

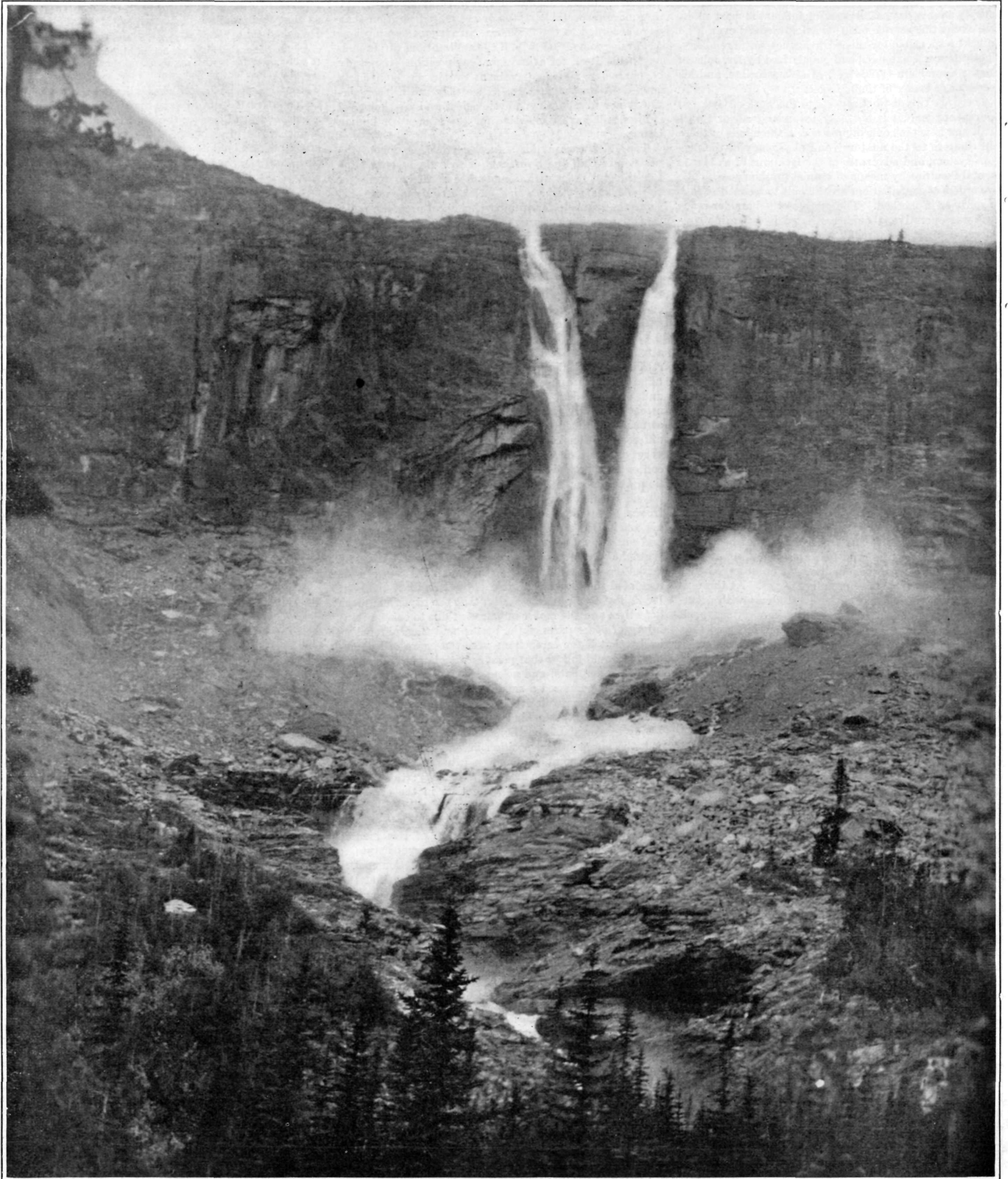
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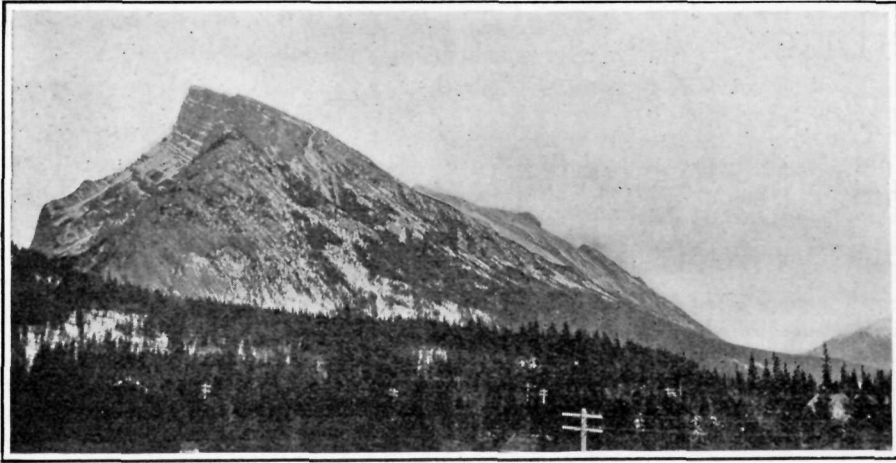
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TWIN FALLS IN YOHO VALLEY, CANADIAN ROCKIES.—[See page 360.]



Mount Rundle at Banff, showing monoclinical structure with escarpment on the face typical of the eastern ranges of the Rocky Mountains.



A scene in Yoho Park, Mount Stephen on the right and Cathedral Mountain on the left, taken from Burgess Pass.

Parks in the Canadian Cordillera*

Physical Features and Attractions in the Canadian National Playgrounds

By John A. Allan

CANADA set aside her first mountain reserve for the benefit and pleasure of the people in 1887. To-day there are eight national playgrounds in the Canadian Cordillera between the Great Plains and the Pacific Ocean. Rocky Mountains Park, Yoho, Glacier and Revelstoke Parks are situated on the main line of the Canadian Pacific Railway; Jasper Park and Mt. Robson reserve are along the Grand Trunk Pacific Railway; Waterton Lakes Park lies south of the Crows Nest line; and Strathcona Park is situated toward the center of Vancouver Island.

Three of these parks are in Alberta, the remaining five are in British Columbia.

Rocky Mountains, Yoho, Jasper, Mt. Robson and Waterton Lakes Park lie within the Rocky Mountain system of the Cordillera; whereas Glacier Park is in the Selkirks and Revelstoke Park is along the edges of the Selkirk and Columbia ranges.

From a scenic point of view these parks are all different and yet all attractive in various respects. Each of these pleasure grounds will be briefly mentioned.

THE ROCKY MOUNTAINS PARK.¹

The Rocky Mountains Park of Canada is the largest and oldest of the Dominion national playgrounds. By an Act of Parliament in 1887 an area comprising 260 square miles was "reserved and set apart as a public park and pleasure ground for the benefit, advantage and enjoyment of the people of Canada." In 1902 this reservation was enlarged to include 4,900 square miles, but as this was found to be too large an area to preserve properly, the boundaries were reduced in 1911 to inclose 1,800 square miles, which is the present size of this world-known playground.

This reservation lies entirely on the east slope of the Rocky Mountain system in the Province of Alberta and extends from the western edge of the plains westward to the summit of the Rocky Mountains, which is also the continental watershed.

This park includes the entire drainage basin of the Bow River within the Rocky Mountains and has roughly the form of an isosceles triangle with the base running in a northeast and southwest direction. The gateway to the park from the plains is also a natural portal to the mountains and is known as the Gap.

This reservation is commonly known as "Banff Park" since it includes the town of Banff, one of the best known and most popular mountain tourist resorts in North America.

Banff and Lake Louise, both well known resorts in the Canadian Rockies, are the only two distributing centers for tourists within this park.

The Rocky Mountains Park contains many features that would attract the general public, the nature lover, the artist or the scientist. It embraces the most rugged, picturesque and majestic part of the Canadian Rockies; many lakes with superb, artistic setting, the sulphur-hot springs at Banff, and above all a museum of scenic beauty so extensive and so varied that it equals any in the world. The contrast of forested lower slopes, rock-barren, towering escarpments and pinnacles, capped with snow and ice, and lakes large and small nestling in a forest or in a rock face, offer variety and enchantment to the visitor. The topography of the park is rugged and distinctly Alpine in character. The lowest valleys reach down to 4,200 feet above sea-level, while the highest peak

is 11,870 feet, seen in the Matterhorn of the Canadian Rockies—Mt. Assiniboine.

Physiographically there are three very distinct structural features to be observed within this park. The first of these is the sharp line of demarcation between the low rounded ridge of the inner foothills and the gray massive limestone mountains, void of vegetation and lightened by patches of snow mantling the upper slopes of the massifs. This break between these two physically different units is marked by an almost perpendicular escarpment, 2,500 to 3,000 feet high. So sharp is this break that it is possible to walk along the extreme eastern base of the Rocky Mountains. This feature is particularly noticeable between latitudes 49 and 52 degrees. This escarpment marks the front of an overthrust block which when the mountains were uplifted was thrust in places several miles over the plains to the east. At the base of the escarpment is exposed the overthrust fault which farther south is called the "Lewis Thrust." Within the eastern edge of the park along this fault the Cambrian beds are thrust over the lower Cretaceous formations.

The other two structural features of note within the park are to be found in the mountains themselves; two thirds of the eastern slope of the Rocky Mountains consist

of a series of sharply defined ridges all parallel to one another which present a steep escarpment on their eastern face and a more gentle slope toward the west. These ridges are huge upthrust fault blocks of rock, the more westerly blocks having been thrust partly over the block in front of it. The rocks in these fault blocks range essentially from Devonian to Cretaceous in age. The mountains in the western one third of the park are much older and belong to the pre-Cambrian and Cambrian periods. These formations have been up-arched into a broad fold which defines the backbone of the Rocky Mountains system, as well as the continental watershed. The rocks in this portion are for the most part lying nearly horizontal. There is a sharp break which is represented by a fault between the younger formations on the east and the older formations on the west. The rocks within this park are entirely of sedimentary origin.

Banff and Lake Louise (Laggan) although only 34 miles apart are very different as to location and scenery. The former is situated in the second range of the Rocky Mountains, on the floor of the Bow Valley at an elevation of 4,542 feet above sea-level. Banff is the headquarters of the park with inclosures containing all varieties of mountain animals including several buffalo. It also contains a museum, meteorological station, headquarters of the Royal North West Mounted Police and the only food distributing center for the entire park.

Lake Louise is situated at an altitude of 5,670 feet above sea-level and 533 feet above the railway at Laggan. The scenic features are truly Alpine, consisting of a valley closed at one end by a glacier, surrounded by rugged mountains of flat-lying quartzites, limestones and shales, whose summits average over 10,500 feet, and fringed with perpendicular cliffs or more gracefully curved slopes heavily timbered. The floor of the valley contains a lake of matchless beauty and the outlet of the valley hangs 600 feet above the floor of the Bow valley.

The highest and most prominent mountains are found on or close to the continental divide. The most lofty peaks include Mt. Assiniboine (11,870 feet); Mt. Temple (11,626); Mt. Hungabee (11,447); Mt. Victoria (11,355); Mt. Deltaform (11,225); Mt. Lefroy (11,220); Mt. Ball (10,825); Mt. Balfour (10,731); Mt. Fay (10,612); Mt. Aberdeen (10,340); Storm Mountain (10,309).

Among the many lakes of special individual scenic beauty that attract the tourist are Louise, Minnewanka, Vermilion, Bow, Hector, Spray, Shadow and Moraine Lake in the valley of the Tean Peaks.

Within the limits of the park there are 300 miles of trails which are frequently traveled, and over 125 miles of carriage road. The government has taken steps to encourage trail travel by the erection of cabins at various points along certain trails. A telephone system is also being installed.

A motor road is being constructed from the plains to the coast. It is already completed through this park and crosses the continental divide at Vermillion Pass, fifteen miles west of Banff.

YHO PARK.

Yoho Park, containing about 560 square miles, is situated on the western slope of the Rocky Mountains adjacent to the Rocky Mountains Park. The Kicking Horse River, rising on the continental watershed at the pass of the same name (locally called the Great Divide), divides the park almost through the center. The grade of the upper part of the river is very steep; at one point



A perfect reflection of Mount Assiniboine seen in Lake Magog. Note the wierd face-like form of some ferocious animal when viewed from the side.

*Courtesy of Science Conspicuous.

¹Published by permission of the Geological Survey, Ottawa.

near the pass, in a distance of 2½ miles there is a difference in elevation of 900 feet.

Yoho Valley, the largest tributary from the north, shows distinct evidence of the handiwork of the glaciers. Takakkaw Falls, nearly 1,200 feet high, and Twin Falls, about 500 feet high, entering the Yoho from either side, rank among the most superb in the continent. Both are formed in massive middle Cambrian limestones and both come from typical hanging valleys inclosing glaciers. The Yoho glacier closes the northern end of the valley. The many peaks in the President range on the west and the Wapituk range on the east, present a panorama truly majestic.

Mention can only be made of such places of particular scenic interest to the tourist as the Ice River Valley surrounded by such peaks as Mts. Goodsir (11,676), Vaux (10,881), and Chancellor (10,751); Ottortail Valley; McArthur Pass and the Cataract Valley with Lake McArthur, Lake O'Hara, Mt. Odaray (10,165), Cathedral Mountain (10,454), Mt. Biddle (10,876), Mts. Hungabee (11,447); Huber (11,041); Mt. Victoria

be visited by all tourists; the Illecillewaet and Asulkan glaciers, and the Nakimu caves. Both are reached by good trails. Within a few minutes' walk from the railway it is possible to stand on the frontal lobe of a real living and moving glacier. This gives one an opportunity to study glacial phenomena in the process of change.

The Nakimu caves (caves of Cheops) are situated in a cirque-like basin toward the head of Cougar Creek on the west side of the Illecillewaet Valley. These caves are wonderful in their formation. They consist of a series of irregular subterranean channels which have been formed by running water from a crystalline limestone. There have been several miles of these tunnels explored and they furnish an interesting and somewhat eerie expedition to the visitor. A considerable portion of the park still awaits the explorer and adventurer.

Game is abundant, especially the grizzly and black bear, whereas the more open mountain slopes offer a museum of floral variety for the botanist.

JASPER PARK.

Jasper Park, although still quite young, is year by year

rounded and well forested. The broadened river course forming Jasper and Brule Lakes and the meandering braided character of the stream in places add beauty to the landscape when backed up by a forested slope terminating in a massive gray limestone escarpment, with well-nigh perpendicular walls. Roche Miette is a good example of this.

The topography of the ranges west of Jasper is quite distinct from that to the east. A line crossing the railway about two miles east of Jasper and drawn in a northwest-southeast direction divides the younger portion of the Rocky Mountains consisting largely of westerly tilted monoclinical fault blocks of Devonian to Cretaceous rocks, from the older portion represented by Cambrian and older rocks that make up the ranges which mark the continental watershed. This structural feature is similar to that more fully described under the Rocky Mountains Park.

A physical feature that is making the park well known is the presence of sulphurous hot springs (Miette hot springs) situated toward the eastern end of the park about seven miles from the railway in the valley of Fiddle Creek. There are several of these springs and the temperature varies to a maximum of 127 deg. Fahr. The water in some of these springs has been proved to have certain medicinal properties for rheumatics.

MOUNT ROBSON RESERVE.

Mt. Robson Park reservation is under the control of the Province of British Columbia; it therefore is not a Dominion park.

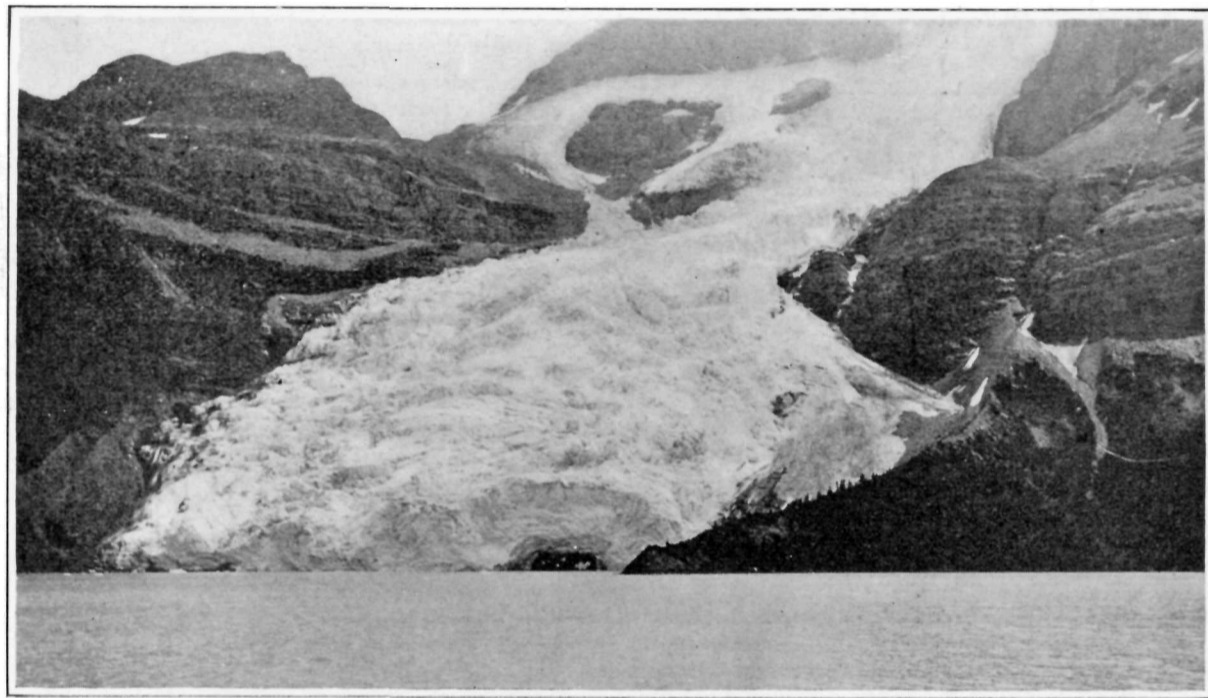
This reservation joins Jasper Park on the west and includes the ranges to the northwest of Yellowhead Pass, forming the continental watershed. This park is still comparatively young and has not yet been thoroughly explored. It however, contains some of the most majestic and rugged scenery in the continent. Mt. Robson, "the Monarch of the Canadian Rockies," has an altitude of about 13,700 feet above sea-level. It is the most lofty peak in the Canadian Cordillera south of the Yukon. There are a number of other peaks in the Robson group equally as magnificent, but much lower in elevation. Associated with these summits are many square miles of glaciers and snowfields that add beauty to the panorama.

Berg Lake and Lake Kinney are two beautiful large sheets of water at the base of Mt. Robson; they are connected by the Valley of a Thousand Falls.

The rocks in this district are chiefly pre-Cambrian and Cambrian in age and are all of sedimentary origin.

WATERTON LAKES PARK.

Previous to 1914, this was the smallest Dominion mountain reservation, having an area of 16 square miles.



Berg Lake and Robson Glacier, in Mount Robson Park. Continuous movement in this glacier, especially in summer, is evidenced by the creaking and groaning sounds which it makes.

(11,355), and many other peaks over 10,000 feet in the Bow range which forms the continental watershed. All of these mountains are readily accessible and can be climbed by the aspiring mountaineer. Mt. Stephen (10,485) one of the best known, can be easily climbed, and from its summit a magnificent panorama can be viewed. On the north slope of Mt. Stephen there is a small lead-zinc mine located 1,000 feet almost vertically above the railway.

Geologically this park is especially unique. Along the railway there is exposed one of the thickest Cambrian sections in the world. The total thickness of a continuous conformable series of quartzites, limestones and shales from the base to the top of the Cambrian was found to be over 18,500 feet.²

The rocks in the park are all sedimentary with the exception of a small area of igneous (plutonic) rock exposed in the Ice River Valley. These rocks are alkaline in composition, ranging from nephelite and sodalite syenites, through ijolites and urtites to jacupirangites and other basic affinities. These rocks have been fully described by the writer in the memoir mentioned above. The mineral sodalite has a beautiful blue color and is much in demand by tourists as souvenirs.

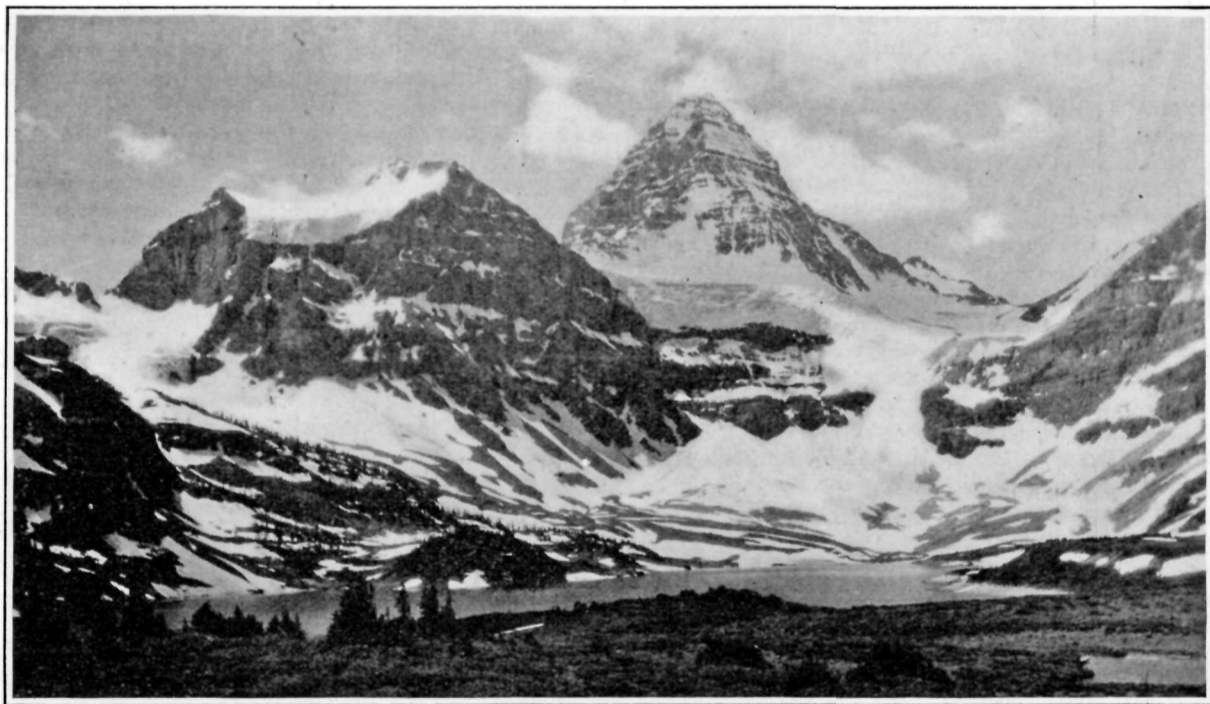
GLACIER PARK.

Glacier Park comprises an area of 468 square miles and is situated at the summit of the Selkirk range. This reservation is the most westerly of the three situated on the main line of the Canadian Pacific Railway. Rogers Pass, the summit of the Selkirks, is located about the center of the park.

The scenery in Glacier Park is equally grand as that of the Yoho or the Rocky Mountains Park, but it is nevertheless quite distinct. The mountain peaks are more numerous and more pointed in form than those in the Rocky Mountain system. This difference of form can be accounted for geologically. The rocks are essentially pre-Cambrian in age and consist of schists, slates, gneisses and other metamorphic types badly contorted and broken. This portion of the Selkirks represents the old terrain from which much of the sediment was derived which gave rise to the great thickness of Cambrian and other Paleozoic formations in the Rocky Mountains.

Two physical features are of special note, and should

²Allan, J. A. *Geology of the Field Map Area—Memoir 55* Geological Survey of Canada, 1914.



Mount Assiniboine (11,870 feet), the "Matterhorn of the Canadian Rockies," in Rocky Mountain Park. Scenery typical of the range forming the continental watershed.

becoming better known. This reservation is situated on the Athabaska River west of Edmonton and comprises an area of 1,000 square miles, which includes a strip 20 miles on each side of the railway and extending from the foothills west to the continental watershed on either side of Yellowhead Pass which also marks the western boundary of Alberta.

The position of Jasper Park in relation to the Rocky Mountains is quite similar to that of the Rocky Mountains Park 200 miles to the south, in that they both occupy the entire eastern slope of the mountain system from the plains to the continental divide.

The topography in Jasper Park, although by no means so rugged and precipitous as that in higher altitudes to the south, is nevertheless attractive, pleasing and varied in its character. The valley of the Athabaska is broadly

It has since been enlarged to include 432 square miles.

This park is situated in the extreme southwestern corner of the Province of Alberta. It is bounded on the west by the continental watershed, on the east, for the most part, by the eastern face of the Rocky Mountains, on the north by Township Five and on the south by the International boundary line.

Waterton Lakes Park adjoins the United States Glacier National Park which has been described in *Bulletin* No. 600 of the United States Geological Survey.

Although this reservation has not yet become well known on account of the lack of roads and trails, yet it is bound to become a popular resort especially for the citizens in Southern Alberta. One of the principal features at present in the park is the chain of lakes after which the park has been named. The upper Waterton

Lake extends for about three miles south of the International boundary.

This chain of lakes is walled in by steep promontories and rock escarpments which rise to an elevation of 8,000 feet. The lower lake lies just outside of the mountains and is separated from the middle and upper lake by a broad delta of alluvial material carried down by Blakiston Creek (Pass Creek). The lakes within the mountains are entirely of glacial origin. There are other equally picturesque lakes within the park; of these Summit Lake (Oil Lake) lies in a large cirque close to the continental divide and extends across the boundary line into the United States. This lake is drained by Oil Creek, so called because small quantities of crude petroleum have been obtained in three or four drill holes in this valley.

The scenery within the park is typical of the eastern part of the Rocky Mountains.

There are no true glaciers, but large patches of perennial snow may be seen on many of the higher slopes. Very little is yet known of the northern half of the park.

REVELSTROKE PARK.

Revelstroke Park is the youngest and smallest of the Canadian Cordilleran playgrounds. It was set aside in June 1914 and consists of 48 square miles in the vicinity

of the town of Revelstroke on the main line of the Canadian Pacific Railway. It is located on the extreme western flank of the Selkirk range on the eastern side of the Columbia River.

The park is being opened up rapidly by the construction of trails and a motor road to the top of Mt. Revelstroke. This peak is only 6,500 feet high, yet from its summit there is a magnificent panorama towards the Selkirks, the Gold ranges, the Cariboo district and up the Columbia valley. An endeavor is being made to make this park a popular winter resort.

STRATHECONA PARK.

In June, 1910, the government set aside an area comprising approximately 260 square miles to be used as a reservation and playground in the center of Vancouver Island. This area was called Strathcona Park. Since the original limits of the park did not include much of the finest lake and mountain scenery, the government in 1913 extended the limits of this reservation to include about 800 square miles.

Strathcona Park is situated about the center of Vancouver Island; the northern gateway is about 120 miles north of Victoria, 75 miles west of Nanaimo and 20 miles north of Alberni.

Although little is yet known of much of the park, each season is bringing it before the public, and showing that this reservation is worthy of being ranked as equally wonderful in the works of nature as other parks referred to above, which are situated far inland and in lofty mountain ranges.

Buttles Lake affords a picturesque watercourse 25 miles long and 1 to 2 miles wide, winding down the center of the park. Streams often with waterfalls enter on either side through heavily timbered shores which terminate in rugged rocky slopes often snow-clad and cold.

Campbell Lake consists of two basins, the lower being 7 miles long and $1\frac{1}{2}$ miles wide, while the upper one is about 6 miles long.

Numerous small lakes which, like the larger ones, are of glacial origin, add charm to the surroundings.

The topography on the whole is rugged since the altitude ranges from sea-level to nearly 7,500 feet. Elkhorn Peak, about 7,200 feet, is known as the Matterhorn of Strathcona Park.

The flora of the park has been studied by James M. Macoun of the Geological Survey of Canada. He reports having noted at least 350 species of phenogamous plants in the park which are very representative of the whole flora of British Columbia.