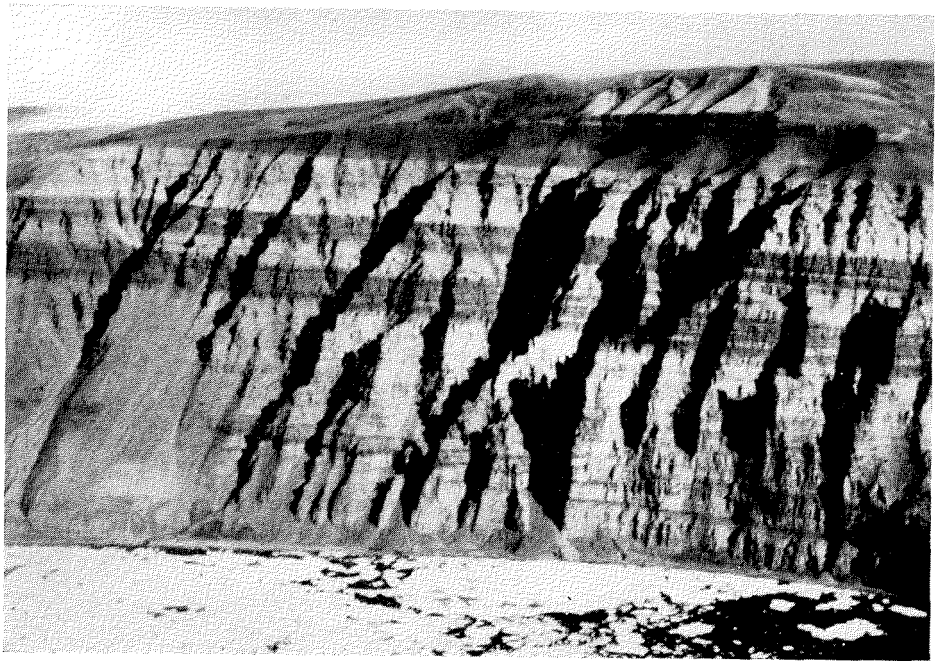
sedimentary rocks. Similar exposures were subsequently examined in the canyon walls near the mouth of a small river which flows into Prince of Wales Strait, approximately thirty miles south of Russell Point. Fossils obtained there, and at Mercy Bay, have been identified as Devonian by Dr. Alice Wilson.

During the last few days the weather had been distinctly autumnal but the following day the temperature dropped to 26°F. with a blizzard from the North which covered the ground with snow and put an end to

Nelson Head, Banks Island.

further collecting of plants. So backward had the season been in northern Banks Island that only half a dozen species of plants had succeeded in maturing seeds, while the majority were overtaken by winter when their flowers had only just opened.

Breaking camp on the 24th we spent the next two days in the southern part of the island, where landings were made at De Salis Bay, Nelson Head, and on a small mountain lake near the summit of the 2,400-foot high plateau which forms the southern portion of the island south of Masik Pass. From Nelson Head west to Cape Lambton and thence north the coast over a distance of about forty miles is formed by sheer cliffs rising from the sea to heights varying from 500 to 1500 feet. The cliffs are formed of well stratified sedimentary rocks and are capped by a great thickness of trap. Flying in perfect weather along this cliff we obtained



Trap-sedimentary series, Cape Lambton, Banks Island.

some very fine photographs of this most spectacular part of Banks Island.

Back of the cliffs the plateau is everywhere covered by a thick mantle of angular rock debris weathered *in situ* which completely covers the underlying bedrock; this suggests that the plateau was not overridden by the glaciers which covered the middle part of the island. However, a small esker which forms the very summit of the plateau shows that at any rate a local ice cap once rested here.

North of Masik Pass the centre of Banks Island is occupied by rolling hills which probably nowhere exceed an altitude of 1000 feet. Toward the north end of the island the north and south trending watershed approaches to within eight miles of the east coast. The eastern portion of the hills has undoubtedly been glaciated and submerged at least to the 500- to 600-foot level. Flying over this part of the island I was forcibly reminded of a huge tidal flat from which the sea has just recently receded. More than half of the surface is lake-covered and lacks well-defined drainage patterns. Here, as everywhere on Banks Island, the land surface bears abundant marks of frost action, either in the form of solifluction stripes or of soil polygons. The latter are such a characteristic feature in the landscape that in the course of the summer we jokingly came to refer to Banks Island as "Polygonia".

The northernmost part of the island is somewhat higher than the middle part and may reach altitudes of nearly 1500 feet. This highland may have escaped glaciation; from the air, there appeared to be no pronounced glacial deposits such as eskers or moraines; furthermore, the rivers which empty into McClure Strait have eroded deep canyons that extend

Victoria Island: typical low coastal plateau, west of Holman Island, showing solifluction contouring.

at least fifty miles inland. Neither at Mercy Bay nor at a lake where we landed near the southwestern edge of the highland, approximately fifty miles southwest of Castel Bay, did I see evidence of glaciation. Likewise, the presence, on the west coast of Banks Island, of high cliffs which contain fossil ice such as is common on the unglaciated north coast of Alaska and in the Yukon, may indicate that the north coast, and possibly also the west coast of Banks Island, was never glaciated.

Owing to difficulty of access by sea, Banks and Victoria Islands have until lately been among the least known islands in the Canadian Arctic Archipelago. No professional botanist had previously visited these islands and for floristic information we had largely depended upon the collections of plants made by officers of the early British expeditions under McClure and Collinson. It was not surprising, therefore, that in the first two hours of botanizing in Banks Island I doubled the known number of species of vascular plants. Although we made landings in ten different places in Banks Island and in eleven places in Victoria Island, in only one or two did time permit long enough stops for thorough collecting of plants. Nevertheless, at the end of the season the total number of vascular plants known to occur in Banks Island had been increased from 65 to 174 and that of Victoria Island from 106 to 201 species. Although the total number of species is low, a relatively large percentage is endemic to the Canadian Arctic Archipelago, a fact which suggests long isolation. Contrary to expectation the flora of both islands proves phytogeographically to be more closely related to the Cordillera than to the flora of Alaska and the Northern Yukon.

As already stated the summer of 1949 was climatically an unusually backward one in the Western Arctic; the break-up occurred almost three weeks later than normal and not until late August did the first boat get in to Cambridge Bay.

Animal life, naturally, was greatly affected by the late season and many migratory birds that normally breed in Banks and Victoria Islands either did not reach their nesting grounds or failed to breed. Throughout the summer we saw very few small land or shore birds and some of those we did see obviously had not bred. All summer we saw only one brood of rock ptarmigan and one flock of 28 black brant. We did see a number of yellow-billed and red-throated loons but they, too, had reared no young. In fact, the only breeding land birds that were at all common were falcons and rough-legged hawks. But even those had experienced hard times, for a pair of gyrfalcons which had nested on a cliff at Mercy Bay had raised but one young and this, when almost full-grown, had starved to death below the nest. On August 5 the nest of a pair of peregrine falcons south of Washburn Lake contained 4 unhatched eggs.

Judging from the abundance of their burrows, lemmings formerly had been abundant on both Banks and Victoria Islands; last summer they were very scarce. On Banks Island we saw collared lemmings in one place only, on a strand flat twenty miles south of Russell Point. On Victoria Island, although generally speaking very scarce, they were reported to be increasing in the vicinity of Cambridge Bay. Foxes, too, were very scarce and only a few tracks were seen. In a letter written just before Christmas, Bill Calder reports that only ten foxes had been traded at Holman Island Post and that the outlook was very poor. Wolves and arctic hares were seen on a number of occasions; caribou appeared to be relatively plentiful and fresh tracks were seen everywhere; in late August scattered small herds, composed mostly of does with their fawns, were seen in the northern part of Banks Island. Although we kept a sharp look-out for musk-ox, we did not actually see any. However, a few may still exist on the island for we saw tracks of a small number at Mercy Bay. When crossing Amundsen Gulf on August 25, we saw a large bowhead whale which obligingly remained surfaced while we circled low over the perfectly calm sea.

Although much too short for the work on hand the field season of 1949 had been a profitable and most enjoyable one for all of us. This was very largely due to the splendid and enthusiastic collaboration by all members of the party, not least from our pilot, Ernie Boffa, and his mechanic, Glenn McKinnon, who maintained the keenest interest in the work of all members of the party, and in the face of the multifarious demands made upon them in the interest of geology, geography, and botany, remained ever unperturbed and helpful.