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BOTANICAL RESULTS OF THE GRENFELL-FORBES NORTHERN LABRADOR EXPEDITION, 1931

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(Plates 408–411)[1]

Introduction

During the summer of 1931, Dr. Alexander Forbes of Harvard University led an expedition to the northeastern part of Labrador, primarily to obtain data for an adequate topographic map of the region. In addition to organizing the expedition, Dr. Forbes also acted as navigator of the *Ramah*, the Nova Scotia-built schooner which was the means of transportation of the expedition. In this difficult task he was ably assisted by Mr. F. T. Hogg, architect, as mate. The direction of the actual surveying (primarily by means of aerial photography) was in the hands of Mr. O. M. Miller of the American Geographical Society, who had just devised a method especially adapted to mountainous country of making maps from aerial photographs, which he calls "plane-tabling from the air." The balance of the scientific staff consisted of Mr. Noel Odell, geologist and mountaineer, who was interested in the structural and glacial geology of the region, and myself who represented the Gray Herbarium as the botanist of the expedition.[2] From the botanical point of view it was considered especially important to investigate the flora at the higher elevations in the Torngat and Kaumajet Mountains because of the current theory that these were not ice-covered during the Wisconsin. It had already been established by Professor Fernald that there is a direct correlation between the presence of "cordilleran" relics and absence of glaciation during the Wisconsin in the more southern nunatak and driftless areas, especially in the Gulf of St. Lawrence region. From earlier collections in northeastern Labrador

[1] The cost of reproduction of the aerial photographs has been met by Professor Alexander Forbes of the Harvard Medical School, organizer and leader of the Expedition. It is a pleasure to acknowledge his generosity not only in this respect, but in numberless other ways both during and after the return of the expedition.

[2] At this point should be mentioned the various members of the expedition who provided valuable aid in collecting plants in the field. These were Mrs. M. Odell, Mrs. M. C. D. Hogg, Miss K. Forbes, Noel Odell, Edwin D. Brooks, Jr., Hoyt Pease, and Brewster Morris, to all of whom I express my thanks.

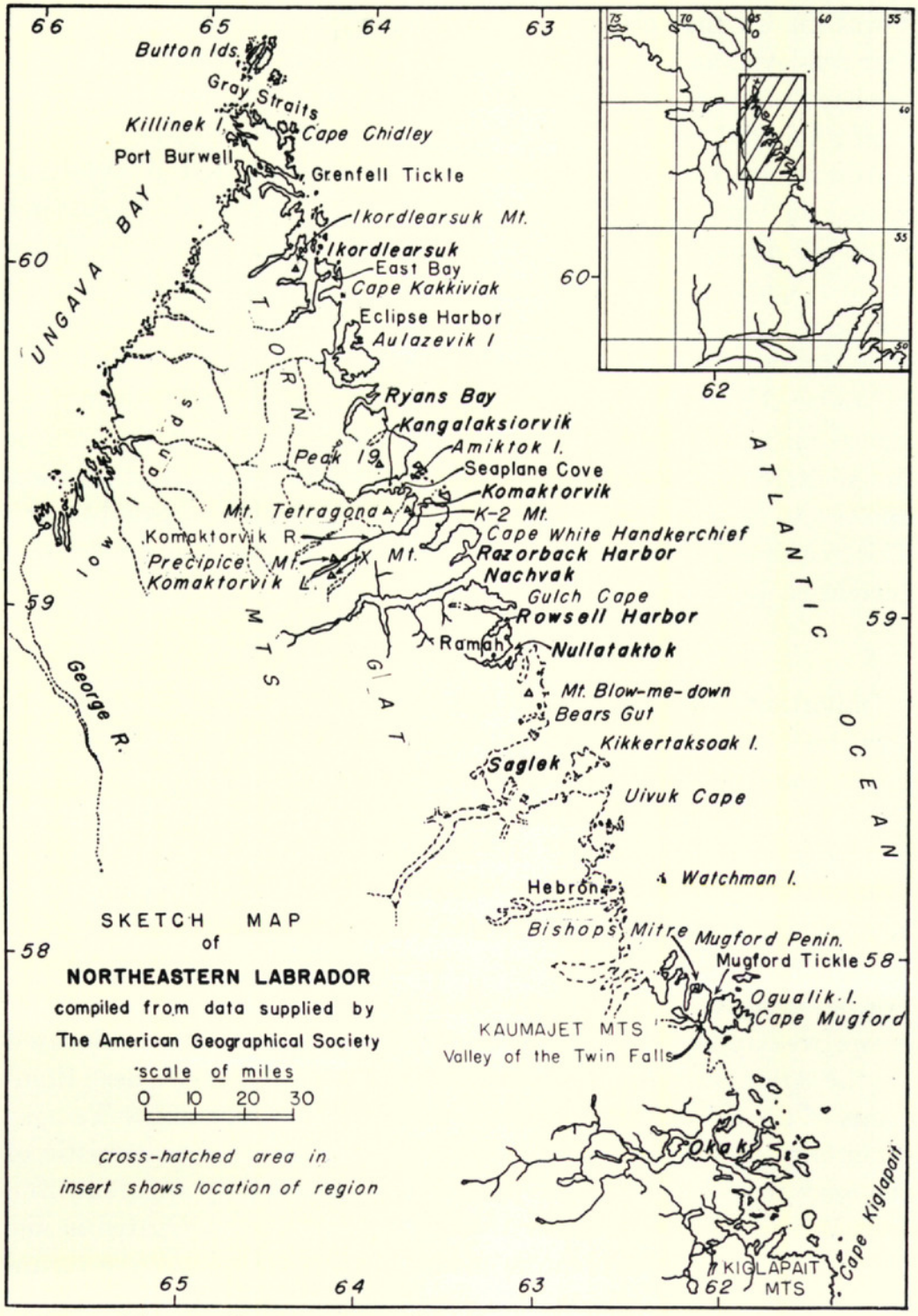


FIG. 1. MAP OF NORTHEASTERN LABRADOR COMPILED FROM DATA SUPPLIED BY THE AMERICAN GEOGRAPHICAL SOCIETY.

Coast from Button Islands to Nachvak based on a more complete Map by O. M. MILLER at THE AMERICAN GEOGRAPHICAL SOCIETY from data obtained on the Expedition; Nachvak based on preliminary survey of R. A. DALY with corrections by A. P. COLEMAN; south of Nachvak to Okak from sketches of W. T. GRENFELL and others; Okak Region from surveys of E. P. WHEELER, 2d.

it was known that occasional "cordilleran" types occur at localities near sea-level, and it was to be expected that even more might have persisted on or near the mountain tops. On the mountains investigated, this did not prove to be the case. Without going into the matter in further detail at this point it appears that if nunataks existed in northeastern Labrador and were capable of supporting plant life during the height of the last glaciation, they were similar in their sparse flora to the contemporary coastal nunataks of more northern Greenland rather than to the unglaciated Gulf of St. Lawrence areas. The presence of "cordilleran" species in northeastern Labrador thus calls for some other explanation, either by their post-glacial migration or by their persistence in place at low altitudes in the sheltered fiords, *below* the level of the ice. The latter solution appears to be the more reasonable by analogy with Greenland today. This requires further explanation which is reserved until after the current geological theories have been reviewed.

Geology of Northeastern Labrador

Important as a background for the consideration of the flora of northeastern Labrador, especially that of the higher elevations, is the geology and physiography of the region. For the purposes of this article, northeastern Labrador may be considered as that part of the Labrador peninsula north of latitude 57° 30′ and east of Ungava Bay (see map, fig. 1). This includes two major mountain groups, the Kaumajet mountains of the Mugford region, and north of Saglek the various ranges of the Torngat mountains. The western part of northeastern Labrador is an undulating lowland. Fundamentally the entire area appears to be a rolling peneplain which has been elevated on the Atlantic side and depressed on the Ungava Bay side. Remnants of the old land surface are everywhere apparent in the Torngat mountains and often form the restricted flat areas characteristic of the very tops of many of the peaks. This is strikingly apparent from the air, as I had opportunity to observe when I participated in the photographic flight of the afternoon of August third. In the mountains, frost action, erosion, and the activity of ice, both as major factors in shaping the fjords and larger valleys and as minor ones in producing the small hanging valleys, have all had a profound effect on the old land-surface.

That glacial activity was responsible for some of the land-forms in

northeastern Labrador has been recognized ever since the early observations of Lieber[1] in 1860. Since that time several geologists including Daly,[2] Coleman[3] and more recently Odell[4] have intensively investigated the geology of the region. But as yet there is increasing difference of opinion in the interpretation of the interplay of forces responsible for the broken topography of the mountains.

The observations of Lieber were limited by the circumstances attendant on an attempt to do geological work on an expedition whose primary purpose was quite different. Furthermore his conclusions were affected by the fact that in the 1860's the interpretation of glacial phenomena was still in the early phase of development when past glaciations were considered in the light of the known behavior of the mountain glaciers of Europe. However as time passed, geologists took the opportunity to study the great continental glaciers, such as those of Spitzbergen and Greenland with the result that major changes occurred in the interpretation of some of the basic phenomena of glaciation. It is, therefore, to the observations of the later geologists that we should turn our attention rather than to those of Lieber and his period. First among these later geologists we should consider Daly, whose masterly work in the Nachvak region in 1900 led him to the conclusion that a general glaciation had not reached above the 1600 to 2100 foot contour in the mountains on the north side of Nachvak. This conclusion was based on the absence of erratics or of *roches moutonnées* above that level and the presence of a more or less continuous *Felsenmeer* composed of deeply weathered and sharp-angled rocks above this level. Daly concludes that the glacial phenomena which he observed could be attributed to the passage of tongues of the major ice-mass of the Labrador glacier through the valleys of the Torngat.

The next major analysis of glacial phenomena was made by Coleman in the seasons of 1915–16, in the Nachvak and Kangalaksiorvik[5] regions. His observations confirmed those of Daly and he also con-

[1] Lieber, O. M. Notes on the Geology of the Coast of Labrador, U. S. Coast Survey Rept. 1860. App. no. 42, 1–7 (1860).

[2] Daly, R. A. The Geology of the Northeast Coast of Labrador. Bull. Mus. Comp. Zool., Harvard Univ., xxxviii. 205–270 (1902).

[3] Coleman, A. P. Northeastern Part of Labrador and New Quebec. Can. Dep. Mines, Geol. Surv. Mem. 124. 1–68 (1921).

[4] Odell, N. E. The Mountains of Northern Labrador. Geog. Jour., lxxxii. 193–210, 315–325 (1933).

[5] Because of a misidentification he refers to Kangalaksiorvik as "Komaktorvik" in his report.

cluded that glaciation in that region of Labrador did not extend above approximately the 2100 foot contour. But he attributed the glaciation to valley glaciers rather than to lobes of the major Labradorean ice-sheet.

Most recently, the researches of Odell, primarily in the coast and central ranges of the Torngat and in the Kaumajet, have led him to conclude that the Labradorean ice-sheet not only reached the Atlantic through the transverse valleys of the Torngats, but that it also completely inundated the Torngat and Kaumajet ranges. His evidence is the occurrence of ice-polishing at practically the summit of the highest peak of the Central Range of the Torngats and *moutonnée* surfaces on one of the highest summits of the Kaumajets. The presence of rounded summits with a covering of rock debris[1] he attributes in a large part to post-glacial weathering[2] which from his observations in the much more recently glaciated mountains of Spitzbergen is quite capable of producing such a condition. Especially would this seem to be the case since the mountain tops of the coastal ranges would have been free of the continental ice for a much longer period of time than were the lower elevations and consequently would have weathered much more than the lower ice-protected surfaces. Also during this period of ice-recession, weathering processes were doubtless even more severe in their action than they are today, and all the geologists who have observed conditions today attest to the violence of even contemporary weathering in northeastern Labrador.

It is beyond the province of this paper to go into further detail concerning the technicalities and interpretation of the glacial phenomena of the region, but it is evident that there are two distinct schools of thought among geologists in their interpretation of its glacial history.

The structural geology of the region has been described in some detail by various geologists, such as Low, Coleman, Daly, Bell, Lieber, and Odell. An excellent review of earlier work is given by Coleman (l. c.). In order to provide an idea of the geological formations at the major centers of botanical collecting on this expedition, the following

[1] Excellent photographs of this condition are given by Odell (l. c., opp. p. 318), by Coleman (l. c., Pl. VIA), and by Delabarre (Bull. Geogr. Soc. Phila., iii.) opp. p. 168 (1902).

[2] That a mantle of this type could even persist at higher levels through a glaciation has been brought out by Hobbs, W. H. The Glaciers of Mountain and Continent. Science, n. s. lxxix. 419–422 (1934).

summary is given, largely based on data very kindly supplied by Mr. Odell.[1]

(Kaumajet Mountains)

The greater part of the Kaumajets is of basic volcanic rock: diabase, basalt, ash, with some peridotite and serpentine (the latter in the Valley of the Twin Falls). The upper part of the Bishop's Mitre has trachytic tuff which is more acid than the magnesium- and calcium-rich silicates of the basement series, which are chiefly granite-gneisses. But between the latter and the volcanics occur in most places, as far as known, about forty to fifty feet of clay-slate of sedimentary origin. It would seem that Daly's Ramah series, extending from Saglek Bay to Nachvak and consisting of slates, quartzites and dolomites, may be the northward continuation of the Mugford slate, but this requires further proof. At most, the Mugford slate attains an elevation of five hundred feet above sea-level in the Mugford region. Its possible northward continuation outcrops at Ramah and Rowsell Harbor. Delabarre mentions a great deal of slate, sandstone, and conglomerate as occurring from about seven miles north of Saglek and reaching beyond Ramah for at least four or five miles. In accordance with these observations, Coleman's map of the "northeastern portion of Labrador and New Quebec" (l. c.) shows the Ramah series as extending directly to the eastern part of the south shore of Nachvak. Thus, a portion of the formation characterizing the Kaumajet region extends locally north into the Torngat region of predominantly Archean formations.

(Torngat Mountains)

Kangalaksiorvik, Tetragona, and *The Four Peaks.* The rocks here are garnet granulite, and garnet pyroxene-gneiss with much intrusive aplite and pegmatite, and diabase in dike form. There are also dikes of the rather uncommon hypersthene-gneiss near the "K" river and in the "K" range. The predominating formations of Mt. Tetragona itself are pyroxenite and amphibolite with the garnet pyroxene-gneiss.

Komaktorvik Lake Region. This is predominantly quartz-garnet granulite, with hypersthene-granulite at the summit of "X" peak.

Ikordlearsuk Region. On the east side of the fiord occur hornblende-gneiss and intrusive amphibolite; on the west side, garnet and hornblende and biotite-gneisses and schists. The highest summit of Ikordlearsuk Mt. is garnet biotite-gneiss.

[1] In lit.

The great contrast between the Kaumajet Mountains of the Mugford region and the Torngat Mountains is in the basic, volcanic or sedimentary rocks of the former, underlain by the acid, highly siliceous, metamorphic rocks characterizing the latter.

Botanical Work in Northeastern Labrador

a. Earlier Collections

In contrast to the rather late start made in the middle of the nineteenth century in systematic investigation of the geology of northeastern Labrador stands the pioneer botanical collecting started early in the eighteenth century by the Moravian missionaries. So much progress had been made by 1830 that Meyer[1] was able to publish his remarkably complete flora of the east coast of Labrador. In it he lists 169 different vascular plants from Labrador many of which were collected in the vicinity of the Moravian missions at Okak and Nain, by the resident missionaries. These collections were apparently made with the idea of eking out the slender funds of the "Unitas Fratrum" by their sale, especially in central Europe They were accordingly sent to the central offices of the Mission in Germany from which they were distributed. An excellent account of the early activities of these Moravian missionaries as plant-collectors is given by M. P. Porsild.[2] The botanical tradition established and carried on by such Moravian brethren as Hertzberg, Weiz, and Stecker is today ably maintained by the Rev. P. Hettasch who is an excellent collector and has contributed to the Royal Herbarium of Kew. It was a real privilege to have had the opportunity of seeing his rock-garden of native plants at Nain, and to have seen his herbarium representative of the local flora. In addition to the numerous collections made by the Moravian missionaries in the last hundred and fifty years, there have been collections made by occasional visitors to the east coast of Labrador, notable among whom are Sornborger,[3] Low,[4] Delabarre,[5] Woodworth,[6]

[1] Meyer, Ernst. De Plantis Labradoricis. Lipsiae (1830).

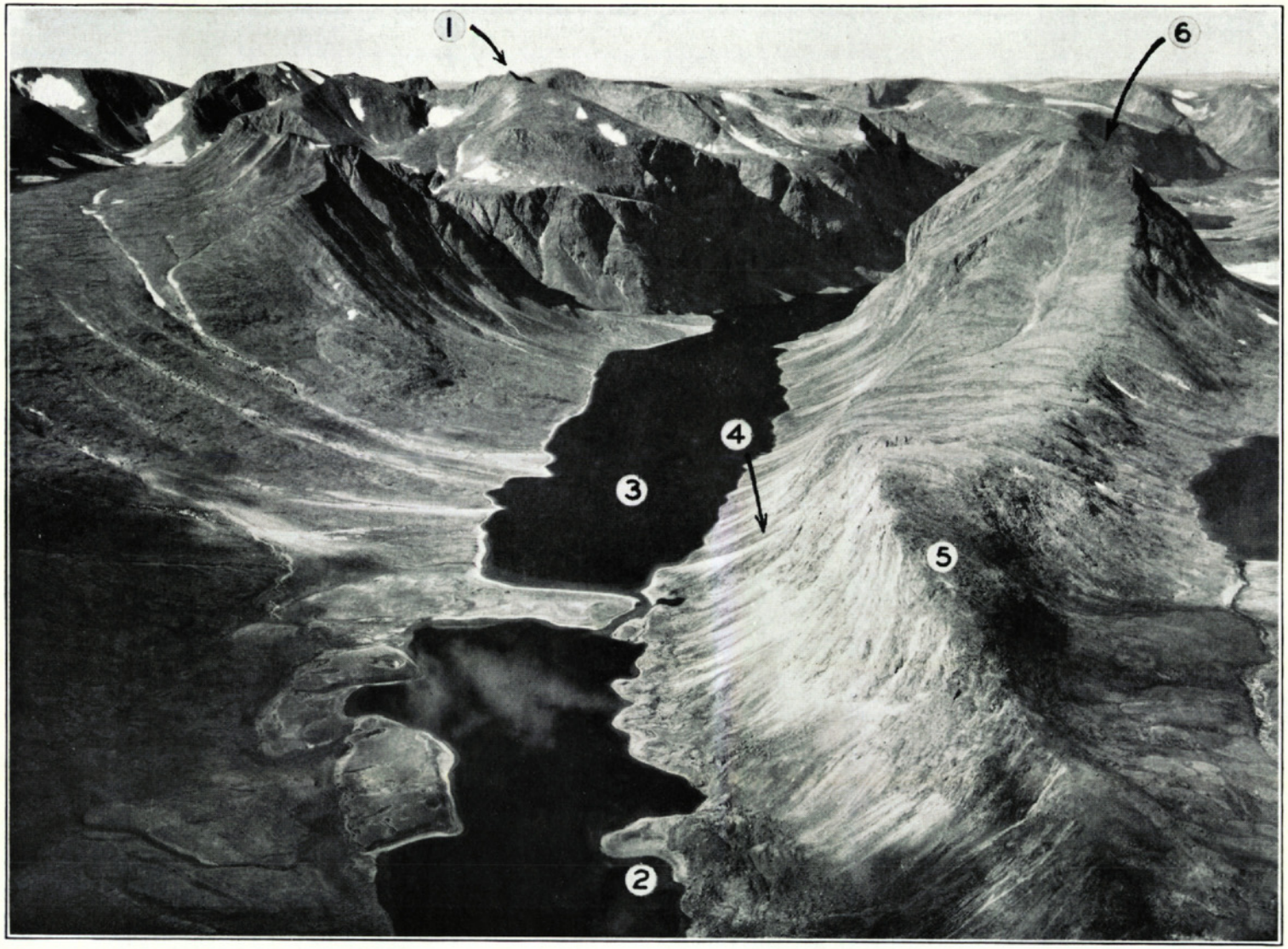
[2] Porsild, M. P. On some Herbaria from Greenland and Labrador collected by the Moravian Brethren. Meddel. om Grønl., xciii. no. 3, 84–94 (1935).

[3] Fernald, M. L. and Sornborger, J. D. Some recent Additions to the Labrador Flora. Ottawa Naturalist, xiii. 89–107 (1899).

[4] Low, A. P. Report on explorations in the Labrador Peninsula. Geolog. Surv. Can., pt. L, Ann. Rept., n. s., viii. 1–43 (1896).

[5] Delabarre, E. B. Report of the Brown-Harvard Expedition to Nachvak, Labrador in the year 1900. Bull. Geogr. Soc. Phila., iii. 65–212 (1902).

[6] Woodworth, R. H. Interesting Plants of Northern Labrador. Rhodora, xxix. 54–57 (1927).



Aerial View of Komaktorvik Lake from the East, 1931 (*courtesy of* Professor Alexander Forbes and The American Geographical Society). Fig. 1, X Peak; fig. 2, the Camp Site; fig. 3. Komaktorvik Lake; fig. 4, Scree Slide from Precipice Ridge to the Lake; fig. 5, Precipice Ridge; fig. 6, Precipice Mountain.

Bishop,[1] and Wetmore.[2] Of these, only Delabarre appears to have collected from higher altitudes, primarily on Mt. Faunce north of Nachvak. In general, then, the flora of the east coast of Labrador at the lower elevations is by no means poorly known while that of the mountains has just barely been sampled. The significant phytogeographical features provided by the flora as then known are given by Professor Fernald in his memoir[3] on the persistence of plants in the unglaciated regions of North America.

B. General Objectives and Itinerary

It was with the idea of obtaining significant and representative plant-material especially from the higher altitudes in the Torngat and Kaumajet mountains that I represented the Gray Herbarium as botanist on the Grenfell-Forbes Expedition. Fortunately the summer of 1931 was unusually open, with but little snow even near the tops of the mountains (see Plates 408, 409, 411). Judging from the accounts of other expeditions to northeastern Labrador it is doubtless the occasional summer snow storms on the mountains which discouraged extensive collecting from them. In addition, the tradition had become well established that the mountains of northeastern Labrador are very high and difficult to climb.[4] This is by no means the case, as the writer found under the skilful guidance of Mr. Odell.

While intensive collecting from the higher elevations was kept in view as the main objective, collections were made elsewhere as opportunity arose, with especial emphasis on the *Gramineae*, *Carex*, *Salix* *Draba*, *Arnica*, *Antennaria*, and *Taraxacum*.

The botanical collecting was done on thirty different days between June 28th and August 30th, although these were not always full collecting days, since the exigencies of travel often left for botanizing only the short time between making harbor and dusk. More time was available at the main centers of collecting which were at Ikordlearsuk, Kangalaksiorvik (Plate 408), Komaktorvik (Plate 408), Komaktorvik Lake (Plate 409), and the Mugford region (Plates 410 and 411). General descriptions of the course of the expedition have

[1] Bishop, H. The Austin Collection from the Labrador Coast. Rhodora, xxxii. 59–62 (1930).

[2] Wetmore, R. H. Plants of Labrador. Rhodora, xxv. 4–12 (1923).

[3] Fernald, M. L. Persistence of Plants in Unglaciated Areas of Boreal America. Memoirs of the Gray Herbarium of Harvard University. II. (1925).

[4] Bent, A. H. The Unexplored Mountains of North America. Geogr. Rev., vii. 403. (1919).

Locality	Date		Latitude	
			°	′
Ikordlearsuk Mountain		Aug. 14	60	02
East Bay, Ikordlearsuk ("Ekortiarsuk")	Aug. 12		59	59
Ryan's Bay	Aug. 10		59	35*
"Peak 19, The Four Peaks"	Aug. 4		59	28
"Near Island" (Amiktok Island), Seven Islands Bay, Kangalaksiorvik (11, Pl. 408)	Aug. 6		59	25
North Shore of Kangalaksiorvik[1]	Aug. 4		59	24
South Shore of Kangalaksiorvik (Seaplane Cove) (8, Pl. 408)	Aug. 6 July 22	Aug. 16	59	23
"Valley of the Bryant Lakes," Kangalaksiorvik (9, Pl. 408)		Aug. 16	59	21
Mount Tetragona (7, Pl. 408)	July 26		59	19
"K-2 Mountain," north shore of Komaktorvik (2, Pl. 408)	July 24		59	18
"Valley of the K River" (3, Pl. 408)	July 22, 24		59	18
Valley of the Komaktorvik River (4, Pl. 408)	Aug. 1		59	14
Razorback Harbor		Aug. 17	59	12
"Precipice Ridge" (5, Pl. 409)	July 29		59	11
"Precipice Mountain" (6, Pl. 409)	July 29		59	10
Komaktorvik Lake (3, Pl. 409)	July 30		59	10
"X Peak" (1, Pl. 409)	July 30		59	08
Nachvak		Aug. 18	59	05
Rowsell Harbor	July 20		58	58
Kikkertaksoak Island, Saglek Bay		Aug. 19	58	34
The Bishop's Mitre (3 and 4, Pl. 411)		Aug. 21	57	36
Ogualik Island (5, Pl. 410, and 2, Pl. 411)		Aug. 21	57	56*
"Valley of the Twin Falls," Cape Mugford (4, Pl. 410)	July 17		57	50*
Nain		Aug. 23	56	33*
Kikkivitak Island, Ittekaut Bay		Aug. 24	56	21*
Hopedale	July 13		55	26
Aillik	July 10		55	09
Indian Harbor	July 8		54	25
Gready Island	July 5, 6		53	48*
Hawkes Island	July 4		53	05
Battle Harbor	July 3	Aug. 30	52	19
St. Anthony, Newfoundland	June 30 July 1		51	21
Keppel Island, Ingornachoix Bay, Newfoundland	June 28		50	40*

Names in quotation-marks are provisional for localities otherwise lacking accepted designations.

Latitudes, unless marked (*), have been checked through the kindness of Mr. O. M. Miller of the American Geographical Society and supersede the latitudes given on the plant-labels, where these differ.

been given by Dr. Forbes elsewhere,[2] but since the activities of the various members of the expedition were often diverse, the preceding

[1] Kangalaksiorvik is the Komaktorvik of Coleman (l. c.).

[2] Forbes, A. Surveying in Northern Labrador. Geogr. Rev., xxii. 30–60 (1932).

———. An aerial Survey in Northern Labrador. Harvard Alumni Bulletin, 917–923 (1932).

———. A Northern Labrador Cruise. Yachting, liii., nos. for March, April and May (1933).

schedule has been prepared to indicate the dates when collections were made at the different stations, and the latitudes of these stations. By reading up the left-hand column of dates and down the right-hand column a general idea of the itinerary may be gained. The arrangement of the stations in a linear succession from north to south has thrown the dates out of the order because of the trip made inland to Komaktorvik Lake late in July.

c. General Considerations concerning the Flora of Northeastern Labrador

Excellent general descriptions of the flora of northeastern Labrador are to be found in the works of Delabarre,[1] Low,[2] Coleman,[3] and others. As pointed out by Macoun and Malte,[4] the northern part of Labrador is in the Arctic zone of Canada. The southern extent of this zone in northeastern Labrador is determined by tree-line, and, as Low (l. c., p. 30) describes it from his personal observations, this extends from about the mouth of the George River on Ungava Bay turning south-southeast just west of the Torngats and runs more or less parallel to the east coast of Labrador to about Hebron where trees first appear near the coast. Really continuous forest does not come out to the coast until much farther south.[5] An opportunity to check on the northern limit of trees near the mouth of the George River was afforded when I accompanied the photographic party on a flight from Kangalaksiorvik south to Nachvak, thence west to the mouth of the George River, north along the shore of Ungava Bay to the Button Islands, and south over the Torngats back to the base at Kangalaksiorvik. On the leg of this flight extending from Nachvak to the mouth of the George River especial watch was kept for any evidence of trees. From the altitude (about 5,000 to 6,000 feet) at which the flight was made, the most striking feature, because of its rarity, was the occurrence of any color other than the gray of the apparently bare land-surface or the blue of the numerous lakes Two general shades of green stood out in this way. Much restricted areas of a yellowish

[1] Delabarre, l. c., p. 167–206; see also Delabarre's chapter on the Flora of Labrador in Grenfell, W. Labrador. New York (1913).

[2] Low, A. P. l. c.

[3] Coleman, A. P., l. c. p. 16–18.

[4] Macoun, J. M. and Malte, M. O. The Flora of Canada. Can. Dept. Mines, Geol. Surv. Museum Bull, no. 26 (1917).

[5] For a description of the wooded conditions near Nain see: Wheeler, E. P., 2nd. Journeys about Nain. Geogr. Rev. xx. 454–468 (1930).

green characterized the heads of the larger lakes in the central range of the Torngats, which experience on the ground indicated was due to grassy, meadow-like areas with occasional willow and alder thickets. But in the rolling hills of the lowland west of the Torngats this yellow-green gave way to a blue-green in the moist, protected heads of lakes. This color may well be interpreted as representing restricted groves of conifers (presumably larch and spruce), especially since the only shadows (other than those caused by the mountains) which were noted on the flight were cast by scattered individuals at margins of such "groves." This substantiates Low's observations. It would seem that the tree line[1] comes a few miles north of the mouth of the George River in the rolling lowlands west of the Torngats. It is then deflected south at least as far as Nachvak in the central range of the Torngats.

From the air there was no evidence of vegetation other than at the heads of lakes. The predominant colors were varying shades of darker gray where the snow had been absent for longer periods of time, and a harsh, light gray where the snow or ice had just recently melted (as indicated by the presence of snow-banks immediately adjacent to many such areas). Closer investigation had already shown that these harsh, light gray areas were generally devoid of vegetation, since apparently they were exposed only when the summer was as *relatively* mild as during the season of 1931.

The greater part of the ice- and snow-free country (which appeared a warmer gray from the air) is covered, especially at the lower elevations, with the ubiquitous tundra, the flora of which is well known. Where the drainage is too good for vascular plants to flourish, lichens and, to a less extent, mosses thrive, while in the moister areas they form the background for the vascular plants. Wherever there is just sufficient moisture for the more hardy vascular plants to exist, an occasional *Hierochloë alpina*, *Luzula confusa* or *Cardamine bellidifolia* will manage to survive. Sometimes only one or two of such plants are to be found on the fragment of an old peneplain forming the summit of a higher mountain. The flora of these mountain tops is indicated in detail in Table I. At lower altitudes, on the ridges or upper slopes of the mountains, a richer flora appears (see Table II) but the hardy species occurring on the mountain tops are present again at these lower elevations, plus some of the fairly hardy plants from below.

[1] Or at least the northern limit of the ecotone between forest and tundra.

Similarly on talus-slopes and in gullies (see TABLE III) one finds most of the plants of the mountain tops and higher slopes, with the addition of some of the ubiquitous tundra species. Then near sea-level there is the richest flora, including most of the hardy species from higher levels plus the tundra, strand, meadow, or outwash-plain species, depending on the combination of environmental circumstances. The striking feature of the flora is the absence of a clear-cut altitudinal separation of the hardier species. The plants of the mountain tops are to be found in the proper habitats all the way practically to sea-level. Nor is this an isolated observation on the behavior of arctic plants; Raup[1] remarks on it with reference to the appearance of arctic species at river-level in the Canadian Rockies; Devold and Scholander[2] observed it in Southeast Greenland; Simmons[3] notes that altitude is of little very consequence in Ellesmereland.

An interesting sidelight on the ability of plants to survive under adverse conditions is provided by an analysis of the species growing on the margins of soil polygons. The best developed soil polygons[4] were found on Ikordlearsuk Mountain and on the upper ridge above the Valley of the Twin Falls at Cape Mugford. The polygons rarely occur singly, and more commonly are in groups, each individual crowded closely against its neighbor. The polygons are cauldron-like areas about three feet in diameter with finely comminuted country rock slowly churning about vertically under the influence of frost-action.[5] In the most active portions of these polygons, at their centers, no plants of any kind occur, but at their margins, where the rock-fragments are somewhat larger, a few hardy species of plants manage to maintain a foothold. This flora was relatively rich at the Mugford locality where the following species of plants occurred on the margins of the polygons: *Carex misandra, Salix herbacea, Salix Uva-ursi, Papaver radicatum, Arenaria sajanensis, Sagina nivalis, Cardamine bellidifolia, Draba nivalis* and *Vaccinium Vitis-Idaea* var. *minus*. At

[1] Raup, H. M. Phytogeographic Studies in the Peace and Upper Liard River Regions, Canada. Contr. Arnold Arboretum, Harvard Univ. No. VI, 63 (1934).

[2] Devold, J. and Scholander, P. F. Flowering Plants and Ferns of southeast Greenland. Skrifter om Svalbard og Ishavet. No. 56, 170 (1933).

[3] Simmons, H. G. The Vascular Plants in the Flora of Ellesmereland. Rep. Sec. Nor. Arc. Exp. "Fram" 1898–1902. No. 2, 8 (1906).

[4] For further mention of these see Odell, l. c.

[5] For a consideration of the mechanics of soil polygons see:

Huxley, J. S. and Odell, N. E. Notes on surface Markings in Spitsbergen. Geogr. Jour., lxiii. 207–229 (1924).

Elton, C. S. The Nature and Origin of Soil-polygons in Spitsbergen. Quart. Jour. Geol. Soc. London, lxxxiii. 163–194 (1927).

the much more northerly station of Ikordlearsuk, the soil polygons on the first summit (alt. ca. 2250 ft.) of Ikordlearsuk Mountain had only *Luzula confusa* and *Cardamine bellidifolia* growing very sparingly at their margins; while on the second peak (alt. ca. 2800 ft.) *Poa glauca, Luzula confusa,* and *Papaver radicatum* occurred, but no *Cardamine bellidifolia.*

Seidenfaden[1] in a study of the plants characteristic of moving soils in East Greenland found that the plants "very seldom have time and power to flower." This was not the case with plants growing on the margins of soil polygons in northeastern Labrador. In his discussion he does not distinguish clearly between areas where vertical movement of the soil predominates, as in the case of soil polygons, and areas where a horizontal motion of the soil is combined with a vertical component as the result of solifluction on slopes. It is difficult, therefore, to compare his observations on the flora of soil polygons in East Greenland with my own in Labrador, but it would appear that in East Greenland a larger number of species occur in such habitats. The general problem of plants in relation to moving soils is a phase of arctic and alpine ecology which is deserving of more attention than it has yet received.

Indicative of the major significance of water in the success of plants at higher altitudes was the presence on a narrow, barren, dry ridge leading toward the higher slopes of the Bishop's Mitre (see Pl. 411) of an exceptional and restricted, moist, mossy area not more than three feet across, with the following species covering it: *Poa glauca, Oxyria digyna, Cerastium alpinum* var. *glanduliferum, Ranunculus pygmaeus, Saxifraga rivularis.* There were numerous stunted individuals of each species closely crowded together, forming a very small segment of meadow-like appearance. It was strikingly different from the occasional widely scattered individuals composing the flora elsewhere at the higher levels and especially for this particular ridge which was otherwise as bare as a city pavement.

d. Flora of higher Elevations and Comparison with contemporary Greenland Nunataks

The results of the major object of the collecting, namely that from higher elevations, is summarized in Tables I, II, and III, the first listing plants found directly on the tops of the mountains; the second,

[1] Seidenfaden, G. Moving Soil and Vegetation in East Greenland. Meddel. Grøn., lxxxvii, no. 2, 1–21 (1931).

those growing on the higher slopes of the mountains and on the tops of the higher ridges; and the third, those of the moist slopes, gullies, or on scree (talus). Included under the heading Arctic America are stations on James Bay and the southwest coast of Hudson Bay which, strictly speaking, are not arctic.

The fact which immediately stands out is the absence of vascular plants from the tops of the two highest mountains investigated, Mt. Tetragona and "X" peak, both in the Torngats. Both of these mountains, however, have a number of lichens and some mosses growing on their tops. The balance of the mountain summits have a decidedly limited flora, the number of individual species depending partly on altitude, partly on latitude, and partly on proximity to the coast. In general the species observed fall into two groups. The first group is composed of plants of a wide arctic distribution, which extend south at least into the Gulf of St. Lawrence region. The second group consists of those arctic species which reach their southernmost limit in Labrador. The members of a very small third group are not known from western America, namely *Cassiope hypnoides*, which is otherwise of wide arctic dispersal (including arctic Eurasia) and occurs in eastern America as far south as alpine habitats of the New England mountains, and *Antennaria angustata*, which appears to be restricted to eastern arctic and subarctic America. In general, then, these plants are of wide arctic distribution. Altitudinally they are not restricted to the mountain tops, but as a consultation of the second part of this paper will show, they occur freely also at the lower levels. It is evident that it is only the hardier members of the flora which are able to survive the severe environment of the higher mountain tops which form isolated portions of the old northeastern Labrador peneplain.

On the higher mountain slopes and tops of ridges (Table II), a larger number of species exists. Many of these, as might be expected, are the same as occur on the tops of the higher mountains. The greater number of species fall into the same categories as those indicated for Table I. In addition there is a small group not known from the northern coast of the American continent west of the Melville Peninsula. These are *Cassiope hypnoides*, *Antennaria angustata* and *A. hudsonica*. Practically all the species which occur at the higher elevations in the Torngat and Kaumajet Mountains are therefore either ubiquitous arctic forms or at least occur in the Arctic of eastern America.

TABLE I

PLANTS COLLECTED ON MOUNTAIN TOPS IN NORTHEASTERN LABRADOR

Occurrence in northern part of western hemisphere[1]						Torngat Region						Kaumajet Region		
Rocky Mountains and (or) Alaska	Arctic America (incl. Hudson Bay)	Arctic Archipelago	Greenland	Gulf of St. Lawrence Region	Altitude in feet→	Ikordlearsuk Mt.—1st Summit 2250[2]	Ikordlearsuk Mt.—2nd Summit 2800	Mt. Tetragona 4420	"K-2" Mountain 2466	Precipice Mountain 3670	"X" Peak 4575	Bishop's Mitre—East Summit 3750	Bishop's Mitre—West Summit 3700	Odell's Peak west of Bishop's Mitre 3620
X	X	X	X	X	Lycopodium Selago var. appressum				X					
X	X	X	X	X	Hierochloë alpina				X					
X	X	X	X	X	Poa glauca		X			X				X
X	X	X	X	O	P. arctica				X			X		
X	X	X	X	X	Festuca brachyphylla				X					
X	X	X	X	X	Carex scirpoidea				X					
X	X	X	X	X	Luzula confusa	X	X		X	X		X	X	X
X	X	X	X	X	L. spicata				X					
X	X	X	X	O	Papaver radicatum		X						X	
X	X	X	X	X	Cardamine bellidifolia	X				X		X	X	
X	X	X	X	O	Draba fladnizensis var. heterotricha								X	
X	X	X	X	X	Saxifraga rivularis					X			X	
X	X	X	X	X	S. cernua								X	
X	X	X	X	O	Cassiope tetragona				X					
O	O	X	X	X	C. hypnoides				X					
X	X	X	X	X	Vaccinium Vitis-Idaea var. minus				X					
O	O	X	X	O	Antennaria angustata				X					
					Mosses and lichens only			X			X			

[1] For foot-notes 1 and 2 see p. 117.

The only other detailed record of the plants which occur at higher elevations is that of Delabarre. He notes the species[3] which he collected on Mt. Faunce (north of Nachvak) between 3500 feet and the top, 4400 feet, as the following: "Papaver nudicaule," "Draba fladnitzensis," "Cerastium alpinum," "Luzula confusa," "Saxifraga caespitosa," "S. rivularis," "S. nivalis," and "Sedum?". This record of a *Sedum* is questionable, and it is probable that something else was mistaken for it. Otherwise the species reported are in close agreement with these which I collected on other mountains of the region. Delabarre's description[4] of his collecting on Mt. Faunce is so felicitous that I quote portions of it, "The height here was 3,400 feet . . . Thence we went up a series of not very difficult slopes along an exceedingly narrow ridge . . . The surface was of finely broken stone. A very little scattered vegetation grew on it, and this was almost exclusively moss and lichen, with occasional individual small plants of grass and very rarely a small flowering plant. Of the latter I found not more than half a dozen varieties." And in a subse-

Foot-notes 1 and 2 from TABLE I:

[1] Errors of omission and commission are difficult to avoid in compiling a table of distribution such as this and the corresponding ones for Tables II and III. In preparing these tables the collections of the Gray Herbarium, taxonomic revisions of certain groups, and the following general works have been utilized:—

Fernald, M. L. Persistence of Plants in Unglaciated Areas of Boreal America. Mem. Gray Herb. of Harvard Univ. II. (1925), repr. from Mem. Amer. Acad. Arts and Sci., xv. 239–342 (1925); also numerous taxonomic revisions and phytogeographical papers appearing in RHODORA by the same author.

Holm, Theo. Contributions to the Morphology, Synonymy and Geographical Distribution of Arctic Plants. Report of the Can. Arct. Exp., 1913–18. v. pt. B. (1922).

Lewis, H. F. An annotated List of Vascular Plants collected on the North Shore of the Gulf of St. Lawrence. Can. Nat. xlv. 129–135, 174–179, 199–204, 225–228; xlvi. 12–18, 36–40, 64–66, 89–95 (1931 and 1932).

Ostenfeld, C. H. The Flora of Greenland and its Origin. Kgl. Danske Vidensk. Selsk., Biol. Medd. vi, no. 3 (1926).

Raup, H. M. Phytogeographic Studies in the Peace and Upper Liard River Regions, Canada. Contr. Arnold Arb. Harvard Univ. no. VI, 1–230 (1934).

Simmons, H. G. Vascular Plants of Ellesmereland. Second Arct. Exp. "Fram," 1898–1902, no. 2 (1906); and also his Phytogeography of the Arctic American Archipelago. Lunds Univ. Arsskr. N. F. pt. 2, ix, no. 19 (1913).

[2] Barometrically determined altitude. The other altitudes are based on the survey conducted in the course of the season of 1931 by Mr. O. M. Miller of the American Geographical Society, and were kindly furnished by him.

[3] In the list of plants which he gives in his Report of the Brown-Harvard Expedition to Nachvak, Labrador 1900, Bull. Geogr. Soc. Phila., iii. 177 et seq. (1902), the nomenclature of the species from Mt. Faunce is not very sure. However in his chapter on the plants of Labrador in Grenfell, W. T., Labrador, New York (1913), page 412, he seems to understand the species somewhat more clearly, and it is primarily from the latter that the species are quoted.

[4] l. c.

TABLE II

PLANTS COLLECTED ON MOUNTAIN SLOPES AND ON THE TOPS OF RIDGES IN NORTHEASTERN LABRADOR

Occurrence in northern part of western hemisphere[1]						Torngat Region							Kaumajet Region			
Rocky Mountains and (or) Alaska	Arctic America incl. Hudson Bay	Arctic Archipelago	Greenland	Gulf of St. Lawrence Region		Ridge S. of East Bay, Ikordlearsuk	Tetragona, spur on S. W. side	"K-2"—near the summit	"K-2"—lower slopes	Precipice Mt.—N. E. shoulder	Precipice Ridge	Razorback Harbor, ridge on N. side	Bishop's Mitre—upper slopes	Bishop's Mitre—ridge leading to upper slopes	Mugford peninsula—upper ridge	Mugford peninsula—lower ridge
					Approximate altitude in feet→	1720	3500	2000	1500	3000	1910	2000	3500	2750	2500	1800
X	X	X	X	X	Lycopodium Selago var. appressum	X										
X	X	X	X	X	Hierochloë alpina	X					X	X				
X	X	X	X	O	Phippsia algida				X							
X	X	(X)[2]	X	X	Trisetum spicatum var. Maidenii									X		
X	X	X	X	X	Poa alpina								X			
X	X	X	X	X	P. glauca		X					X		X		
X	X	X	X	X	Festuca brachyphylla							X				
X	X	X	X	X	Carex capillaris			X								
X	X	X	X	O	C. misandra								X			X
X	X	X	X	X	C. concolor	X					X	X				
X	X	X	X	X	Luzula confusa	X					X	X			X	
X	X	X	X	X	L. spicata							X				
X	X	O	O	X	Salix vestita								X			
O	X	X	X	X	S. Uva-ursi						X				X	
O	X	X	X	X	S. herbacea										X	

TABLE II—*Continued*

PLANTS COLLECTED ON MOUNTAIN SLOPES AND ON THE TOPS OF RIDGES IN NORTHEASTERN LABRADOR

Occurrence in northern part of western hemisphere[1]						Torngat Region							Kaumajet Region			
Rocky Mountains and (or) Alaska	Arctic America incl. Hudson Bay	Arctic Archipelago	Greenland	Gulf of St. Lawrence Region	Approximate altitude in feet→	Ridge S. of East Bay, Ikordlearsuk	Tetragona, spur on S. W. side	"K-2"—near the summit	"K-2"—lower slopes	Precipice Mt.—N. E. shoulder	Precipice Ridge	Razorback Harbor, ridge on N. side	Bishop's Mitre—upper slopes	Bishop's Mitre—ridge leading to upper slopes	Mugford peninsula—upper ridge	Mugford peninsula—lower ridge
						1720	3500	2000	1500	3000	1910	2000	3500	2750	2500	1800
X	X	X	X	(X)	Salix anglorum								X			
X	X	X	X	X	Oxyria digyna									X		
X	X	X	X	X	Silene acaulis var. exscapa			X								
X	X	X	X	O	Lychnis furcata			X								
O	X	X	X	X	Cerastium alpinum var. glanduliferum							X		X		
O	X	O	X	X	C. alpinum var. lanatum					X						
X	X	X	X	X	Arenaria verna var. pubescens								X			
X	X	X	X	X	Arenaria sajanensis							X	X		X	X
O	X	X	X	X	Sagina nivalis										X	
X	X	X	X	X	Ranunculus pygmaeus	X	X							X		
X	X	X	X	O	Papaver radicatum				X						X	X
X	X	X	X	X	Cardamine bellidifolia				X			X			X	
X	X	X	X	O	Draba fladnizensis var. heterotricha		X		X			X	X			
O	O	O	X	X	D. rupestris		X						X		X	
X	X	X	X	X	D. nivalis		X								X	
X	X	X	X	O	Arabis arenicola		X		X				X			

Table II—*Continued*

Plants collected on Mountain Slopes and on the Tops of Ridges in Northeastern Labrador

Occurrence in northern part of western hemisphere[1]						Torngat Region							Kaumajet Region			
Rocky Mountains and (or) Alaska	Arctic America incl. Hudson Bay	Arctic Archipelago	Greenland	Gulf of St. Lawrence Region		Ridge S. of East Bay, Ikordlearsuk	Tetragona, spur on S. W. side	"K-2"—near the summit	"K-2"—lower slopes	Precipice Mt.—N. E. shoulder	Precipice Ridge	Razorback Harbor, ridge on N. side	Bishop's Mitre—upper slopes	Bishop's Mitre—ridge leading to upper slopes	Mugford peninsula—upper ridge	Mugford peninsula—lower ridge
					Approximate altitude in feet→	1720	3500	2000	1500	3000	1910	2000	3500	2750	2500	1800
X	X	X	X	X	Saxifraga rivularis									X		X
X	X	X	X	X	S. cernua								X			
X	X	X	X	X	S. caespitosa	X	X							X		
X	X	X	X	O	S. nivalis		X									
X	X	X	X	X	S. oppositifolia			X					X			
X	X	X	X	X	Dryas integrifolia											X
O	O	X	X	X	Cassiope hypnoides											X
X	X	X	X	X	Vaccinium Vitis-Idaea var. minus						X					
(X)[2]	X	X	X	X	Campanula rotundifolia							X				
X	X	X	X	O	Erigeron unalaschkensis								X			
O	X	X	O	O	Antennaria hudsonica	X										
O	X	X	X	O	A. labradorica (?)					X						
O	O	X	X	O	A. angustata		X					X				
X	X	X	X	X	Taraxacum lacerum							X				
X	X	X	O	X	Crepis nana											X

[1] See corresponding footnote to Table I.

[2] Parentheses indicate that the species *in sensu lato* is known from the region represented by the column.

quent paragraph he says: "The material of the mountain is the same as that of which most of Labrador is formed: mainly hornblende gneiss, cut here and there by dykes of darker trap. The summit is of almost knife-like sharpness and very jagged." (This is often the case but not universal in the Torngat Mountains.) "It is nearly level for about a hundred yards . . . and goes down by a series of steps to the valley." The level top referred to is doubtless a portion of the old peneplain.

The vegetation of the present-day nunataks and mountains of Greenland presents a significant yard-stick for the appraisal of the plants growing at higher levels in northeastern Labrador. Before considering the flora of nunataks it is well to have in mind a clear idea of what is meant by the term nunatak. Among geologists it is considered to be a hill or mountain surrounded by an ice-sheet. This necessitates that it be of relatively restricted area; that it be *above* the ice and thus exposed to the winds and storms sweeping across the ice-fields; and being *above* the ice, that the available water supply be very slight since all melt-water from the ice below is unavailable to it; inherent in its nature as a hill or a mountain top, it would have excellent drainage. All these factors combine to provide an area which ecologically is unfavorable for any but the hardiest plants, because of the sterile and well-drained nature of the soil, and because such a locality partakes of the rigorous climate of the ice-cap.

In Greenland, Böcher[1] mentions as the only plant which he found on a nunatak at Kangerdlugssuak (East Greenland, lat. about 68° N.) *Papaver radicatum*. At Cape Deichman (East Greenland, lat. about 68° N.) he found the following plants on a nunatak, "*Salix arctophila* × *glauca, S. herbacea, Empetrum, Vaccinium, Oxyria, Polygonum, Cerastium alpinum, Silene acaulis, Ranunculus glacialis, Saxifraga oppositifolia, Poa glauca,* and *Luzula confusa.*"

Devold and Scholander[2] note the following species on a rocky plateau, The Brandalfjaell, at Kangerdlugssuak (altitude of about 3476 feet): *Luzula confusa, Papaver radicatum, Silene acaulis, Saxifraga rivularis,* and *Poa glauca;* with the following, in addition, at the margin of the plateau: *Hierochloë, Poa arctica, Luzula spicata, Potentilla emarginata, Phippsia algida,* and *Empetrum.* On Møretind (alt.

[1] Böcher, T. W. Studies on the Vegetation of the East Coast of Greenland between Scoresby Sound and Angmagssalik. Medd. Grønl. civ, no. 4 (1933).

[2] Devold, J. and Scholander, P. F. Flowering Plants and Ferns of Southeast Greenland. Skrifter on Svalbard og Ishavet, no. 56 (1933).

about 3936 ft., lat. about 60° 30′ N., in Southeast Greenland) they found *Lycopodium Selago, Cardamine bellidifolia, Silene acaulis, Salix herbacea, Cassiope hypnoides, Antennaria "alpina," Juncus trifidus, Luzula confusa, Luzula spicata, Carex concolor (C. rigida), Agrostis borealis.* The authors note that these are all (except *Cardamine bellidifolia* and *Luzula confusa*) species of lower elevations in that part of Greenland, a striking parallel to conditions in northeastern Labrador, where, however, even *Cardamine bellidifolia* and *Luzula confusa* are present in the lowlands.

Ostenfeld[1] considers that of the eight species on Midgaardsorm, a nunatak at about 81° N. near the north coast of Greenland, 3 are high-arctic and the other 5 are arctic species. He describes three other nunataks in southern West Greenland (lat. about 63° N.), each with 26 or 27 species and a total flora of 54[2] species. Of these 54 species, 40 are arctic, 3 high-arctic, and only 11 subarctic and boreal. He characterizes the plants occurring on nunataks in Greenland as the hardiest part of the Greenland flora. These widely distributed "glacial species" he thinks are those most likely to have lived through the period of maximum glaciations in Greenland.

Simmons[3] (p. 142) says "the present flora of nunataks and other areas of habitable ground hardly speaks in favour of looking on the main of the Greenland flora as preserved in that way" (namely on nunataks). He goes on to say ". . . we will have to look for such possible survivors only among the high arctic and most hardy species, but these again are generally circumpolar and thus are not apt to give any evidence for or against the hypothesis of persistence." Similarly the species on the mountains of northeastern Labrador are of general arctic or subarctic occurrence. As a result they do not provide positive evidence concerning the glacial history of the mountains. If the upper slopes and tops of the mountains were ice-covered during the Wisconsin, it is these hardy, "aggressive" species which would be expected to follow the retreating ice to the summits of the mountains. On the other hand, if these mountain tops existed as nunataks during the Wisconsin, it is again these "glacial species," as

[1] Ostenfeld, C. H. The Flora of Greenland and its Origin. Kgl. Danske Vidensk. Selskab., Biol. Medd. vi, no. 3 (1926).

[2] For an idea of the flora of such nunataks in East Greenland see the list of plants collected by Bjørlykke on Nordenskiolds Nunatak, in Devold and Scholander, l. c. p. 172.

[3] Simmons, H. G. Phytogeography of the Arctic American Archipelago. Lunds Univ. Arsskr. N. F. pt. 2, ix, no. 19 (1913).

Ostenfeld calls them, which would persist the longest under such adverse environmental conditions. Thus the plants of the higher elevations are of such a character that they contribute no positive evidence toward the solution of the problem of whether the Wisconsin ice completely inundated the mountains. But there still remains the fact that plants of cordilleran affinities occur elsewhere in Labrador.

In TABLE III are listed species which occur on moist slopes, in gullies, and on scree-slopes in northern Labrador. Here again the great majority of the species represented in TABLES I and II are present. There are also some species in addition, primarily those requiring moister habitats. Also it should be noted that most of the habitats treated in this table are at relatively low elevations. Of the species mentioned in TABLE III, only *Cerastium Beeringianum* stands out as having a disrupted range, in the strictest sense of the term. Another example of this type of distribution is *Arenaria humifusa* (*A. cylindrocarpa*), which was collected during the summer of 1931, but is not listed in TABLE III because it was found practically at sea-level.

This brings us to a consideration of species characterized by disrupted ranges. Notable for this among all other species of the northeastern Labrador flora is *Carex filifolia* Nutt. which was collected in 1900 at Nachvak by Delabarre.[1] This western plant is as yet unknown elsewhere than at this station in eastern North America. It also seems to be the only species yet known from Labrador with this type of distribution. This statement requires some explanation since Professor Fernald (p. 316)[2] gives a somewhat longer list of such plants. In the ten years which have passed since the publication of his memoir, changes in taxonomic concepts and further exploration have modified our knowledge of the species which he mentions in this category. His *Draba stenoloba* is now interpreted[3] as *D. Sornborgeri* Fernald a new species endemic in Labrador. *Pedicularis groenlandica* Retz. is now known not only from northeastern Labrador and the Rocky Mountains, but also from James Bay and Port Harrison on Hudson Bay, Saskatchewan and the Athabaska drainage. *Petasites sagittata* (Pursh) Gray has been collected at James Bay and Fort Albany on Hudson Bay, and also occurs in Minnesota, Manitoba,

[1] l. c.

[2] Fernald, M. L. Persistence of Plants in Unglaciated Areas of Boreal America. Mem. Gray Herb. Harvard Univ. II (1925).

[3] Fernald, M. L. Draba in temperate northeastern America. RHODORA XXXVI. 319–321 (1934).

TABLE III

PLANTS COLLECTED ON MOIST SLOPES, IN GULLIES, AND ON SCREE-SLOPES IN NORTHEASTERN LABRADOR

Rocky Mountains and (or) Alaska	Arctic America incl. Hudson Bay	Arctic Archipelago	Greenland	Gulf of St. Lawrence Region	Approximate altitude in feet→	N. side of ridge on S. side of East Bay, Ikordlearsuk 1400	Scree on S. side of Peak 19, The Four Peaks 2750	Old scree, Valley of Bryant Lakes 200	Scree slide from Precipice Ridge 1300	Moist gully in cliff, N. side of Razorback Harbor 1900	Gully from Valley of Twin Falls to lower ridge, Mugford, Peninsula 1400
X	X	X	X	X	Woodsia ilvensis			X		X	X
X	X	X	X	X	W. glabella						X
X	X	X	X	X	Cystopteris fragilis			X			X
X	X	X	X	X	Agrostis borealis				X		
X	X	(X)[1]	X	X	Trisetum spicatum var. Maidenii					X	
(X)	(X)	(X)	(X)	X	T. spicatum var. pilosiglume				X		
X	X	X	X	X	Poa glauca				X		
X	X	O	X	X	P. alpigena				X		
X	X	X	X	X	Festuca brachyphylla				X		
X	X	X	X	X	Carex bipartita		X				
X	X	X	X	X	C. scirpoidea					X	
X	X	X	X	X	Luzula spicata				X		
X	O	O	X	X	L. campestris var. frigida					X	
X	X	X	X	X	Tofieldia minima						X
X	(X)	(X)	(X)	X	Salix anglorum var. araioclada		X				
X	X	X	X	X	Oxyria digyna						X
X	X	X	X	O	Lychnis furcata	X		X			
O	O	O	X	X	L. alpina					X	
X	O	O	O	X	Cerastium Beeringianum					X	
O	O	O	X	X	Cerastium cerastioides				X	X	
X	X	X	X	X	Arenaria verna var. pubescens		X				
X	X	X	X	X	A. sajanensis	X					
O	X	X	X	O	Ranunculus nivalis	X					

[1] Parentheses indicate that the species *in sensu lato* is known from the region represented by the column.

TABLE III—*Continued*

PLANTS COLLECTED ON MOIST SLOPES, IN GULLIES, AND ON SCREE-SLOPES IN NORTHEASTERN LABRADOR

Rocky Mountains and (or) Alaska	Arctic America incl. Hudson Bay	Arctic Archipelago	Greenland	Gulf of St. Lawrence Region	Approximate altitude in feet→	N. side of ridge on S. side of East Bay, Ikordlearsuk 1400	Scree on S. side of Peak 19, The Four Peaks 2750	Old scree, Valley of Bryant Lakes 200	Scree slide from Precipice Ridge 1300	Moist gully in cliff, N. side of Razorback Harbor 1900	Gully from Valley of Twin Falls to lower ridge, Mugford, Peninsula 1400
X	X	X	X	X	Cardamine bellidifolia	X	X				
X	X	X	X	O	Draba fladnizensis var. heterotricha	X			X		
X	X	X	X	X	D. nivalis			X			
X	X	X	X	O	Arabis arenicola						X
O	X	X	X	X	A. alpina						X
X	X	X	X	X	Saxifraga rivularis	X					
X	X	X	X	X	S. cernua		X				X
X	X	X	X	X	S. caespitosa						X
X	X	X	X	X	S. stellaris var. comosa	X					
X	X	X	X	O	S. nivalis	X	X				
X	X	X	X	X	S. aizoides					X	
X	X	X	X	O	S. tricuspidata					X	
X	X	X	X	X	S. oppositifolia						X
X	X	O	X	X	Parnassia Kotzebuei						X
X	X	X	X	X	Potentilla nivea						X
X	X	X	X	X	P. emarginata	X					
X	X	O	O	X	Solidago multiradiata					X	
O	O	X	O	O	Antennaria canescens					X	
O	O	X	X	O	A. angustata		X		X		
O	X	O	X	X	Gnaphalium supinum		X		X		
O	X	O	O	X	Arnica terrae-novae					X	
X	X	X	X	X	Taraxacum lacerum					X	
X	O	X	X	X	T. lapponicum					X	

Saskatchewan, and the Rocky Mountains. *Crepis nana* Richards. has since been collected in Newfoundland and is also known from the Arctic Archipelago and the Arctic Coast, as well as from the Rocky Mountains.

Thus *Pedicularis groenlandica* and *Petasites sagittata* fall in line with other species from Labrador which have "way stations" between their far eastern and far western localities somewhere in the central portion of the continent. Other examples of such Labrador plants (which also occur in the Gulf of St. Lawrence region) are *Danthonia intermedia* Vasey, *Aster foliaceus* Lindl., var. *frondeus* Gray, and *Solidago multiradiata* Ait.

On the basis of our present knowledge of their distribution, *Crepis nana* and *Taraxacum lacerum* occupy "way stations" along the northern coastal fringe of the continent. As further facts concerning the flora of the central portion of subarctic America become available, we may well expect these two apparently different routes to merge into one.

In view of the poorly explored nature of much of the region, both continental and coastal, between the Torngat Mountains of northeastern Labrador and the foothills of the Rockies, occasional records from this intervening area, such as for the species mentioned in the preceding paragraphs, assume more than usual significance. Thus, in the strictest sense of the term, the species mentioned above may not be considered to have disrupted ranges. However, this does not alter the fact that plants with such ranges exist in northeastern Labrador, notably *Carex filifolia*. Other cordilleran species with a somewhat wider distribution in eastern America in addition to their occurrence in northeastern Labrador are *Cerastium Beeringianum* Cham. & Schl., *Senecio pauciflorus*[1] Pursh, *Epilobium Drummondii* Hausskn. and *Arenaria humifusa* Wahlenb.

There is also a small number of endemics in northeastern Labrador (some of them occurring elsewhere in Labrador as well), including *Arnica Sornborgeri* Fernald, *Antennaria pygmaea* Fernald, *A. Sornborgeri* Fernald, *A. burwellensis* Malte, *A. congesta* Malte, *Taraxacum torngatense* Fernald, *Draba Sornborgeri* Fernald and *Poa labradorica* Steudel. These occur in notably "difficult" genera, whose plasticity is well known. Especially in *Arnica*, *Antennaria* and *Taraxacum*, which tend to set seed apogamously, any mutant forms fitted to their

[1] With an intermediate station at Fort Franklin, Mackenzie River.

environment might be expected to be perpetuated more readily than in plants setting seed in the usual fashion. These genera might well be considered to be among the first to "throw" recognizable new species. It is of interest, however, as Fernald says (l. c. p. 317), that these are "species with their affinities clearly with cordilleran plants." To what extent this similarity can be attributed to parallel mutations is a question of interest which needs further study for its solution.

E. Contemporary Climate and Relic Species

In considering the presence of unusual species in the flora of northeastern Labrador it is natural to look to the climate as a possible explanation. Coleman (l. c. page 9) gives a good description of some of the features of the climate of northeastern Labrador. As he points out, the climate is "more nearly arctic than its latitude." Hann[1] characterizes its climate as decidedly sub-arctic and on the north coast as arctic, as does Koeppe.[2]

A climatic factor which would appear to be of primary importance in plant distribution is temperature. Charts[3] illustrating temperature conditions are provided in figs. 2–5. It will be noted that the sea-level isotherms representing the winter mean temperatures of northern Labrador approximate those of northwestern Greenland and James Bay (fig. 2); that the early spring mean temperatures are comparable to those in central West Greenland and the central portion of Hudson Bay (fig. 3); that the summer mean temperatures are similar to those in southwestern Greenland and northern Hudson Bay (fig. 4); and that the fall mean temperatures are essentially similar to the summer mean temperatures (fig. 5). Perhaps the most significant of these charts from the botanical point of view is that for July (fig. 4), because it gives us a picture of temperature conditions at the height of the growing season. But this does not provide a clear-cut explanation for the presence of unusual elements in the flora, since many

[1] Hann, J. Handbuch der Klimatologie, iii. ed. 3. Stuttgart (1911).

[2] Koeppe, C. E. The Canadian Climate. Bloomington, Ill. (1931).

[3] The charts comprising figs. 2–7 are traced from manuscript charts recently prepared by Prof. C. F. Brooks, Mr. A. J. Connor, and Dr. W. Köppen. They are very kindly made available at the Blue Hill Observatory of Harvard University before their ultimate publication in Köppen, W. and Geiger, R. Handbuch der Klimatologie, ii, Part J, Klimakunde von Nordamerika by R. DeC. Ward, C. F. Brooks, and A. J. Connor, publ. by Gebr. Borntraeger, Berlin, Germany. The charts were made on Goode's Base Map no. 202 (North America on Lambert's Azimuthal Projection). Used by permission of The University of Chicago Press.

It is pleasure to acknowledge here my indebtedness to Professor Brooks, not only for providing aid in locating climatic data, but also for his constructive suggestions.

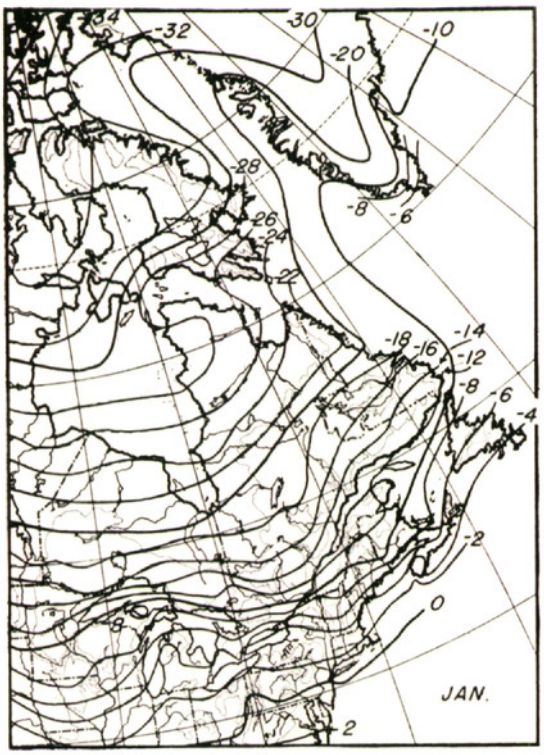


fig. 2.

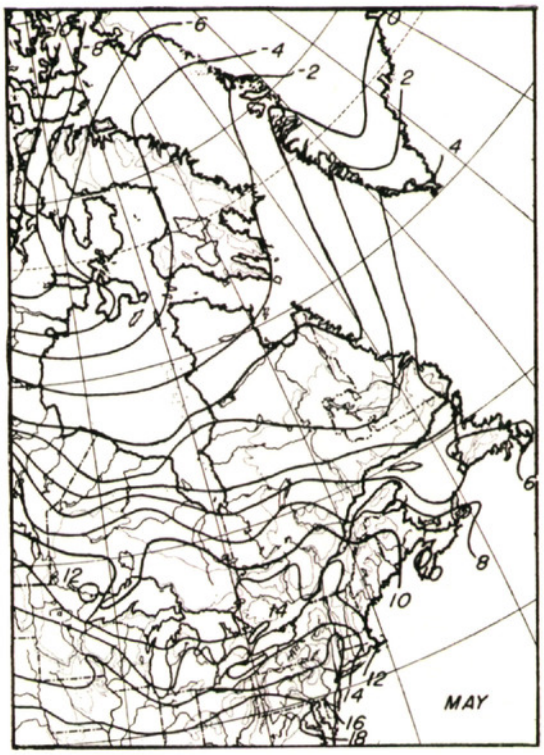


fig. 3.

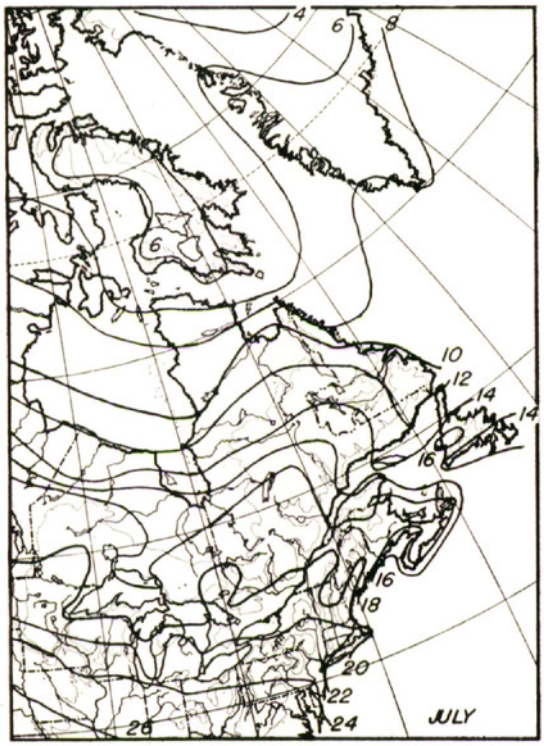


fig. 4.

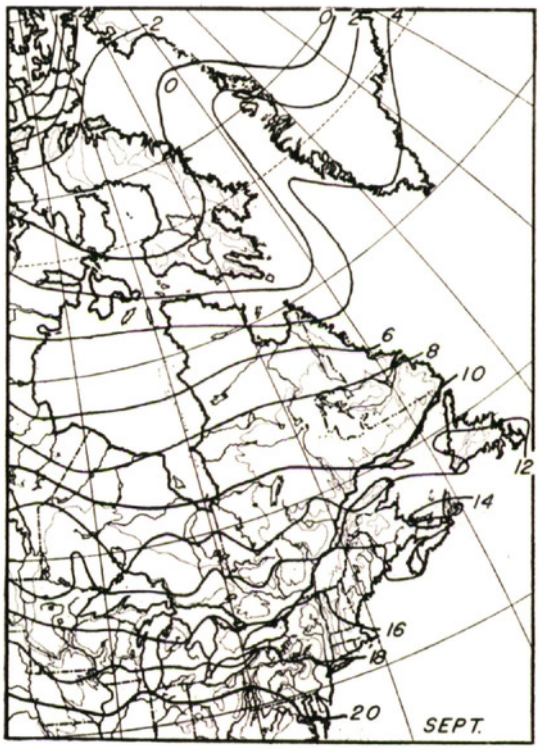


fig. 5.

SEA LEVEL ISOTHERMS IN °C.

For Sources see Footnote, p. 127.

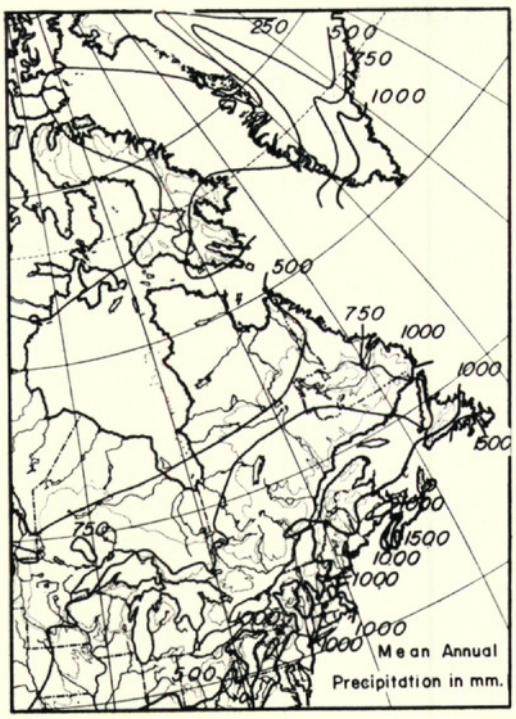


fig. 6.

fig. 7.

For Sources see Footnote, p. 127.

species have a wide tolerance for temperature extremes. This is shown, for instance, in maps illustrating the distribution of *Saxifraga oppositifolia*,[1] *Androsace septentrionalis*,[2] and *Scirpus cespitosus* var. *callosus*.[3] The ranges of these species cross the isotherms in a way which indicates that certainly not all boreal species are controlled by temperature conditions alone in their distribution.

Another factor to be considered is the precipitation. In FIG. 6 the mean annual precipitation in millimeters is shown. Here again will be noted a general similarity between northern Labrador, southeastern Greenland and James Bay. FIG. 7 shows the amount of rainfall at the height of the growing season, in July. The amount of precipitation is comparable with that of southern Greenland, eastern Baffinland, the Gulf of St. Lawrence region in part, the north shore of Lake Superior, and James Bay. Like temperature, precipitation alone does not solve the problem, especially since an extra variable, the soil moisture derived from the melting snow, supplements atmospheric precipitation. On a preceding page it was pointed out that the sparse

[1] Map 1 in Fernald, M. L. Recent Discoveries in the Newfoundland Flora. Rhodora, xxxv. 7 (1933).

[2] Map 5, Fernald, l. c. 82.

[3] Map 10, Fernald, l. c. 88.

and hardy flora of the higher altitudes in northeastern Labrador could probably be attributed primarily to the small amount of available water. At lower elevations the amount of ground water becomes increasingly greater, because of the run-off from melting snow-fields and from the gradual thawing of the subsoil as the summer advances. It is, therefore, difficult to evaluate the flora in terms of atmospheric precipitation alone, especially since so many local factors operate.

Another feature responsible for the character of the climate of Labrador is the winds which are predominantly on-shore from the northerly quarter or else are from the westerly quarter.[1] Sweeping in over the ice-cold[2] Labrador current the northerly and northeasterly winds account for the low summer temperatures of Labrador, especially on the immediate coast and its islands. In combination with the low temperatures, strong on-shore winds are probably a major factor in the limitation of plant life on this immediate coastal strip because of their desiccating qualities. When the winds are offshore during the summer, weather conditions are less unfavorable, and a chinook effect has even been reported[3] which is also said to be associated with desiccation. These chinook winds were not sufficiently marked during the summer of 1931 to have been observed, although their possible occurrence had been anticipated.

To summarize the various climatic factors considered, evidently the winds off the cold Labrador current are largely responsible for the low temperature of the coastal region. Precipitation during the growing season is limited, but in favorable localities melt-water supplements it. The winds as desiccating agents are especially effective in producing conditions unfavorable for plant life. Thus plants with a sufficiently high survival value to exist at all in northeastern Labrador, really flourish only when occurring in places protected from prevailing winds and if well supplied with soil water. Thus the majority of the plants (both individuals and species) are restricted to the lower, moist, protected habitats. As pointed out above for temperature, and as is also true for the other climatic agencies, plants adapt themselves to a relatively wide range of climatic variability. Climate can be expected to become a limiting factor primarily when there is a major swing away from present conditions.

[1] Koeppe, l. c.

[2] Iselin gives the characteristic temperature of the body of the current as − 1° to − 1.5° C.; see Iselin, C. A Report on the coastal Waters of Labrador. Proc. Amer. Acad. Arts and Sci., lxvi. 21 (1930).

[3] Coleman, l. c.

While the present climate is important in its effect on the general nature of the flora, at least two other factors are probably more important in their bearing on the presence of highly localized species in Labrador. One is the influence of the underlying rocks on soil composition, and the selective effect of this on the survival of plants in favorable areas. There are indications that the basic soils are important in this respect. But this awaits not only a more general analysis of the plants collected in the past but, more especially, comprehensive collections from the Mugford region in eastern Labrador and from other as yet unexplored localities with basic rocks in western Labrador. The other factor, which may be termed the historical one, deals with glacial and post-glacial history and is of especial interest with reference to the presence of relic species which include the following: *Carex filifolia, Cerastium Beeringianum, Senecio pauciflorus, Epilobium Drummondii,* and *Arenaria humifusa.*

f. Possibilities of Survival of Relic Species on Nunataks during the Wisconsin Glaciation

In seeking a historical explanation for the occurrence of these "relic" species in northeastern Labrador several alternatives suggest themselves. First should be considered the possibility of their survival on nunataks during the height of Wisconsin glaciation. The great modern testing grounds for this concept lie in areas which today have continental glaciers, namely the Antarctic continent and Greenland. It has been pointed out on a preceding page that the most recent geological research in the Torngats throws doubt on the existence of nunataks in the high mountains of northeastern Labrador. If, however, the older theories are correct and we had nunataks as possible sanctuaries for plants during the Wisconsin glaciation they could have been either of two types. They might have been like those of the inhospitable Antarctic continent. In that case there would have been no flowering plants surviving on them, because flowering plants are unknown[1] from the explored regions of the Antarctic continent. If, on the other hand, the environmental conditions of the coast of Labrador have been like those of the coast of Greenland today, we can expect a flora to have existed on the Labrador nunataks similar to that now found on the Greenland nunataks. It is not improbable

[1] See Brown, R. N. R. Antarctic and Sub-antarctic Plant Life and some of its Problems *in* Problems of Polar Research. Amer. Geogr. Soc. Spec. Publ. no. 7 (1928).

that the latter may have been the case because of the environmental similarities between the coast of Labrador and the coast of Greenland. Even today the sparse flora of the higher mountains in northern Labrador resembles that of the nunataks of Greenland. But in both cases the plants composing this high-altitude flora are the hardy species of ubiquitous arctic occurrence. The peculiar relic forms are in general characteristically restricted to more sheltered and favorable localities. It does not appear probable that the ice-surrounded, well-drained, and wind-exposed nunataks which may have existed in northern Labrador during the Wisconsin would have been havens for plants which even today do not grow in habitats of this nature. It may be objected that abundant proof has been presented for the survival of flowering plants on nunataks and driftless areas in the Gulf of St. Lawrence region. But it is important to remember in considering this, that the solution applicable in one area is not necessarily applicable in another area different in physiography, latitude, and its geological conditions. The St. Lawrence region was far better situated during the Wisconsin for the survival of plants at higher elevations (as well as at lower levels), because of the larger areas left uncovered by ice, a warmer climate associated with its more southern latitude, and the predominance of basic rock. On the other hand, northern Labrador with its predominantly acid Archean formations, its more northern latitude and correspondingly more stringent climate, and greater (?) covering of ice was hardly as favorable for the persistence of flowering plants. This suggests another solution to the problem. Could these relic species not have survived at or near sea-level?

G. Possibilities of Survival of Relic Species near Sea Level during the Wisconsin

If these relics survived near sea-level during the Wisconsin, any major environmental change should be taken into account. Both geologists[1] and meteorologists[2] paint very similar pictures of the environment on the shores of the North Atlantic during the greatest ad-

[1] Antevs, E. Retreat of the last Ice-sheet in eastern Canada. Can. Dept. Mines, Geol. Surv. Mem. no. 146 (1925).

Bryan, K. and Cady, R. C. The Pleistocene Climate of Bermuda. Amer. Jour. Sci., xxvii. 241–264 (1934).

[2] Brooks, C. E. P. Climate through the Ages. New York (1926).

Simpson, G. C. World Climate during the Quaternary Period. Quart. Jour. Roy. Met. Soc., lx. 425 (1934).

vances of the Pleistocene continental glaciers. Very cold surface water with much floating ice from various sources, southward displacement of the Icelandic low pressure area, with corresponding northerly winds resulting in a diversion to the south of the Gulf Stream, are all points of general agreement among the authorities cited. The effects of this combination of factors on the northwestern portion of the Atlantic Basin are interesting to contemplate. Climatic conditions on the coast of northeastern Labrador would have been more severe than they are today, since the waters of the northwestern corner of the Atlantic would not have been modified even as slightly as they are today by that branch of the Gulf Stream which recurves around the southern tip of Greenland. Instead the whole area would have been subject to the temperatures of the cold surface waters. With prevailing northerly winds, ice-bergs and sea-ice would have tended to be held on shore and thus contribute to lower air-temperatures. Even today the effect of the bleak winds from over the cold Labrador current makes itself evident in the impoverished flora of the coastal islands, headlands, and exposed shore of Labrador. On the other hand, occasional southerly storm-winds of higher temperatures, both because of their origin to the south and because of the latent heat of condensation on the glacial ice-surface, might have counteracted in part effects of agencies responsible for lower temperatures, especially in less exposed localities. In addition there probably were occasional winds of the föhn type blowing off the ice-cap which would also aid in ameliorating the climate in more protected areas. Furthermore, if the coastal mountains acted as barriers to a complete inundation of the coast by ice (much as seems to be the case in Greenland today), the interaction of all these factors might well serve to provide restricted and well-protected areas with a climate sufficiently mild for plants to exist.[1] Not only lichens as suggested by Lynge,[2] but even higher plants might have grown under such conditions.[3] Another fact favoring this is that even when the air-tempera-

[1] Dr. C. Iselin of the Woods Hole Oceanographic Institute has pointed out to me that the Labrador reef may well have served to prevent extreme ice accumulation on the shores of northeastern Labrador, and also that a weak current of relatively fresh water originating from the melting of ice in and about Hudson Bay could have extended locally down the coast of Labrador. Both of these factors would have favored local amelioration of climate in northeastern Labrador.

[2] Lynge, B. General Results of recent Norwegian Research Work on Arctic Lichens. Rhodora, xxxvi. 133 (1934).

[3] A very healthy note of skepticism concerning the reconstruction of climatic conditions during past glaciations is sounded by Nannfeldt (Symbol. Bot. Ups. iii. 80 (1935)). Unfortunately, his thought-provoking paper has come to hand too late to consider in the main body of the discussion.

ture seems to be too low for metabolism in plants in the high Arctic, insolation on clear days raises the temperatures of the plants themselves to such a level that it is possible for the plants to carry on their life processes. For example, Wulff[1] found in North Greenland that on the 10th of June when the air-temperature was as low as − 4.2° C., the temperature 2 cm down in a dense, sun-exposed tuft of *Luzula confusa* was 8.0° C.; on another occasion, the 20th of June, when the air-temperature was only 5.0° C., a sun-exposed tuft of *Saxifraga oppositifolia* was 21.1° C. Possibly then, the balance of all factors were such that in areas, as at the heads of fiords, protected from wind, warmed by occasional föhn winds and by the action of direct insolation, and with melt-water available from the ice-fields above, plants may have survived through the peak of Wisconsin glaciation in the lee of the Torngat Mountains in northeastern Labrador. The major question, however, is whether the cordilleran relics mentioned above could have been among these. It is not unlikely that they could, since in North Greenland, which in many respects resembles this reconstruction of Labrador during the "Ice Age," there occur today a number of species[2] whose ranges extend thirty to forty degrees of latitude to the south, as, for instance, *Woodsia glabella* R. Br., *Festuca brachyphylla* Schultes, *Hierochloë alpina* (Lilj.) R. & S., *Eriophorum Scheuchzeri* Hoppe, *Carex incurva* Lightf., *C. glareosa* Wahlenb., *Juncus albescens* (Lange) Fern., *Oxyria digyna* (L.) Hill, *Cerastium alpinum* L., *Silene acaulis* L., var. *exscapa* (All.) DC., *Draba nivalis* Lilj., *Saxifraga oppositifolia* L, *Dryas integrifolia* Vahl, *Epilobium latifolium* L. and *Androsace septentrionalis* L. (For further examples see Fernald, l. c. pp. 120 and 121).

H. Possibilities of a Post-Wisconsin Migration of Relic Species into Northeastern Labrador during the Climatic Optimum

We have, however, to reckon with the theory that Labrador may have been covered entirely with the ice of the Wisconsin glaciation (Odell, l. c.). Under these circumstances a third alternative comes to mind, since it would have been necessary for the entire flora to have

[1] As reported by Ostenfeld, C. H. The Vegetation of the North-Coast of Greenland. Meddel. Grønl., lxiv. no. 5. 223–268 (1923).

[2] For an extensive consideration of the flora of nunatak areas in Greenland see Gelting, P. Studies on the Vascular Plants of East Greenland, etc. Meddel. Grønl., ci., No. 2. 1–337 (1934).

migrated in with the retreat of the ice. There is a growing tendency to accept the idea of rather large climatic fluctuations since the retreat of the Wisconsin ice. Evidence in favor of at least one, and possibly more, "warm periods" or "climatic optima" since the wane of the Wisconsin ice comes from a number of sources.[1] Students of molluscan and other fossil faunas find remains of southern forms far north of their present ranges;[2] meteorologists consider that there was a post-glacial climatic optimum;[3] geologists and geographers[4] on the basis of studies of variation in the levels of lakes, movements of sand dunes, temperatures of underlying rocks, deposits of tufa, studies on the salinity of inland lakes, and the analysis of clay varves are led to this same general conclusion; on the basis of the cultural history of the people of the north, archeologists[5] conclude that there have been periods of more moderate climate in post-glacial time; botanical evidence, such as the presence of remains of *Alnus fruticosa* and *Betula alba* in the post-glacial silts of the New Siberian Islands;[6] the often noted tendency for many of the higher plants in the Arctic not to mature their seeds, studies in floristics,[7] and extensive pollen-

[1] *See* Die Veränderung des Klimas seit dem Maximum der letzten Eiszeit. Eine Sammlung von Berichten . . . herausgegeben von dem Executiv Komittee des 11. Internat. Geol. Kongr. Stockholm. 1910.

[2] Brøgger, W. C. Om de senglacials og post glaciale Nivå forandringer i Kristianiafeltet (Molluskfaunen). Norges Geol. Unders. no. 31. 1–731 (1900–1901).

Praeger, R. L. Report on the Raised Beaches of the north-east of Ireland, with special Reference to their Fauna. Proc. Roy. Irish. Acad., ser. 3., iv. 30–54 (1896).

[3] Simpson, l. c. 459, 463.

Köppen, W. and Wegener, A. Die Klimate der Geologischen Vorzeit. Berlin (1924).

Brooks, C. E. P. The Evolution of Climate. London (1922).

————. Climate threough the Ages. New York (1926).

————. Some Problems of modern Meteorology, No. 16. Post-glacial Climates and the Forests of Europe. Quart. Jour. Roy. Meteor. Soc., lx. 377 (1934).

[4] Ailio, J. Die geographische Entwicklung des Ladogasees in post-glazialer Zeit. Bull. Comm. Geol. Finlande. no. 45. 1–159 (1915).

Daly, R. A. The changing World of the Ice Age. New Haven (1934).

Coleman, A. P. Ice Ages, recent and ancient. New York. 1926.

Antevs, E. Retreat of the last Ice Sheet in eastern Canada. Can. Dep. Mines, Geol. Surv. Mem. no. 146 (1925).

————. The last Glaciation. Amer. Geogr. Soc. Res. Ser. no. 17 (1928).

[5] Sollas, W. J. Ancient Hunters. ed. 3, rev. New York (1924).

Nörlund, P. Buried Norsemen at Herjolfsnes. Meddel. Grønl., lxvii. no. 1. 1–270 (1924).

Curry, J. C. Climate and Migrations. Smiths. Rep. for 1929, 423–435 (1930).

[6] Mecking, L. The Polar Regions *in* The Geography of the Polar Regions. Amer. Geogr. Soc. Spec. Publ. no. 8 (1928).

[7] Gleason, H. A. The Vegetational History of the Middle West. Ann. Ass. Amer. Geogr., xii. 39–85 (1922); see also Science, n. s., lii. 340 (1920).

Printz, H. The Vegetation of the Siberian-Mongolian Frontiers. Contr. Flor. Asiae Inter. Pert. III (publ. by Kong. Norske Vidensk Selsk. 1921).

analytical investigations in this country and in Europe[1] point to a post-glacial "warm period." Doubtless there are errors here and there in the diversified investigations mentioned above, but the mass of the evidence strongly supports the general conclusion that at least one climatic optimum has occurred between late Wisconsin time and the present. This would make a promising working hypothesis for the interpretation of the post-glacial history of the flora of northeastern Labrador, if there were definite evidence for it from northeastern Labrador itself. Unfortunately no work of any kind has come to my attention which contributes to our knowledge of post-glacial climatic fluctuations in the region (or in Arctic America generally). However, the occurrence of a climatic optimum in northeastern Labrador is strongly suggested by the evidence from many other localities in arctic and temperate zones. As a third alternative, then, it is suggested that if Labrador had been completely ice-covered in the Wisconsin the present flora of northeastern Labrador owes its character in part to migrations northward of Laurentian plants, including some of the cordilleran relics, during a possible period of post-glacial climatic amelioration.[2] With subsequent refrigeration, there may have been a restriction of these relic species to more favorable localized areas (such as those of basic rock), or even a complete destruction of some of them, in northeastern Labrador.

In summarizing the various hypotheses suggested to explain the presence of cordilleran relics in the flora of northeastern Labrador, it is evident that a great deal depends on the interpretation of the behavior of the Wisconsin ice in the region. If the majority of geologists who have visited the region are correct, we may assume the presence of nunataks, a coastwise ice-free strip of land, and ice-free coastal islands, on all of which plants could have lived through the

[1] Sears, P. B. Post glacial Climate in eastern North America. Ecology, xiii. 1–8 (1932).

————. Glacial and post glacial Vegetation. Bot. Rev. i. 37–51 (1935).

von Post, L. Problems and Working Lines in the postarctic Forest History of Europe. Proc. Fifth Int. Bot. Congress, Cambridge. 48–54 (1931).

[2] The objection might be raised that a long enough period of time has not elapsed to permit such a migration *en masse* of a flora. One has but to refer to the observations of Professor W. S. Cooper (A Third Expedition to Glacier Bay, Alaska. Ecology, xii. 61–95 (1931)) to realize that the various components of the boreal flora can follow a retreating ice-margin with amazing and sufficient celerity.

It should also be emphasized that there is floristic evidence for the infiltration of some species from Greenland and the Arctic Archipelago into Northeastern Labrador. The agency involved is doubtless wind (see Simmons, Phytogeogr. Arct. Amer. Archipel., for a consideration of the important role played by wind in the dispersal of plants in the Arctic.).

maximum of glaciation. By analogy with Greenland today, especially northern Greenland (to which northern Labrador probably approached most closely in environmental conditions during the Wisconsin), it is suggested that cordilleran relics which today are limited to lower elevations in northeastern Labrador would probably not have survived on the wind-swept, overly well-drained nunataks. Nor from our knowledge of the extreme maritime climate of coastal islands is it likely that relic species would have survived there. But they may have survived in the favorable habitats at the heads of fiords where the desiccating power of the winds would have been felt least, and with a southerly exposure so that plants could have benefited from warmth obtained by direct insolation and have had melt-water available from the ice. Since relics have persisted in North Greenland in known areas of this type, this appears to explain best the persistence of cordilleran species in northern Labrador as well. However, if it is correct that the ice extended over all the land at the height of glacial development in the Wisconsin, then we must have recourse to a post-glacial migration of all plants, rather than their persistence in place. Under these circumstances, during the climatic optimum subsequent to the retreat of the ice, there may have been an immigration into northeastern Labrador of a contingent from the relic floras of the driftless areas of the St. Lawrence region. With subsequent refrigeration leading to our present climate there would have been a localization of the relic forms to the areas where they are found today. This hypothesis does violence to the concept of relics as senescent and non-aggressive species which have largely lost their power of migration. It also depends on the idea of a post-glacial climatic optimum, for which direct evidence from northeastern Labrador is lacking, although it appears to have been satisfactorily demonstrated elsewhere in the North. Therefore it should be tested further as new data become available. In the light of our present knowledge we must give preference to the theory that these cordilleran relics survived in protected habitats of relatively low altitude at or near the places where they today occur.

In conclusion, I should like to thank Professor M. L. Fernald for his unfailing interest and stimulating suggestions in the course of this study, as well as for his aid in the determination of the specimens. To other authorities of the Gray Herbarium, especially Mr. C. A. Weatherby, I am grateful for aid in connection with various phases of

this work. It is a pleasure to acknowledge the help given by Dr. H. M. Raup of the Arnold Arboretum, both in the taxonomy of Arctic plants and in the interpretation of their distribution. To the many others who have liberally given of their time and experience, and to my wife, Mrs. Lucy B. Abbe, who has helped in so many ways, I should also like to express my thanks.

Vascular Plants Collected in Labrador on the Grenfell-Forbes Northern Labrador Expedition, 1931

In the following list, the plants collected in Labrador only are noted, while the collections made in the short time spent in Newfoundland are omitted. Several members of the expedition helped in the collecting and to save space in the enumeration of plants, their names will be designated by the following abbreviations placed in parentheses after the number of each collection: (A) Ernst C. Abbe; (B) E. B. Brooks, jr.; (F) Miss K. Forbes; (H) Mrs. M. C. D. Hogg; (N) Noel Odell; (O) Mrs. M. Odell. Mention here should also be made of Mr. Hoyt Pease, who provided very efficient aid in Newfoundland up to the time he concluded his temporary connection with the expedition to join Dr. Grenfell.

Plants new to the coast of Newfoundland Labrador, as judged by the specimens in the Gray Herbarium, are marked with an asterisk (*). The arrangement of genera and species is essentially that of Engler and Prantl. Dates are not given but may be determined for the most part from the itinerary provided in the discussion of the botanical results of the expedition. The localities under each species are arranged in order from north to south along the coast.

When a species has been collected but a few times from the coast of Labrador I have taken occasion to mention the other stations from which it is known in the region. If the first occurrence on the coast is here noted, the distribution elsewhere in eastern North America is given in most cases.

Woodsia ilvensis (L.) R. Br. Scree slope, Valley of the Bryant Lakes, Kangalaksiorvik, no. 2 (A); face of cliff on north side of Razorback Harbor, no. 3 (A); Ogualik Island, no. 4 (O); gully from the lower ridge to the Valley of the Twin Falls, Kaumajet Mountains, no. 1 (A); in the Rev. P. Hettasch's rock garden at the Moravian Mission, Nain, nos. 600, 601 (A).

No. 600 was introduced by the Rev. Hettasch from the surrounding country, while he brought no. 601 into his garden from Hebron.

*W. GLABELLA R. Br. Gully from the lower ridge to the Valley of the Twin Falls, Kaumajet Mountains, no. 5 (A).

This collection provides an intermediate station between the northern known limit of the species in Greenland and the Arctic Archipelago, and its more southern occurrence in the Gulf of St. Lawrence region. Another possible intermediate station of this kind is that for POLYSTICHUM LONCHITIS (L.) Roth. The Rev. Hettasch reports this as growing on Ogualik Island but unfortunately it must remain as his "sight record" since he did not collect a specimen of it.

CYSTOPTERIS FRAGILIS (L.) Bernh. Old scree, Valley of the Bryant Lakes, Kangalaksiorvik, no. 8 (A); moist slope on north side of Razorback Harbor, no. 9 (A); mossy spot near waterfall, north side of Nachvak, no. 10 (B); on slaty talus slope, Rowsell Harbor, no. 7 (A & O); gully from the lower ridge to the Valley of the Twin Falls, Kaumajet Mountains, no. 6 (A).

EQUISETUM SYLVATICUM L., var. PAUCIRAMOSUM Milde. See Fernald, RHODORA, xx. 129 (1918). Mossy spot near waterfall, Nachvak, no. 12 (B).

LYCOPODIUM SELAGO L., var. APPRESSUM Desv. For this and the following species of *Lycopodium* see Marie-Victorin, Les Lycopodinées du Quebec (1925). Ridge extending south from East Bay, Ikordlearsuk, no. 14 (A & O); west side of the Valley of the Bryant Lakes, Kangalaksiorvik, no. 15 (A); summit of "K-2," north side of Komaktorvik, no. 16 (A).

L. ALPINUM L. See Porsild, Medd. Grønl. xciii. no. 3, 3 (1935). First ridge north of Kangalaksiorvik, no. 18 (A); moist slope on the north side of Razorback Harbor, no. 19 (A).

SELAGINELLA SELAGINOIDES (L.) Link. Moist, sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 20 (A & H).

JUNIPERUS COMMUNIS L., var. MONTANA Ait. In ericaceous mat, shore of Ittekaut Bay, Kikkivitak Island, no. 22 (A).

SPARGANIUM HYPERBOREUM Laestad. Shallow pool in rocks, Rodney Mundy Island, Indian Harbor, no. 23 (A & H).

This collection is characterised by well-developed fruits of the previous year. The species has been collected previously in Labrador by *Bishop* at Cape Harrigan, and by *Sewall* at Anatolak.

TRIGLOCHIN PALUSTRE L. At stream-mouth near the Moravian Mission, Hopedale, no. 24 (A & H).

HIEROCHLOË ODORATA (L.) Wahlenb. Moist sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 101 (A & H).

H. ALPINA (Liljebl.) R. & S. On ridge extending south from East Bay, Ikordlearsuk, no. 107 (A & O); summit of "K-2," north side of Komaktorvik, no. 105 (A); morainal bench near the "K" River, Kangalaksiorvik, no. 104 (A); top of ridge north of Razorback Harbor,

no. 108 (A); on the main ridge of Precipice Mountain, no. 106 (A); Valley of the Twin Falls, Kaumajet Mountains, no. 103 (A); near the top of the hill back of Battle Harbor, no. 102 (A).

*Alopecurus aequalis Sob., var. natans (Wahlenb.) Fernald. See Fernald, Rhodora, xxvii. 196 (1925). In tundra pool near west shore of the island, Kikkertaksoak, Saglek, no. 100 (A).

Otherwise known in eastern North America from Greenland and the Gulf of St. Lawrence area.

*Phippsia algida (Soland.) R. Br. Near the mouth of stream emptying into East Bay, Ikordlearsuk, no. 99 (A); on moist, meadowy hillsides, Near Island (Amiktok), Kangalaksiorvik, no. 98 (A); on a very wet spot left by a melting snow bank, lower slopes of "K-2," Komaktorvik, no. 97 (A).

Also known from Greenland, the Arctic Archipelago, Port Burwell on Ungava Bay, and Hudson Strait.

Agrostis borealis Hartm. See Fernald, Rhodora, xxxv. 203 (1933). Moist meadowy hillsides on Near Island (Amiktok), Kangalaksiorvik, no. 89 (A); scree slide from the top of Precipice Ridge to Komaktorvik Lake, no. 87 (A); north shore of Komaktorvik Lake, no. 88 (A); Ogualik Island, no. 90 (B); hilltop above large sphagnum bog, Kikkivitak Island, Ittekaut Bay, no. 91 (A); in the Salix-Empetrum mat near the old Eskimo village back of Hopedale, no. 86 (A & H); moist, mossy spot near the top of the hill back of Battle Harbor, no. 85 (A).

Calamagrostis canadensis (Michx.) Nutt., var. robusta Vasey. See Inman, Rhodora, xxiv. 142 (1922); Stebbins, Rhodora, xxxii, 42 (1930). North shore of the fiord, Kangalaksiorvik, no. 92 (F & O); mossy spot near waterfall on the north side of Nachvak, no. 93 (B).

C. neglecta (Ehrh.) Gaertn. See Stebbins, l. c. 53. Shores of Seaplane Cove, Kangalaksiorvik, no. 94 (O & H).

C. neglecta (Ehrh.) Gaertn., var. borealis (Laestad.) Kearney. See Stebbins, l. c. 55. Shores of Seaplane Cove, Kangalaksiorvik, nos. 95, 96 (O & H).

Deschampsia alpina (L.) Roem. and Schult. In mossy spot near mouth of stream emptying into the south side of East Bay, Ikordlearsuk, no. 82 (A & O); in the tundra above the anchorage, Ryans Bay, no. 81 (A & O); north shore of Kangalaksiorvik, no. 80 (F & O).

Deschampsia flexuosa (L.) Trin. North shore of Komaktorvik Lake, no. 76 (A); in the valley of the Komaktorvik River, no. 77 (A); moist, open place in a grove of spruce and fir, Kikkivitak Island, Ittekaut Bay, no. 78 (A); near stream on upper slopes of hill back of Battle Harbor, no. 79 (A).

This material has the longer spikelets (0.4 to 0.6 mm.) of the Arctic and European mountain specimens, as well as their slightly less open inflorescence and less delicate branchlets of the panicles, thus differing

from the plants of the more southern part of the range of this species in North America. This material may well be *D. flexuosa* var. *montana* (L.) Trin.

D. ATROPURPUREA (Wahlenb.) Scheele. In the tundra above the anchorage, Ryans Bay, no. 83 (A & O); in the valley of the Komaktorvik River, no. 84 (A).

TRISETUM SPICATUM (L.) Richter. For this and its varieties see Fernald, RHODORA, xviii. 195 (1916). Ogualik Island, no. 69 (B).

T. SPICATUM (L.) Richter, var. MAIDENII (Gandoger) Fernald. Near the mouth of the "K" River, Kangalaksiorvik, no. 71 (A); moist gully on south side of cliff on north side of Razorback Harbor, no. 72 (A); between beach and slaty talus slope, no. 70 (A & O); restricted moist area on the ridge leading up to the easterly summit of the Bishop's Mitre, Kaumajet Mountains, no. 73 (A).

T. SPICATUM (L.) Richter, var. PILOSIGLUME Fernald. Scree slide from the top of Precipice Ridge to Komaktorvik Lake, no. 75 (A); in Salix-Empetrum mat near the old Eskimo village back of Hopedale, no. 74 (A & H).

POA ALPINA L. On the north side of the fiord, Kangalaksiorvik, no. 42 (A); in the valley of the Komaktorvik River, no. 41 (A); near the summit of the Bishop's Mitre, Kaumajet Mountains, no. 43 (A).

P. ALPINA L., var. BREVIFOLIA Gaudin. Between the beach and the slaty, talus slope, Rowsell Harbor, no. 39 (A & O).

P. GLAUCA M. Vahl. (*cf.* J. A. Nannfeldt, Symbol. Bot. Ups. v. (1935)). At the margins of soil polygons on the second summit of Ikordlearsuk Mountain, Ikordlearsuk, no. 60 (A); west side of the Valley of the Bryant Lakes, Kangalaksiorvik, nos. 51, 52 (A); spur on the southwest side of Mount Tetragona, Kangalaksiorvik, nos. 47, 50 (A); flood-plain of the "K" River, Kangalaksiorvik, no. 46 (A); on the top of Precipice Mountain, no. 49 (A); top of ridge north of Razorback Harbor, no. 53A; scree slide from the top of Precipice Ridge to Komaktorvik Lake, no. 48 (A); in an exceptional and restricted, moist, mossy area on the dry ridge leading to the east summit of the Bishop's Mitre, no. 61 (A); on Odell's Peak west of the Bishop's Mitre, no. 54 (N); in the Valley of the Twin Falls, Kaumajet Mountains, nos. 44, 45 (A).

P. ARCTICA R. Br. (*P. rigens* of Lindman, perhaps not of Hartm. See Nannfeldt, Symb. Bot. Ups. iii. (1934)). Moist swaley place near stream in the Valley of the Bryant Lakes, Kangalaksiorvik, no. 65 (A); north shore of Kangalaksiorvik, no. 59 (F & O); on the summit of "K-2," Komaktorvik, no. 64 (A); on morainal bench near the "K" River, Kangalaksiorvik, no. 63 (A); in the valley of the Komaktorvik River, no. 58 (A); between the beach and the slaty talus slope, Rowsell Harbor, no. 56 (A & O); on the easterly summit of the Bishop's Mitre, Kaumajet Mountains, no. 66 (A).

P. ALPIGENA (Fr.) Lindm. See Lindman in Lynge, Rep. Sci. Res.

Norw. Exp. Novaya Zemlya, 1921, no. 13. 114 (1923). In the valley of the Komaktorvik River, no. 611 (A); on the scree slope from the top of Precipice Ridge to Komaktorvik Lake, no. 57 (A); between the beach and the base of the slaty talus slope, Rowsell Harbor, no. 55 (A & O); in the tundra beyond the wireless station at Battle Harbor, no. 62 (A).

Dupontia psilosantha Rupr. Upper margin of the beach on the south side of East Bay, Ikordlearsuk, no. 67 (A & O).

Puccinellia phryganodes (Trin.) Scribn. & Merr. See Fernald and Weatherby, Rhodora, xviii. 8 (1916). Near the mouth of a stream emptying into the south side of East Bay, Ikordlearsuk, no. 26 (A & O); on the shores of Seaplane Cove, Kangalaksiorvik, no. 25 (O & H).

This is known from the coast of Labrador by the previous collection made by Sornborger at Nain in 1897. It was also collected from Port Burwell on Ungava Bay in 1927 and 1928 by M. O. Malte.

Festuca rubra L. See Fernald, Rhodora, xxxv. 132 (1933). In "The Park," Hopedale, no. 38 (A, H & F).

F. brachyphylla Schultes. West side of the Valley of the Bryant Lakes, Kangalaksiorvik, no. 33 (A); on the summit of "K-2," north side of Komaktorvik, no. 30 (A); in the valley of the Komaktorvik River, no. 32 (A); on the ridge north of Razorback Harbor, nos. 34, 35, 36 (A); scree slide from the top of Precipice Ridge to Komaktorvik Lake, no. 31 (A); between the beach and the slaty talus slope, Rowsell Harbor, no. 29 (A & O); in Salix-Empetrum mat near the old Eskimo village, Hopedale, no. 28 (A & H).

Festuca brachyphylla Schultes and *Festuca supina* Schur have been thoroughly confused in the literature on arctic botany. They are, however, beautifully distinct taxonomically, *F. brachyphylla* having anthers from 0.5 to 1.2 mm. long and the leaf-sheaths split to the base, while *F. supina* has the anthers 1.8 to 3.0 mm. long and the leaf-sheaths split but two-thirds or three-quarters of the way to the base. Other characters exist as well,[1] but an examination of the material in the Gray Herbarium indicates that those mentioned are the most serviceable ones. *F. brachyphylla* was described by Robert Brown[2] in 1824 as *F. brevifolia*, but due to the earlier *F. brevifolia* Muhl., 1817, the first valid name is *F. brachyphylla* Schultes.[3] Brown in his description does not specify either the length of the anthers or the nature of the leaf-sheath, but fortunately there is a co-type of his *F. brevifolia* at the Gray Herbarium, which upon examination substantiates the characters given above.

[1] Fernald, Rhodora, xxxvii. 250 (1935).
[2] Brown, R. Chloris Melvilliana. App. Parry's Voy. Suppl. 289 (1824).
[3] Schultes, Mant. iii. 646 (1827).

Mention should be made of a persistent error. Hackel[1] characterises the sheath of *F. brachyphylla* as "omnino v. saltem a basi ultra medium usque integrae" although at the same time he gives the anther-dimensions correctly in his key. This mistake was perpetuated by Piper[2] when he described the sheaths as "closed their whole length or nearly." As recently as 1925, Saint-Yves[3] repeats the old error, although Simmons[4] had detected it in 1906.

F. VIVIPARA (L.) Sm. See Fernald, RHODORA, xxxvii. 250 (1935). Near the top of the hill back of Battle Harbor, no. 37 (A).

ELYMUS ARENARIUS L., var. VILLOSUS E. Mey. See St. John, RHODORA, xvii. 98 (1915). In "The Park," Hopedale, no. 68 (A, H & F).

ERIOPHORUM SCHEUCHZERI Hoppe. See Fernald, RHODORA, xxvii. 203 (1925). Moist area between "K-1" and "K-2," Komaktorvik, no. 113 (A); seaward side of hill back of Battle Harbor, no. 112 (A).

E. SPISSUM Fernald. North shore of Komaktorvik Lake, no. 116 (A); near the top of the hill back of Battle Harbor, no. 115 (A).

E. ANGUSTIFOLIUM Roth. See Fernald, RHODORA, vii. 88 (1905) West side of the Valley of the Bryant Lakes, Kangalaksiorvik, no. 120 (A); in a large sphagnum bog on Kikkivitak Island, Ittekaut Bay, no. 121 (A); in a sphagnous meadow beside a lake on Gready Island, no. 119 (A & H).

SCIRPUS CESPITOSUS L., var. CALLOSUS Bigelow. See Fernald, RHODORA, xxiii. 22 (1921). In the dry ericaceous mat, shore of Kikkivitak Island, Ittekaut Bay, no. 110 (A).

KOBRESIA BELLARDI (All.) Degland. See Mackenzie, N. A. Flora, xviii. 4 (1931). On the west side of the Valley of the Bryant Lakes, Kangalaksiorvik, no. 123 (A).

*CAREX CAPITATA L. In the Valley of the Komaktorvik River, no. 124 (A); in the tundra near the west shore of Kikkertaksoak Island, Saglek Bay, no. 125 (A).

The only other collection in the Gray Herbarium of this from the Labrador peninsula is that made by *Malte* at Port Harrison on the east coast of Hudson Bay.

*C. MARITIMA Gunner (*C. incurva* Lightf.). See Fernald, RHODORA, xxxv. 395 (1933). Sandy stream bank, Near Island (Amiktok), Kangalaksiorvik, no. 126 (A).

Otherwise known from Greenland, the Arctic Archipelago, Newfoundland and Hudson Bay in eastern North America.

[1] Hackel, E. Monographia Festucarum Europaearum, 82. Berlin (1882).

[2] Piper, C. V. North American Species of Festuca. Contr. U. S. Nat. Herb. x pt. 1, 27 (1906).

[3] Saint-Yves, A. Contr. a l'étude des Festuca (Subgen. Eu-Festuca) de l'Amérique du Nord et du Mexique. Candollea, ii. 257 (1925).

[4] Simmons, H. G. Vascular Plants in the Flora of Ellesmereland. Rep. Sec. Nor. Arc. Exp. "Fram" 1898–1902. no. 2, 154 (1906).

C. BIPARTITA All. (*C. Lachenalii* Schkuhr). See Mackenzie, Bull. Torr. Bot. Club, l. 348 (1923). Scree on the south side of Peak 19, The Four Peaks, Kangalaksiorvik, no. 128 (A); on the north side of Kangalaksiorvik, no. 127 (O & F).

C. GLAREOSA Wahl. Tundra above the anchorage at Ryans Bay, no. 129 (A & O).

C. CANESCENS L. Stream-margin just above large sphagnum bog on Kikkivitak Island, Ittekaut Bay, no. 130 (A).

C. SCIRPOIDEA Michx. Moist, meadowy hillsides on Near Island (Amiktok), Kangalaksiorvik, no. 135 (A); summit of "K-2," north side of Komaktorvik, no. 134 (A); moist gully in cliff on the north side of Razorback Harbor, no. 136 (A); on slaty talus slope, Rowsell Harbor, no. 133 (A & O); moist, sphagnous tundra near small brook on Rodney Mundy Island, Indian Harbor, no. 132 (A & H).

Number 136 is of interest in that it has brown rather than the more usual purple scales.

C. CAPILLARIS L. On moist meadowy hillsides, Near Island (Amiktok), Kangalaksiorvik, no. 143 (A); near the summit of "K-2," north side of Komaktorvik, no. 142 (A); on slaty talus slope, Rowsell Harbor, no. 141 (A & O); seaward side of the island, Battle Harbor, no. 140 (A).

*C. MISANDRA R. Br. On a moist bench near the summit of the Bishop's Mitre, Kaumajet Mountains, no. 145 (A); on the lower ridge east of the Valley of the Twin Falls, no. 144 (A).

This has been collected elsewhere on the Labrador peninsula by *M. O. Malte* at Port Burwell on Ungava Bay in 1927.

C. RARIFLORA (Wahlenb.) Smith. Moist, meadowy hillsides on Near Island (Amiktok), Kangalaksiorvik, no. 147 (A); in a large sphagnum bog on Kikkivitak Island, Ittekaut Bay, no. 148 (A); in a sphagnous meadow on Gready Island, no. 146 (A & H).

C. PAUPERCULA Michx. In a large sphagnum bog on Kikkivitak Island, Ittekaut Bay, no. 149 (A).

C. VAHLII Schkuhr (*C. alpina* Swartz). See Fernald, RHODORA, xxxv. 398 (1933). On moist, meadowy hillsides, Near Island (Amiktok), Kangalaksiorvik, no. 150 (A); between the beach and talus, Rowsell Harbor, no. 153 (A & O).

C. CONCOLOR R. Br. (*C. rigida* Good.). In boggy meadow at the foot of the ridge south of East Bay, Ikordlearsuk, no. 160 (A & O); on ridge extending south from East Bay, Ikordlearsuk, no. 158 (A & O); moist meadowy hillsides, Near Island (Amiktok), Kangalaksiorvik, no. 157 (A); top of the ridge north of Razorback Harbor, no. 159 (A); on the main ridge, Precipice Ridge, no. 156 (A); Ogualik Island, no. 161 (B); in the Valley of the Twin Falls, Kaumajet Mountains, no. 155 (A); moist sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 154 (A & H).

C. AQUATILIS Wahlenb. On the shore of a pond in the large sphagnum bog on Kikkivitak Island, Ittekaut Bay, no. 164 (A); in "The Park," Hopedale, no. 163 (A, H & F); in a sphagnous meadow beside lake on Gready Island, no. 162 (A & H).

*C. SUBSPATHACEA Wormskj. Near the mouth of a stream emptying into the south side of East Bay, Ikordlearsuk, no. 165 (A & O).

This rare little sedge is known otherwise in eastern North America from Greenland and the Gulf of St. Lawrence region.

*C. MICROGLOCHIN Wahlenb. Moist, meadowy hillsides, Near Island (Amiktok), Kangalaksiorvik, no. 166 (A).

Formerly known primarily from Greenland and the Gulf of St. Lawrence region in eastern North America. It is characterized by Professor Fernald[1] as "one of the most famous of rarest sedges."

C. SAXATILIS L., var. RHOMALEA Fernald. See Fernald, RHODORA, iii. 50 (1901). In tundra above the anchorage, Ryan's Bay, no. 168 (A & O); in the valley of the Komaktorvik River, no. 167 (A); tundra near the west shore of the island, Kikkertaksoak, Saglek, nos. 169, 170 (A); at base of the cliff near the spruce-fir grove on Kikkivitak Island, Ittekaut Bay, no. 171 (A).

C. MEMBRANOPACTA Bailey. At the margins of the bog on the south side of East Bay, Ikordlearsuk, no. 172 (A & O).

LUZULA PARVIFLORA (Ehrh.) Desv. In "The Park," Hopedale, no. 184 (A, H & F).

L. CONFUSA Lindeb. On the margins of soil polygons on top of the first peak, Ikordlearsuk Mountain, Ikordlearsuk, no. 198 (A); margins of soil polygons on top of the second peak, Ikordlearsuk Mountain, no. 197 (A); on the ridge extending south from East Bay, Ikordlearsuk, nos. 195, 196 (A & O); shores of Seaplane Cove, Kangalaksiorvik, no. 194 (O & H); on the morainal bench above the anchorage, Kangalaksiorvik, no. 189 (A); on the summit of "K-2," north side of Komaktorvik, no. 190 (A); in the valley of the Komaktorvik River, no. 193 (A); top of ridge north of Razorback Harbor, no. 604 (A); on the main ridge, Precipice Ridge, north of Komaktorvik Lake, no. 192 (A); on top of Precipice Mountain, Torngat Mountains, no. 191 (A); on the westerly summit of the Bishop's Mitre, Kaumajet Mountains, no. 199 (A); on the easterly summit of the Bishop's Mitre, no. 200 (A); on Odell's peak west of the Bishop's Mitre, Kaumajet Mountains, no. 605 (N); on the upper ridge above the Valley of the Twin Falls, Kaumajet Mountains, no. 188 (A).

L. SPICATA (L.) DC. On the summit of "K-2," north side of Komaktorvik, no. 185 (A); top of the ridge north of Razorback Harbor, no. 187 (A); scree slide from the top of Precipice Ridge to Komaktorvik Lake, no. 186 (A); on the bare hilltops of Hawkes Island, no. 603 (A).

[1] Fernald, RHODORA, xxviii. 53, 54 (1926).

L. CAMPESTRIS (L.) DC., var. FRIGIDA Buch. See Fernald and Wiegand, RHODORA, xv. 38 (1913). In moist gully in cliff on the north side of Razorback Harbor, no. 202 (A).

JUNCUS TRIFIDUS L. In a mossy spot near waterfall on the north side of Nachvak, no. 174 (B); Ogualik Island, no. 175 (O).

J. FILIFORMIS L. On the bank of a stream entering sphagnum bog on Kikkivitak Island, Ittekaut Bay, no. 176 (A).

J. BIGLUMIS L. Near the mouth of a stream emptying into the south side of East Bay, Ikordlearsuk, no. 177 (A & O).

The only previous collection from the coast of Labrador is that of *Woodworth* made in 1926 on a rocky hillside, "Ekortiarsuk" Bay (= Ikordlearsuk). It was collected by *Malte* at Port Burwell in 1927 and at Wakeham Bay in 1928, and is also known on the Arctic Archipelago, in Greenland, and on the Arctic coast of North America.

J. ALBESCENS (Lange) Fernald. See Fernald, RHODORA, xxvi. 202 (1928), and RHODORA, xxxv. 236 (1933). In the valley of the Komaktorvik River, no. 179 (A); between the beach and the slaty talus slope, Rowsell Harbor, no. 178 (A & O).

J. CASTANEUS Smith. Moist, meadowy hillsides, Near Island (Amiktok), Kangalaksiorvik, no. 182 (A); in the valley of the Komaktorvik River, no. 181 (A); between the beach and slaty talus slopes of the south side of Rowsell Harbor, no. 180 (A & O).

TOFIELDIA MINIMA (Hill) Druce (*T. palustris* Hudson). On the west side of the Valley of the Bryant Lakes, Kangalaksiorvik, no. 206 (A); gully from the lower ridge to the Valley of the Twin Falls, Kaumajet Mountains, no. 203 (A); in the Valley of the Twin Falls, no. 204 (A).

SMILACINA TRIFOLIA (L.) Desf. Near the top of the hill back of Battle Harbor, no. 205 (A).

HABENARIA DILATATA (Pursh) Hook. See Ames, Orchidaceae, iv. 62 (1910). In a moist, mossy place beyond the wireless station on the hill back of Battle Harbor, no. 207 (A).

H. OBTUSATA (Pursh) Richards., var. COLLECTEANA Fernald. See Fernald, RHODORA xxviii. 175 (1926). On the margin of a small lake in the tundra, Aillik, no. 208 (A).

CORALLORRHIZA TRIFIDA Chat. In a patch of bare, wet clay near the shore of Rodney Mundy Island, Indian Harbor, no. 209 (A & H).

SALIX RETICULATA L. Between the beach and the slaty talus, Rowsell Harbor, no. 210 (A & O).

Previously collected in Labrador by Woodworth at Ryan's Bay in 1926.

S. VESTITA Pursh. See Fernald and St. John, Can. Dep. of Mines, Mem. 126. 44 (1922). Mossy spot near waterfall on the north side of Nachvak, no. 213 (B); on slaty talus slope, Rowsell Harbor, no. 212 (A & O); on dry hillside above the tundra near the west shore of

the island, Kikkertaksoak, Saglek, no. 214 (A); just below the easterly summit of the Bishop's Mitre, Kaumajet Mountains, no. 216 (A); Ogualik Island, no. 215 (B).

S. UVA-URSI Pursh. On the west side of the Valley of the Bryant Lakes, Kangalaksiorvik, no. 221 (A); on the main ridge of Precipice Ridge, no. 220 (A); on the upper ridge above the Valley of the Twin Falls, Kaumajet Mountains, no. 219 (A); in the tundra on the seaward side of the island, Battle Harbor, no. 218 (A).

S. HERBACEA L. West side of the Valley of the Bryant Lakes, Kangalaksiorvik, no. 225 (A); margins of soil polygons on the upper ridge above the Valley of the Twin Falls, Kaumajet Mountains, no. 224 (A); at the base of the hill back of the Moravian Mission, Hopedale, no. 223 (A & H); in the sides of a moist crevice near the top of a hill on Rodney Mundy Island, Indian Harbor, no. 222 (A & H).

S. ANGLORUM Cham. For this species and its varieties see Schneider, Bot. Gaz. lxvi. 126 (1918). West side of the Valley of the Bryant Lakes, Kangalaksiorvik, no. 232 (A); on the rock ridge approaching the east summit of the Bishop's Mitre, Kaumajet Mountains, no. 233 (A); at the base of the hill back of the Moravian Mission, Hopedale, no. 227 (A & H).

S. ANGLORUM Cham., var. KOPHOPHYLLA Schn. On the west side of the Valley of the Bryant Lakes, Kangalaksiorvik, no. 231 (A); in the moist sphagnum near the top of the hill back of Battle Harbor, no. 226 (A).

Number 231 is an extreme type with cordate leaves and the twigs puberulous.

*S. ANGLORUM Cham., var. ARAIOCLADA Schn. Halfway down the scree on the south side of Peak 19, The Four Peaks, Kangalaksiorvik, no. 229 (A); on the steep bank of the "K" River, no. 228 (A).

Heretofore known only from the Gaspé Peninsula and the Rocky Mountains.

S. ARCTOPHILA Cockerell. On Rodney Mundy Island, Indian Harbor, no. 235 (A & H); near the top of the hill back of Battle Harbor, no. 234 (A).

S. CORDIFOLIA Pursh, var. TYPICA Fernald. For this species and its varieties see Fernald, RHODORA, xxviii. 181 (1926); also Schneider, Bot. Gaz. lxvi. 343 (1918). On dry, gravelly slopes, Near Island (Amiktok), Kangalaksiorvik, no. 230 (A).

S. CORDIFOLIA Pursh, var. CALLICARPAEA (Trautv.) Fernald. On slaty talus slope, Rowsell Harbor, no. 244 (A & O); at the margin of a large sphagnum bog on Kikkivitak Island, Ittekaut Bay, no. 249 (A); on hilltop near the harbor, Gready Island, no. 241 (A & H); on the seaward side of the island, Battle Harbor, no. 240 (A).

S. CORDIFOLIA Pursh, var. INTONSA Fernald. Mossy spot near waterfall on the north side of Nachvak, no. 247 (B); dry hillside

above tundra near the west shore of the island, Kikkertaksoak, Saglek, no. 248 (A); in the tundra on Rodney Mundy Island, Indian Harbor, no. 243 (A & H).

S. cordifolia Pursh, var. Macounii (Rydberg) Fernald. On the west side of the Valley of the Bryant Lakes, Kangalaksiorvik, no. 246 (A); in the moist tundra near a small brook, Rodney Mundy Island, Indian Harbor, no. 242 (A & H).

S. calcicola Fernald & Wiegand. On the bank of the "K" River near "K-1," Kangalaksiorvik, no. 252 (A); on slaty talus slope, Rowsell Harbor, no. 251 (A & O); in the Valley of the Twin Falls, Kaumajet Mountains, no. 250 (A).

S. planifolia Pursh. See Schneider, Jour. Arnold Arboretum, i. 75 (1919). In the valley of the Komaktorvik River, no. 255 (A); in a gully on the peninsula at Aillik, no. 254 (A).

S. argyrocarpa Anderss. In the valley of the Komaktorvik River, no. 245 (A).

Myrica Gale L. In the tundra beyond the wireless station, Battle Harbor, no. 256 (A).

Alnus crispa (Ait.) Pursh. Mossy spot near waterfall on the north side of Nachvak, no. 257 (B).

Betula glandulosa Michx. In moist sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 258 (A & H).

Koenigia islandica L. Near mouth of stream on the south side of East Bay, Ikordlearsuk, no. 264 (A & O); on mossy stream-bank, Near Island (Amiktok), Kangalaksiorvik, no. 263 (A); moist gravel under overhanging rocks, Gready Island, no. 262 (A & F).

Oxyria digyna (L.) Hill. On a restricted, moist, mossy area on the western end of the ridge near the east summit of the Bishop's Mitre, Kaumajet Mountains, no. 261 (A); in the Valley of the Twin Falls, no. 259 (A); in the gully from the Valley of the Twin Falls to the lower ridge, no. 260 (A).

Polygonum viviparum L. In sphagnum on Near Island (Amiktok), Kangalaksiorvik, no. 267 (A).

Silene acaulis L., var. exscapa (All.) DC. See Fernald and St. John, Rhodora, xxiii. 119 (1921). On gravelly slope above the tundra near the anchorage, Ryan's Bay, no. 324 (A & O); within 100 m. of the top of "K-2," north side of Komaktorvik, nos. 321, 322 (A); valley of the "K" River, Kangalaksiorvik, no. 320 (A).

Lychnis furcata (Raf.) Fernald (*L. affinis* J. Vahl). See Fernald, Rhodora, xxxiv. 22 (1932). On the dry slope of the ridge south of East Bay, Ikordlearsuk, no. 318 (A & O); old scree slope on the west side of the Valley of the Bryant Lakes, no. 319 (A); near the summit of "K-2," north of Komaktorvik, no. 317 (A).

Lychnis alpina L. In moist gully in cliff on the north side of Razorback Harbor, no. 316 (A); in the Valley of the Twin Falls, Kaumajet Mountains, no. 315 (A); crack in rock on the seaward side of Gready Island, no. 313 (O).

CERASTIUM ALPINUM L. For this species and its varieties see Fernald and Wiegand, RHODORA, xxii. 169 (1920). In a moist place on a hill-top near Gready Harbor, no. 297 (A & H).

C. ALPINUM L., var. GLANDULIFERUM Koch. On the ridge north of Razorback Harbor, no. 302 (A); in a restricted, moist area on a rock ridge near the east summit of the Bishop's Mitre, Kaumajet Mountains, no. 303 (A).

C. ALPINUM L., var. LANATUM (Lam.) Hegetschw. Moist, meadowy hillsides, Near Island (Amiktok), Kangalaksiorvik, no. 301 (A); on the northeast shoulder of Precipice Mountain, no. 300 (A); between the beach and the slaty talus, Rowsell Harbor, no. 299 (A & O); on the sides of a moist crevice near the top of a hill on Rodney Mundy Island, Indian Harbor, no. 298 (A & H).

*C. BEERINGIANUM Cham. & Schlecht. In moist gully in cliff on the north side of Razorback Harbor, no. 305 (A); in mossy tundra, north shore of Komaktorvik Lake, no. 304 (A).

C. ARVENSE L. Ogualik Island, no. 306 (B).

C. CERASTIOIDES (L.) Britton. In gravelly stream-bed in the edge of the tundra above the anchorage, Ryan's Bay, no. 311 (A & O); on a sandy stream-bank, Near Island (Amiktok), Kangalaksiorvik, no. 310 (A); on the north shore of Kangalaksiorvik, no. 309 (O & F); on the shores of Seaplane Cove, Kangalaksiorvik, no. 307 (A); moist gully in cliff on the north side of Razorback Harbor, no. 312 (A); scree slide from the top of Precipice Ridge to Komaktorvik Lake, no. 308 (A).

STELLARIA LONGIPES Goldie. Near a little pond in the tundra above the anchorage, Ryan's Bay, no. 293 (A & O); on the shores of Seaplane Cove, Kangalaksiorvik, no. 292 (A); between the beach and talus, Rowsell Harbor, no. 291 (A & O); Ogualik Island, no. 295 (B); mossy spot near the landing, Gready Island, no. 290 (A & F); in the Salix-Empetrum complex, Gready Island, no. 289 (A & H).

S. CRASSIFOLIA Ehrh. Near the Eskimo remains, shore of Seaplane Cove, Kangalaksiorvik, no. 285 (O).

S. HUMIFUSA Rottb. Margins of soil polygons, Near Island (Amiktok), Kangalaksiorvik, no. 287 (A); in moss by brook, Near Island (Amiktok), Kangalaksiorvik, no. 288 (A); shores of Seaplane Cove, Kangalaksiorvik, no. 286 (A).

ARENARIA VERNA L., var. PUBESCENS (Cham.. & Schl.) Fernald. See Fernald, RHODORA, xxi. 21 (1919). On scree on the south side of Peak 19, The Four Peaks, Kangalaksiorvik, no. 275 (A); between "K-2" and the "K" River, Kangalaksiorvik, no. 607 (A); near "K-2," Komaktorvik, no. 274 (A); near the easterly summit of the Bishop's Mitre, Kaumajet Mountains, no. 276 (A); in cracks in the bare rock top of hilltop near the harbor, Rodney Mundy Island, Indian Harbor, no. 268 (A & H).

A. VERNA L., var. PUBESCENS (Cham. & Schl.) Fern., forma EPILIS Fernald. Between the beach and the slaty talus, Rowsell Harbor, no. 273 (A & O).

This form was collected by *Sornborger* at Rama in 1897.

A. HUMIFUSA Wahlenb. (*A. cylindrocarpa* Fern.) See FERNALD, RHODORA, xvi. 43 (1914) and RHODORA, xxxv. 11 and 265 (1933); also Nordhagen, Bergens Museums Årbok, 1935, Natur. rekke, No. 1 (1935). On slaty talus slope, Rowsell Harbor, no. 284 (A & O).

A. GROENLANDICA (Retz.) Spreng. See Fernald, RHODORA, xxi. 17 (1919). Moist, gravelly areas among rocks, Kikkivitak Island, Ittekaut Bay, no. 272 (A); in cracks in the rock top of hill back of the Moravian Mission, Hopedale, no. 271 (A & H).

A. SAJANENSIS Willd. See Fernald, RHODORA, xxi. 12 (1919). Moist, mossy slope of the ridge south of East Bay, Ikordlearsuk, no. 281 (A & O); dry, gravelly patch of soil in tundra above the anchorage, Ryan's Bay, no. 277 (A & O); shores of Seaplane Cove, Kangalaksiorvik, no. 280 (A); top of ridge north of Razorback Harbor, no. 282 (A); on the margins of soil polygons, upper ridge above the Valley of the Twin Falls, Kaumajet Mountains, no. 278 (A); easterly slope of the Bishop's Mitre, no. 283 (A); lower ridge above the Valley of the Twin Falls, no. 279 (A).

SAGINA NIVALIS Fries. At the mouth of a stream emptying into the south side of East Bay, Ikordlearsuk, no. 270 (A & O); on the margins of soil polygons, upper ridge above the Valley of the Twin Falls, Kaumajet Mountains, no. 269 (A).

MONTIA LAMPROSPERMA Cham. See Fernald and Wiegand, RHODORA, xii. 138 (1910). At a stream-mouth, Near Island (Amiktok), Kangalaksiorvik, no. 613 (A).

This was called to my attention by Dr. R. A. Laubengayer in a lot of preserved *Koenigia islandica* with which it was mixed.

ANEMONE PARVIFLORA Michx. On slaty, talus slope, Rowsell Harbor, no. 342 (A & O); in the Valley of the Twin Falls, Kaumajet Mountains, no. 343 (A).

RANUNCULUS TRICHOPHYLLUS Chaix, var. ERADICATUS (Laestad.) W. B. Drew, *fide* Drew, RHODORA, xxxviii. 33 (1936). Pool in rocks on Near Island (Amiktok), Kangalaksiorvik, no. 325 (A).

R. REPTANS L. See Fernald, RHODORA, xix. 135 (1917). Moist, gravelly area in the tundra near the west shore of Kikkertaksoak Island, Saglek, no. 326 (A).

R. NIVALIS L. See Holm, Rep. Can. Arc. Exp. 1913–18, v. pt. B, 32 (1922). On the moist, mossy slope of the ridge to the south of East Bay, Ikordlearsuk, no. 328 (A & O); steep, wet bank of the "K" River, Kangalaksiorvik, no. 327 (A).

R. PYGMAEUS Wahlenb. See Fernald, RHODORA, xix. 138 (1917). On the ridge extending south from East Bay, Ikordlearsuk, no. 335 (A & O); mossy stream-bank, edge of the tundra above the anchorage, Ryan's Bay, no. 334 (A & O); spur on the southwest side of Mount Tetragona, no. 333 (A); valley of the "K" River, Kangalaksiorvik, no. 332 (A); on slaty talus slope, Rowsell Harbor, no. 331 (A & O);

on a restricted moist, mossy area on ridge near the east summit of the Bishop's Mitre, Kaumajet Mountains, no. 336 (A).

R. ALLENII Robinson. In the Valley of the Twin Falls, Kaumajet Mountains, nos. 329, 330 (A).

*R. PEDATIFIDUS J. E. Smith, var. LEIOCARPUS (Trautv.) Fernald (*R. affinis* R. Br.). See Fernald, RHODORA, xix. 138 (1917); and idem, xxxvi. 93 (1934). Mossy shore of lake south of East Bay, Ikordlearsuk, no. 338 (A & O); in the Valley of the Twin Falls, Kaumajet Mountains, no. 337 (A).

Otherwise known in eastern North America from Greenland, the Arctic Archipelago, Ungava, Newfoundland and the Gaspé Peninsula.

PAPAVER RADICATUM Rottb. See Hultén, Kungl. Svensk. Vetensk. Akad. Handl., ser. 3, v. no. 2, 138 (1928); also Simmons, Rep. Sec. Norw. Arc. Exp. "Fram" 1898–1902, pt. 2, 99 (1906). On the margins of soil polygons on the top of Ikordlearsuk Mountain, no. 349 (A); near "K-2," north side of Komaktorvik, no. 348 (A); on the west summit of the Bishop's Mitre, Kaumajet Mountains, no. 350 (A); lower ridge above the Valley of the Twin Falls, Kaumajet Mountains, no. 347 (A); on the slopes of the upper ridge above the Valley of the Twin Falls, Kaumajet Mountains, no. 346 (A); on the edge of soil polygon, on the upper ridge above the Valley of the Twin Falls, no. 345 (A).

Number 347 from the Kaumajet region was white-petalled. It was the only plant noted during the summer that had this character, but it is of interest in view of Gelting's[1] observations on the white-petalled form in Greenland that my specimen also lost its petals with even greater ease than do the yellow-petalled ones.

Whether the white-petalled form observed in northeastern Labrador is identical with that discussed by Nannfeldt (Symbol. Bot. Upsal. v. 84. (1935)) it is difficult to say. It is so rare as compared with the Scandinavian occurrence, as he reports it for some localities, that on a genetical basis the Labrador plant would seem to be a case of a sporadic, recessive mutation, rather than due to the segregation of individuals out of a population carrying factors for both white and yellow. This is evidently a case which requires cyto-taxonomic and breeding analysis for an approach to a clarification of the basic phenomena involved.

COCHLEARIA GROENLANDICA L. Between the beach and the slaty talus on the south side of Rowsell Harbor, no. 352 (A & O); moist crevice in rocky hilltop near the harbor, Gready Island, no. 351 (A & H).

[1] Gelting, Meddel. Grønl. ci. no. 2, 87 (1934).

Cardamine bellidifolia L. On the margins of soil polygons on the first peak of Ikordlearsuk Mountain, no. 359 (A); on moist, mossy north face of the ridge south of East Bay, Ikordlearsuk, no. 358 (A & O); scree on the south side of Peak 19, The Four Peaks, Kangalaksiorvik, no. 357 (A); on the lower slopes of "K-2," north side of Komaktorvik, no. 355 (A); on the steep, moist bank of the "K" River, Kangalaksiorvik, no. 354 (A); top of the ridge north of Razorback Harbor, no. 360 (A); on top of Precipice Mountain, north of Komaktorvik Lake, no. 356 (A); on the easterly peak of the Bishop's Mitre, Kaumajet Mountains, no. 361 (A); on top of the westerly peak of the Bishop's Mitre, no. 362 (A); on the margins of soil polygons, upper ridge above the Valley of the Twin Falls, Kaumajet Mountains, no. 353 (A).

Much of the material of this species collected in Labrador in the past has been labelled *C. bellidifolia* L., var. *laxa* Lange (see Meddel. Grønl. iii. 251 (1887)). While most of the specimens collected in the past agree well with the description of the variety in their generally loose habit, less compacted inflorescences, and longer petioles, my material provides various intermediate stages to the typical species, especially the plants from the higher exposed situations. With a graded series dependent primarily on local environmental variations, it does not seem that the variety is worthy of more than the designation of a form.

Draba fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball, *fide* M. L. Fernald. See Fernald, Rhodora, xxxvi. 286 (1934). Moist, mossy northern face of the ridge south of East Bay, Ikordlearsuk, no. 382 (A & O); steep, wet, cold bank of the "K" River, Kangalaksiorvik, no. 375 (A); spur on the southwest side of Mount Tetragona, no. 379 (A); on the lower slopes of "K-2," north side of Komaktorvik, no. 376 (A); top of the ridge north of Razorback Harbor, no. 384 (A); scree slide from the top of Precipice Ridge to Komaktorvik Lake, nos. 380, 381 (A); on slaty talus slope, Rowsell Harbor, no. 373 (A & O); on the west summit of the Bishop's Mitre, Kaumajet Mountains, no. 387 (A); on the eastward side of the east summit of the Bishop's Mitre, no. 386 (A).

D. rupestris R. Br., *fide* M. L. Fernald. See Fernald l. c. 292. Eastward side of the east summit of the Bishop's Mitre, no. 385 (A).

D. crassifolia Graham, *fide* M. L. Fernald. See Fernald l. c. 293. Steep, wet, cold bank of the "K" River, Kangalaksiorvik, no. 374 (A).

D. nivalis Liljebl., *fide* M. L. Fernald. See Fernald l. c. 296. Talus slope on the west side of the Valley of the Bryant Lakes, Kangalaksiorvik, no. 383 (A); spur on the southwest side of Mount Tetragona, nos. 377, 378 (A); margin of soil polygons on upper ridge above the Valley of the Twin Falls, Kaumajet Mountains, no. 372

(A); moist crevice near the top of hill on Rodney Mundy Island, Indian Harbor, no. 369 (A & H).

D. INCANA L., var. CONFUSA (Ehrh.) Liljebl., *fide* M. L. Fernald. See Fernald l. c. 315. At the edge of "The Park," Hopedale, no. 370 (A, H & F).

D. GLABELLA Pursh, *fide* M. L. Fernald. See Fernald l. c. 333. In the Valley of the Twin Falls, Kaumajet Mountains, no. 371 (A).

*ARABIS ARENICOLA (Richards.) Gelert. See Gelert, Bot. Tids., xxi. 287 (1898). Spur on the southwest side of Mount Tetragona, no. 390 (A); lower slopes of "K-2," north side of Komaktorvik, no. 389 (A); easterly slopes of the Bishop's Mitre, no. 391 (A); gully from the lower ridge to the Valley of the Twin Falls, Kaumajet Mountains, no. 388 (A).

Otherwise known from Greenland, the Arctic Archipelago, and various stations on Hudson Bay.

A. ALPINA L. In gully from the lower ridge to the Valley of the Twin Falls, no. 393 (A).

SAXIFRAGA RIVULARIS L. On moist, mossy slope of ridge south of East Bay, Ikordlearsuk, no. 400 (A & O); on the bank of the "K" River, Kangalaksiorvik, no. 397 (A); on top of Precipice Mountain, no. 398 (A); restricted moist, mossy area near the east summit of the Bishop's Mitre, Kaumajet Mountains, no. 399 (A); on the west summit of the Bishop's Mitre, no. 402 (A); lower ridge above the Valley of the Twin Falls, no. 396 (A); in a moist crevice near hilltop, Rodney Mundy Island, Indian Harbor, no. 395 (A & H); moist gravelly spot under a ledge near the harbor, Gready Island, no. 394 (A & F).

S. CERNUA L. See Fernald and Weatherby, RHODORA, xxxiii. 235 (1931). Halfway down the scree on the south side of Peak 19, The Four Peaks, no. 405 (A); on slaty talus slope, Rowsell Harbor, no. 404 (A & O); slope east of the summits of the Bishop's Mitre, Kaumajet Mountains, no. 406 (A); west summit of the Bishop's Mitre, no. 407 (A); gully from the lower ridge to the Valley of the Twin Falls, nos. 403, 426 (A).

S. CESPITOSA L. On the ridge south of East Bay, Ikordlearsuk, no. 413 (A & O); spur on the southwest side of Mount Tetragona, no. 412 (A); on slaty talus slope, Rowsell Harbor, no. 411 (A & O); ridge east of the summits of the Bishop's Mitre, no. 414 (A); gully from the lower ridge to the Valley of the Twin Falls, no. 410 (A).

S. STELLARIS L. Gravelly brook-bottom near the edge of the tundra above the anchorage, Ryan's Bay, no. 415 (A & O).

S. STELLARIS L., var. COMOSA Poir. Moist, mossy slope at the north end of the ridge extending south from East Bay, Ikordlearsuk, no. 416 (A & O).

S. NIVALIS L. Moist, mossy slope on the north end of the ridge extending south from East Bay, Ikordlearsuk, no. 420 (A & O); scree on the south side of Peak 19, The Four Peaks, no. 419 (A); spur on

the southwest side of Mount Tetragona, no. 418 (A); upper part of slaty talus slope, Rowsell Harbor, no. 417 (A & O).

S. AIZOIDES L. Moist gully in cliff on the north side of Razorback Harbor, no. 422 (A); mossy spot near waterfall, north side of Nachvak, no. 421 (B).

S. TRICUSPIDATA Retz. Moist gully in cliff on the north side of Razorback Harbor, no. 424 (A); upper part of the slaty talus slope, Rowsell Harbor, no. 423 (A & O).

S. AIZOÖN Jacq. Moist slope by stream entering the north side of Razorback Harbor, no. 428 (A); mossy spot near waterfall north side of Nachvak, no. 429 (B); upper part of slaty talus slope, Rowsell Harbor, no. 427 (A & O).

S. OPPOSITIFOLIA L. On the upper slopes of "K-2," north side of Komaktorvik, no. 432 (A); east slope near the summits of the Bishop's Mitre, Kaumajet Mountains, no. 433 (A); gully from the lower ridge to the Valley of the Twin Falls, no. 430 (A).

S. OPPOSITIFOLIA L., var. ALBIFLORA Lange. See Pflanzenreich iv. Fam. 117, Heft. 69, 624. In gully from the lower ridge to the Valley of the Twin Falls, Kaumajet Mountains, no. 431 (A).

PARNASSIA KOTZEBUEI Cham. & Schlecht. On slaty talus slope, Rowsell Harbor, no. 437 (A & O); in gully from the lower ridge to the Valley of the Twin Falls, Kaumajet Mountains, no. 435 (A); in the Valley of the Twin Falls, no. 436 (A).

RUBUS ACAULIS Michx. At base of the hill back of the Moravian Mission, Hopedale, no. 455 (A & H).

R. CHAMAEMORUS L.

Noted farthest north along the coast of Labrador at Kikkertaksoak Island, Saglek, August 19. No fruit had set on any of the plants, the single floral pedicels ending instead in the dried remains of the flowers. Delabarre[1] also noted that during the season of 1900 the "bakeapple" had not set fruit where it occurred farthest north on the coast. Holm[2] remarks that *R. Chamaemorus* "seldom becomes sufficiently advanced to produce mature fruit in these [the Polar] regions," although he considers the center of distribution is to be sought there. Why instead is this not a plant which is either working farther north by its highly specialized and efficient means of vegetative reproduction, or else originally was farther north during the "climatic optimum" after the Wisconsin glaciation and is now surviving thanks to its capable vegetative system? Either interpretation would account for the presence of the plant in regions which environmentally are apparently not suited to its reproducing by means of fruit.

[1] Delabarre, Bull. Geogr. Soc. Phila. iii. (1902).

[2] Holm, Rep. Can. Arctic Exp. 1913–18, v. pt. B, 107 (1922).

POTENTILLA NIVEA L. In the gully from the lower ridge to the Valley of the Twin Falls, Kaumajet Mountains, no. 440 (A).

P. NORVEGICA L., var. LABRADORICA (Lehm.) Fern. See Fernald, RHODORA, xxviii. 213 (1926). At the edge of "The Park," Hopedale, no. 441 (A, H & F).

*P. EMARGINATA Pursh. See Malte, RHODORA, xxxvi. 173 (1934). Moist, mossy mountain slope on the south side of East Bay, Ikordlearsuk, no. 444 (A & O); bank of "K" River, Kangalaksiorvik, nos. 442, 443 (A).

Otherwise this species is known from Port Burwell, Ungava Bay (*Malte*, 1928, and *Macoun*, 1910), Hudson Bay, Greenland, the Arctic Archipelago and elsewhere in the Arctic, and on the Shickshock Mts. of Gaspé.

P. ALPESTRIS Hall f. In mossy meadow beside lake south of East Bay, Ikordlearsuk, no. 449 (A & O); in tundra above the anchorage, Ryan's Bay, no. 450 (A & O); on the banks of "K" River, Kangalaksiorvik, no. 447 (A); near the base of "K-2," north of Komaktorvik, no. 448 (A); on the shore east of the Bishop's Mitre, no. 451 (A); in the Valley of the Twin Falls, no. 446 (A); moist sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 445 (A & H).

DRYAS INTEGRIFOLIA M. Vahl. Ogualik Island, no. 454 (B); on the lower ridge above the Valley of the Twin Falls, no. 453 (A); on disintegrated trap dike near the harbor, Rodney Mundy Island, Indian Harbor, no. 452 (A & H).

ASTRAGALUS ALPINUS L. On upper margin of the beach, Rowsell Harbor, no. 457 (A & O); in the Valley of the Twin Falls, no. 456 (A).

A. EUCOSMUS Robinson. In the Valley of the Twin Falls, Kaumajet Mountains, no. 459 (A); near the harbor, on Rodney Mundy Island, Indian Harbor, no. 458 (A & H).

Otherwise known from the coast at Rama where it was collected by *Stecker* in 1899 and at Nain where it was collected by *Sewall* in 1927.

*OXYTROPIS FOLIOLOSA Hook. For this and the following species see Fernald, RHODORA, xxx. 137 (1928). On the upper margin of the beach, Rowsell Harbor, no. 460 (A & O).

This has been collected elsewhere in eastern North America at Wakeham Bay, Hudson Strait, by *Malte* in 1927 and in Newfoundland by Professor *Fernald* and his companions. In Newfoundland Professor Fernald[1] notes that it is known only from areas with basic rock. The Labrador station is also basic rock, the Rama formation of slates. The species is otherwise known only from the Rocky Mountains.

O. TERRAE-NOVAE Fernald. On the upper margin of the beach,

[1] RHODORA, xxxv. 274 (1933).

Rowsell Harbor, no. 463 (A & O); on hilltops near the harbor, Rodney Mundy Island, Indian Harbor, no. 462 (A & H); seaward side of hill back of Battle Harbor, no. 461 (A).

Lathyrus japonicus Willd., var. aleuticus (Greene) Fernald. See Fernald, Rhodora, xxxiv. 177 (1932). In cracks of the rock, top of hill near harbor, Rodney Mundy Island, Indian Harbor, no. 465 (A & H); hillsides near harbor, Gready Island, no. 464 (A & H).

Empetrum nigrum L. Tundra near the west shore of the island, Kikkertaksoak, Saglek, no. 466 (A).

Ubiquitous at lower elevations in the tundra.

Viola palustris L. Half way up hill back of the Moravian Mission, Hopedale, no. 467 (A & H).

V. pallens (Banks) Brainerd. In sphagnous meadow beside lake on Gready Island, no. 468 (A & H).

V. labradorica Schrank. In the valley of the Komaktorvik River, no. 471 (A); in the Valley of the Twin Falls, no. 470 (A); moist, sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 469 (A & H).

Epilobium angustifolium L., var. intermedium (Wormsk.) Fernald. See Fernald, Rhodora, xx. 1 (1918). Moist slope by stream on the north side of Razorback Harbor, no 478 (A).

E. latifolium L. Tundra above the anchorage, Ryan's Bay, no. 479 (A & O).

Very common in northern Labrador and especially well-developed in number of individuals and luxuriance of growth on gravelly outwash plains and deltas.

E. alpinum L. See Fernald, Rhodora, xx. 36 (1918). On the north shore of Kangalaksiorvik, no. 480 (O & F).

Conioselinum chinense (L.) B. S. P. See Fernald, Rhodora, xxviii. 221 (1926). Mossy stream bank near the top of the hill back of Battle Harbor, nos. 481, 609 (A).

Collected previously by Bishop at Frenchman's Run, 1928.

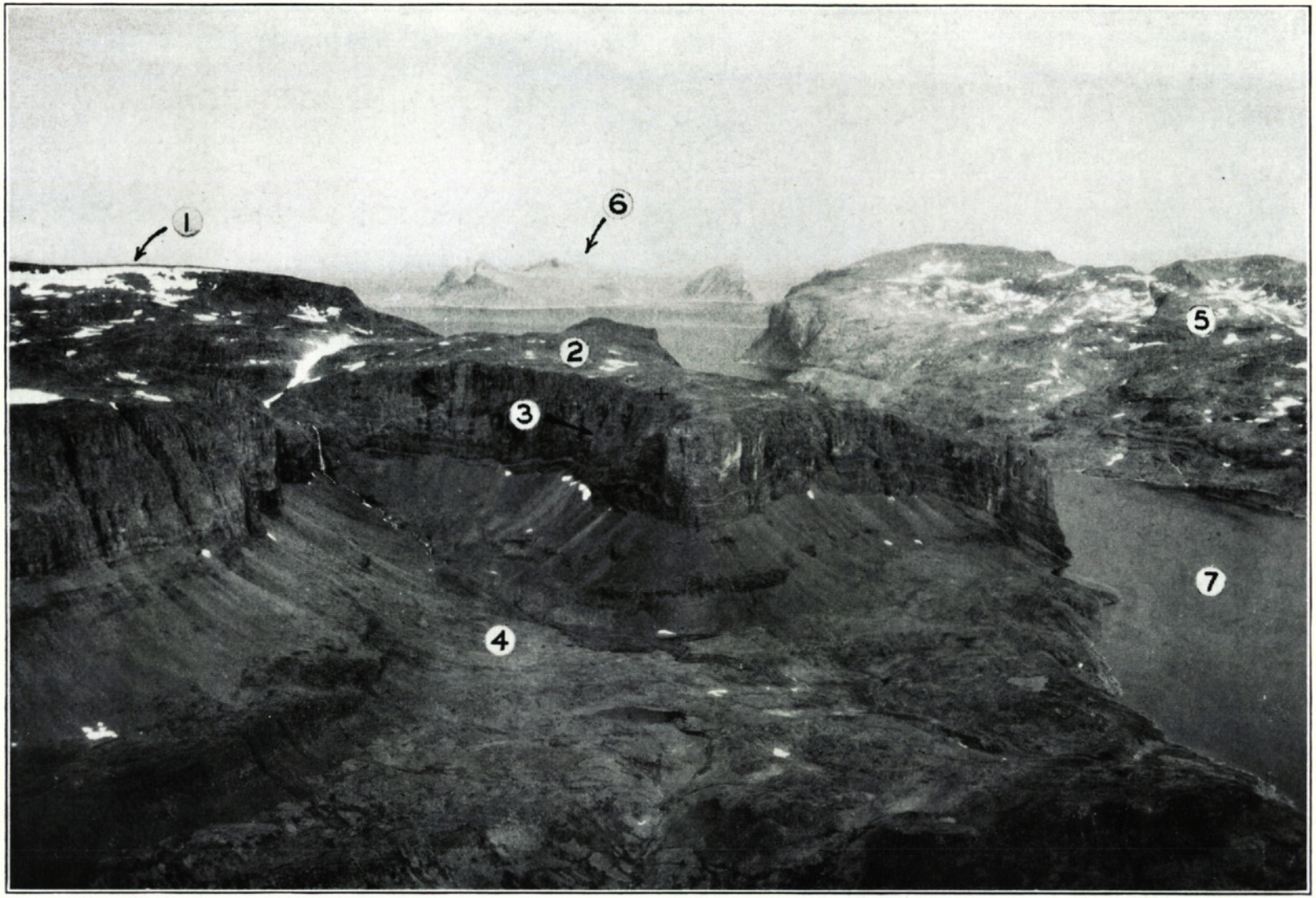
Pyrola secunda L., var. obtusata Turcz. In the Valley of the Twin Falls, Kaumajet Mountains, no. 482 (A).

P. grandiflora Radius. On slaty talus slope, Rowsell Harbor, no. 485 (A & O); in the Valley of the Twin Falls, no. 484 (A); in moist sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 483 (A & H).

Ledum palustre L., var. decumbens Aiton. Sphagnous meadow, Gready Island, no. 487 (A & F); tundra on Hawkes Island, no. 486 (A).

As Simmons[1] points out, the variety grades into the species proper. It hardly seems that this variety is worth more than the designation of a form, since it seems to be primarily an ecological development.

[1] Simmons, Phytogeogr. Arctic Amer. Arch. 116 (1913).



AERIAL VIEW OF VALLEY OF THE TWIN FALLS, KAUMAJET MOUNTAINS. FROM THE SOUTHWEST, 1932 (*courtesy of* Professor ALEXANDER FORBES). FIG. 1, THE UPPER RIDGE ABOVE THE VALLEY; FIG. 2, THE LOWER RIDGE; FIG. 3, GULLY FROM THE LOWER RIDGE TO THE VALLEY; FIG. 4, THE VALLEY OF THE TWIN FALLS; FIG. 5, OGUALIK ISLAND; FIG. 6, NANNUKTOK ISLAND; FIG. 7, MUGFORD TICKLE.

RHODODENDRON LAPPONICUM (L.) Wahlenb. In the valley of the Komaktorvik River, no. 488 (A).

CASSIOPE TETRAGONA (L.) D. Don. On the summit of "K-2," north side of Komaktorvik, no. 494 (A); on slaty talus slope, Rowsell Harbor, no. 493 (A & O).

C. HYPNOIDES (L.) D. Don. West side of the Valley of the Bryant Lakes, no. 492 (A); on the summit of "K-2," north side of Komaktorvik, no. 491 (A); on the bank of the "K" River, no. 490 (A); lower ridge above the Valley of the Twin Falls, Kaumajet Mountains, no. 489 (A).

VACCINIUM VITIS-IDAEA L., var. MINUS Lodd. On the summit of "K-2," north side of Komaktorvik, no. 496 (A); on the main ridge above the Valley of the Twin Falls, no. 495 (A).

STATICE LABRADORICA (Wallr.) Hubbard & Blake. See Blake, RHODORA, xix. 1 (1917). In the Valley of the Twin Falls, Kaumajet Mountains, no. 498 (A); moist sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 497 (A & H).

PRIMULA STRICTA Hornem. For this and the following species see Fernald, RHODORA, xxx. 59 (1928). Moist, gravelly slopes, Near Island (Amiktok), Kangalaksiorvik, no. 501 (A).

P. LAURENTIANA Fernald. Moist sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 500 (A & H).

P. EGALIKSENSIS Wormskj. Cracks in rock hilltops near the harbor, Rodney Mundy Island, Indian Harbor, no. 503 (A & H).

GENTIANA NIVALIS L. In the Valley of the Komaktorvik River, no. 504 (A); moist slope on the north side of Razorback Harbor, no. 505 (A). Also noted on the moist, cold bank of the "K" River but not collected.

A species collected but seldom on the coast of Labrador. Other collections in the Gray Herbarium from this region were made by Delabarre at Saglek Bay in 1900, by Sornborger at Rama in 1897, and by Rev. Heldenburg "in Labradoria" about 1845.

VERONICA WORMSKJOLDII Roem. & Schult. (*V. alpina* L., var. *unalaschensis* C. & S.). See Pennell, RHODORA, xxiii. 15 (1921). Between the beach and the slaty talus, Rowsell Harbor, no. 507 (A & O); in the Valley of the Twin Falls, Kaumajet Mountains, no. 508 (A); moist sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 506 (A & H).

CASTILLEJA PALLIDA (L.) Spreng., var. SEPTENTRIONALIS (Lindl.) Gray. Tundra above the anchorage, Ryan's Bay, no. 610 (A & O); east shore below the Bishop's Mitre, Kaumajet Mountains, no. 512 (A); Ogualik Island, no. 511 (B); in the Valley of the Twin Falls, no. 510 (A); moist, sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 509 (A & H).

EUPHRASIA ARCTICA Lange. See Fernald and Wiegand, RHODORA, xvii. 192 (1915); and also Fernald, RHODORA, xxxv. 301 (1933). Dry,

gravelly slopes, Near Island, (Amiktok), Kangalaksiorvik, no. 515 (A); wet bank of stream tributary to the "K" River, Kangalaksiorvik, no. 514 (A); between the beach and the slaty talus, Rowsell Harbor, no. 513 (A & O).

*E. HUDSONIANA Fern. and Wieg. See Fernald and Wiegand, l. c. 194. Mossy spot near waterfall on the north side of Ryan's Bay, no. 516 (B).

This little-known species was collected by *Spreadborough* on the Koaksoak River, Ungava Bay, in 1896. Otherwise it seems to be unknown from the Labrador peninsula and previously had not been collected from the Atlantic coast.

BARTSIA ALPINA L. Between the beach and the slaty talus, Rowsell Harbor, no. 519 (A & O); in the Valley of the Twin Falls, Kaumajet Mountains, no. 518 (A); moist, sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 517 (A & H).

PEDICULARIS LAPPONICA L. On slaty talus slope, Rowsell Harbor, no. 520 (A & O); in the Valley of the Twin Falls, Kaumajet Mountains, no. 612 (A).

P. LABRADORICA Hout. See Fernald, RHODORA, xxxiii. 193 (1931). Near the beach by the old Eskimo village, Hopedale, no. 521 (A & H).

P. FLAMMEA L. On slaty talus slope, Rowsell Harbor, no. 523 (A & O); in the Valley of the Twin Falls, Kaumajet Mountains, no. 522 (A).

PINGUICULA VILLOSA L. Moist, sphagnous tundra near a small brook, Rodney Mundy Island, Indian Harbor, no. 525 (A & H).

P. VULGARIS L. Mossy spot near waterfall on the north side of Nachvak, no. 524 (B).

PLANTAGO JUNCOIDES Lam., var. GLAUCA (Hornem.) Fernald. See Fernald, RHODORA, xxvii. 93 (1925). Freshwater pool near harbor, Gready Island, no. 527 (A & H).

LONICERA VILLOSA (Michx.) R. & S., var. CALVESCENS (Fern. & Wieg.) Fernald. (*L. caerulea* L., var. *calvescens* Fern. & Wieg.). See Fernald, RHODORA, xxvii. 8 (1925). In moist, sphagnous tundra near small brook, Rodney Mundy Island, Indian Harbor, no. 528 (A & H).

LINNAEA BOREALIS L., var. AMERICANA (Forbes) Rehder. Margin of spruce-fir grove, Kikkivitak Island, Ittekaut Bay, no. 529 (A).

CAMPANULA UNIFLORA L. In the Valley of the Twin Falls, Kaumajet Mountains, no. 476 (A); side of a gravelly hill on Rodney Mundy Island, Indian Harbor, no. 475 (A & O).

The collection from the Valley of the Twin Falls has the corolla markedly shorter than the calyx-lobes which gives it a distinctive appearance. An examination of the material in the Gray Herbarium indicates, however, that it is merely a very extreme form connected by

intermediates with the more usual type, which also varies to the other extreme where the corolla is much longer than the calyx.

C. ROTUNDIFOLIA L. See Malte, RHODORA, xxxvi. 188 (1934). Among rocks in the delta of the "K" River, Kangalaksiorvik, no. 473 (A); top of the ridge north of Razorback Harbor, no. 474 (A); moist sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 472 (A & H).

SOLIDAGO MACROPHYLLA Pursh, var. THYRSOIDEA (E. Meyer) Fernald. See Fernald, RHODORA, viii. 227 (1906). Mossy spot near waterfall on the north side of Nachvak, no. 531 (B); between the hill and the beach near the old Eskimo village, Hopedale, no. 530 (A & H).

S. MULTIRADIATA Ait. See Fernald, RHODORA, xvii. 4 (1915). Moist gully in cliff on the north side of Razorback Harbor, no. 535 (A); on slaty talus slope, Rowsell Harbor, no. 534 (A & O); Ogualik Island, no. 536 (B); in the Valley of the Twin Falls, no. 533 (A).

ERIGERON UNALASCHENSIS (D. C.) Vierh. See Malte, RHODORA, xxxvi. 190 (1934). On slaty talus slope, Rowsell Harbor, no. 537 (A & O); just below the easterly summit of the Bishop's Mitre, Kaumajet Mountains, no. 538 (A).

ANTENNARIA HUDSONICA Malte, *fide* M. O. Malte. For a consideration of this and the following species see Malte, RHODORA, xxxvi. 101 (1934). On the ridge south of East Bay, Ikordlearsuk, no. 547 (A & O); dry gravelly slopes of Near Island (Amiktok), Kangalaksiorvik, no. 549 (A).

A. CANESCENS (Lange) Malte, *fide* M. O. Malte. Dry gravelly slopes of Near Island (Amiktok), Kangalaksiorvik, no. 554 (A); steep, wet, cold bank of the "K" River, Kangalaksiorvik, nos. 552, 553 (A); moist gully in cliff on the north side of Razorback Harbor, nos. 556, 556a (A).

A. LABRADORICA Nutt., *fide* M. O. Malte. See Fernald, RHODORA, xxxiii. 222 (1931). Near the top of Precipice Mountain, Torngat Mountains, no. 543 (A)—identity doubtful; in the Valley of the Twin Falls, Kaumajet Mountains, no. 550 (A).

A. ANGUSTATA Greene, *fide* M. O. Malte. Scree on the south side of Peak 19, The Four Peaks, nos. 545, 545a (A); dry gravelly slopes, Near Island (Amiktok), Kangalaksiorvik, no. 546 (A); small spur on the southwest side of Mount Tetragona, no. 542 (A); summit of "K-2," north side of Komaktorvik, nos. 541, 541a (A); steep, wet, cold bank of the "K" River, Kangalaksiorvik, nos. 540, 540a (A); top of the ridge north of the harbor, Razorback Harbor, no. 548 (A); scree slide from the top of Precipice Ridge to Komaktorvik Lake, no. 544 (A); on slaty talus slope, Rowsell Harbor, no. 539 (A & O).

A. PYGMAEA Fernald. See Fernald, RHODORA, xvi. 129 (1914) and RHODORA, xxvi. 99 (1924). Base of "K-2," north side of Komaktorvik, no. 561 (A); steep, wet, cold bank of the "K" River, Kangalaksiorvik, no. 560 (A); on slaty talus slope, Rowsell Harbor, no. 559 (A & O); Valley of the Twin Falls, Kaumajet Mountains, no. 558 (A).

A. isolepis Greene. Dry hillside, west shore of the island, Kikkertaksoak, Saglek, no. 562 (A).

A. sp. unidentifiable, *fide* M. O. Malte. Moist gully in cliff on the north side of Razorback Harbor, no. 555 (A); on slaty talus slope, Rowsell Harbor, no. 551 (A & O).

Gnaphalium supinum L. Half way down the scree on the south side of Peak 19, The Four Peaks, no. 564 (A); scree slide from the top of Precipice Ridge to Komaktorvik Lake, no. 563 (A).

The only other collection from the coast of Labrador is that made by *Sornborger* at Rama in 1897.

Artemisia borealis Pall. Valley of the Komaktorvik River, no. 566 (A); on slaty talus slope, Rowsell Harbor, no. 565 (A & O).

A. borealis Pall., var. latisecta Fernald. See Fernald, Rhodora, xxix. 93 (1927). Dry, gravelly slopes, Near Island (Amiktok), Kangalakasiorvik, no. 567 (A).

Arnica terrae-novae Fernald. See Fernald, Rhodora, xxxv. 365 (1933). Moist, meadowy hillsides, Near Island (Amiktok), Kangalaksiorvik, no. 572 (A); moist gully in cliff on the north side of Razorback Harbor, no. 573 (A); slaty talus slope, Rowsell Harbor, nos. 570, 571 (A & O).

A. plantaginea Pursh. See Fernald, Rhodora, xxvi. 104 (1924). On slaty talus slope, Rowsell Harbor, no. 569 (A & O); moist, sphagnous tundra, Rodney Mundy Island, Indian Harbor, no. 568 (A & H).

Senecio pauciflorus Pursh. See Fernald, Rhodora, xxvi. 116 (1924). Valley of the Komaktorvik River, no. 575 (A); Valley of the Twin Falls, Kaumajet Mountains, no. 574 (A).

S. palustris (L.) Hook. Moist bottom of a recently desiccated pool on the seaward side of the island, Battle Harbor, no. 576.

Immature specimens, kindly determined by Professor Fernald.

Taraxacum lacerum Greene, *fide* M. L. Fernald. See Fernald, Rhodora, xxxv. 378 (1933). Lakeside meadow at foot of ridge south of East Bay, Ikordlearsuk, nos. 593, 594 (A & O); moist, meadowy hillsides, Near Island (Amiktok), Kangalaksiorvik, no. 595 (A); top of ridge north of harbor, Razorback Harbor, no. 596 (A); moist gully in cliff on north side of Razorback Harbor, nos. 583, 597 (A); base of hill back of Moravian Mission, Hopedale, no. 592 (A & H).

T. lapponicum Kihlm., *fide* M. L. Fernald. See Fernald, l. c. 383. Shore of lake at base of hill south of East Bay, Ikordlearsuk, no. 585 (A & O); moist hillside above tundra near the anchorage, Ryan's Bay, nos. 588, 589 (A & O); dry, gravelly slopes, Near Island (Amiktok), Kangalaksiorvik, no. 591 (A); base of "K-2," near "K" River, no. 578 (A); moist gully in cliff on north side of Razorback Harbor, nos. 582, 584, 590 (A); moist crevice in hillside near harbor, Rodney Mundy Island, Indian Harbor, no. 598 (A & H).

T. sp. (unidentifiable) *fide* M. L. Fernald. Valley of the Komak-

torvik River, no. 587 (A); Ogualik Island, nos. 586, 586a (B); Valley of the Twin Falls, Kaumajet Mountains, no. 581 (A); base of the hill back of the Moravian Mission, Hopedale, nos. 579, 580 (A & H).

CREPIS NANA Richards. On the lower ridge above the Valley of the Twin Falls, Kaumajet Mountains, no. 599 (A).

This collection is a single individual of a very rare species. It was growing in the exceedingly well-drained gravel formed by the decomposition of the basic rocks of the Mugford series. Although an extensive search was made for other individuals, none were found. It is of interest that it is also very rare and local in Newfoundland as Professor Fernald[1] indicates in his dramatic description of its discovery on the dry limestone barrens of Burnt Cape. The only other records in eastern North America for this rarity are from Rama on the coast of Labrador where it was collected in 1897 by *Sornborger,* and in 1899 by *Stecker,* from an outcrop of slate.[2] There is still another record of a very ambiguous nature in the Gray Herbarium. A single plant of *Crepis nana* has associated with it a label which indicates that it was collected by "Waitz" at "O. Kuk," Labrador and also by "Wietz" at Northumberland Bay. Under the circumstances this specimen with its dual data can hardly be considered. As far as we have good records this interesting little plant appears to occur only on areas of basic rock in eastern North America.

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THE PRODUCTION OF SEED BY EUPHORBIA CYPARISSIAS

W. C. MUENSCHER

AN illustration of a common weed in which the production of seeds is thought to be of rare occurrence is *Euphorbia Cyparissias,* commonly known as Cypress Spurge or Graveyard Weed. This plant was one of the early introductions into America and was formerly extensively planted as an ornamental. The distribution and spread of this perennial by vegetative propagation by its roots has been pointed out by Deane, who believed that, "the plant has in a great measure lost its power of setting fruit, at least in America."[3] Deane recorded the production of seeds by *Euphorbia Cyparissias* at Shelburne,

[1] RHODORA, xxviii. 103–104 (1926).
[2] Fernald and Sornborger, Ottawa Nat. xiii. 107 (1899).
[3] Deane, W. RHODORA **12**: 57–61. 1910.