



GEOLOGICAL
SURVEY
OF
CANADA

DEPARTMENT OF MINES
AND TECHNICAL SURVEYS

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A PROVISIONAL PHYSIOGRAPHIC MAP
OF CANADA

(Report and Map 13-1964)

H. S. Bostock



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Map 13-1964 Provisional physiographic map of
 Canada (in pocket)

ABSTRACT

The physiography of Canada falls naturally into two major units: the Shield Region, a region of low relief formed mainly of granitic rocks and gneisses that form the core of the continent; and the Border Region, which surrounds and laps onto the margin of the Shield and is formed of generally younger rocks.

These regions have been subdivided into provinces; those in the Shield Region are on a rather arbitrary basis, but those in the Border Region are clear-cut physiographic units. Three main areas of folded and faulted sedimentary rocks elevated and carried into mountain ranges form the eastern, western, and northern flanks of Canada.

A PROVISIONAL PHYSIOGRAPHIC MAP OF CANADA

INTRODUCTION

The writer is preparing a catalogue of Canadian air-photographs by which pictures of the different physiographic parts of Canada can be found. For this purpose a physiographic map of the country is essential. As no such map for the whole of Canada is available it has been necessary to compile one. The map presented here has been prepared primarily as an illustration for the airphoto-graph catalogue and therefore as a physiographic map is necessarily provisional.

Most of the large physiographic divisions of Canada are well established, but have been referred to loosely as provinces or regions, such as the Cordillera and Appalachians (Stockwell, 1957). For them the boundaries have been delineated and their subdivisions and units described; there is no need therefore to repeat here what has already been published. Others such as the Precambrian Shield and its parts, the Arctic Islands, and the northern Interior Plains are much less known and their boundaries and subdivisions have nowhere been adequately described. Where published maps and descriptions of physiographic provinces and their parts exist these have been followed, but, for the less known parts of Canada where this has not been done brief descriptions of the units are given, often for the first time.

PHYSIOGRAPHIC SUBDIVISIONS OF CANADA

Canada may be divided into two great physiographic regions, the Shield Region and the Border Region. The Shield Region is a vast area of Precambrian rocks around and overlapping which lie the younger rocks of the Border Region. Some bodies of the younger rocks also lie in isolated patches upon the Shield.

These major regions, and indeed also their divisions do not necessarily conform to the general accepted geographic or political boundaries. For instance the northern boundary between the two regions cuts irregularly through the Arctic Archipelago, parts of which therefore fall into each region.

Each physiographic region is divided into provinces and these into subdivisions, distinguished on the basis of geology and physiography.

The physiographic divisions of Canada are as follows:

SHIELD REGION

Bear Province

Bear Upland

Coronation Hills

Slave Province

Slave Upland

Western Churchill Province

Kazan Upland
Back Lowland
Wager Plateau
Boothia Plateau

Bathurst Hills
East Arm Hills
Thelon Plain
Athabasca Plain

Northern Churchill Province

Davis Highlands
Baffin Coastal Plain
Baffin Upland

Hall Upland
Frobisher Upland
Melville Plateau

Eastern Churchill Province

Richmond Hills
Belcher Islands
Povungnituk Hills
Labrador Trough
Sugluk Upland

Whale Depression
George Plateau
Labrador Highlands
Michigamau Plateau

Superior Province

Severn Upland
Nipigon Plain
Abitibi Upland
Cobalt Plain
Eastmain Plain

Larch Plateau
Nichicun Plateau
Kaniapiskau Plateau
Mistassini Hills

Southern Province

Port Arthur Hills
Michipicoten Island

Penokean Hills

Grenville Province

Pletipi Plateau
Hamilton Upland
Hamilton Plateau
Melville Depression

Mealy Mountains
Mecatina Plateau
Laurentian Highlands

BORDER REGION

Innuitian Province

Grant Land Mountains
Eureka Uplands
Victoria and Albert Mountains

Sverdrup Lowland
Parry Plateau

Arctic Lowland Province

Lancaster Plateau
Victoria Lowland
Shaler Mountains

Boothia Plain
Foxe Plain

Arctic Coastal Plain Province

Sverdrup Coastal Plain
Banks Coastal Plain

Mackenzie Delta
Yukon Coastal Plain

Cordilleran Province

St. Elias Mountains
Queen Charlotte Ranges
Queen Charlotte Lowland
Skidegate Plateau
Vancouver Island Ranges
Pacific Coastal Plain
Hecate Depression
Georgia Depression
Coast Mountains
Cascade Mountains

Stikine Plateau
Cassiar Mountains
Nass Basin
Skeena Mountains
Omineca Mountains
Northern Rocky Mountain Trench
Interior Plateau
Columbia Mountains
Southern Rocky Mountain Trench
British Mountains

Porcupine Plateau
Ogilvie Mountains
Selwyn Mountains
Yukon Plateau
 Shakwak Trench
 Tintina Trench
 Pelly Mountains
Liard Plain
Hyland Plateau

Richardson Mountains
Peel Plateau
Mackenzie Mountains
Mackenzie Plain
Franklin Mountains
Liard Plateau
Rocky Mountains
Rocky Mountain Foothills

Interior Plains Province

Anderson Plain
Peel Plain
Horton Plain
Brock Plain
Colville Hills
Great Bear Plain
Great Slave Plain

Alberta Plateau
 Fort Nelson Lowland
 Peace River Lowland
Alberta Plain
 Cypress Hills
Saskatchewan Plain
Manitoba Plain

Hudson Bay Province

Hudson Bay Lowland

Southampton Lowland

St. Lawrence Province

West St. Lawrence Lowland
East St. Lawrence Lowland

Anticosti Lowland

Appalachian Province

Mainland and Prince Edward
Island
 Green, White, and Notre
 Dame Mountains
 Eastern Quebec Upland
 Chaleur Upland
 New Brunswick Highlands
 Gulf of St. Lawrence Plain
 Annapolis Lowland
 Nova Scotia Highlands
 Atlantic Upland of Nova
 Scotia

Newfoundland Island
 Newfoundland Coastal
 Upland
 Newfoundland Highlands
 Newfoundland Central
 Lowland
 Atlantic Uplands of
 Newfoundland

SHIELD REGION

The vast Shield Region is a most difficult terrain to divide physiographically and to describe by units. Topographic maps are still not available for all of it and few parts have been described physiographically. Views of most of the region suggest an endless sameness that discourages division. The skyline has a general evenness that is almost universal although it may be only a few tens of miles away. Even features that may intercept the line of the horizon often have flattened summits, suggesting remnants of some old surface. Great areas of the terrain are so similar that were it not for changes in vegetation many views of northern Quebec and Ontario, and the Northwest Territories would be indistinguishable.

Geologically also the Shield is monotonous over great expanses. It is composed of great areas of coarse, gneissic, high-grade metamorphic rocks, largely granitic but including metavolcanic and metasedimentary rocks. Less abundant are lower grade metamorphic rocks and in places unmetamorphosed rocks or massive intrusions.

Despite the general uniformity of the gneissic terrain of the Shield, geological structure and evidence of orogenies show that it is composed of different parts that were once probably as physiographically distinct as the Cordillera and Interior Plains are today. The ancient boundaries are still definite geologically and also in many parts physiographically. Now, however, in some areas a physiographic province boundary transects terrain that seems from surface appearance to form a single physiographic unit; for instance, the wide unit, called the Lake Plateau of Quebec by Hare (1959), is cut into sections by the geological province boundaries, and physiographic subdivision on this basis seems arbitrary. It is, therefore, thought that adherence to the ancient geological province boundaries is both reasonable and practical. On the other hand the boundary between the geological provinces of Churchill and Nain (Stockwell, 1963), as presently drawn, cuts diagonally across the Labrador Highlands and for this report the Nain Province is ignored and incorporated in the Eastern Churchill Province.

Four types of terrain in the Shield physiographic provinces are distinguishable as physiographic subdivisions based on bedrock phenomena. The most readily discernible of these are the areas of unmetamorphosed rocks that comprise more or less flat-lying structures mantling the massive rocks, such as the sandstones of Thelon and Athabasca Plains, the conglomerate of Cobalt Plain, and the sills of Nipigon Plain. Another is composed of areas of low-grade metamorphic rocks, generally sediments, tilted or folded around the borders of the great blocks of massive rocks. These include such features as Bathurst, East Arm, and Penokean Hills and the Labrador

Trough. A third type is composed of particularly resistant, intrusive, massive bodies of rock such as the Mealy Mountains, which project above the surrounding terrain. The fourth type is formed of areas of massive rocks with broadly warped surfaces, such as Wager Plateau and Eastmain Plain.

The boundaries of most of the other divisions coincide with those of geological units, but some have been arbitrarily drawn for convenience of description where otherwise the units would be of unwieldy size, as for instance the separation of Severn and Abitibi Uplands.

In drawing the physiographic divisions of the Shield Region the boundaries of the Precambrian geological provinces by Stockwell (1963) are followed and as far as feasible the same names are used. In subdividing the provinces too, wherever the geological name is at all suitable it or some similar name is used with a physiographic generic.

Bear Province

Most of Bear Province is composed of less altered rocks than those of the adjacent Slave Province. It is broadly divided here into Bear Upland and the Coronation Hills, but in detail is an interlocking puzzle of plateaux, uplands, hills, and plains (Rand Corp., 1957c). Bear Upland is made of folded strata and massive rocks, On the whole the stratified rocks lie in, and northeast of, Coppermine River valley, while gneissic rocks lie to the south and southwest. Generally the surface resembles that of many upland areas of the Shield Region. Numerous lakes fill the hollows, and rounded rocky hills, generally exhibiting a relief of a few hundred feet, are characteristic. In places, however, relief exceeds 1,000 feet and summits reach above 1,600 feet.

The main part of the Coronation Hills is low, extending generally along Rae and Richardson Rivers eastward into Coronation Gulf. In this part they are underlain by gently northward dipping Precambrian sediments, which are intruded by basic sills and dykes. All are largely submerged and show only as islands in the Gulf; the hills and ridges rise westward to elevations of more than 800 feet. In the southwest the character of the surface changes; the ridges become more closely spaced until they merge to form broad, irregular, relatively smooth topped uplands, including Coppermine Hills, and reach an elevation of about 2,000 feet. Southwest of Dismal Lakes gneissic rocks protruding through the sediments form large rounded hills.

Slave Province

Slave Province comprises only one unit, the Slave Upland, composed of some of the oldest rocks in Canada. Like the Bear Upland, in detail it is a mosaic of plateaux, uplands, hills, and plains (Rand Corp., 1957c). The highest part is in the rugged centre where Peacock Hills reach more than 2,000 feet in elevation and some nearby lakes are at 1,600 feet. Elsewhere its rolling hilly surface is typical of so much of the great stretches of massive rocks of the Shield and it is practically continuous with the Bear Upland.

Churchill Provinces

The geological Churchill Province is formed of great stretches of gneissic rocks, folded and faulted belts, and overlying areas of stratified rocks. The province covers a vast area, more than 2,000 miles from east to west, and sweeps around Hudson Bay in a great, irregular horseshoe. For convenience this huge geological province is here divided into three parts: the Western Churchill Province, covering the mainland west of Hudson Bay; the Northern Churchill Province, taking in Melville Peninsula, Baffin Island, and adjacent areas; and the Eastern Churchill Province around northern Quebec and Labrador.

Western Churchill Province

The Western Churchill Province consists of broad areas of massive or gneissic granitic rocks and associated metavolcanic and metasedimentary rocks that make up Kazan Upland, Back Lowland, Wager Plateau, and Boothia Plateau. These units together form a massive platform, which is locally bordered by downfaulted, folded sediments and sills that comprise the Bathurst and East Arm Hills, and which is overlain by sandstone in the Thelon and Athabasca Plains. A marked feature of the province is the general sameness of its great areas of massive rocks, although in detail it is divisible into a mosaic of plateaux, uplands, hills, and plains like the Slave and Bear Provinces to the west (Rand Corp., 1955, 1957b).

The Kazan Upland covers a vast expanse of rolling lake-spattered country, typical in general aspect of so much of the Shield. In its main part north of the Athabasca Plain the highest points are 1,500 to 1,900 feet in elevation with relief rarely more than 200 or 300 feet. This great area drains and slopes gradually to Hudson Bay except along its western border where streams flow to the Mackenzie River drainage. Towards Hudson Bay, but still about 150 miles from the coast, the relief increases to 600 feet in places while the higher

summits become more separated and conspicuous. For as much as 100 miles inland from the sea the upland was covered by the post-glacial marine overlap, which reached as high as 675 feet above present sea-level (Lee, 1959). The area of the overlap forms a coastal plain of little relief and is largely mantled by reworked drift deposits, which obscure nearly all outcrops.

Included in the Back Lowland (Rand Corp., 1957b) are upland areas more than 1,000 feet in elevation on the east side of the Bathurst Hills, and considerable uplands towards Thelon Plain. Nonetheless its surface is generally lower than that of the uplands and plateaux that border it on the southwest and east, particularly between Back and Ellice Rivers. Much of its surface is typical of the Western Churchill Province, but the lower part near the coast is mantled by mud and silt laid down during the post-glacial period of marine overlap. Numerous eskers are particularly a feature of the inland parts of this lowland.

The surface of the Wager Plateau (Rand Corp., 1955, 1957a and b) rises from Chesterfield Inlet to Wager Bay. On the south side of the latter it reaches an elevation of about 2,000 feet and is deeply dissected. From Wager Bay northward the surface declines and loses its identity in low patches alternating with high rugged areas 400 to 700 feet in elevation.

Boothia Plateau is an arch in which Precambrian rocks projecting northward from the Shield are exposed through the Palaeozoic strata that flank it on the east and west. Its main, southern part is a prominent upland reaching 2,000 feet above sea-level, but to the north its surface declines and its relief is less marked. Along the west side of Somerset Island it becomes largely submerged and as its surface declines that of Boothia Plain and Lancaster Plateau on the east rises so that it no longer stands above the surrounding areas.

The Bathurst Hills (Bird, 1961) are composed of folded sediments and sills down-faulted between areas of massive rocks that rise as high as 2,000 feet in elevation on the west. The softer strata have been severely eroded and in many places are submerged in bays and channels, leaving the harder members, generally the sills, as long cuervas in places more than 1,000 feet in elevation. Marine silts and reworked deposits from the marine overlap mantle some of the lower parts.

The East Arm Hills, like the Bathurst Hills, are formed of down-folded and faulted, differentially eroded strata with massive gneissic rocks rising around them. On the north side the resistant strata dip southerly, forming broad cuervas rising as much as 900 feet above Great Slave Lake, whose surface is about 500 feet in elevation.

On the south side the hills are narrow and lower. Throughout the whole range of hills, most of the valleys are flooded by arms of Great Slave and other lakes.

The Thelon Plain (Rand Corp., 1957b) includes areas of the nearly flat-lying sandstones and volcanic rocks, which form a veneer over the massive rocks and are characteristically expressed by sandy flats sparsely covered by vegetation.

Similar sandstones cover the Athabasca Plain, which has a rolling to hummocky, lake-spotted surface rising in elevation from 900 feet on the west to 2,000 feet on the east and with a local relief of 200 to 300 feet.

Northern Churchill Province

The Northern Churchill Province (Dunbar and Greenaway, 1956) is a long, narrow, northward-pointing triangle in which the main part forms a basin of Precambrian rocks surrounding the Palaeozoic rocks of Foxe Plain much as the mainland Shield area surrounds the Hudson Bay Province.

Davis Highlands (Ives and Andrews, 1963) are an elevated belt of deeply dissected upland formed by crystalline rocks of Precambrian age. They comprise most of the northeast flank of Baffin Island and most of Bylot Island. Thence they extend north in a long spur of Precambrian rocks along the east coast of Devon Island and south Ellesmere Island as far as Bache Peninsula. Everywhere along this distance, some 1,200 miles, mountain summits reach 5,000 feet or more above sea-level and are truncated by an upland surface that slopes gently to the west or southwest. Long arms of the sea penetrate the land, some as sounds and many as fiords, some of which cut right through the highlands. The summits are commonly crowned by ice-caps. The largest, the Penny ice-cap, lies at an elevation of 6,000 to 7,000 feet near the southeast end of Cumberland Peninsula.

Baffin Coastal Plain is an area of coastal lowland that borders the Davis Highlands on Baffin Island, on Henry Kater Peninsula and northwestward to Eglinton Fiord. Its greatest width is about 25 miles and it continues as isolated narrow strips as far north as Cape Adair.

Baffin Upland is a broad upland or plateau whose surface is cut on Precambrian rocks. On the northeast the surface is as high as 3,000 to 5,000 feet and slopes upward to join the surface marked by the summits of the Davis Highlands. From there in general it slopes down to the west and southwest, merging with the surface of Foxe

Plain and ultimately dipping beneath the sea. To the west, on Brodeur Peninsula, the upland surface slopes generally southward and is spotted with areas and mesas of Palaeozoic sediments. The Barnes ice-cap lies in the northeast part and about midway in the length of the upland.

In the southeast, Cumberland Sound separates the Baffin Upland from the Hall Upland on Hall Peninsula (Rand Corp., 1958). The surfaces of these two uplands are similar. The Hall Upland reaches 3,800 feet elevation on the northeast side and slopes southward to Frobisher Bay. South of the bay the Frobisher Upland is again similar. On the northeast it rises abruptly from the sea to 3,000 feet elevation and from there slopes southward down to the sea. A similar but lower and more irregular terrain extends westward to FoXe Peninsula. The southwest part, where maximum elevations of about 1,200 feet are reached, is included in Frobisher Upland. The Precambrian rocks that underlie all these uplands continue as isolated areas of the Frobisher Upland in the rugged plateaux of Salisbury and Nottingham Islands.

The mainland part of Melville Plateau (Rand Corp., 1955) is largely a featureless, smooth upland, 1,500 to 2,000 feet in elevation, but with some rugged areas along its west border. On Southampton Island the upland surface is lower at the northwest and east ends, but near the centre much of it is about 2,000 feet high.

Eastern Churchill Province

The Eastern Churchill Province is wrapped around the northeastern part of the Superior Province. It consists on the north and east of typical shield areas bordered by a somewhat disconnected chain of ranges of hills. These ranges are composed of similar rocks, all of which have suffered the orogeny typical of the Churchill Provinces. They form the Belcher Islands, the Richmond Hills and scattered islands in Hudson Bay, the Povungnituk Hills, and the Labrador Trough. On the south the Mistassini Hills belong to this group geologically, but due to their isolated position, far from other parts of the Eastern Churchill Province, they are included in the Superior Province for convenience.

The Belcher Islands are a range of hills eroded from elaborately folded sediments truncated by an old erosion surface. The higher summits of the islands are about 400 feet in elevation.

The Richmond Hills, including the Nastapoka Islands and other islands to the north, are mainly a group of east-facing cuestas of sediments and volcanic rocks.

The Povungnituk Hills include the Cape Smith and Povungnituk Ranges. They are composed of roughly east-west ridges and valleys of folded strata with a relatively high relief in the western part and more subdued in character eastward.

The Labrador Trough includes the whole belt of folded strata along the east side of the Larch and Kaniapiskau Plateaux. It is mainly a belt of ridges and valleys of folded strata, down-warped and faulted. The summit elevations range from 2,400 feet in the south and central parts to 1,200 feet in the northern part. In the southern end the relief is subdued, but towards the Koksoak River it is bolder and commonly 300 feet. Farther northward again the Trough becomes narrow and its surface merges with that of the adjacent plateau areas. There the valleys are generally drift floored with till drumlins and sand plains. In its northern part, along Ungava Bay, the Trough breaks up into discontinuous areas of the strata that form it.

The Sugluk Upland is the area at the northern tip of the peninsula and is typical of the Churchill Provinces. On the north coast the plateau drops abruptly as much as 1,700 feet to the sea. To the west it slopes down gently and is covered by the marine overlap. Inland its slightly undulating surface reaches elevations of 1,900 feet.

The Whale Depression is a broad, irregular, largely drift-covered area drained by Whale River. Its scattered hilltops range from 2,000 feet elevation in the south to 800 feet in the north. Its boundaries, determined largely by its drift cover, are arbitrary.

The George Plateau is a bedrock plain, undulating and somewhat higher than the Larch Plateau, except where it slopes down in the north and west to merge with the Whale Depression. Parts of it are occupied by drumlinized till. Its summits are generally between 1,000 and 2,000 feet in elevation, but it rises higher northeastward toward the Labrador Highlands.

The Labrador Highlands include several ranges as well as the Torngat Mountains. The summits of these ranges, in places, exhibit remnants of an old undulating, westward-sloping surface. These summits reach 3,500 and in places even 5,000 feet in elevation. On the east these ranges are deeply dissected by fiords with high sea cliffs and their summit drops steeply to the ocean. From the fiord heads some deep valleys cut through the highlands and connect with others that lead to Ungava Bay.

The Michikamau Plateau is similar to the Nichicun Plateau of the Superior Province, both being parts of Hare's Lake Plateau (Hare, 1959). Lakes and drift features cover much of its surface but here and there are rugged areas. Its surface is 1,400 to 2,100 feet in elevation.

Superior Province

The Superior Province stretches from Nelson River around the southern margin of the Hudson Bay Lowland and the east shore of Hudson Bay. It shows no distinct physiographic characteristics by which it may be distinguished from the Churchill Provinces, but if delineated on geological evidence, forms a very practical unit. Except in the northeast, the great part of it slopes and drains to Hudson Bay. Its surface is characteristically spattered with numerous lakes among rocky, rounded hills. Though huge, the province is not readily divisible and its subdivisions are in part arbitrary. A number of relatively small areas of younger stratified Precambrian rocks resting on the older rocks can, however, be distinguished. These are the Nipigon and Cobalt Plains and the Mistassini Hills.

The Severn Upland has a broad rolling surface, without any conspicuous feature. It rises gently southwestward from the Hudson Bay Lowland, reaching about 1,500 feet elevation in its southern and highest part. Most of it, however, lies between 900 and 1,200 feet elevation. To the southwest much of it is mantled by glacial lake deposits.

Around Lake Nipigon is a shallow basin, referred to as the Nipigon Plain, which consists of nearly flat-lying sills and sediments. It forms a dissected plain at an elevation of about 900 feet on which remnants of the resistant sills stand as scattered hills.

The Abitibi Upland is the eastward continuation of the Severn Upland and resembles it generally. Big areas of its northern parts are covered by glacial lake deposits.

The Cobalt Plain to the south is composed of flat-lying clastic sediments on the older massive gneissic rocks.

Hare (1959) described the physiography of northern Quebec and Labrador from a reconnaissance study of airphotographs and prepared a map from this work. This has been used extensively here but an effort has been made to fit his units to the main outlines of the geology. This has necessitated some modification to his units, names, arrangements, and boundaries.

The interior part of the Eastmain Plain (Remick, 1963) is a continuation of the Abitibi Upland and sweeps north to blend with the Larch Plateau. However, it is generally lower than either of these and large areas, particularly near the border of James Bay, were covered by the marine overlap. There lakes are fewer and muskeg prevails. As a whole it has a gently sloping surface, broken here and there by hills, rising to the east. Its highest part is northwest of Lake

Mistassini, where lakes lie at elevations of 1,200 feet.

The Larch Plateau has an undulating surface with elevations generally between 500 and 1,500 feet. Bedrock is largely exposed and drift is thin. Large areas, particularly on the west side, were covered by the marine overlap but in its southeast part drumlinized till cloaks much of the low-lying parts. In the southern part drainage is to Hudson Bay, but in the north a large area is drained by Leaf and Larch Rivers to Ungava Bay. Leaf River indeed starts within 30 miles of Hudson Bay at an elevation of about 500 feet and as it flows northeast the hills rise from 600 to more than 1,000 feet above it on each side.

The Nichicun Plateau occupies much of the middle of the peninsula and has a broad, undulating, lake-spattered and partly drift-covered surface, generally between 1,500 and 3,000 feet in elevation. Its summits blend with or are somewhat lower than those of adjacent units. Several areas of rugged, dissected rocky highlands in the central part rise some hundreds of feet above the general surface. As in other central areas of the peninsula, lakes cover a large part of its surface, and are interspersed with numerous drumlins and eskers and other drift features.

The Kaniapiskau Plateau lies at the core of the peninsula and is composed of rugged granitic hills in which fracture systems are conspicuously etched. Parts reach elevations of more than 3,000 feet. Its eastern border forms an escarpment overlooking the Labrador Trough, but elsewhere its surface merges with that of the Nichicun Plateau.

Mistassini Hills and the Labrador Trough are composed of similar rocks and the same strata can be traced through the intervening part of the Grenville Province. In the hills and the trough, however, these rocks have escaped the characteristic deformation of the Grenville rocks although they have been subjected to deformation later than the other rocks of the Superior Province. In a strictly geological sense the Mistassini Hills belong to the Eastern Churchill Province, but as a physiographic unit they are more conveniently regarded as a part of the Superior Province, which largely surrounds them.

The Mistassini Hills area consists of hills, ridges, and valleys. Summits are more than 3,500 feet in elevation in the highest part, Otish Mountains, and 2,300 feet in elevation above Lake Mistassini. Most of the ridges are cuestas and are subdued over most of the unit, particularly around the lake.

Southern Province

The Southern Province is represented in Canada only by the Port Arthur Hills, Michipicoten Island, and the Penokean Hills but it includes the Precambrian of the States of Michigan, Minnesota, and Wisconsin. It is distinguished from the adjacent Superior Province by the imprint of an orogeny younger than any undergone by rocks of the more northerly province.

The Port Arthur Hills are formed of sills and sediments tilted to the south to form hills and promontories into Lake Superior. They reach summits of 1,500 feet in elevation, in places rising 800 feet above the lake and adjacent valleys. Michipicoten Island is composed of sediments that have been subject to the same orogeny. Farther east, north of Lake Huron, the Penokean Hills form another area of folded sediments. Most of these hills are 800 to 1,000 feet in elevation, but two points at least reach higher than 1,500 feet, giving a maximum relief in the order of 900 feet.

Grenville Province

The Grenville Province underwent the latest orogeny of any of the Precambrian provinces. It lies as a massive upland abutting relatively abruptly along faults against lowlands of the St. Lawrence Province, in contrast to the west margin of the Shield where the Precambrian surfaces dip gently under the overlapping Palaeozoic and Mesozoic rocks of the Interior Plains Province.

The Pletipi Plateau is virtually continuous with the Nichicun and Michikamau Plateaux in the Superior and Eastern Churchill Provinces respectively and its surface is similar to theirs. In general, however, it is higher than the Michigamau Plateau to the north with elevations commonly as high as 2,500 feet and in a few instances 3,000 feet.

The Hamilton Upland is a composite unit of three bold, rugged areas of hills as much as 2,500 feet in elevation that stand 500 to 1,000 feet above the surrounding lake and drift covered plateau surface that separates them.

To the southeast of the Hamilton Upland, drift-covered areas similar to those of the Nichicun Plateau form a belt referred to here as the Hamilton Plateau.

The Melville Depression, containing Lake Melville, is an irregular lowland, largely about 500 feet in elevation but with a few hills reaching to about 1,000 feet. It is much dissected by river valleys that enter it from the west.

The Mealy Mountains rise abruptly on the south side of the Melville Depression, reaching their highest elevation of 3,700 feet in the east. An old surface truncates their summits and slopes downward to the west. Cirques are reported in the highest part.

The Mecatina Plateau is rough and undulating and its margins are deeply dissected. It generally rises rapidly from the coast to elevations of 700 to 1,200 feet and then more gently to about 1,800 feet along its inland borders. Much of its western and inland parts are drift covered.

The Laurentian Highlands is a broad plateau or upland that in general rises abruptly from the St. Lawrence Province. Its southeastern edge is deeply and in places widely dissected by numerous rivers, which gather volume on the high undulating interior and drop rapidly near the edge. As a result the southeastern border has a truly mountainous appearance from its valleys, where the relief is commonly 1,000 to 2,000 feet. In many parts of the interior too the surface is mountainous, but there an evenness of summit levels is often apparent and this general surface, with a relief of 1,000 to 1,500 feet is commonly higher than the adjacent plateaux to the north. Much of this upland surface lies at about 2,000 feet, but here and there are broad areas with summits 3,000 feet and, in a few parts, 4,000 feet in elevation. At the south end the Laurentian Highlands include the hills that form the spur of Precambrian rocks referred to as the Frontenac Axis extending into the United States between the West and East St. Lawrence Lowlands.

BORDER REGION

In all parts the Border Region exhibits a general similarity in the arrangements of its units. Generally on the inner side, toward the Shield Region, areas of plains or lowlands of relatively undisturbed post-Precambrian strata overlap or lie against the Shield, bordered on their outward side, by more or less folded and mountainous areas of thick geosynclines. This has long been well recognized for the east, south, and west, but has not been widely realized in the north. There, in the Arctic Islands, the same threefold division is apparent, the provinces of the Shield lie to the east and south while the Arctic Lowland Province largely of flat-lying Palaeozoic rocks forms the extension and counterpart of the Interior Plains Province. The Innuitian Province of more or less folded Palaeozoic strata and areas of overlying younger rocks which form its mountains and basins corresponds to the Cordilleran and Appalachian Provinces.

In making this threefold division some areas of Precambrian rocks are ignored, notably an area of Archaean rocks, similar to those of the Superior Province, west of Hadley Bay on Victoria Island, and the unmetamorphosed Proterozoic strata of the Shaler Mountains and Cape Lambton. These areas are inliers, well isolated from the main body of the Precambrian and, like the Proterozoic strata of the Brock Plain in the Interior Plains Province, are not treated as part of the Shield Region.

Arctic Coastal Plain Province includes the coastal terrain along the shores of the Arctic Ocean from Alaska to Meighen Island. This unit traverses the border of the Cordilleran, Interior Plains, and Arctic Lowland Provinces and part of the Innuitian Province. Each section has its peculiar characteristics that entitle it to a separate name.

Innuitian Province

(Dunbar and Greenaway, 1956; Fortier, et al., 1963)

The Grant Land Mountains are composed of folded Palaeozoic sediments, gneisses, schists, and minor intrusions. A large part of them is covered by ice-caps and glaciers. Their summits reach elevations as high as 8,000 feet and exhibit a general uniformity suggestive of the presence of an old surface from which their valleys have been cut.

A mosaic of elongated units, 20 to 100 miles long and 10 to 30 miles wide comprise the Eureka Upland. There are ridged uplands, valley and ridge areas interspersed in places with ridged lowlands and a broad, broken upland around Eureka Sound. The upland surface dips inward toward the Sound and some wide valley areas occur near it forming a hollow around it in the general surface of the uplands. Eureka Upland includes the plateau area of folded sediments around Lake Hazen and the ice-cap on the ridged upland of Axel Heiberg Island. A notable feature too is the truly rugged mountains of Axel Heiberg Island, which reach elevations higher than 6,000 feet.

A narrow belt of plateau, generally about 3,000 feet in elevation is part of the Eureka Upland extending north from the Lancaster Plateau along the border of the Davis Highlands.

Victoria and Albert Mountains are ranges of folded sediments reaching above 6,500 feet in elevation in many places and largely covered by an ice-cap and glaciers.

The Sverdrup Lowland is a structural basin and comprises a group of generally low islands. Some to the north and east can be described as ridged lowland, others are rolling, scarped lowland and near Isachsen stands a plateau-like area. The rocks are Mesozoic sediments folded and pierced by domes.

Parry Plateau is a belt of elevated islands composed generally of the same folded strata as compose the Eureka Uplands and mountain areas to the northeast. It wraps around the south side of the Sverdrup Lowland. Except for a patch of lowland around Prince Alfred Bay, all of it is uplands varying in elevation from about 400 to 2,000 feet. Most of it has a high rolling surface, but in northern Bathurst Island it contains a large area of much cut up ridged upland. Its main body ends abruptly at Kellett Strait, where Eglinton Island by structure and form belongs to Sverdrup Lowland, but beyond this to the west around Mould Bay an area of ridged upland forms a detached part of the Parry Plateau.

Arctic Lowland Province

Victoria Lowland (Fyles, 1962) stretches west from Boothia Plateau across the channels and islands to the Banks Coastal Plain. Though its main part is south of Viscount Melville Sound it includes the area of flat-lying Devonian strata that form Dundas Peninsula north of the Sound. Most of the lowland is underlain by nearly flat-lying Palaeozoic sediments. On the west on Banks Island it is underlain by Mesozoic and Tertiary sediments and merges with the Banks Coastal Plain. On the southeast of Banks Island the lowland includes a conspicuous, dissected plateau that drops abruptly several hundred feet into the sea. On the northeast of Banks Island, southeast of Mercy Bay, a broad plateau of Devonian rocks 1,000 to 1,500 feet high matches with a similar area on Dundas Peninsula across M'Clure Strait on Melville Island. On both sides of Prince of Wales Strait rough belts of morainal hills, 600 feet or more in elevation, rise steeply from the sea. In the west-central part of Victoria Island an anticline of Precambrian sediments and volcanic rocks form Shaler Mountains. They are generally 1,000 to 1,500 feet in elevation, but a plateau of igneous rocks in the interior reaches 2,500 feet. Southeast from the mountains the lowland stretches away with ranges of morainal hills and lower areas, generally declining eastward in elevation until it becomes largely submerged and is only exposed in the islands. To the east of the mountains, east of Hadley Bay, on Stefansson Island and on the north of Prince of Wales Island the terrain is plateau-like in character, though elevations seldom exceed a few hundred feet, reaching a maximum of 780 feet on Prince of Wales Island.

Boothia Plain is a largely flooded lowland. It consists of Palaeozoic sediments around the Gulf of Boothia, and its surface continues that of Lancaster Plateau from which it slopes southward.

Foxe Plain is low, smooth, largely flooded, and composed of Palaeozoic rocks lying in a basin-like area on Precambrian rocks. It is therefore much like the Hudson Bay Province only on a smaller scale. The main feature is the Great Plain of the Koukdjuak, which is bordered by low uplands in three places.

Arctic Coastal Plain Province

The Arctic Coastal Plain Province stretches from Alaska along the north shore of the Yukon Territory, over the Mackenzie Delta, and thence along the northwest coast of the Arctic Lowland and Inuitian Provinces as far northeast as Meighen Island.

On the islands, from Meighen Island to the north corner of Banks Island, the Sverdrup Coastal Plain and the northern Banks Coastal Plain are typical of coastal plains composed of very gently, seaward dipping, unconsolidated strata. The main part of the Banks Coastal Plain, however, is masked by unconsolidated materials and the structure is hidden. The coastal plain of the Interior Plains is composed of a small area extending westward from the tip of Cape Bathurst and the Mackenzie Delta (Mackay, 1956), including both the present and the earlier deltas. To the west, the Yukon Coastal Plain overlooks the Mackenzie Delta, but declines in elevation westward where it forms a drift- and lake-covered lowland along the coast to near Herschel Island. There it is made up of great alluvial fans and deltas coming down from the British Mountains.

Cordilleran Province

The physiographic divisions of the Cordilleran Province are described by Bostock (1946 and 1961) and by Holland (in press) and the physiographic boundaries shown on the accompanying map are taken from these publications.

Interior Plains Province

The southern part of the Interior Plains Province has been known and described for many years, but only during the last two decades has the northern part of the province to the Arctic coast been sufficiently explored and mapped to permit physiographic subdivision. It is now apparent that the northern parts of the province are more complex and divisible into smaller units than the southern.

Anderson Plain (Douglas et al., 1963, and Mackay, 1958) is characteristically undulating and rises inland to the south from the sea coast. On the north along the coast it includes the low flat, lake-dotted Capes Bathurst and Parry. East of Mackenzie Delta it has elevations of 200 to 400 feet and inland from the capes it rises abruptly in an escarpment to 600 and even 1,000 feet in elevation. Southward and inland generally its elevation increases gradually and in much of its interior the valleys and lake-floored hollows are at elevations of 500 to 700 feet with hills around at about 800 to 1,000 feet. The main stream valleys are entrenched a few hundred feet below its general surface. The northwest part of the plain is underlain by Mesozoic sediments and to the southeast and southwest the bedrock is Palaeozoic. Large parts of its higher levels are rocky, but much of it too is covered by outwash from an ice-front that lay near its southeast border. From this ice-front entrenched run-off channels wind across the plain.

Peel Plain (Douglas et al., 1963) lies southwest of Mackenzie River. Its main southwest part is a broad shallow hollow about 400 feet in elevation, some parts with innumerable small lakes and others without any. On the northeast its surface rises to hills reaching 1,500 feet elevation at their eastern end. Arctic Red River is entrenched across Peel Plain, and Ontaratieu River rising in it follows a deeply incised course through the hills to Mackenzie River. The southwestern part of the plain is underlain by Mesozoic rocks whereas Palaeozoic strata form the hills.

Colville Hills (Douglas et al., 1963) is an upland of small rolling hills and lake-filled hollows, and is surrounded by ridges of hills, which follow an open net-like plan with meshes 10 miles or more across. The lower ground within the ridges lies at 800 to 1,000 feet elevation, while the serpentine ridges have summits here and there up to 2,200 feet. The plain is an area of Palaeozoic sediments.

Horton Plain is composed of nearly flat-lying Palaeozoic sediments. It has a gently rolling surface at elevations of 1,200 to 2,000 feet, the higher parts being near the head of Hornaday River and in the east part. Much of the west part of the plain is rocky, but in the eastern part there are considerable areas of drift. With a few exceptions the lakes are small and scattered. Throughout, as the streams gather size, they become entrenched 200 to 400 feet below the upland.

Brock Plain (Fraser et al., 1960; Mackay, 1958) is an area of nearly flat-lying late Precambrian sediments exposed by the erosion of slightly upwarped, surrounding Palaeozoic, and in the northwest Mesozoic strata. In places these form low scarps around it and scattered mesas within its borders. The surface of the plain is rolling and the Melville Hills, including Mount Hooker 1,600 feet in elevation, stretch across it.

Great Bear Plain (Douglas et al., 1963) is largely composed of Mesozoic strata. Its rolling surface is generally below 1,000 feet elevation, but a number of small plateaux and hills rise above this, such as the Scented Grass Hills and Grizzly Bear and Cartridge Mountains, which reach elevations of about 1,500 feet.

Great Slave Plain (Douglas et al., 1963) is largely of Palaeozoic strata and its surface is generally below 1,000 feet in elevation. Its central part, however, contains the plateau of Horn Mountains, which consists of Mesozoic strata whose broad, smooth top has an elevation of 2,500 feet.

Alberta Plateau (Holland, in press) is a broad area of hills of Mesozoic sediments separated by the wide valleys of the Fort Nelson, Hay, and Peace Rivers. On the north the border of the plateau is formed by a broken but definite escarpment, which overlooks Great Slave Plain from the hills west of Trout Lake to Cameron Hills and Caribou Mountains. Beyond this the border is less defined. It extends east across the wide Peace River valley and southeast around the Birch Hills. From there it turns south, first along the Athabasca River valley, which it crosses to include the Cheecham Hills and then southwest past Pelican Mountain and Swan Hills, generally along the Athabasca River to join the Cordillera. The ranges of hills reach elevations between 3,000 and 4,000 feet. They are characteristically broad and smooth topped. Two river valleys within the plateau form important hollows, the Fort Nelson and the Peace River Lowlands, where the terrain is generally below 2,000 feet elevation.

South of the line of hills along Athabasca River the Alberta Plain (Acton et al., 1960), also largely composed of Mesozoic strata but with some Tertiary sediments in the west and south, stretches southeastward to the International Boundary. Although virtually the continuation of the Alberta Plateau, it has a more even surface, broken only by a few widely separated groups of hills such as the Neutral, Cypress, and Porcupine Hills. Much of the plain is about 2,500 feet in elevation with the hills rising to 3,500 or more; Cypress Hills reach 4,700 feet. The river valleys are entrenched 200 to 400 feet below the surrounding plain.

Saskatchewan Plain (Acton et al., 1960) borders the Alberta Plain on the northeast and has a generally lower surface. The Saskatchewan Plain is in fact a group of undulating to rolling plains 1,500 to 2,150 feet in elevation with a few scattered low ranges of hills or uplands 1,800 to 2,600 feet in elevation. In the northwest the Ile a la Crosse Lowland around Peter Pond Lake, a detached area characteristic of the Manitoba Plain, is included with the Saskatchewan Plain.

Manitoba Plain (Acton et al., 1960) has a flat to gently undulating surface 700 to 1,500 feet in elevation and lies east of the Missouri Coteau. Except along the west side and Saskatchewan River, where it is underlain by Mesozoic sediments, it is composed of Palaeozoic strata. Most of it was formerly under Glacial Lake Agassiz and owes its surface deposits to that lake.

Hudson Bay Province

Hudson Bay Province includes the Hudson Bay Lowland on the mainland northwest of James Bay and the Palaeozoic areas of Southampton, Coats, and Mansel Islands.

Hudson Bay Lowland is a low, swampy plain of Palaeozoic rocks sloping gently up from Hudson and James Bays inland to the Shield. It reaches elevations of 200 to 400 feet along the edge of the Shield where, south of James Bay, it overlooks the Precambrian as a notable escarpment. Its one outstanding feature is the Sutton Ridges, an inlier of Precambrian strata that rise to an elevation of 600 feet, about 500 feet above the surrounding surface.

Southampton Lowland (Dunbar and Greenaway, 1956; and Rand Corp., 1957a) is also a plain of Palaeozoic sediments, but it is not so flat and is better drained than the Hudson Bay Lowland. It is generally less than 300 feet in elevation, but it contains two higher areas of protruding Precambrian rocks, one, on Southampton Island, reaching 500 feet in elevation and the other, at the north end of Coats Island, 700 feet.

St. Lawrence Province

The St. Lawrence Province comprises the St. Lawrence Lowlands, which are divided into the lowlands west of the Frontenac Axis referred to as the West St. Lawrence Lowland, the lowlands east of the axis extending down the St. Lawrence River to beyond Quebec City, referred to as the East St. Lawrence Lowlands and Anticosti Island, Mingan Islands, and a narrow strip along the north shore of the Gulf of St. Lawrence opposite these islands referred to as the Anticosti Lowland. The St. Lawrence Province is described under St. Lawrence Lowlands by Stockwell et al. (1957, p. 207).

Appalachian Province

For the Appalachian Province the physiographic divisions given in Stockwell et al. (1957, p. 123 and Figure 40), are followed on the physiographic map accompanying this paper except that the province is divided into two main parts, the Mainland and Prince Edward Island, and Newfoundland Island. To accommodate the small scale of the map some names have been shortened and minor subdivisions omitted.

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