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Botanical and physiographic reconnaissance of northern British Columbia

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FRONTISPIECE. *Picea glauca* woods along the Narrows of the Grand Canyon of the Stikine River, approximately 35 miles upstream from Telegraph Creek, British Columbia. In this section the Stikine River has cut a spectacular gorge up to 1000 feet deep through horizontal Tertiary rocks and underlying steeply folded Triassic and Upper Paleozoic rocks. The river has an elevation of approximately 1500 feet here at approximately 58°08′ N; 130°20′ W.

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Stanley L. Welsh[1] and J. Keith Rigby[2]

ABSTRACT

The area of study is located in northern central British Columbia and includes the Sustut Basin and surrounding mountains. The physiography and geology of the region is described and the plant communities are enumerated. An annotated list of 205 species, 11 subspecies, and 35 varieties collected during the summer of 1969 is included.

INTRODUCTION

Location

The Sustut Basin and surrounding mountains, the primary area of collecting, are located in north central British Columbia (Fig. 1) in parts of the McConnell Creek, Spatsizi, Toodoggone, Dease Lake, and Cry Lake quadrangles. The collecting area, approximately 150 miles long and 40 to 50 miles wide, extends northward from approximately 56°39′ to 58°30′ North latitude, and westward from 126°30′ to 130°30′ West longitude. Collections are representative of the region between Thutade Lake and Sustut Peak, northwestward to Dease Lake, in a belt northeast of the Skeena River and Little Klappan River valleys and southwest of the Omineca and Thudaka Ranges in the headwaters of the Stikine, Finlay, and Skeena Rivers (Fig. 2).

Prince George is 279 miles southeast of the southern part of the basin and Hazelton is 120 miles to the south-southwest (Fig. 1). Telegraph Creek is 99 miles northwest, and Watson Lake, Yukon, is 135 miles north of the northern part of the area.

The Sustut Basin is situated along the Continental Divide between Arctic and Pacific drainages. Much of the southern part of the basin drains through the Finlay River into the Peace River and the Arctic Mackenzie drainage. The southwestern part drains into the Skeena River, and the central and northwestern part drains into the Stikine River in the Pacific drainage. The Kechika and Dease Rivers drain the north and northeastern area into the Liard River and Arctic drainage.

Accessibility

The area of primary concern is currently accessible only by float planes to the several lakes in the area and by helicopter. Even large planes can work from Thutade, Tatlatui, Trygve, Kitchener, Cold Fish, and Dease Lakes (Fig. 2). Several of the smaller lakes are adequate for landing by either a Beaver or Otter and could function as a secondary campsite or base. A short, graded but unsurfaced, air strip is available at the southeastern corner of the area in the vicinity of Sustut Peak and Moose Valley. The strip is currently maintained by the New Wellington mine operation and is capable of handling a Twin Beechcraft, although at certain times of the year the strip is soft. A second dirt strip is maintained at Hyland Post, in the central part of the area, on the Spatsizi River. A third was contemplated by 1970 at the northern end of Cold Fish Lake in the northwestern part of the basin.

Although no roads lead directly into the area, several roads are constructed into relatively nearby areas. An all-weather, maintained, graded road leads from Watson Lake and the Alaska Highway south to Dease Lake and southwest to Telegraph Creek. A spur road is currently under construction which will connect Dease Lake and Stewart. This road is finished as far south as

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Kinaskan Lake and could be utilized by field vehicles as far as Bob Quinn Lake in 1969. A winter caterpillar tractor trail is developed eastward from Dease Lake approximately 20 miles in the vicinity of the east side of Dome Mountain and could afford access to the northern part of the area. A mine access road along the north side of the Stikine River was under construction late in the summer of 1969. It extends east from near the Stikine River ferry to the southeastern margin of the Three Sisters Peaks region, near the northern edge of the Sustut Basin.

Topographic maps with a scale of 1:250,000 are available for the entire area. Relatively recent geologic maps are available for the eastern half of the McConnell Creek Quadrangle (Lord,

FIG. 1. Map of British Columbia showing area of collection.

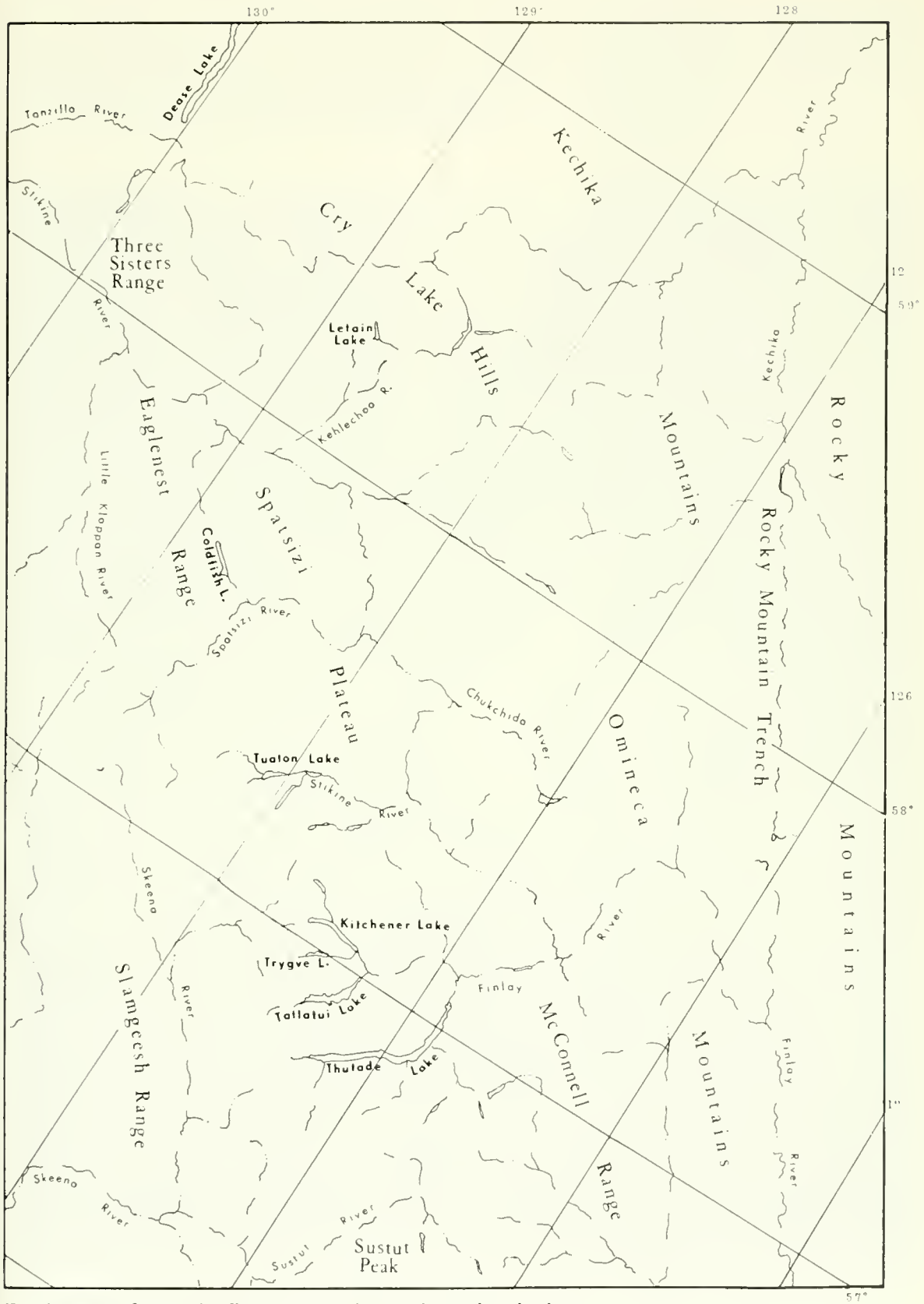
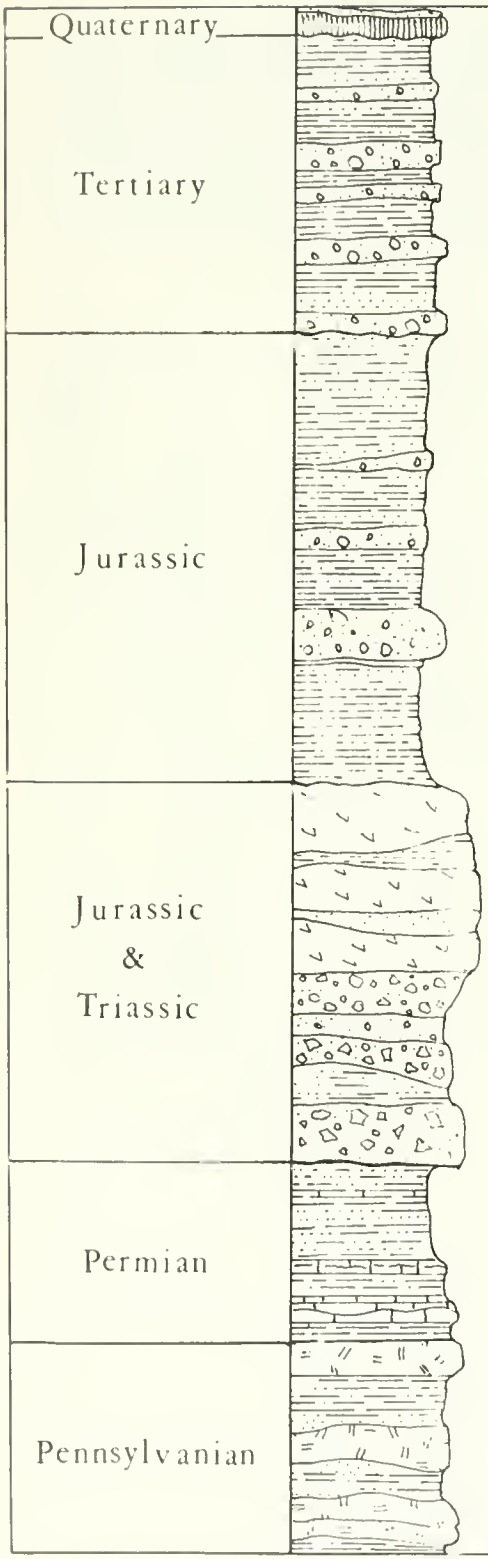


Fig. 2. Map of area of collection, in north central British Columbia.



TUYA BASALT and overlying glacial debris and alluvium

SUSTUT GROUP

Well-bedded sandstone, conglomerate, mudstone with minor interbedded dacite tuff, carbonaceous shale and coal. Group may include some Cretaceous rocks in the lower part. Generally well-bedded and flat lying in plateaus, with ledges and slopes.

BOWSER GROUP

Interbedded gray-green and dark-gray, thin-bedded mudstone and siltstone, gray-green, thin- to thick-bedded graywacke sandstone, massive to thick-bedded graywacke pebble- to cobble-conglomerate, with minor thin limestone, coal, and carbonaceous shale units.

TAKLA GROUP

Massive gray-green, reddish brown, and maroon agglomerate with local beds of graywacke and tuff with minor siliceous and tuffaceous argillite and basalt. Forms resistant crags and cliffs in higher ranges of the region.

CACHE CREEK GROUP

Interbedded chert, graywacke, tuff, basalt, and limestone in somewhat cyclic sequence. Limestones are locally fossiliferous and cherty; graywacke and tuff units are siliceous. Entire unit shows some metamorphism and structural complexity. Forms shoulders below crags of Triassic volcanic section.

ASITKA GROUP

Reddish brown, pinkish gray and bright apple green tuff and argillite with interbedded massive pinkish brown to maroon rhyolite and andesite flows. Forms craggy exposures near the valley margins.

FIG. 3. Geological section for northern British Columbia.

1948), and Cry Lake Quadrangle (Gabrielse, 1962) and the Dease Lake Quadrangle (Gabrielse and Souther, 1961). The Spatsizi and Bowser Lake quadrangles are covered as part of the older Project Stikine map by the Geological Survey of Canada (1957). Aerial photographs, with a scale of approximately 1:30,000 are available for most of the area of primary concern through offices of the Geological Survey of Canada in Calgary.

Fig. 4. Geological camp at Coldfish Lake, on beach gravel of high stand of the lake, in a protected forest at collecting locality 6, at approximately 57°39′ N; 128°44′ W, at an elevation of approximately 3820 feet. Mixed woodland dominated by *Pinus contorta, Picea glauca,* and *Betula glandulosa.*

PHYSICAL FEATURES

All of the collecting area is included in the Interior Ranges of British Columbia and in the Interior Plateau section in the Stikine River region along the east side of the Bowser Basin, 60 miles southwest of the Rocky Mountain Trench. In broad terms the entire region can be subdivided into: 1) the high rugged topography of the Sustut belt; 2) the low bordering lowland river valleys along the southwestern, northern and northeastern sides of the plateaus; 3) the horizontally bedded plateau belt from Thutade Lake northwestward into the Spatsizi Plateau; 4) folded Sustut and Bowser beds and the intensely folded high mountains and glaciated areas east of the Skeena River Valley; 5) the Cry Lake hills to the north; 6) the uplands and highlands to the northeast of the basin; 7) the Eaglenest Range uplands; and 8) Three Sisters Range.

The Sustut Peak highlands and adjacent Asitka uplands are a region of relatively mountainous terrain that extends from Niven Peak southeast beyond Sustut Peak in the region of outcropping Paleozoic and Triassic to upper Jurassic volcanic rocks (Lord, 1948). The belt of highlands is dominated by Sustut Peak which rises to an elevation of 8100 feet, 4000 feet above the valley floor of Moose Valley on the northeast and Sustut Lake directly to the east. Savage Peak, with an elevation of 7600 feet, and Dewar Peak, with an elevation of 7350 feet, are northern parts of the highlands. All of the major high peaks are horns and are connected to one another by arête ridges. The entire area has been intensely glaciated, and active glaciers still persist on the northeast side of Savage and Dewar Peaks and around the east and north sides of Sustut Peak. The eastern part of the range is carved in large part from folded Late Paleozoic volcanic and carbonate rocks that produce a relatively subdued topography in contrast to the high peaks

FIG. 5. Forest in the vicinity of the Cold Fish Lake camp, Locality 6, at 57°39′ N; 128°44′ W, at approximately 3800 feet elevation. Boreal forest of *Pinus contorta* and *Picea glauca*, with tents surrounded by *Salix* species and *Betula glandulosa*.

Fig. 6. West across Coldfish Lake from the campsite at 57°39′ N; 128°44′ W. toward the south end of the Eaglenest Range, with well-developed Boreal Forest in the foreground and along the low flanks of the volcanic range in the background. The camp is at approximately 3800 feet and the range crest at approximately 7500 feet. Boreal Forest of *Picea glauca, Abies lasiocarpa,* and *Pinus contorta.* The lake shore is fringed with *Betula glandulosa* and *Salix* species.

and ragged massive cliffs carved on the thick-bedded Triassic and Jurassic agglomerate along the west side of the belt. Toward the northwest Sustut Peak highlands are separated from the southeastern plateaus by the broad Niven River valley which separates the folded Paleozoic Triassic and Jurassic rocks from the nearly flat-lying Cretaceous and Tertiary Sustut rocks to the northwest (Fig. 3). Broad Moose Valley and Asitka River valley on the east separate the Sustut Peak area from the McConnell Range and other mountainous areas of the Omineca batholithic areas to the northwest.

Broad flat-topped, but deeply indented, glaciated plateaus have developed along the northeastern side of Sustut Basin from near Thutade Lake, northwestward beyond the Spatsizi Plateau, to the Stikine Valley in the vicinity of the

Three Sisters Range, a distance of approximately 100 miles. The plateau section is carved on horizontal or very nearly horizontal Sustut beds which form relatively open, simple-contoured topography and extends from Mt. Forest-Niven River region southeast of Thutade Lake northwestward across the entire Spatsizi Plateau. The characteristic topographic development of the horizontal beds is perhaps best shown in the area between Tatlatui and Thutade Lakes in the

FIG. 7. Southwest along Buckinghorse Creek near its junction with the Spatsizi River. Outcrops of Jurassic volcanics are in the foreground with spruce woods on the talus of the overlying Bowser formation at approximately 57°27' N; 128°35' W. *Picea glauca* woodland, with *Populus tremuloides*, *Betula glandulosa*, and *Salix* species in the openings.

vicinity of Tabletop Mountain and Mt. Jorgensen (Fig. 25) where the alternating resistant and nonresistant beds form almost lake terracelike topographic features. The same erosional pattern can be seen from southeast of Thutade Lake on Thutade Peak and on Mt. Forest and to the Stikine River Valley and Idozadelly Mountain and the Spatsizi Plateau in the bend of the Stikine River. The entire flat upland of the plateau rises to an elevation of 6500 to 6800 feet, approximately 3000 to 4000 feet above the valley floor lowlands. It is a region of broad open summits and relatively gently sloping walls to broad, flat, river valleys. In general, it is a region where lake development is not extensive. The northeastern tip of Thutade, Tatlatui, Kitchener and Laslui Lakes extend into the western part of the plateaus, but broad valleys of these lakes and their drainages dissect the plateau surface.

An eastern lowland belt separates the horizontal plateau section, where Tertiary and Cretaceous horizontal rocks dominate, from the dipping Triassic and Jurassic rocks along the flanks of the Omineca and Cassiar batholith belt to the east and northeast. A nearly continuous, low, broad valley extends southeast from near Dease Lake along tributaries and main valley of the Stikine River into the vicinity of Caribou Hide, and then on the Toodoggone River and continuing southeastward into the headwaters of the Finlay River and Moose Valley. These broad, low valleys have an elevation of from 3000 to 4500 and range up to 15 to 20 miles wide. The various drainages are separated by low, broad passes such as Matzantan Pass between the Toodoggone and Stikine rivers; Lawyer's Pass between the Toodoggone and Chapea rivers, the latter a tributary near the head of the Finlay River at Thutade Lake. A broad pass in the middle of Moose Valley separates the Finlay River drainage from that of the Skeena and the Sustut Rivers and is almost unnoticed when flying over the region in the southwestern end of the valley.

A western lowland along the Klappan and the Little Klappan and the Skeena rivers continues N 30° W, almost along strike near the south-

Fig. 8. Boreal Forest on the north flank of the deep Grand Canyon of the Stikine River at approximately 58°09′ N; 130°21′ W, above the junction of the Tanzilla River with the Stikine River. Prominent ledges are of conglomeratic sandstone separated by broad shale belts along the shoulder of the canyon at an elevation of approximately 2500 feet. Mixed *Picea glauca-Populus tremuloides* woodland.

FIG. 9. Northwest toward the main massif of Savage Peak, elevation 7600, at 56°39′ N; 126°42′ W, eroded from massive agglomerate of the lower part of the Takla Group. The rocks which hold up Savage Peak are essentially of the same unit as that which holds up Sustut Peak to the southeast. Savage Peak is here proposed for Douglas Savage who has spent many years in the area and who was killed in a helicopter crash just east of the peak in Moose Valley in the summer of 1969. Valley bottom with meadow and Boreal Forest extending up slope to alpine tundra.

western border of the area of primary concern. These valleys are 4 to 5 miles wide, broad, with steep walls and are intensely glaciated. They separate the interior of the Bowser Basin from the folded Bowser beds to the northeast. Both the Skeena and Klappan valleys have elevations between 3000 and 4000 feet and bridge over a broad open pass at almost midlength along the area of concern near Mt. Gunnanoot. The Skeena River drains to the southwest into the Pacific, and the Klappan and Little Klappan River drain ultimately into the Stikine River near the northwestern edge of the acreage and then into the Pacific.

West and south of the horizontally bedded plateaus of the Sustut Basin is a mountainous area carved, in large part, in complexly folded and faulted Jurassic Bowser Group and Creta-

ceous Tertiary Sustut beds. The boundary between these folded rocks and the relatively simple to horizontal Sustut beds of the basin is along a prominent hogback or a line almost due northwest from the middle of Thutade Lake, northwest across the tip of Tatlatui and Kitchener lakes, along the west base of the Brothers Peak and northwest across Lashui Lake toward the western Spatsizi Plateau east of Coldfish Lake. Southwest of this hogback both the Bowser and Sustut rocks are complexly folded in a series of asymmetric anticlines and synclines. The folded beds and the relatively high elevation produce rather spectacular, sharp, serrated peaks, many of which are now glaciated, characterized by such heights as Rama Peak, with an elevation of 7105 feet, Chipmunk Peak with an elevation of approximately 7135 feet, and Mellanistic Peak, with an elevation of 7110 feet. All of these rise 4000 to 4500 feet above the general low valley along the Skeena River to the west and above the general elevation of 6000 to 6500 feet of the plateau regions to the northeast.

Three Sisters Range is a complex igneous intrusive mass in Triassic and Jurassic volcanic rocks. It occurs near the northwest border of the area a few miles southeast of Dease Lake. In this general area the rock dip regularly from the intrusive mass near the Three Sisters Peak into the low country along the southeast border of Dease Lake and south and eastward into the Stikine River Valley and its tributaries. Peaks in the range rise to 7565 feet in the northeastern part. Three Sisters Range is nearly circular, 15 to 20 miles in diameter, and is the southwesternmost major promontory of igneous activity associated with the Omineca-Cassiar batholith sequence. The Three Sisters rises above the McBride River hills to the east and the Hotailuh Range to the west. These latter areas are of relatively moderate relief and are in folded Triassic rocks, in the main.

Fig. 10. Meadow, shrubland, and Boreal Forest along Spatsizi Valley, at lat. 57°34′ N. long. 128°33′ W, elevation 3700′.

The Eaglenest Range highland is carved in folded Jurassic (?) volcanic rocks but is distinctive from less prominent peaks carved in the folded Jurassic Bowser beds because of the spectacular, sharp, serrated ridges and peaks which the massive volcanic rocks have produced. The Eaglenest Range rises above broad Coldfish Valley, which separates it from the Spatsizi Plateau, to the northwest, and generally above the ranges of folded Bowser rocks to the west and southwest. Like other ranges, glaciated valleys are often connected by low passes through the margin of the range or near the valley floor of adjacent lowlands. Peaks, such as Nation Peak, with an elevation of 7741 feet; Mt. Will, with an elevation of approximately 7600 feet, and Cartmell Mountain, with an elevation of 7135 feet, rise three to four thousand feet above adjacent valleys.

Cry Lake Hills, at the northern margin of the area studied, are carved in metamorphosed Paleozoic and Mesozoic rocks and form rather subdued to rounded ranges and hills, all of which have been glaciated and rounded beneath ice masses (Gabrielse, 1962). The Cry Lake Hills are relatively low features, with a relief of approximately 2000 feet in the main, and occur in front of the main Stikine Ranges to the northeast in the belt of Omineca and Cassiar batholith development. These hills are more or less topographic continuations of the Mt. Dease and the McConnell Range uplands which rise only moderately above the bordering Stikine River-Sturdee River-Moose Valley lowlands. The Cry Lake Hills and the other southeastward continuations show on the topographic maps as generally rounded topography rather than as sharply ridged and jagged topography of adjacent highlands to the northeast.

VEGETATION

Boreal Forest

The Boreal Forest, which occupies most of the area of northern British Columbia, is dominated by three tree species (Figs. 4, 5, and 6). The most abundant of these is the white spruce, *Picea glauca.* Next in importance is the alpine fir, *Abies lasiocarpa.* Third in importance numerically is the lodgepole pine, *Pinus contorto.* There are two other tree species which make up a smaller part of the total Boreal Forest. They are the aspen, *Populus tremuloides,* and the cottonwood, *P. balsamifera.* White spruce is abundant on alluvial gravels in valley bottoms, and on glacial moraine and talus. Alpine fir occurs as individual trees and in small groups within the spruce-dominated woods in the lower elevations. Upwards, the alpine fir is more abundant, and in timberline situations alpine fir is the dominant conifer. Lodgepole pine occurs mostly on ridges of glacial moraine, which are evidently better drained than the surrounding regions. In some sites, such as north of New Wellington mining camp, lodgepole pine occur in almost pure stands.

Aspen occurs in parkland areas, usually above the spruce forest, but also in openings in spruce woodlands, commonly on slopes (Figs. 7 and 8).

Major components in the understory of the spruce-fir-pine woods include species of willow (*Salix* spp.), and the almost omnipresent dwarf birch, *Betula glandulosa.* Other components of the understory include:

Linnaea borealis, Viburnum edule, Shepherdia canadensis, Lonicera involucrata, Cornus canadensis, and *Empetrum nigrum.*

The ground layer in the woodlands consists of sparse to dense vegetation. In some areas there are three species of violet growing sympatrieally, two of which are common (*Viola adunca, V. glabella*) and one uncommon (*V. unifolia*). Other plants in the ground layer include:

Lycopodium annotinum, Lycopodium complanatum, Lycopodium alpinum, Equisetum arvense, Anemone richardsonii, and *Listera cordata.*

During the second week of June 1969, the spores were released from *Lycopodium annotinum* in large numbers. Spores covered the entire surface of Thutade Lake. Wind and water currents concentrated the spores into long yellowish streamers on the lake surface, and finally onshore breezes stacked windrows of spores along the lake shore. Some of the windrows were to one-half an inch in depth.

Parkland meadows are present in valley bottoms in the Boreal Forest. Willows and dwarf birch grow along the drainages in the meadowlands (Figs. 9 and 10). The meadows proper are occupied in wet sites by the cottongrass, *Eriophorum angustifolium,* and the sedge, *Carex aquatilis.* Drier sites in the meadows are dominated by species of *Poa, Festuca altaica,* and *Calamagrostis purpurascens.*

Fig. 11. Steep monocline and flat-lying portion of the middle and upper part of the Sustut Formation 4 miles northwest of Thutade Lake at approximately 56°53′ N; 127°11′ W. Resistant beds are conglomerate and separated by thick units of softer silty mudstone and shale.

Riparian and Palustrine vegetation consists of essentially the same species which occur in the Boreal Forest. However, on alluvial gravels along stream courses the cottonwoods (*Populus balsamifera*) and willows (*Salix* spp.) and alder (*Alnus crispa*) become more dominant.

A steep south-facing slope about two miles southwest of the southern end of Thutade Lake is worthy of mention. This region is occupied by up and down slope stripes of trees which alternate with similarly oriented stripes dominated by herbs and shrubs. The herb and shrub stripes are apparently due to snow slides which sweep away tree growth and allow herbs and shrubs to dominate. On June 14 at about 8:00 p.m., we landed the helicopter on a small outcrop in one of the slide areas, and in about an hour we were able to collect some 39 species. The shrubby vegetation consists of *Viburnum edule*, *Ribes glandulosum*, and *Sambucus racemosa*. Important herbaceous species include: *Valeriana sitchensis*, *Aquilegia formosa*, *Heracleum lanatum*, *Hackelia jessicae*, *Geranium erianthum*, *Senecio triangularis*, *Castilleja unalaschcensis*, *Veratrum eschscholtzii*, *Myosotis sylvatica*, *Pedicularis bracteosa*, *Lupinus nootkatensis*, and *Urtica dioica*.

Principal grasses on the slope include species of *Poa* and *Festuca altaica*. The habitat and species list is reminiscent of open slopes in Little Susitna Canyon in south central Alaska.

The upper elevational limit of the Boreal Forest varies considerably, but most of the forest occurs below the 5,000 foot line. However, there are trees growing to about the 6,000 foot line in some regions. In these sites, the trees occur singly, in small clumps, or in long lines trending upward along drainages or slopes (Figs. 11 and 12). In other sites the tree line is truncated along the apparent upper limit of glacier ice of the Pleistocene glaciation (Figs. 13 and 14). The forest is best developed on glacial debris

along the slopes and on moraines and alluvium in the valleys. The tree species above about 5000 feet in elevation are limited to spruce and alpine fir. The trees take on a krummholz appearance, spreading out horizontally along the slopes above the tree phases more typical of the forest at lower elevation (Figs. 15 and 16). The krummholz type occurs in patches to several acres in extent, mostly above areas affected by glacier ice, and it seems probable that some of these may have persisted throughout the Pleistocene glaciation and have provided propagules for reforestation of the valleys following the retreat of glaciers. The krummholz interfingers upwards with alpine tundra (Figs. 17, 18, 19, and 20). In its upper limits, the alpine fir krummholz grows with *Phyllodoce empetriformis*, *P. glanduliflora*, and *Cassiope tetragona*.

Alpine Tundra

Alpine tundra is well developed in the mountains of northern British Columbia. On alpine slopes and rounded ridge tops the tundra is dominated by *Dryas integrifolia*, *Festuca altaica*, *Carex* sp., *Cassiope tetragona*, *Salix arctica*, *S. glauca*, *S. reticulata*, and *S. stolonifera* (Figs. 21, 22, 23, 24, and 25). On ridges, beginning at about 6000 feet elevation, and steep slopes upwards from that elevation, the tundra consists of sparse vegetation, dominated by clumps of *Dryas integrifolia*, *Potentilla diversifolia*, *P. hyparctica*, *P. uniflora*, *Lupinus arcticus*, *Oxytropis campestris*, *Luzula confusa*, *L. nivalis*, and *Carex* sp. (Figs. 26, 27, and 28). In some areas the bearberry, *Arctostaphylos alpina* is present near the upper limits of alpine tundra. Between 6000 and 7000 feet elevation, the open spaces between plants on rock outcrops and rocky ridge crests, crustose lichens form the most abundant plant cover (Figs. 29, 30, 31). These semibarren lichen dominated lands are herein called fell fields. Important species of flowering plants in fell fields include:

Ranunculus eschscholtzii, *Potentilla diversifolia*, *P. hyparctica*, *Sibbaldia procumbens*, *Hierochloe alpina*, *Pedicularis sudetica*, *Anten-*

FIG. 12. Northwest to the northeast spur of Sustut Peak at 56°37′ N, 126°35′ W. The relatively smooth, even crestline of the ridge is in the sandstone sequence near the base of the Triassic Takla Group. The deep snow-filled col near the right margin is at the approximate boundary between Triassic and Permian rocks. The ridge crest is at an elevation of approximately 7000 feet. Alpine tundra grading downward with krummholz and Boreal Forest.

naria monocephala, *Antennaria alpina*, and *Salix glauca*.

A particularly inhospitable habitat was encountered on an outcrop of siltstone and coal beds in a saddle about 5 miles southeast of the south end of Thutade Lake (Fig. 32). The surface is in large part barren of vegetation, but plants, *Draba incerta* and *Carex podocarpa*, occur widely spaced on the soft surface. This is the only locality wherein *Arenaria sajanensis* was collected, growing directly on the carbonaceous surface.

COLLECTING LOCALITIES

Plants were collected at localities throughout the Sustut Basin during much of the growing season (Fig. 33). Collecting was initiated on June 7 and the final collections for the season were taken on August 13. All major plant communities were sampled, but the list of specimens

Fig. 13. Dewar Peak at 56°43′ N., 126°50′ W. as seen from the southeast. Dewar Peak is composed of pinkish gray rhyolite and andesite in the upper part of the Asitka Group which also forms the ragged rocky exposures on the skyline to the right. Locality 34 is in the prominent saddle on the skyline to the immediate left of Dewar Peak and is at an elevation of approximately 6400 feet. Woodland dominated by *Picea glauca* and *Abies lasiocarpa* grading upwards with krummholz of *Abies lasiocarpa* and alpine tundra and fell fields.

FIG. 14. Southwest across Coldfish Lake Valley to the prominent serrated massive volcanic rocks of the Eaglenest Range. The snow line is at about the upper level of the Boreal Forest. The snow is from the early snowstorms which came the 10th to 12th of August and blanketed the uplands. The snow line corresponds with the approximate upper limit of trees and to near the elevation of maximum elevation of valley glaciers during major Pleistocene glaciations.

collected is not represented as being exhaustive for the region. Many additional species will undoubtedly be added as the flora of this magnificent region becomes better known. The nature of the Sustut Basin can be seen from the aerial photographs of selected areas (Figs. 34-42).

1. Ironbridge. South bank of the Tanzilla River, 8 miles south of Dease Lake village, at Ironbridge, along Dease Lake-Stewart Highway, 58°21′ N; 129°52′ W, at 3090 feet elevation, on river terrace gravels.
2. Letain Lake. Asbestos prospect, northeast of Letain Lake, and ca 7 miles west of King Mt., at 58°20′ N; 128°45′ W, at 6000 feet elevation, in Alpine tundra, on weathered serpentine intrusive.
3. Kehlechoa River. Ridge west of Kehechoa River, at 58°12′ N; 128°45′ W, at 5000 feet elevation, in alpine tundra, on green micaceous schists.
4. Cold Fish Lake, north shore. North end of Cold Fish Lake, at 57°42′ N; 127°50′ W, at 3800 feet elevation, in Boreal Forest, on glacial moraine.
5. Cold Fish Lake, camp ridge. Cold Fish Lake, south end of camp ridge, at 57°40′ N; 128°45′ W, at 3800 feet elevation, in open woods on glacial moraine.
6. Cold Fish Lake. South end of Cold Fish Lake, at 57°34′ N; 128°44′ W, at 3800 feet elevation, in Boreal Forest, on glacial moraine and beach gravel.
7. Chukachida River. South of the mouth of Chukachida River, at 57°40′ N; 127°33′ W, at 5200 feet elevation, in tundra, on Jurassic volcanic rocks.
8. S.W. Mt. Will. Pass Lakes, ca 6 miles southwest of Mt. Will, at 57°29′ N; 128°53′ W, at 6500 feet elevation, in Alpine tundra on talus and outwash of Bowser Formation.
9. Griffith Creek. Head of Griffith Creek, on Bowser Formation, at 7000 feet elevation, at 57°28′ N; 128°28′ W. Alpine tundra.
10. Caribou Hide. At Caribou Hide, along the Stikine River at 57°27′ N; 127°34′ W, at 3700 feet elevation, in open woods, on river fill.
11. Tuaton Lake. West side of Tuaton Lake, at 57°17′ N; 128°06′ W, at 6000 feet elevation, in alpine tundra, on Bowser Formation.
12. Stalk Ridge. Northeast Stalk Ridge, at 57°09′ N; 127°37′ W, at 6000 feet elevation, on siliceous conglomerates, of Bowser Formation, in Alpine tundra.
13. Stalk Peak. Northwest spur of Stalk Peak, at 57°08′ N; 127°44′ W, at 6000 feet elevation, in alpine tundra, on barren shale slope of Bowser Formation.
14. Stalk Lakes. East shore at south end of the north-

ernmost lake of Stalk Lakes, at 57°07′ N; 127°36′ W, at 4500 feet elevation, in meadows, on alluvium.

15. N. Kitchener Lake. Ca 4 miles north of Kitchener Lake, at 57°07′ N; 127°32′ W, at 5000 feet elevation, in alpine tundra on alluvium.
16. Kitchener Crag. Rocky, bedrock ridge crest, immediately west of Kitchener Crag, southwest of Kitchener Lake, at 57°01′ N; 127°26′ W, at 6500 feet elevation, in alpine tundra on Bowser Formation.
17. Kitchener Lake. Along south shore of Kitchener Lake, at 57°11′ N; 126°57′ W, at 5000 feet elevation, in alpine tundra on Triassic marble.
19. N. tip Thutade Lake. Northwest shore, north tip of Thutade Lake, at 57°08′ N; 126°54′ W, at 3700 feet elevation, in Boreal Forest, on granite bedrock.
20. N.W. Tatlatui Lake. Ca 3 miles northwest of Tatlatui Lake, at 56°58′ N; 127°23′ W, at 6000 feet elevation, in alpine tundra on Bowser Formation.
21. Skeena River Valley, Tatlatui Range, ca 6 miles south and 60° west of Alma Peak, at 56°40′ N; 127°38′ W, on slope above Skeena River Valley, at 6200 feet elevation, ca 17 miles southwest of Thutade Lake, in Bowser beds or Takla Formation.
22. Head Thutade Creek. Tatlatui Range, in pass between head of Thutade Creek and unnamed tributary of Skeena River, ca 12 miles southwest of Thutade Lake, at 56°44′ N; 127°33′ W, at 5600 feet elevation, in a fell field, on Asitka slate.
23. Thutade Creek. Near head of Thutade Creek, ca 5 miles southwest of Thutade Lake, at 56°47′ N; 127°18′ W, at ca 3800 feet elevation, on stream gravels, in willow heathland.
24. Tatlatui Lake. Tatlatui Lake shore, at 56°54′ N; 127°24′ W, at 4080 feet elevation, in beach deposits and morainic gravels, in mixed woodland.
25. S.W. Thutade Lake. Steep, southeast-facing slope, ca 2 miles due west of the southwest corner of Thutade Lake, at 56°47′ N; 127°17′ W, at 4500 feet elevation, on middle Bowser Formation.
26. Thutade Lake camp. West shore of Thutade Lake,

Fig. 15. North to the boundary fault zone at the west edge of the Sustut Basin exposed in the ridge crest immediately north of Thutade Lake at 56°50′ N; 127°12′ W. Minor affect of differences in lithology of Sustut Formation and the Bowser group shows in nearly uniform plant patterns. The alternating light-banded beds on the left are overturned, and sheared middle beds of the Sustut Formation and the more massive, nearly horizontal beds exposed on the left are in the Jurassic Bowser Formation, here composed of mudstone and minor beds of conglomerate. Krummholz of *Abies lasiocarpa* and open-grass and sedge-covered slopes.

FIG. 16. Northeast spur of Niven Peak at 56°56′ N; 126°52′ W, as seen from the east. The three low sawtooth-shaped ridges along the spur near the center of the photograph are held up by fossiliferous limestone at the top of the Cache Creek sequence and are at an elevation of approximately 7000 feet, 2000 feet above the valley floor. The general level spur toward the left is held up by graywacke sandstone at the base of the Triassic Takla sequence. The ragged ledge-forming exposures in the center and right are on the upper part of the volcanic Asitka sequence near Locality 33. The steep, apparently barren, slopes in center background are clothed with grassy alpine tundra dominated by *Festuca altaica*.

near south end, in mixed lodgepole pine, white spruce, alpine fir woodland, at 56°48′ N; 127°12′ W, at 3625 feet elevation, on morainic gravels.

27. Thutade Mt. On mountain behind camp at Thutade Lake, at 56°49′ N; 127°11′ W, at 5000-6000 feet elevation, in alpine tundra and steep grassy slopes, on Bowser Formation.
28. South Pass Peak. Ca 1.5 miles northwest of South Pass Peak, ca 7 miles south-southwest of "Thutade Village," at 56°42′ N; 127°09′ W, at 4300 feet elevation, in open woods, on alluvium.
29. Coal beds. In saddle of mountains, ca 5 miles southeast of south end of Thutade Lake, at 56°45′ N; 127°05′ W, at ca 5000 feet elevation, in alpine tundra and barrens on Tertiary Sustut coal beds.
30. Mt. Jorgensen. On Mt. Jorgensen, ca 12 miles northeast of "Thutade Village," at 56°54′ N; 126° 56′ W, at 5200 feet elevation, in alpine tundra on Sustut Formation.
31. Firesteel River. Ca 7 miles east of Kitchener Lake, at 57°03′ N; 127°10′ W, 4000 feet elevation, in Boreal Forest on alluvium.
32. Niven Creek. Tributary of Niven Creek, ca 3 miles east-southeast of Dewar Peak, at 56°42′ N; 126°52′ W, at 4500 feet elevation, in open willow-meadow lands surrounded by white spruce woods, on alluvium.
33. W. and S.W. Dewar Peak. Ridge crests, west and southwest of Dewar Peak, at ca 56°42′ N; 126°50′ W, at ca 5500 feet elevation, in alpine tundra in Upper Takla Group volcanic rocks.
34. Dewar Peak vicinity. Alpine tundra, at 56°45′ N; 126°45′ W, at 6000-6500 feet elevation, on lavas of the Asitka Group.
35. Dewar Peak NNE. Ca 3 miles NNE Dewar Peak, at 6125 feet elevation on Tertiary Sustut Formation, at 56°46′ N; 126°45′ W. Alpine tundra and fell fields.
36. Thorne Lake. Marshy east shore of Thorne Lake, at 56°50′ N; 126°42′ W, at 3900 feet elevation. Marshy east shore, on alluvium.

37. Mt. Savage. Massif south of Moosevale Creek, ca 3 miles southeast of Dewar Peak, at 56°40′ N; 126°45′ W, at 6000 feet elevation, in krummholz and alpine tundra, on lavas of the Takla Group.
38. New Wellington. At New Wellington mining camp, in Moose Valley at the mouth of Moosevale Creek, at 56°44′ N; 126°37′ W, at ca 4000 feet elevation, in wet to dry meadow, stream bank, and open lodgepole pine woods on alluvium.
39. Rognaas Peak. Northeast spur of Rognaas Peak, at 57°09′ N; 127°04′ W, at 4700 feet elevation, in open woods, on cherty rubble at Triassic Takla Formation.
40. Trygve Lake. North shore west end, on glacial moraine, at 56°59′ N; 127°30′ W, at 4570 feet elevation. Heathland on Pleistocene glacial moraine.
41. Lawyer Pass. North side of hill, 4 miles east of Lawyer Pass, at 57°18′ N; 127°13′ W, at 6000 feet elevation, in deep soils over Jurassic Takla Group (?) volcanics, in alpine tundra.

ANNOTATED LIST OF SPECIES

The following list of species was collected in northern British Columbia during the summer of 1969. Two main collections are included; one by S. L. Welsh and J. K. Rigby taken during the first two weeks of June, and a second collected by J. K. Rigby and G. Cuddy throughout the growing season of 1969. In order to save space, the collection localities have been numbered and described separately from the list of species. The names of the collectors are abbreviated; with WR standing for Welsh and Rigby, and RC for Rigby and Cuddy.

Fig. 17. Northwest along the eastern base of the Niven Peak massif at 56°46′ N; 126°51′ W. Light colored tuffaceous and rhyolitic units are a distinctive feature in the central part of the photograph beyond the helicopter. Well-bedded rocks in the middle distance are on the southeast spur of Forrest Mountain to the northeast of Niven River. Peaks along the skyline are in the vicinity of Fredrickson Peak and other peaks to the northeast to Thutade Lake and are composed of Takla volcanics cut by Ominica intrusive granodiorite. Thorne Lake, Locality 36, occurs in the valley between the batholithic belt and Mount Forrest. Locality 38, at New Wellington, is in Moose Valley a short distance to the right of the photograph. Ridge crest dominated by *Potentilla hyparctica, Lupinus arcticus, Dryas integrifolia, Antennaria monocephala,* and *Selaginella sibirica.*

FIG. 18. Northwest toward the northeast spur of Niven Peak with Cache Creek rocks forming most of the central exposures and Asitka rocks forming the light colored to brilliantly colored rocks along the right part of the photograph at 56°47′ N; 126°50′ W. Collections from Locality 35, Dewar Peak north northeast, were collected from the saddle and cliff zone separating the light and dark-colored rocks at the right center skyline. Sparse alpine tundra dominated by crustose lichens in foreground, with krummholz and tundra covered slopes in center and on ridge in background.

Collection localities are numbered from northern portions of the region southward and are not in order as to date of collections.

In the checklist, the subdivisions are arranged in phylogenetic sequence, but families, genera, species, and infraspecific taxa are in alphabetical order. A summary of the number of taxa is presented at the end of the checklist (Fig. 33). All specimens are deposited in the herbarium of Brigham Young University (BRY). Identifications were based on works by Hulten (1968) and Welsh (1971).

LYCOPSIDA

Lycopodiaceae Clubmoss Family

Lycopodium alpinum L.

Locality #26, WR 8996, 7 June. Ground layer in woods, on glacial moraine.

Lycopodium annotinum L.

ssp. *annotinum*

Locality =26, WR 8992, 7 June. Ground layer in woods, on glacial moraine. This species sporulated during the second week of June and covered the surface of Thutade Lake with spores. Onshore breezes concentrated them along the beaches in windrows to half an inch deep.

Lycopodium complanatum L.

Locality #26, WR 8991, 8994, 7 June. Ground layer in woods, on glacial moraine.

Lycopodium selago L.

Locality #12, RC 139, 30 June; #25, WR 9041, 9 June, in alpine tundra, on Bowser and Sustut Formations.

Selaginellaceae Selaginella Family

Selaginella sibirica (Milde.) Heiron

Locality #24, WR 9037, 9 June. Ridge crest, on lavas, in alpine tundra. This is evidently the first report of *S. sibirica* for British Columbia.

SPHENOPSIDA

Equisetaceae Horsetail Family

Equisetum arvense L.

Locality #26, WR 9074, 14 June. In thicket along stream bank, on glacial moraine.

Equisetum variegatum Schleich.

Locality #23, WR 9091, 14 June. In moist site, on gravel bar.

PTEROPSIDA FILICINEAE

Polypodiaceae Fern Family

Cryptogramma crispa (L.) R. Br.

Locality #25, WR 9111, 14 June. Rock outcrop, on steep south-facing, grassy slope, on Bowser Formation.

Cystopteris fragilis (L.) Bernh.

Locality #25, WR 9098, 14 June. Rock outcrop, on steep south-facing, grassy slope, on Bowser Formation.

PTEROPSIDA GYMNOSPERMAE

Pinaceae Pine Family

Abies lasiocarpa (Hook.) Nutt.

Locality #26, WR 8981, 7 June. A dominant in the Boreal Forest, and the chief component of the well-developed krummholz of the region.

Juniperus communis L.

Locality #26, WR 8989, 7 June. Open woods, on morainic gravels.

Picea glauca (Moench) Voss

Locality #6, RC 262, 6 Aug.; 26, WR 8985, 7 June. A dominant species in the Boreal Forest.

Pinus contorta Dougl.

var. *latifolia* Engehn.

Locality #1, RC 275, 13 Aug.; #6, RC 263, 6 Aug.; #26, WR 8990, 7 June. A dominant species in the Boreal Forest.

PTEROPSIDA ANGIOSPERMAE
DICOTYLEDONEAE

Betulaceae Birch Family

Alnus crispa (Ait.) Pursh

var. *laciniata* Hultén

Locality #1, RC 269, 13 Aug. Streamsides.

Alnus incana (L.) Moench

ssp. *rugosa* (Dukoi) R. T. Clausen

var. *occidentalis* (Dipp.) C. L. Hitchc.

Locality #26, WR 8984, 7 June. Lake shores.

Betula glandulosa Michx.

var. *glandulosa*

Locality #1, RC 266, 13 Aug. 1969; Locality # 6, RC 264, 6 Aug. 1969; #26, WR 8983, 7 June. Boreal Forest, taiga, and heathlands.

Boraginaceae Borage Family

Hackelia jessicae (McGregor) Brand

Locality #25, WR 9116, 14 June; #26, RC 148, 4 July. A component of the steep meadows along snow slide tracks on south-facing slopes.

Mertensia paniculata (Ait.) D. Don

ssp. *paniculata*

Locality #3, RC 219, 27 July; # 5, RC 170, 22 July; #18, RC 129, 30 June; #26, WR 9062, 13 June; # 30, RC 11, 17 June; #26, RC 47, 19 June. Lake shores, woods, morainic gravels, meadows, heathlands, and alpine tundra.

Myosotis sylvatica Hoffm.

Locality #3, RC 209, 216b, 27 July; #7, RC 257, 5 Aug.; #8, RC 238, 240, 1 Aug.; #16, RC 23, 31, 19 June; #25, WR 9107, 14 June; #28, RC 2b, 16 June; #32, WR 9050, 10 June. Alpine tundra, meadows, and talus.

Campanulaceae Bellflower Family

Campanula lasiocarpa Cham.

Locality #3, RC 217, 27 July; #7, RC 249, 5 Aug.; #12, RC 137b, 30 June; #13, RC 100, 27 June; #34, RC 80a, 25 June. Fell fields, alpine tundra, and talus slopes, on micaceous schists, siliceous conglomerate, and lavas.

Caprifoliaceae Honeysuckle Family

Linnaea borealis L.

var. *longiflora* Torr.

Locality #5, RC 171, 22 July; #6, 193, 26 July. Woods and thickets, on glacial moraine.

Lonicera involucrata (Richards.) Banks

Locality #26, WR 9083, 14 June; do RC 71, 92, 25 June; do RC 158, 11 July. Lake shores and woods, on glacial moraine. These collections represent a range extension northward in British Columbia.

Viburnum edule (Michx.) Raf.

Locality #25, WR 9092, 14 June; #26, WR 9084, 14 June; do RC 88, 25 June. Lake shores, woods, and slopes, on glacial moraine and Bowser Formation.

Caryophyllaceae Pink Family

Arenaria rubella (Wahl.) Smith

Locality #2, RC 235, 28 July (glabrous phase); #27, RC 123, 29 June. Alpine tundra, on weathered serpentine intrusive.

Arenaria sajanensis Willd.

Locality #29, WR 9134, 15 June. Noted only on Tertiary Sustut coal beds.

Cerastium arvense L.

Locality #2, RC 228, 28 July; #25, WR 9123a, 14 June. Alpine tundra and meadows, on weathered serpentine-intrusive and on Bowser Formation.

Cerastium beeringianum Cham. & Schlecht.

Locality #18, RC 128a, 30 June; #36, RC 48d, 19 June. Alpine tundra and alluvium along

FIG. 19. A continuation toward the left of Figure 20 and shows mainly Jurassic volcanic rocks. Locality 9, Griffith Creek, is in the general vicinity at approximately 7000 feet elevation. Krummholz, alpine tundra, talus slopes, and barrens.

lakes and streams, on Triassic (?) marble and alluvium.

Silene acaulis L.

var. *exscapa* (All.) DC.

Locality #32, WR 9052, 10 June; #34, WR 8978, 7 June; do WR 9031, 8 June. Alpine tundra and fell fields, on alluvium and lavas.

Stellaria longipes Goldie

var. *altocaulis* (Hultén) C. L. Hitchc.

Locality #16, RC 21a, 28a, 19 June; #36, RC 48c, 19 June. Alpine tundra, on Bowser Formation and alluvium.

var. *longipes*

Locality #10, RC 124a, 29 June. River gravels.

Fig. 20. Northwest across the headwaters of Griffith Creek in the east central part of the Spatsizi Quadrangle from 59°29′ N; 128°25′ W. Ragged exposures along the skyline are in the Jurassic Eaglenest volcanic rocks. The smooth saddle and relatively rounded rocks toward the right are folded Sustut rocks. A well-exposed major fault here separates the Jurassic and Tertiary formations along the west side of the Sustut Basin. Krummholz and alpine tundra on solifluction slopes and talus.

FIG. 21. Lehi F. Hintze in argillaceous exposure in the upper part of the Bowser Formation at approximately 57°20′ N; 28°33′ W, on ridges west of Buckinghorse Creek, which is in the background. Grassy slope dominated by *Festuca altaica*, with *Potentilla diversifolia* in the foreground.

Chenopodiaceae Goosefoot Family

Chenopodium capitatum (L.) Asch.

Locality #4, RC 187, 22 July. Glacial moraine, in open woods.

Compositae Composite Family

Achillea millefolium L.

ssp. *borealis* (Bong.) Breitung

Locality #6, RC 200, 26 July; #7, RC 251c, 5 Aug. Moraines, river gravels, and volcanic rocks in tundra and woods.

ssp. *lanulosa* (Nutt.) Piper

Locality #5, RC 168a, 22 July; #27, RC 119, 29 June; #36, RC 50, 19 June. Moraines, river gravels, and Bowser Formation in mountain slopes.

Agoseris aurantiaca (Hook.) Greene

Locality #3, RC 222, 27 July; #6, RC 194,

Fig. 22. West across the western edge of the Spatsizi Plateau from 57°42′ N; 128°43′ W, across Coldfish Lake Valley into the Eaglenest Range during one of the first major snowstorms in early August. The snow line is at about the timberline and snow blankets the upper-elevation tundra surfaces developed on volcanic rocks in the background and on flat-lying siliceous sedimentary rocks in the foreground. Alpine tundra.

26 July; #26, RC 152, 11 July. Ridge tops and mountain slopes, in micaceous schists and moraines, in alpine tundra and woods.

Antennaria alpina (L.) Gaertn.

var. *stolonifera* (Porsild) Welsh

Locality #22, WR 9133a, 15 June; #36, RC 55a, 19 June. Alpine tundra, heath, and woods, on slate and alluvium.

Antennaria monocephala DC.

Locality #20, RC 20, 18 June; #21, WR 9089, 14 June; #29, WR 9133, 15 June; #34, WR 9038, 9 June; #37, WR 9009, 8 June. Alpine tundra and heathlands, on Bowser Formation, Tertiary Sustut coal beds and lavas.

Antennaria neglecta Greene

Locality #26, RC 89, 25 June. Open woods on glacial moraine.

Antennaria rosea Greene

Locality #25, WR 9112a, 15 June. Open woods and meadows, on alluvium.

Arnica cordifolia Hook.

Locality #25, WR 9110, 14 June; #26, 87, 25 June. Open woods, on alluvium and glacial moraine.

Arnica latifolia Bong.

Locality #3, RC 215, 27 July; #7, RC 254, 5 Aug.; #26, WR 9076, 14 June; do RC 36, 19 June; do RC 95, 25 June; do RC 165, 11 July; #39, RC 135, 30 June. Alpine tundra, meadows, and open woods, on micaceous schist, glacial moraine, and cherty rubble.

Artemisia campestris (L.) DC.

ssp. *borealis* (Pallas) H. & C.

var. *borealis*

Locality #5, RC 180, 22 July. Glacial moraine, in woods.

Artemisia nowegica Fries

var. *saxatilis* (Besser) Jeps.

Locality #3, RC 223, 27 July; #7, RC 258a, 5 Aug.; #21, WR 909, 14 June; #26, WR 9078, 14 June; #29, WR 9132a, 15 June. Open woods, alpine tundra, and fell field, on micaceous schists, coal beds, and glacial moraine.

Erigeron humilis Grah.

Locality #8, RC 239a, 1 Aug.; #17, RC 21, 19 June; #27, RC 121, 29 June; #29, WR 9128,

FIG. 23. Lehi F. Hintze photographing Monkshood and sedge along the north flank of the northwest spur of Mt. Will, near Locality 8, on siliceous Jurassic volcanic rocks of the Eaglenest volcanic sequence at approximately 57°32′ N; 128°47′ W, and at an elevation of 6000 feet. Alpine tundra, with *Hierochloe alpina, Aconitum delphinifolium*, and *Carex*.

15 June; #36, RC 48b, 19 June. Alpine tundra and talus slopes, on Bowser Formation, and alluvium.

Erigeron lonchophyllus Hook.

Locality #4, RC 189b, 22 July. Glacial moraine, in woods.

Erigeron peregrinus (Pursh) Greene ssp. *callianthemus* (Greene) Cronq.

Locality #3, RC 212, 27 July; #7, RC 247, 5 Aug.; #25, WR 9101, 14 June; #26, RC 74, 74a, 93, 25 June. Open woods, meadows, and alpine tundra, on micaceous schist.

Hieracium gracile Hook.

Locality #3, RC 220b, 27 July. Alpine tundra, on micaceous schist.

Petasites frigidus L.

var. *frigidus*

Locality #14, RC 60, 25 June; #22, WR 9056, 12 June; #27, RC 144b, 30 June. Alpine tundra, fell fields, and meadows, on alluvium and Bowser Formation.

var. *palmatus* (Ait.) Cronq.

Locality #38, WR 9025, 8 June. Wet meadow, along stream.

Senecio lugens Richards.

Locality #17, RC 97, 27 June; #18, RC 130, 30 June. Alpine tundra and woods, on Triassic (?) marble and alluvium.

Senecio triangularis Hook.

Locality #3, RC 210, 225, 27 July; #7, RC 258, 5 Aug.; #25, WR 9122, 14 June; #26, RC 166, 11 July. Meadows, open woods, and alpine tundra, on micaceous schist, Bowser Formation, and morainic gravels.

Solidago multiradiata Ait.

Locality #5, RC 169a, 22 July; #6, RC 201,

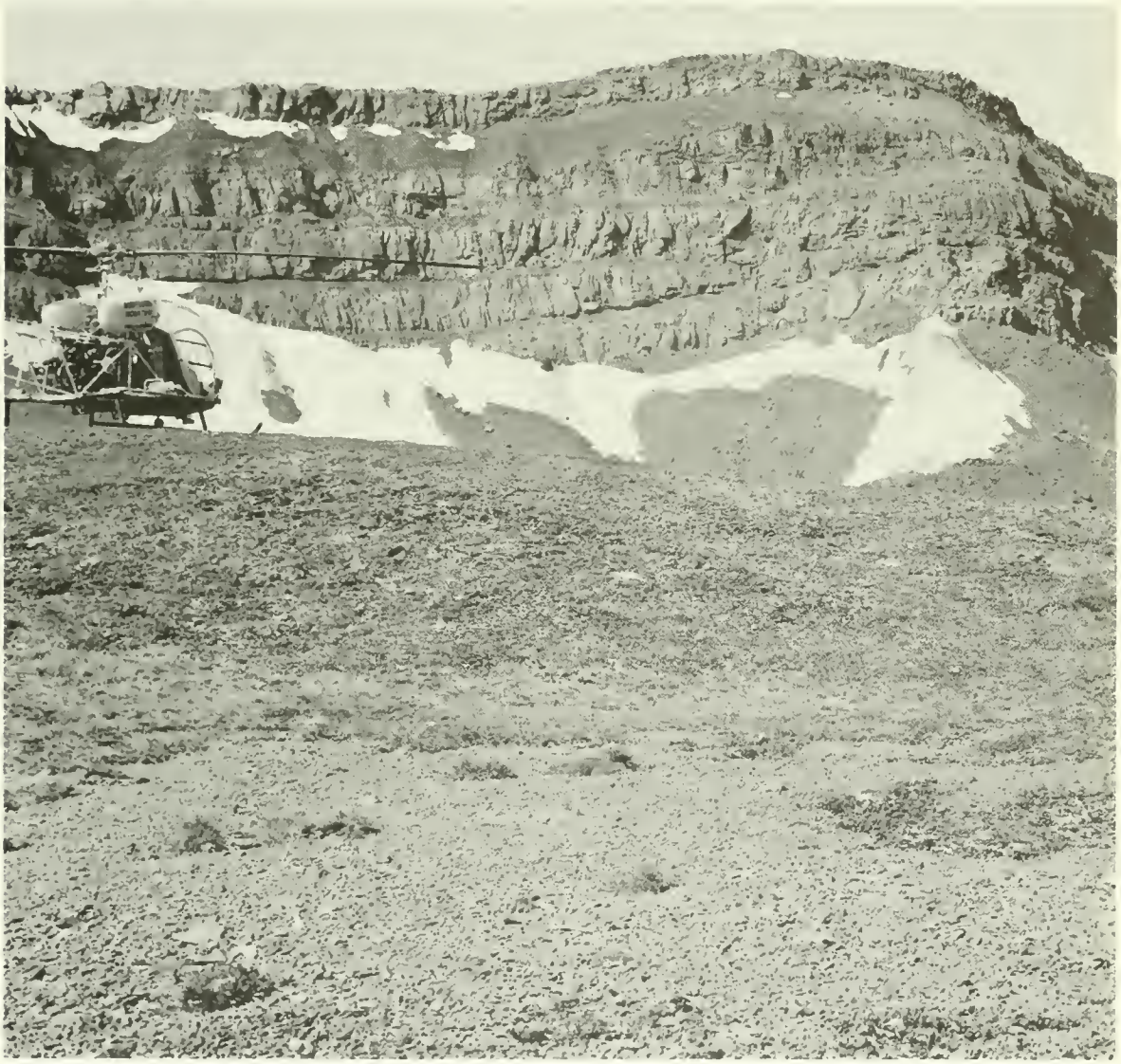


Fig. 24. View westward toward a conglomerate and coal-bearing sequence in the lower part of the Bowser Group on the northeast side of Stalk Ridge. Conglomerate and sandstone form the prominent ledges with coal and carbonaceous shale forming the distinctive slope zone. Plants in the foreground are growing on siliceous pebbly conglomerate and are typical of alpine tundra along ridge crests. The foreground is at an elevation of 6500 feet and at 57°09′ N; 127°35′ W, a short distance south of collecting locality 12. Plants from Locality 12 were collected on the same beds of sandstone and conglomerate shown above the talus.

FIG. 25. Horizontally bedded Sustut rocks on the northwestern part of the Mount Jorgensen massif at the northwest end of Tabletop Mountain at 56°57′ N; 127°09′ W, at 6500 feet in the Spatsizi Plateau. Peaks along the skyline in the distance are part of the folded Bowser sequence west of the Sustut Basin. The alternating terraces are produced by interbedded resistant conglomerate and sandstone. Easily eroded shales form vegetated stripped surfaces on top of the sandstone ledges. Alpine tundra heathlands and limited krummholz vegetation.

201a, 26 July; #7, RC 253, 5 Aug. Open woods, heathlands, and alpine tundra, on moraine and volcanic rocks.

Taraxacum ceratophorum (Ledeb.) DC.

Locality #8, RC 239, 1 Aug.; #13, RC 99b, 27 June; #36, RC 50a, 19 June. Talus slopes and ridges, in woods, meadows, and alpine tundra, on Bowser Formation and alluvium.

Taraxacum eriophorum Rydb.

Locality #17, RC 22, 19 June; #20, RC 19b, 18 June. Alpine tundra, fell fields, and open woods, on alluvium, and Bowser Formation.

Cornaceae Dogwood Family

Cornus canadensis L.

Locality #26, WR 9075, 14 June; do RC 9, 17 June. Woods, on morainic gravels.

Crassulaceae Stonecrop Family

Sedum lanceolatum Torr.

Locality #6, RC 191, 26 July; #30, RC 14, 17 June. Glacial moraine in open woods, and alpine tundra on Sustut Formation.

Cruciferae Mustard Family

Arabis divaricarpa A. Nels.

Locality #4, RC 186, 26 July. Glacial moraine in open woods.

Arabis drummondii Gray

Locality #19, RC 114, 28 June. On granite bedrock, in open woods.

Arabis glabra (L.) Bernh.

Locality #25, WR 9103, 14 June; #26, RC 37d, 19 June; #28, RC 4, 16 June. Alluvium and morainic gravels in open woods and meadows.

Arabis lemmonii Wats.

Locality #33, WR 9050a, 10 June. Alpine tundra, on volcanic rocks.

Arabis lyrata L.

Locality #8, RC 237b, 1 Aug.; #14, RC 56, 25 June; #28, RC 3, 16 June; #29, WR 9142a, 15 June. Open woods, heathlands, and alpine tundra, on alluvium, talus, and coal beds.

Barbarea orthoceras Ledeb.

Locality #20, RC 37f, 19 June; do, RC 79, 25 June. Morainic gravels in open woods.

Cardamine pratensis L.

Locality #14, RC 60b, 25 June. Alluvium, in meadows.

Draba aurea Vahl

Locality #5, RC 178, 22 July; #6, RC 197, 26 July; #40, RC 101, 28 June. Glacial moraines, in open woods and heathlands.

Draba borealis DC.

var. *maxima* (Hultén) Welsh

Locality #7, RC 251, 5 Aug.; #25, WR 9112b, 14 June; #27, RC 144, 30 June. Meadows, open woods, and alpine tundra; on volcanic rocks, Bowser Formation, and alluvium.

Draba incerta Payson

Locality #13, RC 100b, 27 June; #16, RC 28b, 19 June; #27, RC 144a, 30 June; #29, WR 9130, 15 June; #34, WR 9036, 9 June. Alpine tundra and fell fields, on Bowser Formation, coal beds, and volcanic rocks.

Draba nivalis Payson

var. *elongata* Wats.

Fig. 26. West from the northeast spur of Sustut Peak at 56°35′ N; 120°36′ W, across the Sustut River Valley at 3500 feet to the southwest spur of Savage Peak which rises to over 7000 feet. Lower dark green agglomerate of the Takla Group forms the prominent high serrated peaks in the right center and right of the photograph. The upper part of the Takla group forms the somewhat rounded cliffs along the skyline to the left. Prominent steep valleys are carved in softer more distinctly bedded tuffaceous and graywacke sandstone beds interbedded with the agglomerate. *Dryas integrifolia* and crustose lichen fell field in the foreground.

FIG. 27. Collection locality 2, shown by the arrow, is at an asbestos prospect near Letain Lake, the prominent lake in the left intermediate distance. Country rocks here are metamorphosed argillite, argillaceous quartzite, and volcanic rocks which have been intruded by serpentine peridotite. Serpentine peridotite forms the light-colored exposures in the background along the ridge crest immediately beyond the collecting locality. Low-rank mica schist forms the low rounded hills in part of the area. The Locality 2 collecting site is at 58°20′ N; 128°45′ W, at approximately 5400 feet in elevation. Alpine tundra, heathlands, krummholz and meadows.

Locality #37, WR 9009a, 8 June. Alpine tundra, on lavas.

Draba stenoloba Trautv.

Locality #28, RC 3a, 16 June. Alluvium, in heathlands.

Thlaspi arvense L.

Locality #4, RC 185, 22 July. Glacial moraine, in open woods.

Elaeagnaceae Oleaster Family

Shepherdia canadensis (L.) Nutt.

Locality #1, RC 270, 13 Aug.; #26, WR 9065, 13 June. Lake shores and stream banks, on glacial moraine and stream terrace gravels, in woods.

Empetraceae Crowberry Family

Empetrum nigrum L.

Locality #1, RC 278, 13 Aug.; #26, WR 8982, 7 June. Open woods and heathlands, on alluvium and moraines.

Ericaceae Heath Family

Arctostaphylos uva-ursi (L.) Spreng.

Locality #1, RC 279, 13 Aug.; #26, WR 8997, 7 June; do RC 37, 19 June; do RC 72, 25 June; #30, RC 7, 17 June. Alluvium glacial

Fig. 28. View looking northwest from Triangulation Station 6539 about four miles east of the junction of the right and left forks of Kehlechoa River at 59°09′ N; 128°37′ W. Rocks in the foreground are metamorphosed phyllite and slate Unit 14 on the Cry Lake quadrangle geologic map of Geologic Survey of Canada. Rocks of Unit 11-B and 12 of the Cry Lake quadrangle can be seen across Kehlechoa River in the background, on the right of the photograph along the crest of the ridge in the middle distance between the two forks of Kehlechoa River. Alpine tundra dominated by species of *Carex*, *Dryas*, and *Lichen*.

FIG. 29. View towards the northwest along the northeast face of Stalk Ridge. The Stalk Ridge collection at Locality 12, 57°09′ N; 127°37′ W, at approximately 6000 feet, was made in the ledges at the extreme right margin of the photograph. All the rocks seen here are in the Bowser formation. Plants from Locality 12 were collected principally off the siliceous conglomerate and sandstone beds which form the prominent ledges in the intermediate distance. Alpine tundra and fell fields.

moraine and Sustut Formation in open woods and alpine tundra.

Arctostaphylos alpina (L.) Spreng.
var. *alpina*
Locality #37, WR 9011, 8 June 1969. Alpine tundra, on lavas.

Cassiope mertensiana (Bong.) D. Don
Locality #3, RC 215b, 27 July; #15, RC 18, 18 June; #18, RC 134, 30 June. Alpine tundra and heathlands, on micaceous schist, alluvium, and marble.

Cassiope tetragona (L.) D. Don
var. *saximontana* (Small) C. L. Hitchc.
Locality #29, WR 9141, 15 June; #34, RC 80, 25 June; #35, WR 9042, 9 June. Alpine tundra and heathlands, on coal beds and lavas.

Ledum groenlandicum Oeder
Locality #1, RC 277, 13 Aug.; #5, RC 177, 22 July. Glacial moraine and river terrace gravels, in woods.

Phyllodoce empetriformis (Sm.) D. Don
Locality #18, RC 133, 30 June; #29 WR 9138, 15 June; #30, RC 10, 17 June. Alpine tundra and heathlands, on marble, coal beds, and sandstone.

Phyllodoce glanduliflora (Hook.) Coville
Locality #2, RC 231d, 28 July; #18, RC

132, 30 June; #26, RC 91, 25 June; #29, WR 9139, 15 June; #37, WR 9010, 8 June. Alpine tundra, heathlands, and open woods, on weathered serpentine intrusive, marble, glacial moraines, coal beds, and lava.

Vaccinium caespitosum Michx.

Locality #25, WR 9099, 14 June; #26, WR 9079, 14 June; do RC 72b, 25 June. Open woods and meadows on morainic gravels and alluvium.

Vaccinium membranaceum Dougl.

Locality #26, WR 9063, 13 June. Open woods on morainic gravels.

Vaccinium vitis-idaea L.

Locality #1, RC 276, 13 Aug.; #12, RC 141, 30 June. Open woods and heathlands, on alluvium and siliceous conglomerate.

Fumariaceae Fumitory Family

Corydalis sempervirens (L.) Pers.

Locality #1, RC 280, 13 Aug. River terrace gravels, in open woods.

Fig. 30. Southeast toward the southwest Mt. Will glacier from 57°32′ N; 128°50′ W. Rocks along the skyline toward the left on the south spur of Mt. Will are held up by Eaglenest volcanics which are here essentially flat lying. Rocks in the center and the center right which form the high ledges are the topmost beds of the Eaglenest volcanic sequence and are overlain by shaly exposures of the Bowser beds at the upper right. Mt. Will rises to approximately 8000 feet above valleys at 5000 to 6000 feet. Alpine barrens and fell fields.

FIG. 31. Omineca and Sustut highlands looking southeast from Sustut Peak towards Sustut Lake from 56°36′ N; 126°32′ W. Outcrops immediately beyond the helicopter are of the Asitka and Cache Creek Groups and are dipping steeply toward the southwest. Asitka Peak, elevation 7055 feet, is the isolated mountain beyond Sustut Lake, elevation 4250 feet, and is composed in large part of southwest dipping Takla volcanics. High peaks along the skyline in the distance are in the Ingenika and Osilinka ranges and are composed in large part of Takla volcanics intruded by Omineca granodiorite and quartz diorite. Sparse alpine tundra, with *Lycopodium selago, Cassiope tetragona, Dryas integrifolia* and *Salix reticulata.*

Gentianaceae Gentian Family

Gentiana glauca Pallas

Locality #3, RC 215a, 27 July; #7, RC 252b, 5 Aug.; #12, RC 136, 30 June; #18, RC 128, 30 June; #27, RC 121a, 29 June. Alpine tundra and heathlands, on micaceous schist, volcanic rocks, siliceous conglomerate, and Bowser Formation.

Gentianella amarella (L.) Borner

Locality #5, RC 173, 27 July; #6, RC 196, 205, 26 July; do, RC 244, 3 Aug. Glacial moraine, in open woods.

Gentianella propinqua (Richards.) Gillette

Locality #2, RC 232, 28 July; #4, RC 189a, 22 July; #5, RC 172a, 22 July. Open woods, meadows, and alpine tundra, on weathered serpentine intrusive and glacial moraine.

Geraniaceae Geranium Family

Geranium crianthum DC.

Locality #14, RC 57, 26 June; #25, WR 9119, 14 June; #27, RC 122, 29 June. Open woods and meadows, on alluvium, glacial moraine, and Bowser Formation.

Leguminosae Legume Family

Astragalus alpinus L.

Locality #26, RC 37c, 19 June; #28, RC 28, 19 June; ;28, RC 1, 16 June; #36, RC 65, 19 June. Open woods, lake shores, and stream gravels.

Hedysarum alpinum L.

Locality #5, RC 175, 22 July; #6, RC 192, 26 July. Open woods, on glacial moraine.

Lupinus arcticus Wats.

Locality #5, RC 168, 22 July; #6, RC 204, 26 July; #33, WR 9048, 10 June; #34, WR 8980, 7 June; do WR 9001, 9092, 8 June; do WR 9033, 9 June; #36, RC 45, 19 June; #37, WR 9068, 13 June. Open woods, heathlands, and alpine tundra on moraine and lavas. All specimens collected in alpine sites are considerably

Fig. 32. Mr. Graham Cuddy, who assisted with some of the plant collection, on barren exposures of siltstone and coal in the upper part of the Sustut Formation at the south end of the Sustut Basin and the Spatsizi Plateau at Locality 29, at approximately 56°45′ N; 127°05′ W, at approximately 6500 feet in elevation. Semibarren alpine tundra, dominated by *Draba incerta* and *Carex podocarpa*.

more silky villous than those from woodland sites at lower elevations.

Lupinus nootkatensis Donn

var. *nootkatensis*

Locality #25, WR 9120, 14 June; #26, WR 8993, 7 June; do 9061, 13 June. Grassy slopes and open woods on glacial moraine. *L. nootkatensis* is common in the Pacific drainages, but has seldom been reported in the Mackenzie drainage. Thus, the report of this entity for the Thutade Lake vicinity is unique.

Oxytropis campestris (L.) DC.

var. *varians* (Rydb.) Barn.

Locality ±6, RC 204b, 26 July; #16, RC 25, 43, 19 June; ±29, WR 9131, 15 June; #34, RC 81, 25 June; ±37, WR 9004, 8 June. Alpine tundra and heathlands on Bowser Formation, coal beds, and lavas, and on glacial moraines and river gravels in open woods. The low elevation phases are similar to specimens from throughout Alaska and Yukon, but the alpine phases resemble var. *jordalii* (Porsild) Welsh in leaflet size and number. The flower size is within the range of variation of var. *varians* and apparenty the specimens are merely alpine dwarfs of var. *varians*.

Onagraceae Evening-Primrose Family

Epilobium alpinum L.

var. *alpinum*

Locality #7, RC 248a, 5 Aug.; #9, RC 237, 1 Aug.; #26, RC 34, 19 June. Alpine tundra and heathlands and open woods, on volcanic rocks, Bowser Formation, and lavas.

Epilobium angustifolium L.

Locality #5, RC 182, 22 July; #6, RC 202, 26 July; #7, RC 255, 5 Aug.; #19, RC 112, 28 June. Open woods, heathlands and tundra, on gravels, moraines, talus, and granite bedrock.

Epilobium latifolium L.

Locality #7, RC 246, 5 Aug.; #8, RC 236, 1 Aug.; #16, RC 96, 27 June. Alpine tundra stream gravels, and talus, on volcanic rocks and Bowser Formation.

Papaveraceae Poppy Family

Papaver alboroseum Hultén

Locality #16, RC 44, 19 June; do RC 98, 27 June. Alpine tundra on Bowser Formation. This is apparently the first report of *P. alboroseum* for British Columbia.

Papaver radicatum Rottb.

Locality #16, RC 30, 19 June; do RC 116, 28 June. Alpine tundra, on Bowser Formation.

Polemoniaceae Phlox Family

Polemonium caeruleum L.

ssp. *villosum* (Rud.) Brand

Locality ±2, RC 231a, 28 July; #3, RC 213 (white flowers), 214, 27 July; #5, RC 184, 22 July; #6, RC 207, 26 July; #7, RC 257, 5 Aug.; #14, RC 58, 25 June; #19, RC 111, 28 June; #31, RC 110, 28 June; ±36, RC 49b, 19 June. Alluvium and moraines along streams and lake shores in open woods, and in heathlands and tundra on weathered serpentine intrusive, micaceous schist, and granite.

Polemonium pulcherrimum Hook.

Locality #16, RC 27, 42, 19 June; ± 25, WR 9097, 14 June; #28 RC 2a, 16 June; #31, RC 108, 28 June; #33, WR 9049, 10 June. Alpine tundra, heathlands, meadows, and open

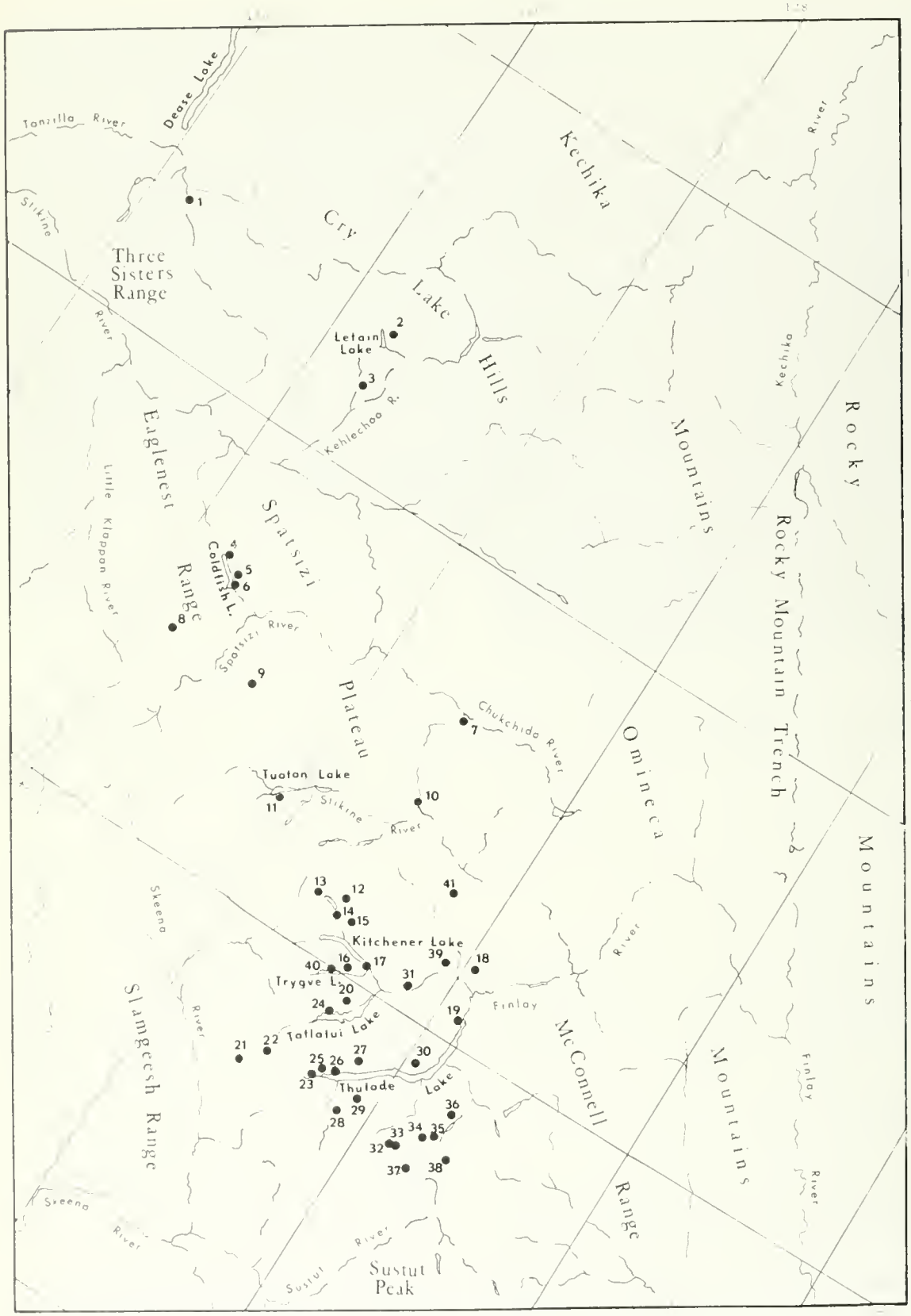


FIG. 33. Map of collecting localities in northern British Columbia.

woods on glacial moraine, talus, alluvium, Bowser Formation, and lavas.

Polygonaceae Buckwheat Family

Oxyria digynia (L.) Hill

Locality =7, RC 259, 5 Aug.; #22, 9055, 12 June. Alpine tundra, on volcanic rocks and slate.

Polygonum viviparum L.

Locality #2, RC 227, 28 July; #3, RC 216a, 27 July; #5, RC 177a, 22 July; #7, RC 248, 5 Aug.; #36, RC 48, 19 June. Open woods, heathland, and alpine tundra, on alluvium, glacial moraine, weathered serpentine intrusive, and micaceous schist.

Rumex acetosa L.

Locality #3, RC 224, 27 July; #25, WR 9102, 14 June; #28, RC 5, 16 June; #38, WR 9016, 8 June. Open woods and meadows, on alluvium and micaceous schist.

Fig. 34. Sustut Peak, the sharp glaciated horn near the upper center of the photograph, is one of the striking topographic features of the Sustut region near the southern border of the area investigated. It is held up by massive volcanic rocks of Triassic age and is flanked by lower Triassic rocks and Paleozoic rocks in the long ridges at the northeastern base of the range and by Jurassic volcanic rocks at the southwestern base. The valleys are clothed by Boreal Forest which is continuous with krummholz upwards.

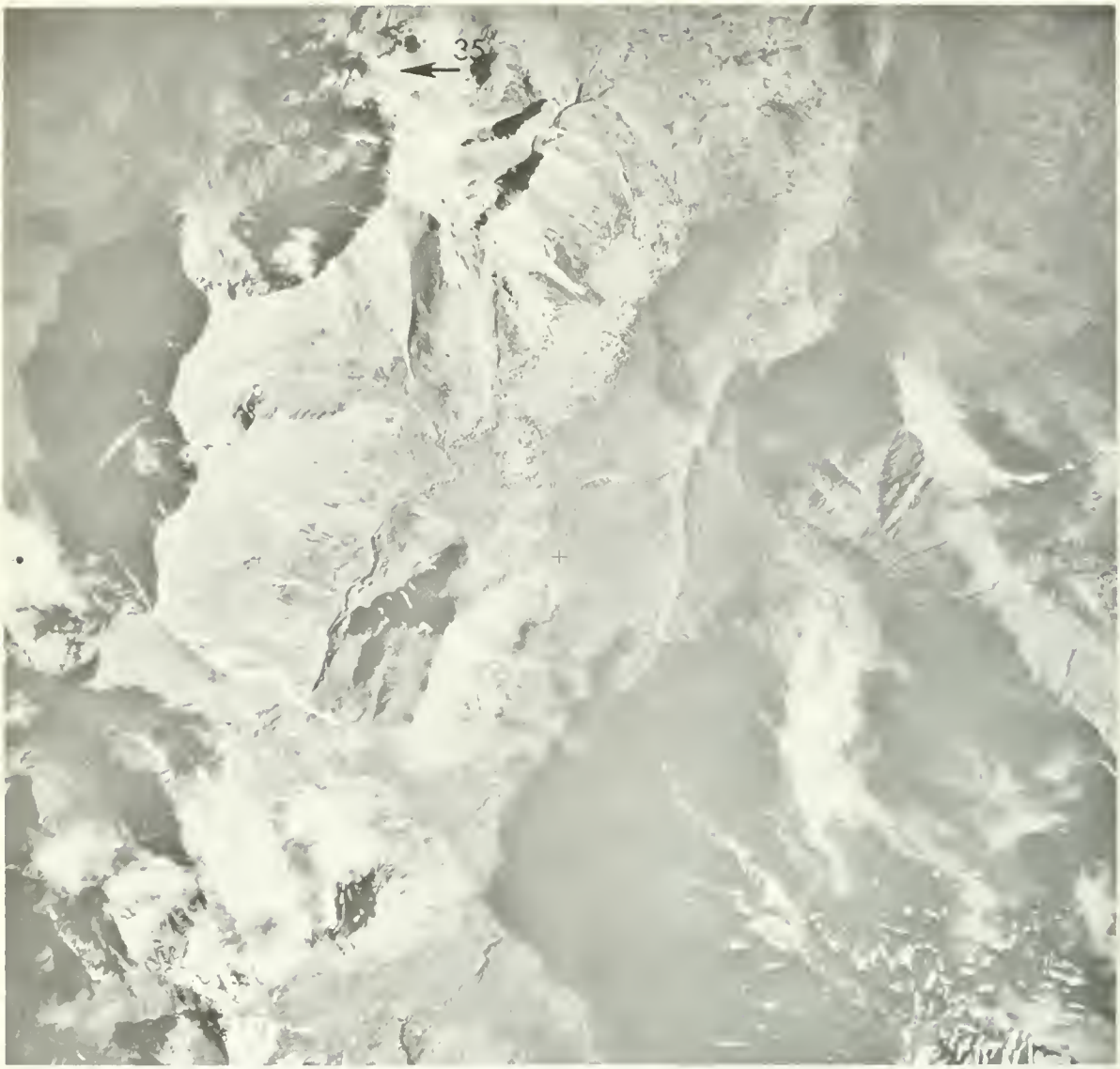


FIG. 35. Niven Peak, the sharply outlined peak along the ridge in the left center of the photograph, is typical of the topographic expression of Triassic and Upper Paleozoic rocks of the Sustut Peak region. Locality 35, near the upper margin, is on siliceous volcanic rocks of the Asitka Group.

Portulacaceae Purslane Family

Montia sarmentosa (C. A. Mey.) Robins.

Locality #2, RC 231e, 28 July; #3, RC 216, 27 July; #8, RC 237a, 1 Aug.; #11, RC 150, 8 July; #41, RC 103, 28 June. Alpine tundra, on weathered serpentine intrusive, micaceous schist, Bowser Formation, and on lavas.

Primulaceae Primrose Family

Trientalis europaea L.

Locality #26, WR 9073, 14 June; do RC 37b, 19 June; do RC 82, 25 June; #28, RC 8, 17 June. Glacial moraine and alluvium, in open woods.

Pyrolaceae Wintergreen Family

Pyrola asarifolia Michx.

Locality #5, RC 172, 22 July; #6, RC 203, 26 July; #26, RC 154, 11 July; do RC 84, 25 June. Open woods and meadows, on alluvium and glacial moraine.

Ranunculaceae Buttercup Family

Aconitum delphinifolium DC.

var. *delphinifolium*

Locality #3, RC 221, 27 July; #5, RC 179, 22 July; #6, RC 208, 26 July; #7, RC 256, 5 Aug.; RC 127, 30 June; #26, 159, 11 July; #27, RC 118, 29 June. Meadows, open woods, lake

shores, river banks, and alpine tundra, on alluvium, glacial moraines, talus slopes, micaceous schist, volcanic rocks, and Bowser Formation.

Anemone multifida Poir.

Locality #5, RC 195, 26 July; #15, RC 18a, 18 June; #33, WR 9051a, 10 June. Alpine tundra, heathlands, and open woods, on volcanic rocks, alluvium, talus, and glacial moraine.

Anemone narcissiflora L.

var. *monantha* Schlecht.

Locality #2, RC 233, 28 July; #3, RC 220a, 27 July; #41, RC 104, 28 June. Alpine tundra, on serpentine intrusives, micaceous schist, and volcanic rocks.

Anemone parviflora Michx.

Locality #5, RC 181, 22 July; #16, RC 31a, 19 June; #34, WR 9003, 9032, 8 June; #37, WR 9005, 8 June. Alpine tundra and open woods, on glacial moraine, Bowser Formation, and lavas.

Anemone richardsonii Hook.

Locality #26, WR 9071, 14 June; #28, RC 1a, 16 June. Dense woods, on alluvium.

Fig. 36. Collecting Locality 25 is on the southern flank of a high ridge of Bowser mudstone and sandstone on the north side of Thutade Creek, west of Thutade Lake. It is one of the most prolific localities collected during the summer.

FIG. 37. West end of Thutade Lake is bordered by mountains carved in mudstone and conglomerate of the Bowser Group. Locality 26 is at the campsite, on the lakeshore, and Locality 27 is on the high ridge behind camp to the north.

Aquilegia formosa Fisch. ex DC.

Locality #25, WR 9104, 14 June; #26, 146, 4 July. Grassy slopes, on talus.

Caltha leptosepala DC.

Locality #10, RC 124, 29 June; #19, RC 115, 28 June; #26, RC 147, 4 July; #26, RC 95a, 25 June; #38, WR 9020, 8 June. Stream banks and wet meadows, on alluvium and granite.

Delphinium glaucum Wats.

Locality #5, RC 183, 22 July; #6, RC 199, 26 July; #26, RC 160, 11 July. Open woods and meadows, on glacial moraine and alluvium.

Ranunculus eschscholtzii Schlecht.

Locality #8, RC 241, 1 Aug.; #10, RC 125a, 29 June; #16, RC 44b, 19 June; #25, WR 9123, 14 June; #26, WR 9000, 7 June; RC 6, 16 June; #29, WR 9126, 15 June; #33, WR 9047, 10 June. Open woods, meadows, alpine tundra, and heathlands, on talus, alluvium, Bowser Formation, coal beds, and volcanic rocks.

Ranunculus nivalis L.

Locality #12, RC 138, 30 June. Alpine tundra, on siliceous conglomerate.

Ranunculus occidentalis Nutt.

var. *brevistylus* Greene

Locality #8, RC 241a, 1 Aug.; #14, RC 61, 25 June. Open woods, meadows, and alpine tundra, on Bowser Formation, and alluvium.

Ranunculus pygmaeus Wahl.

Locality #12, RC 137, 30 June. Alpine tundra, on siliceous conglomerate.

Ranunculus unicinatus D. Don

Locality #26, RC 163, 11 July. Open woods, on glacial moraine.

Thalictrum alpinum L.

Locality #36, RC 51, 19 June. Marshy lake shore, in woodland.

Thalictrum occidentale Gray

Locality #25, WR 9121, 14 June; #26, WR 9067, 13 June; do RC 39, 19 June; do RC 78, 25 June; #36, RC 49, 19 June. Open woods, grassy slopes, meadows, and lake shores, on glacial moraine and alluvium.

Fig. 38. Mt. Jorgensen is held up by nearly horizontal alternating beds of conglomeratic sandstone and argillaceous mudstone. Sandstone beds form ledges and mudstone form slopes in the step-like erosional pattern well expressed in cirque floors. Locality 30 is on Mt. Jorgensen.

FIG. 39 Kitchener Lake is in the region between the folded mountains to the west and the Spatsizi Plateau to the east. Locality 17 is at the eastern end of the lake near its outlet. Locality 16 near Kitchener Crag is just off the photograph along the sharp ridge at the lower left, and is in Bowser shale and sandstone.

Rosaceae Rose Family

Dryas integrifolia Vahl

var. *integrifolia*

Locality #16, RC 41, 19 June; #35, WR 9039, 9 June; #37, WR 9070, 13 June. Alpine tundra, on Bowser Formation, Sustut, a dominant species.

Dryas octopetala L.

var. *kamtschatica* (Juz.) Hultén

Locality #2, RC 231c, 28 July; #13, RC 99, 27 June. Alpine tundra, on serpentine intrusive and Bowser Formation. These specimens approach *D. integrifolia* but possess glands similar to *D. octopetala*.

Fragaria virginiana Duchesne

var. *glauca* Rydb.

Locality #31, RC 106, 28 June. Open woods and meadows, on alluvium.

Geum macrophyllum Willd.

Locality #26, RC 157, 11 July. Open woods and meadows, on glacial moraine.

Luetkea pectinata (Pursh) Kuntze

Locality #2, RC 229, 28 July. Alpine tundra, on serpentine intrusive.

Potentilla diversifolia Lehm.

Locality #16, RC 32, 44a, 19 June; #25, WR 9096, 14 June; #26, RC 37e, 19 June; #28, RC 2, 16 June; #29, WR 9129, 15 June; #31, RC 107, 28 June; #36, RC 49a, 19 June; #38, WR 9024, 8 June. Alluvium, Bowser Formation, and coal beds, in meadows, lake shores, alpine tundra, and woods.

Potentilla fruticosa L.

Locality #5, RC 176, 22 July; #10, RC 125, 29 June; #26, RC 167, 11 July; #36, RC 54, 19 June. Lake shores, open woods, meadows, and heathlands, on glacial moraine and alluvium.

Potentilla hyparctica Malte

Locality #21, WR 9088a, 14 June; #22, WR 9132, 15 June; #34, WR 9035, 9 June. Alpine tundra, on slate and lavas.

Potentilla uniflora Ledeb.

Locality #16, RC 29, 19 June; #21, 9088, 14 June; #33, WR 9051, 10 June; #34, WR 9002, 9030, 8 June; #35, WR 9039a, 9 June. A dominant in alpine tundra, on Bowser Formation and lavas.

Rosa acicularis Lindl.

Locality #5, RC 174, 22 July; #6, RC 206, 26 July. Glacial moraine, in open woods.

Fig. 40. Stalk Lakes region collecting localities are on Jurassic Bowser siliceous conglomerate and sandstone (locality 12) and on alluvium and lake shore material associated with a landsile (locality 14), at the southwestern margin of the Spatsizi Plateau region.

FIG. 41. Coldfish Lake region between the Eaglenest Range, on the left, and Spatsizi Plateau, on the right. Locality 6 is at the campsite and is on glacial material, modified by lake margin deposits. The Eaglenest Range is held up by Jurassic volcanic rocks while the Spatsizi Plateau is held up largely by Tertiary Sustut Formation.

Rubus arcticus L.

Locality #26, RC 38, 19 June. Open woods, on glacial moraine.

Rubus idaeus L.

ssp. *melanolasius* (Dieck.) Focke

Locality #19, RC 133, 28 June. Open woods, on granite bedrock.

Rubus pedatus J. E. Smith

Locality #26, RC 37a, 19 June; do RC 145, 4 July. Open woods, on glacial moraine.

Rubus stellatus J. E. Smith

Locality #28, RC 1c, 16 June. Heathland, on alluvium.

Sanguisorba officinalis L.

Locality #2, RC 234, 28 July. Alpine tundra, on serpentine intrusive. This report represents a locality intermediate between populations in the Yukon and those to the south in British Columbia.

Sanugisorba stipulata Raf.

Locality #4, RC 189, 22 July; #6, RC 204a, 26 July; #26, RC 161, 11 July. Alluvium and glacial moraine in open woods.

Sibbaldia procumbens L.

Locality #29, WR 9135, 15 June; #36, RC 55, 19 June. Lake shores in open woods and alpine tundra on coal beds.

Sorbus scopulina Greene

Locality #26, WR 9080, 14 June; do RC 33, 19 June; do RC 72a, 77, 90, 25 June. Open woods and grassy slopes, on alluvium, glacial moraine, and talus.

Rubiaceae Madder Family

Galium boreale L.

Locality #5, RC 169, 22 July; #6, RC 190, 26 July, RC 120, 29 June; do RC 156, 11 July; #40, RC 102, 25 June. Open woods, meadows, and grassy slopes, on alluvium, moraine, and talus.

Salicaceae Willow Family

Populus balsamifera L.

Locality #1, RC 273, 13 Aug. River terrace gravels, in riparian woods.

Populus tremuloides Michx.

Locality #1, RC 267, 13 Aug.; #6, RC 260, 6 Aug.; #24, WR 9143, 15 June. River terraces, slopes, and open coniferous woodlands.

Salix arctica Pallas

Locality #3, RC 218, 27 July; #30, RC 15, 17 June; #37, WR 9012, 9013, 8 June; do, WR 9060, 13 June. Alpine tundra, on siliceous schist, Sustut Formation, and lavas.

Salix alaxensis Cov.

var. *longistylis* (Rydb.) Schneid.

Locality #1, RC 274, 274a, 13 Aug. River terrace gravels, in woods and thickets.

Salix barclayi Anderss.

Locality #26, WR 8986, 8988, 8998, 7 June; do WR 9082, 14 June; #32, WR 9045, 9046, 10 June; #64, RC 64, 19 June; #38, WR 9021, 9022, 9023, 8 June. Stream banks, lake shores, thickets, and meadows, on alluvium and moraine.

Salix barrattiana Hook.

Locality #32, WA 9043, 9044, 10 June; #38, WR 9026, 8 June. Stream banks and meadows, on alluvium and moraine.

Salix brachycarpa Nutt.

ssp. *brachycarpa*

Locality #38, WR 9028, 8 June. Stream banks and meadows, on alluvium.

Salix commutata Bebb.

Locality #36, RC 62, 19 June. Lake shore, in open woods.

Salix drummondiana Barr.

Locality #26, WR 8999, 7 June; do, WR 9086, 14 June; #36, RC 63, 19 June; #38, WR 9027, 8 June. Stream banks, lake shores, and meadows, on alluvium.

Salix glauca L.

Locality #6, RC 265, 6 Aug.; #25, WR 9144, 15 June; #26, WR 9064, 13 June; do WR 9081, 9085, 14 June; #29, WR 9140, 15 June. Lake shores, stream banks, open woods, heathlands, and tundra.

Salix monticola Bebb.

Locality #1, RC 272, 13 Aug. Stream terrace gravels.

Salix novae-angliae Anderss.

Locality #38, WR 9017, 8 June. Stream sides and meadows, on alluvium.

Salix reticulata L.

Locality #16, RC 24, 19 June; #35, WR 9040, 9 June; #37, WR 9007, 8 June. Alpine tundra, on Bowser and Sustut Formations, and on lavas.

Salix stolonifera Trautv.

Locality #37, WR 9006, 9006a, 8 June. Alpine tundra, on lavas.

Santalaceae Sandalwood Family

Geocaulon lividum (Richards.) Fern.

Locality #26, WR 8987, 7 June; do RC 95b, 25 June. Open woods, on alluvium and moraine.

Saxifragaceae Saxifrage Family

Heuchera glabra Willd.

Locality #25, WR 9125, 14 June. Grassy slope on Bowser Formation.

Leptarrhena pyroliflora (D. Don) R. Br.

Locality #26, RC 94, 95c, 25 June. Grassy slope, on talus.

Table 1. Summary of taxa collected in northern British Columbia.

	Lycopsida	Sphenopsida	Filicinia	Gymnospermae	Dicotyledonae	Monocotyledonae	Total
Families	2	1	1	1	35	5	45
Genera	2	1	2	4	89	14	112
Species	5	2	2	4	167	25	205
Subspecies	0	0	0	0	11	0	11
Varieties	0	0	0	0	35	0	35

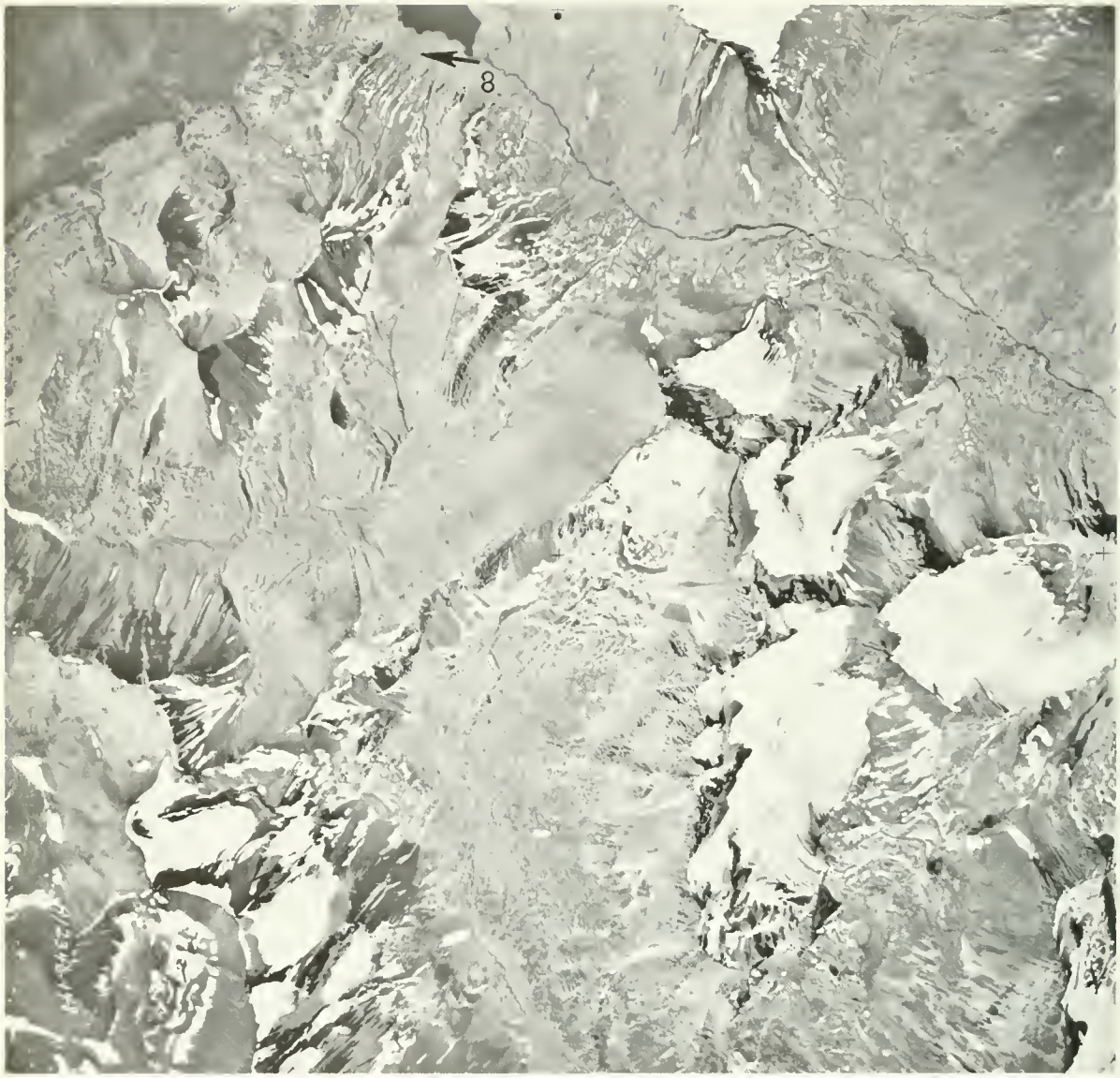


FIG. 42. Mt. Will region at the southern end of the Eaglenest Range. Locality 8, near Pass Lake, is in a low saddle carved in lower beds of the Bowser Formation. Mt. Will, between the three glaciers at right center is in massive Jurassic volcanic rocks.

Parnassia fimbriata Konig.

Locality ±2, RC 226, 28 July; #7, RC 250, 5 Aug. Alpine tundra, or serpentine intrusive and lavas.

Parnassia palustris L.

Locality #4, RC 188, 22 July. Glacial moraine, in open woods.

Ribes lacustre (Pers.) Poir.

Locality #26, WR 9066, 13 June. Glacial moraine, in open woods.

Ribes glandulosum Grauer

Locality ±25, WR 9108, 14 June. Grassy slope, on Bowser Formation.

Saxifraga ferruginea Grah.

Locality #12, RC 140, 30 June. Alpine tundra, on siliceous conglomerates.

Saxifraga flagellaris Willd.

var. *flagellaris*

Locality #9, RC 243, 1 Aug. Alpine tundra, on Bowser Formation.

Saxifraga lyallii Engler

Locality ±2, RC 235a, 28 July; #7, RC 251a, 5 Aug.; #8, RC 238b, 1 Aug. Alpine tundra, on serpentine, intrusive, Jurassic volcanics, and Bowser Formation.

Saxifraga nivalis L.

Locality #12, RC 99a, 27 June; #16, RC 26, 19 June. Alpine tundra, on barren shale slopes of Bowser Formation.

Saxifraga occidentalis Wats.

var. *rufidula* (Small) C. L. Hitchc.

Locality #25, WR 9109, 14 June. Grassy slope, on Bowser Formation.

Saxifraga oppositifolia L.

Locality #18, RC 131, 30 June; #34, WR 8979, 7 June; #37, WR 9008, 8 June. Alpine tundra, on marble, volcanic rocks, and lavas.

Saxifraga punctata L.

var. *porsildiana* (Calder & Savile) Welsh

Locality #12, RC 137a, 30 June. Alpine tundra, on siliceous conglomerates.

Saxifraga rivularis L.

var. *rivularis*

Locality #29, WR 9128a, 15 June. Alpine tundra, in Tertiary Sustut coal beds.

Saxifraga tricuspidata Rottb.

Locality #8, RC 239b, 1 Aug.; #19, RC 12, 13, 17 June; #25, WR 9112, 14 June; #37, WR 9014, 8 June. Alpine tundra, in lavas and Bowser talus and outwash, and on steep grassy slopes.

Scrophulariaceae Snapdragon Family

Castilleja miniata Dougl.

Locality #26, RC 35, 19 June; do RC 76, 25 June; #36, RC 53; 19 June. Open woods, meadows, and lake shores.

Castilleja unalaschcensis Hook.

Locality #2, RC 231, 28 July; #3, RC 211, 27 July; #6, RC 198, 26 July; #25, WR 9095, 14 June; #27, RC 117, 29 June. Open woods, meadows, grassy slopes, and alpine tundra.

Pedicularis bracteosa Benth. ex Hook.

Locality #25, WR 9117, 14 June; #26, RC 86, 25 June. Steep grassy slopes, on Bowser Formation. This is the northernmost known locality for this entity.

Pedicularis labradorica Wirsing

Locality #7, RC 252a, 5 Aug.; #26, RC 72c, 86a, 25 June. Open woods, meadows, and alpine tundra, on volcanic rocks and glacial moraine.

Pedicularis langsdorfii Fisch. ex Steven.

Locality #13, RC 100a, 27 June; #20, RC 19, 18 June. Alpine tundra.

Pedicularis sudetica Willd.

var. *gymnocephala* Trautv.

Locality #3, RC 211a, 27 July; #14, RC 9, 25 June; #29, WR 9127, 15 June; #36, RC 46, 19 June. Alpine tundra, open woods, and meadows, on micaceous schist, coal beds, and alluvium.

Penstemon procerus Dougl.

Locality #10, RC 126a, 29 June; #24, RC 149, 8 July; #31, RC 105, 28 June. Alluvium, on lake shores, and stream terraces.

Veronica serpyllifolia L.

var. *humifusa* (Dickson) Vahl

Locality #2, RC 231b, 28 July; #14, RC 60a, 25 June; #27, RC 121b, 29 June. Alpine tundra, on serpentine, intrusive, or along streams and lake shores on alluvium.

Veronica wormskjoldii

var. *wormskjoldii*

Locality #7, RC 249a, 5 Aug.; #8, RC 238a, 1 Aug.; #25, WR 9113, 1922a, 14 June. Alpine tundra and grassy slopes, on volcanic rocks and Bowser Formation.

Umbelliferae Carrot Family

Angelica lucida L.

Locality #26, WR 9087, 14 June; do RC 73, 25 June. Open woods on glacial moraine.

Heracleum lantum Michx.

Locality #25, WR 9106, 14 June. Steep, grassy, south-facing slopes.

Urticaceae Nettle Family

Urtica dioica L.

ssp. *gracilis* (Ait.) Selander

var. *lyalli* (Wats.) C. L. Hitchc.

Locality #25, WR 9124, 14 June. Steep, grassy, south-facing slope, on Bowser Formation.

Valerianaceae Valerian Family

Valeriana dioica L.

Locality #10, RC 126, 29 June; #31, RC 109, 28 June; #36, RC 52, 19 June. Wet meadows, river banks, and lake shores, on alluvium.

Valeriana sitchensis Bong.

Locality #3, RC 220, 27 July; #7, RC 251b, 5 Aug.; #25, WR 9093, 14 June; #26, RC 85, 25 June; do RC 164, 11 July. Grassy slopes and open woods, on alluvium, glacial moraine, and talus.

Violaceae Violet Family

Viola adunea Smith

Locality #25, WR 9114, 14 June; #26, WR 9054, 11 June; do RC 40, 19 June; #28, RC 1b, 6b, 16 June; #38, WR 9018, 8 June. Open woods, and meadows, on alluvium and glacial moraine.

Viola glabella Nutt.

Locality #26, WR 8995, 7 June. Open woods, on glacial moraine. This record represents an eastern extension of this entity from the more restricted coastal distribution previously known.

Viola renifolia Gray

var. *brainerdii* (Greene) Fern.

Locality #26, WR 9053, 11 June. Open woods, on glacial moraine.

PTEROPSIDA—ANGIOSPERMAE—MONOCOTYLEDONAE

Cyperaceae Sedge Family

Carex aquatilis Wahl.

Locality #26, RC 26, 25 June. Pond margin, on alluvium.

Carex deflexa Hornem.

Locality #38, WR 9019, 8 June. Dry, open woods, on alluvium.

Carex hoodii Boott?

Locality #25, WR 9094, 14 June. Steep, south-facing, grassy slope, on Bowser Formation. The specimen is somewhat immature and is difficult to ascribe positively to this entity.

Carex podocarpa R. Br.

Locality #12, RC 137c, 30 June; #15, RC 17, 18 June; #16, RC 26, 19 June; #20, RC 19a, 18 June; #29, WR 9136, 15 June; #34, WR 9034, 9 June. Alpine tundra, in lavas, coal beds, and siliceous conglomerates.

Carex praticola Rydb.

Locality #29, WR 9137, 15 June. Alpine tundra, on Tertiary Sustut coal beds.

Carex pyrenaica Wahl.

Locality #18, RC 128b, 30 June; #21, WR 9090a, 14 June; #22, WR 9058, 9058a, 12 June. Alpine tundra, on ridge crests, on marble, Bowser Formation, and slate.

Carex rossii Boott

Locality #25, WR 9124a, 14 June. Steep, south-facing, grassy slope, on Bowser Formation.

Carex vaginata Tausch

Locality #36, RC 48a, 19 June. Marshy lake shore.

Eriophorum angustifolium Honck.

Locality #26, RC 70, 25 June; do RC 151, 11 July. Pond margin.

Gramineae Grass Family

Calamagrostis purpurascens R. Br.

Locality #5, 177b, 27 July. Open woods, on glacial moraine.

Festuca altaica Trin.

Locality #12, RC 143, 30 June; #26, RC 66, 67, 25 June. Open woods, meadows, and grassy slopes, on Bowser Formation.

Hierochloe alpina (Sw.) R. & S.

Locality #12, RC 142a, 30 June; #29, WR 9142, 15 June. Alpine tundra, on Bowser Formation and coal beds.

Phleum alpinum L.

Locality #2, RC 230, 28 July. Alpine tundra, on serpentine intrusive.

Poa lanata Scribn.

Locality #12, RC 142, 30 June. Alpine tundra, on siliceous conglomerates of Bowser Formation.

Poa leptocoma Trin.

Locality #25, WR 9100, 14 June. Steep, south-facing, grassy slope, on Bowser Formation. This collection represents an eastward range extension for *P. leptocoma*.

Poa paucispicula Scribn. & Men.

Locality #22, WR 9059, 12 June. Alpine tundra, on slate.

Trisetum spicatum (L.) Richter

Locality #22, WR 9057, 12 June. Alpine tundra, on slate.

Vahlodea atropurpurea (Wahl.) Fries

Locality #26, RC 68, 25 June. Open woods, on glacial moraine.

Juncaceae Rush Family

Luzula confusa Lindeb.

Locality #41, RC 103a, 28 June. Alpine tundra, on alluvium.

Luzula parviflora (Ehrh.) Desv.

Locality #8, RC 240a, 1 Aug. Alpine lake shore, on alluvium.

Luzula spicata (L.) DC.

Locality #34, WR 8977, 7 June. Alpine fell field, on lavas.

Liliaceae Lily Family

Streptopus amplexifolius (L.) DC.

Locality #26, WR 9077, 14 June; do RC 153, 167a, 11 July. Open woods, on glacial moraine.

Veratrum eschscholtzii Gray

Locality #25, WR 9105, 14 June; #26, RC 155, 11 July. Meadows and steep, south-facing, grassy slopes, on Bowser Formation.

Orchidaceae Orchid Family

Listera cordata (L.) R. Br.

Locality #26, WR 9072, 14 June. Ground layer, in spruce woods, on glacial moraine.

Habenaria dilatata (Pursh) Hook.

Locality #25, WR 9118, 14 June; #26, RC 162, 11 July; do RC 83, 25 June. Marshy areas, along streams, and lakes, and in open grassy slopes, on Bowser Formation and glacial moraine.

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