PROVINCE OF BRITISH COLUMBIA
DEPARTMENT OF EDUCATION

PROVINCIAL MUSEUM
of NATURAL HISTORY
and ANTHROPOLOGY

REPORT FOR THE YEAR 1954

VICTORIA, B.C.
Printed by DON MCDIARMID, Printer to the Queen's Most Excellent Majesty
1955

To His Honour CLARENCE WALLACE, C.B.E.,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

The undersigned respectfully submits herewith the Annual Report of the Provincial Museum of Natural History and Anthropology for the year 1954.

R. G. WILLISTON,
Minister of Education.

Office of the Minister of Education,
April, 1955.

PROVINCIAL MUSEUM OF NATURAL HISTORY AND ANTHROPOLOGY,
VICTORIA, B.C., April 14th, 1955.

The Honourable R. G. Williston, B.A.,
Minister of Education, Victoria, B.C.

SIR,—The undersigned respectfully submits herewith a report of the activities of the Provincial Museum of Natural History and Anthropology for the calendar year 1954.

I have the honour to be,
Sir,
Your obedient servant,

G. CLIFFORD CARL,
Director.

DEPARTMENT OF EDUCATION

The Honourable R. G. WILLISTON, B.A., *Minister.*
H. L. CAMPBELL, B.A., M.Ed., *Deputy Minister and Superintendent.*

PROVINCIAL MUSEUM OF NATURAL HISTORY AND ANTHROPOLOGY

Staff

G. CLIFFORD CARL, Ph.D., *Director.*
CHARLES J. GUIGUET, M.A., *Biologist.*
WILSON DUFF, M.A., *Anthropologist.*
WILLIAM A. HUBBARD, M.A., *Botanist.*
FRANK L. BEEBE, *Illustrator and Museum Technician.*
MARGARET CRUMMY, B.A., *Senior Stenographer.*
BETTY C. NEWTON, *Artist.*
SHEILA Y. DAVIES, *Clerk.*
MARY ELEANORE WHEELDON, *Clerk.*
E. J. MAXWELL, *Attendant.*
GEORGE A. HARDY, *Entomologist* (part time).

Totem-pole Restoration Programme

MUNGO MARTIN, *Chief Carver.*
DAVID MARTIN, *Assistant Carver.*
HENRY HUNT, *Assistant Carver* (part time).

PROVINCIAL MUSEUM OF NATURAL HISTORY AND ANTHROPOLOGY

Objects

(*a*) To secure and preserve specimens illustrating the natural history of the Province.

(*b*) To collect anthropological material relating to the aboriginal races of the Province.

(*c*) To obtain information respecting the natural sciences, relating particularly to the natural history of the Province, and to increase and diffuse knowledge regarding the same.

(Section 4, "Provincial Museum Act," chapter 273, R.S.B.C. 1948.)

Admission

The Provincial Museum is open to the public, free, on week-days, 9 a.m. to 5 p.m., and on Sunday afternoons, 1 p.m. to 5 p.m.

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REPORT OF THE PROVINCIAL MUSEUM

FOR THE YEAR 1954

REPORT OF THE DIRECTOR

NEW EXHIBITS

As an addition to the new mammal exhibits planned for the main floor and partly as an experiment, Mr. Beebe designed and completed a small-scale habitat display of moose. The animals were modelled in styrfoam, an industrial plastic extremely light in weight yet remarkably strong, and are displayed against a curved background painted to show mountain country in early spring (*see* illustration).

A full-size replica of the common dolphin has also been modelled in styrfoam by Mr. Beebe and now hangs among other marine mammals above the light-well on the upper floor.

In the botanical section an exhibit has been arranged by Mr. Hubbard and Miss Newton to illustrate various means of seed-dispersal among plants, and near the entrance to the Indian exhibits a pictorial display showing steps in the removal of totem-poles from the Queen Charlotte Islands has been arranged by Mr. Duff.

During the year an electric guessing game was set up on the main floor featuring some of the common sea-shells. The game is designed so that the subject-matter can be changed when desired.

SPECIAL EXHIBITS

In April and May several examples of wood sculpture, the work of Carola Bartl, were on display. Miss Bartl, a recent arrival from Oberammergau, Germany, has achieved a high degree of skill in carving animals in various types of wood. Some of her work may be seen in Provincial parks.

A demonstration hive of honeybees was installed again on the main floor, this year through the courtesy of Mr. G. V. Wilkinson, of the Victoria Bee Keepers' Association. The exhibit proved to be one of the principal attractions, as it has in the past.

FIELD WORK AND OUT-OF-PROVINCE TRAVEL

In addition to the more or less regular field work being carried out in the Victoria area, surveys were carried out as follows:—

May 18th to 25th: Mr. Duff visited Skidegate Mission in company with Dr. Peter Kelly to make preliminary arrangements for the purchase and removal of certain Haida totem-poles.

June 21st to July 5th: Mr. Duff returned to the Queen Charlotte Islands to supervise the preparation and removal of six Haida poles.

June 29th to July 3rd: Messrs. Guiguet, Hubbard, and Beebe visited Solander Island and the Bunsby Islands in the vicinity of Cape Cook, west coast of Vancouver Island.

September 5th to 13th and October 15th to 18th: Mr. Duff took part in an archæological survey along a portion of the east coast of Vancouver Island as noted in a later section.

We are greatly indebted to the Federal Fisheries Department, which provided transportation for the Museum party to and from the west coast islands, and to several other organizations and individuals as acknowledged in other sections of the Report.

Early in the year the Director made an extended lecture tour through the United States (sponsored by the National Audubon Society), during which time he was able to visit the following institutions: Pioneer Memorial Museum (Salt Lake City); Museum of Anthropology, University of Utah (Salt Lake City); Colorado Museum of Natural History and Denver Art Museum (Denver); Nebraska State Museum of Natural History and State Historical Museum (Lincoln); Museum of the Academy of Science and Letters (Sioux City, Iowa); American Museum of Atomic Energy (Oak Ridge, Tenn.); Tulane University, Odenheimer Aquarium, Exhibit of Natural Resources, Museum of Middle America Research Institution, and Louisiana State Museum (New Orleans); Louisiana

(Photo by G. C. Carl.)

Moose—a habitat group in miniature, by F. L. Beebe.

State University and Museum (Baton Rouge); Texas Memorial Museum (Austin); Houston Museum of Natural History (Houston); Louisiana State Exhibit Museum (Shreveport); Museum of the University of Oklahoma (Norman); Oklahoma A. and M. College (Stillwater); Museum of Texas Technical College (Lubbock); Museum of Folk Art (Santa Fé, New Mexico); Santa Barbara Museum of Natural History (Santa Barbara, Calif.); University of Washington (Seattle, Wash.).

On June 3rd, 4th, and 5th the Director attended the annual meeting of the Canadian Museums Association, which was held in Winnipeg, Man., in conjunction with the meetings of the Learned Societies. En route a stop-off was made at Regina, Sask., to confer with Mr. Fred Bard, Director of the Provincial Museum of Saskatchewan, and to inspect the new museum building under construction. The many courtesies extended during this visit were greatly appreciated.

EDUCATION

Museum Lectures

Motion-picture programmes were again presented to school-children of the Greater Victoria area as follows:—

Date	Topic	Attendance
March 6th	"Once upon a Time"	700
March 13th	"Voice of the Deep"	607
March 20th	"Nature's Creatures"	580
March 27th	"Hidden Treasure"	614
April 3rd	"To Every Creature"	451
April 10th	"Native Peoples"	512

We are pleased to express here our thanks to the Audio-Visual Education Branch of the Greater Victoria School Board for distributing the tickets to the schools, and to the British Columbia Electric Railway Company for granting special travel privileges to school-children attending the lectures.

A similar series of films was presented to the general public on Sunday afternoons during the above period. More than 2,000 persons attended the six programmes. We are indebted to the British Columbia Electric Company and the Imperial Oil Limited for the loan of certain films used on these programmes.

Other Lectures

During the year the Director gave lectures and film-shows to the following groups: Victoria Junior Chamber of Commerce (wives); Chi Rho Club, Christ Church Cathedral; Saanichton Girl Guides; Gordon Head School; Victoria Chapter, P.E.O.; Victoria and Island Branch of the Agricultural Institute of Canada; Oak Bay Junior High School; Fairfield United Church Men's Club; Professional Photographers' Association of British Columbia; Victoria Y's Men's Club; Sidney Girl Guides; Margaret Jenkins School; St. Paul's Church Men's Group; Victoria Aquarium Society (two lectures); Canadian Museums Association (Winnipeg); United Commercial Travellers; Oak Bay Kiwanis; Victoria Natural History Society; Cadboro Bay Men's Club; Duncan Rotary Club; Victoria Kiwanis Club; Elk Lake Girl Guides; Vancouver Natural History Society; Victoria Musical Arts Society; Golden Age Club; Fall Institute (Campbell River); Metchosin P.-T.A.; Professional Engineers (Vancouver Island Division); St. Michael's School; Victoria Electric Club; Victoria Horticultural Society; St. Margaret's School; Quadra School P.-T.A.; Young Adults, Y.M.C.A.; St. John's Older Young People; View Royal Garden Club; Quadra Island P.-T.A. and Quadra Island School; Campbell River Elementary-Junior-Senior School; Willow Point School; Courtenay and District Fish and Game Association; Colwood Community Club; Victoria Girl Guides; Department of Education personnel; and the general public in the Museum.

In addition to lectures given to local organizations, the Director gave a series of public lectures under the sponsorship of the National Audubon Society in more than thirty cities in Eastern and Southern United States during the early part of the year. Thirty-six programmes were presented to more than 20,000 persons.

The Director also conducted a course on the "Natural History of British Columbia," given at the Victoria Summer School for teachers, during which more than twelve lectures were given. He also contributed to an evening course, "British Columbia, Before and After," given by Museum staff members under the auspices of Victoria College.

A new series of lectures by specialists in the various fields of science was organized by Mr. Duff early in the fall season under the title of "Technical Talks." The first lecture, "Some Aspects of Cartographic Design," by A. L. Farley, geographer of British Columbia Lands Service, was given on December 10th.

Other staff members contributed lectures, as noted in other parts of this Report. Not noted elsewhere are several lectures and demonstrations of falconry given by Mr. Beebe to schools, Fish and Game Associations, and other groups.

Extended Open Hours

For many weeks during the tourist season the Museum building was reopened in the evening from 7 to 10 p.m. (except Sundays) to accommodate the many visitors witnessing the flag-lowering ceremonies in front of the Legislative Buildings at sunset each day and others not able to visit during the normal hours of opening. The response was sufficient to justify the small additional expense of employing an evening attendant.

PUBLICATIONS

The following have originated from the Museum during 1954:—

By G. Clifford Carl—

"The Hammerhead Shark in British Columbia." Victoria Naturalist, Vol. 11, No. 4, p. 37.

"Tanks that Catch the Eye." Fin Fare, Bull., Victoria Aquarium Society, Vol. 5, No. 2, pp. 9–10.

By Wilson Duff (editor)—

"Anthropology in British Columbia, No. 4," 1954. Contents: "Anthropological Research and Publications, 1953–54"; "An Archeological Survey of the Okanagan and Similkameen Valleys of British Columbia," by Warren W. Caldwell; "Some Aspects of Prehistoric Coastal-Interior Relations in the Pacific Northwest," by Charles E. Borden; "A Scottsbluff-Eden Point from British Columbia," by Wilson Duff and Charles E. Borden; "An Okanagan Winter Dance," by Norman H. Lerman; "John Henry Sewell, 1885–1953," by Charles E. Borden.

By Wilson Duff—

"A Heritage in Decay, the Totem Art of the Haidas." Canadian Art, Vol. 11, No. 2, Winter, 1954.

"Preserving the Talking Sticks." Powell River Digester, Vol. 30, No. 6, November, 1954.

By G. A. Hardy—

"Nesting of the Mourning Dove on Vancouver Island." Murrelet, Vol. 35, No. 1, p. 13.

By William A. Hubbard—

"Seed Dissemination." Victoria Naturalist, Vol. 10, No. 8, pp. 97–98.

"Floral Emblems." Victoria Naturalist, Vol. 11, No. 3, pp. 26–29.

By C. J. Guiguet, illustrated by F. L. Beebe—

"The Birds of British Columbia: (1) The Woodpeckers; (2) The Crows and Their Allies." B.C. Provincial Museum Handbook No. 6, pp. 1–51, October.

In addition to these, Mr. Guiguet and Mr. Beebe have continued to contribute a weekly illustrated article on British Columbia birds to the Victoria Daily Colonist, and material which had already appeared in newspaper form has been revised with a view to publishing in booklet form.

Mr. Hubbard and Mr. Beebe also produced a short series of weekly articles on spring wild flowers which appeared in the Victoria Daily Times.

During the year the text material on "The Mammals of British Columbia" has been mostly completed by Mr. Guiguet and Dr. I. McTaggart Cowan, and a start was made in the preparation of distribution maps for this publication.

MOTION PICTURES

The policy of gathering material on film has been continued; to the footage on hand more material has been added, including shots of marine life, birds, mammals, and insects. A new lecture film based on the relation of water to wildlife has been commenced for future use.

While supervising the removal of totem-poles from Indian villages in the Queen Charlotte Islands, Mr. Duff took motion pictures for the television division of the Canadian Broadcasting Corporation. The material obtained was used on programmes from coast to coast.

ATTENDANCE

The number of visitors to the Museum during 1954 is summarized as follows:—

	Registered	Estimated
January	725	966
February	1,114	1,485
March	5,095	6,793
April	3,295	4,393
May	3,252	4,336
June	6,608	8,810
July	11,743	15,657
August	12,144	16,992
September	5,243	6,990
October	1,817	2,422
November	985	1,313
December	563	750
Totals	53,184	70,907

The 3,464 children who attended the Saturday morning film programmes and the 2,005 persons who attended the Sunday afternoon programmes in March and April have been included in the above numbers. In addition, thirty school classes totalling upwards of 1,000 students visited the Museum during the year, bringing the estimated total to about 72,000.

The attendance record for the month of July has been broken down by Mr. Maxwell as follows:—

Residence	Registration	Residence	Registration
British Columbia	2,726	Washington	1,730
Alberta	578	Oregon	995
Saskatchewan	324	California	2,483
Manitoba	229	Other States	1,898
Ontario	472	Alaska	5
Quebec	122	Great Britain	76
New Brunswick	12	Other countries	41
Nova Scotia	29		
Prince Edward Island	12	Total	7,228
Newfoundland	11	Grand total	11,743
Total	4,515		

The sum of $318.29 collected by the Solarium donation-box during the year was turned over to the Queen Alexandra Fund for Crippled Children.

BUILDING MAINTENANCE AND ALTERATIONS

More venetian blinds were installed early in the year, so that now all windows on the first and second floors are equipped with blinds of this type, except in some offices where they are not required.

Following the replacement of most of the water-pipes by new installations, the washrooms and portions of the basement hallway were repainted in March.

Later in the year, work was started on remodelling the interior of the cottage on Superior Street formerly used as a workshop and storage-room. Certain partitions were removed, windows were replaced, wallboard, new flooring, lighting, and plumbing were installed, with the result that we now have a well-lit studio and workshop combined with proper storage space for field-work equipment and a metal-lined room to house dermestid beetles used in preparing skeletons. We are indebted to the Department of Public Works for these changes which have greatly improved our working conditions. By the end of the year Mr. Beebe had moved his studio equipment from the basement room in the main Museum building to the new quarters.

STAFF NOTES

On June 15th Mr. George Hardy, formerly Botanist and Entomologist on the Museum staff, returned on a part-time basis to take care of the large Provincial insect collection, to work up new material, and to prepare manuscripts for publication. By the end of the year a report on the natural history of the Forbidden Plateau area was almost ready for final typing.

During the summer Mr. Fen Landsdowne acted as student assistant and Mr. J. Moffat and Mr. R. Burns were relief attendants.

OBITUARIES

We regretfully record here the passing of Dr. Alice Ravenhill on May 27th, 1954, in her ninety-sixth year. During the last two decades of her long and active life, Dr. Ravenhill became much interested in native Indian arts and crafts, and through her efforts the B.C. Indian Arts and Welfare Society was founded. She also produced several publications, two of which have been published by the Department of Education—"Native Tribes of British Columbia" (1938) and "A Corner Stone of Canadian Culture" (1944). The latter has been one of the Museum's most popular publications; it has been reprinted several times. Even though confined to her bed during the last seven years of her life, she maintained an active interest in the affairs of the Museum.

On April 26th there occurred the death of Dr. J. B. Munro, recently retired Deputy Minister of Agriculture, to whom we have been indebted for providing us with a demonstration hive of bees which has been a feature attraction on the main floor each summer. On November 25th there passed away Mr. J. R. J. Llewellyn Jones, formerly of Cobble Hill, B.C., who had donated many beautifully prepared insects to our collection and maintained a close association with the Museum for many years.

REPORT OF THE BOTANIST

One field-trip was undertaken this year to Solander Island, which is located just off Cape Cook. This tiny island contains comparatively few plants, but is inhabited by a great number of sea-birds. The plants collected are listed below.

Agrostis exarata Trin.
Calamagrostis inexpansa A. Gray.
Stachys palustris L.
Muhlenbergia richardsonis (Trin.) Rydb.

Festuca rubra L.
Potentilla villosa Pall.
Sagina saginoides (L.) Brit.
Cœlopleurum longipes C. & R.
Hordeum nodosum L.
Sanicula arctopoides Hook. & Ain.
Conioselinum Gmelini C. & R.
Montia sibirica (L.) Howell.
Saxifraga newcombei Small.
Mimulus guttatus Fisher.
Archillea millefolium L.
Rubus spectabilis Pursh.
Unifolium dilatatum (Wood) Howell.
Plantago maritima L.
Elymus canadensis L.
Lolium perenne L.

The interesting feature of this island is the fact that it is completely devoid of trees. It has been suggested that one of the causes for the failure of trees to establish themselves is the wind. The wind probably carries the seed from Vancouver Island to Solander, but very likely carries it off again before it has time to become located and germinate. Another more plausible theory is that competition is too great for the establishment of tree seedlings. Because of the high nitrogen content of the soil due to the large bird population, the growth of grass is extremely luxuriant, practically eliminating any chance for tree establishment.

Work was started on "The Grasses of British Columbia." It is hoped that this manuscript will be published in 1955, as one of the present handbook series.

We have been fortunate in obtaining a collection of plants from the British Columbia Department of Agriculture. The collections were made by Mr. B. Sizer during the course of the 1953 Federal-Provincial weed survey.

Another collection received this year was from Mr. L. G. Sugden. Most of these plants were collected in the vicinity of Williams Lake.

Another interesting collection was received from the British Columbia Department of Agriculture. The collection was made by Mr. D. Faris during the course of the 1954 Federal-Provincial survey in the Lower Fraser Valley. These plants will be numbered and filed next year.

In the latter collection are a number of plants that are of especial interest. One, *Polygonum perfoliatum* L., a native of Eastern Asia, is new to Canada. The only other North American record is from Pennsylvania State, where it is established in nurseries and where it is showing signs of becoming a troublesome weed. Another, the leopard-bane of gardens, *Doronicum pardalianches* L., was collected near Agassiz in natural habitat, and these specimens appear to be the first for North America. A third, commonly called elecampane, *Inula helinum* L., was found east of Cloverdale. It is becoming evident that the flora of the Lower Fraser may well contain more adventives than any other area of equal size in Canada.

Recorded accessions for the year 1954 amount to 150 sheets of specimens.

As we were able to obtain eight new herbarium cases during the year, we have been able to list and file a great number of plants previously labelled and catalogued. This work has been efficiently attended to by Mrs. S. Davies.

The wild-flower exhibit of seasonal flowers was maintained as usual. This exhibit was kept in good condition by a weekly field-trip to outlying districts of Victoria. A small amount of botanical material was also collected for the National Museum at Ottawa.

A lecture was given to the Summer School students in July on elementary botany, illustrated with living plant specimens. Two night-school lectures were given at the Museum on the ecology of British Columbia before and after the advent of the white man.

Other duties of the botanist have been the identification of innumerable plants and mushrooms either sent in or brought in by the general public.

Miss Betty Newton completed twenty-nine wild-flower studies in colour, to augment the Susan Stoker collection of flower paintings.

REPORT OF THE BIOLOGIST

Field work in 1954 included small mammal and avian investigations on Solander Island, off Cape Cook, west coast of Vancouver Island. On this expedition, June 29th to July 3rd, we also made preliminary investigations on the Bunsby Islands at the mouth of Ououkinsh Inlet in the same general area. These preliminary investigations revealed the presence of small mammals on the Bunsbys; consequently these islands are next on our agenda of west coast zoological exploration.

No small mammals were discovered on Solander Island, and no signs of cuttings, droppings, or runways were present. Twelve dozen snap traps set along the south side of the island were untouched during the one night we were able to set them on the island. There is little doubt that *Peromyscus* and *Microtus* are absent from this remote island.

The sea-birds found nesting included large numbers of tufted puffins, Cassin auklets, and boreal petrels, while glaucous-winged gulls, black oyster catchers, pigeon guillemots, and pelagic cormorants were nesting in smaller numbers. Passerine birds were represented by fox sparrows and song sparrows, and though no nests were discovered, it was evident that these birds were nesting. There was evidence also that peregrine falcons utilize this island as an aerie, and, in fact, a large adult female was seen on several occasions and two "plucking stations" were located. No young birds or occupied nests were seen.

Rhinocerous auklets were present in the water surrounding Solander Island, but we found no evidence of a breeding population of these birds nor ancient murrelets nor marbled murrelets.

Unfortunately we were without an entomologist on this expedition, and little time was available for the collection of insects. However, a small collection of isopods, centipedes, and millipedes was made.

Investigations instituted three years ago in Oak Bay with regard to speciation of coastal white-footed mice (*Peromyscus maniculatus*) are now completed in the initial phase. Successful introductions of single mated pairs of *Peromyscus maniculatus* from Vancouver Island were made on each of five islands, all of which now harbour appreciable populations of these mice. The next phase in this research involves the collection and study of series of these mice at five-year intervals in order to determine if any appreciable morphological changes are taking place. A sixth island has been set aside as a "control" unit, and a continual flow of live mice from Vancouver Island is being maintained thereon.

A short field-trip was undertaken during the open season on Vancouver Island wapiti in order to secure skulls for systematic research now under way at the Provincial Museum in regard to this species. Fourteen skulls were secured through the co-operation of Game Management Biologist Don Robinson and Game Warden Charles Estlin. We now have sufficient material from Vancouver Island, but difficulty in securing adequate material from the Olympic Peninsula has been encountered. The Museum is most anxious to compare the Vancouver wapiti with specimens of *Cervus canadensis roosevelti* of the Olympic Peninsula in order to determine if these animals are indeed of the same subspecific status.

In November, at the invitation of the Dominion Wildlife Service, the Museum Biologist accompanied Mr. Ron Mackay, of that service, and Mr. Don Robinson, of the British Columbia Game Department, on a short waterfowl investigation to the Tofino mud-flats. In the course of this operation, three flocks of trumpeter swan were recorded. Hunting-pressure observations, in which the party was mainly interested, were greatly curtailed due to the inclement weather at the time of our visit. Strong south-east winds, torrential rains, and floods resulted in an almost complete absence of hunters from the area at that time.

When possible one day per week was allocated to field work on Vancouver Island in order to keep a record of conditions and movements of local birds and mammals. Due to the pressure of other commitments, this work was greatly curtailed this year.

Two handbooks on British Columbia birds were completed this year and made ready for publication, one appearing in print in November. An additional fifty species of birds were written up during the year, bringing the total to 130 species so far prepared for this handbook series. Some of these articles have appeared as weekly outdoor features in a local newspaper. Several short papers were prepared for scientific periodicals during the year, some of which have appeared in print. Work was continued on the major publication, "Mammals of British Columbia," and this special publication is now nearing completion despite the many difficulties encountered in allocation of time by the authors, Dr. Cowan and the Museum Biologist. The manuscript is at the stage where the authors must work together, and as one is stationed at Vancouver and one at Victoria, this is usually difficult.

New subspecies of small mammals discovered and collected on the Scott Islands have been described, and the paper appears elsewhere in this publication.

Early in the year the Museum Biologist was asked to initiate a natural-history radio programme involving three five-minute broadcasts weekly. Eighty-four programmes were produced at radio station CKDA in Victoria dealing with many phases of activity in the wildlife field; conservation, life-histories, game management problems, education, sport-fishing reports, hunting reports, and information pertaining to outdoor sports in general were featured.

Guest speakers included Dr. I. McTaggart Cowan on education, Dr. G. C. Carl on marine mammals and fish, Dr. James Hatter and Biologists Don Robinson, George Mitchel, and Ernest Taylor on game management, Biologist Stewart Smith on fisheries management, Mr. Ron Mackay on waterfowl management, Mr. Wilson Duff on anthropology, Mr. Frank Beebe on the sport of falconry, Mr. Dave Gray on the bucktail fly and fishing reports, and Dr. David Turner on the British Columbia Resources Conferences. Most of these specialists have appeared on the programme several times during the year. Mr. Don Robinson, Regional Game Management Biologist for the British Columbia Game Commission, was heard regularly, keeping sportsmen and naturalists posted on the many aspects of deer, elk, and blue grouse management problems on Vancouver Island.

Routine curatorial activities dealing with nearly 16,000 scientific-study skins of birds and mammals, specimen preparation, preparation and rearrangement of exhibits, cataloguing and indexing of material, specimen identification, lecturing, research, writing, and the host of minor activities associated with museum work, combined with the field activities, completely utilized the Biologist's time during the year 1954.

Five hundred and eighty specimens from the scientific-study collections of birds, mammals, amphibians, and plants went out on loan or were returned in the current year by the following institutions: University of California, United States Department of Interior, University of Washington, University of British Columbia, United States Fish and Wildlife Service, University of Georgia, Royal Ontario Museum, University of Kansas, British Museum, and Central Experimental Farm, Ottawa.

We wish to acknowledge the continued voluntary co-operation of the many citizens of this Province who contribute annually to our biological collections and knowledge,

especially members of the Dominion Fisheries Department—Mr. A. J. Whitmore, Mr. H. E. Palmer, and Capt. C. W. Earnshaw and the crew of the "Howay"; members of the Victoria Branch of the Game Commission—Inspector George Stevenson, Game Wardens Joseph Jones, R. Sinclair, and Don Kiers; Game Warden W. Webb and Constable D. Drapper, Royal Canadian Mounted Police; Mr. Bruce Irving, of Pender Island; Messrs. George Hillier and Vince Madden, of Ucluelet; Mr. Bert Robson, of Atnarko; Mr. Len Newbigging, of Victoria; Mr. Don Robinson, of the British Columbia Game Commission at Nanaimo; Game Warden Charles Estlin, of Courtenay; Mr. R. H. Mackay, of the Canadian Wildlife Service; Mr. Gordon Pike, of the Pacific Biological Station, Nanaimo; and many others whom we may have failed to mention here.

REPORT OF THE ANTHROPOLOGIST

ACTIVITIES

A major part of the Anthropologist's work during the year involved efforts to salvage totem-poles from old native villages of the Province. Early in the year he joined with officials of the University and the Indian Affairs Branch to form a Totem-pole Preservation Committee, the object of which is to stimulate and co-ordinate totem-pole salvage and restoration projects in British Columbia. Officials of Powell River Company Limited invited the Anthropologist to submit a plan for the salvage of the last six totem-poles in the Haida villages of Skedans and Tanoo, and agreed to finance the project by means of a grant to the Committee.

In May the Anthropologist and Rev. Dr. Peter B. Kelly went to Skidegate for a week to find the native owners of the six poles and obtain permission to purchase and remove them. On June 21st, all preliminaries completed, he returned to the Queen Charlottes for two weeks to undertake the salvage operation. A Skidegate seine-boat and crew were hired for the work; the poles were carefully lowered, cut into sections, crated, and taken to Aero Camp, Cumshewa Inlet, for shipment south. Three of the poles were shipped to Vancouver for storage at the University; the other three came to this Museum. A large part of the cost of shipping was kindly donated by Union Steamships Limited. The project received considerable publicity in the press, on radio, and on television. Mr. Bill Reid, a C.B.C. announcer of Haida descent, gave his time to take part in the project, and prepared two radio reports and two interviews which were broadcast. Photographs and movies taken by the Anthropologist were widely publicized; the latter were televised on two occasions. The six poles are now safely in storage, and it is planned to have copies of them carved during the coming year.

Another field project in which the Anthropologist participated was an archæological survey of the area between Nanaimo and Sayward, which was undertaken by Dr. Herbert C. Taylor, Jr., of Western Washington College of Education, Bellingham. Two periods were spent in the field. During the first, September 5th to 13th, he and Dr. Taylor were accompanied by Dr. Douglas Leechman, of the National Museum of Canada; during the second, October 15th to 18th, five student archæologists participated. Several reports and articles based on this field work are now being prepared jointly with Dr. Taylor.

At the invitation and expense of the Canadian National Railways, the Anthropologist made two trips to Jasper, Alta., early in the year to direct the restoration and repainting of the Jasper totem-pole. This pole was moved to Jasper from Masset, Queen Charlotte Islands, in 1919, and is one of the largest and finest totem-poles in existence.

Educational work was carried out both in and outside the Museum. Some twenty school classes (700 pupils) made supervised visits to the Museum to see the Indian exhibits, and were given talks and demonstrations. Several other visiting groups were given guided tours. Late in the year the Anthropologist participated in a Victoria College evening course being given by the Museum staff, and also organized a new series of

" Technical Talks " to be given monthly during the winter in the Museum by professional workers in various fields. Lectures and film-shows outside the Museum were given to eleven service clubs or other such groups in the Victoria area, and also to the people of Skidegate village, University summer classes in anthropology, the Northwest Anthropological Conference, and the Jasper National Park Kiwanis Club.

A good deal of work was done during the year in reorganizing the anthropological collections in storage and on display. This became possible when a new storage-room in the basement of the finance building was made available. Ten packing-cases of Indian material which had been stored in the bomb-proof Topaz Avenue vaults since the war were moved to the new storeroom and unpacked. Many large items crowded in the display-rooms were likewise stored, and several exhibits were " weeded out " and

(Photo by Wilson Duff.)

Removing a totem-pole from the abandoned village of Tanoo, Queen Charlotte Islands, June, 1954.

reorganized. Considerable time was spent organizing the archæological collections; in this work Mrs. Eleanore Wheeldon gave much assistance. Routine accessioning and care of the collections also took time. A loan of thirty objects of Indian art was made to the Arts Centre of Greater Victoria for a special exhibition during the summer.

Visits of anthropologists, writers, and news and television photographers were frequent during the year. Most were drawn by the presence of Mungo Martin and the totem-carving programme. Every effort was made to assist such visitors. In addition, a large amount of correspondence crossed the Anthropologist's desk. Close contact with other anthropological institutions was maintained. In May the Anthropologist attended the Northwest Anthropological Conference in Vancouver, where he presented a paper on " Totem-pole Preservation in British Columbia " and showed movies on totem-poles.

The presence of the Kwakiutl carvers has allowed the continued recording of Kwakiutl music and ethnology. The tape recordings of the house-warming potlatch

last winter were edited, and a full description of the events and translations of the speeches was written. In addition, more songs have been obtained on tape, and more information on Kwakiutl ethnology gathered.

A number of publications or articles were prepared by the Anthropologist during the year, and a larger number are still in preparation. "Anthropology in B.C. No. 4" was prepared for publication and distributed in December. Two articles on totem-pole salvage were published elsewhere. In preparation, with Dr. H. C. Taylor, Jr., are three articles based on archæological and historical research on Eastern Vancouver Island. A study of the population of the native tribes, including research on early Hudson's Bay censuses and a systematic tabulation of Indian Department census figures, is nearing completion. Two maps, to be published in the forthcoming "Atlas of B.C. Resources," are being prepared. One, on the distribution of the aboriginal population, will be based on the population study just mentioned; the other, on tribal distribution, is already completed.

TOTEM-POLE RESTORATION PROGRAMME

The carving programme in Thunderbird Park continued in operation through its third year. Mungo Martin and David Martin worked steadily throughout the year, and, in addition, donated funds allowed the employment of Henry Hunt for the period April 9th to June 12th.

Replicas of two Haida, two Tsimshian, one Kwakiutl, and one Bella Coola totem-pole were carved. The Haida poles are large house frontal poles collected by Dr. C. F. Newcombe in 1911 (Museum No. 1307 from Cumshewa and No. 1391 from Tanoo). The Tsimshian poles are tall memorial columns, collected from the Upper Skeena village of Kitsegukla in 1952. These are the pole of Tupesu (*see* Barbeau, C. M.: *Totem Poles of the Gitksan,* page 69 and Plate XI, Figure 7), and the second pole of Wistis (ibid., page 36 and Plate V, Figure 2). The Kwakiutl pole is Museum No. 1854, a large Quatsino house-post, and the Bella Coola pole is a grave-marker, No. 2310. At year's end, preparations were under way to erect these poles and others in the park.

The problem of storage was eased somewhat when part of a corrugated-iron shed on Superior Street was made available for totem-pole storage.

It is again a pleasure to acknowledge a good deal of public support for the programme. In the spring Mr. Paul Arsens, of Victoria, staged a two-week "potlatch" in his two restaurants, during which funds were raised for the Thunderbird Park Fund. Mr. Arsens donated one day's proceeds of his restaurants to the Fund. With this Fund, Henry Hunt was hired as an apprentice carver for over two months. MacMillan & Bloedel Limited continued to donate the logs being carved into totem-poles.

ACCESSIONS

By the end of 1954 the catalogued accessions stood as follows: Indian material, 7,960; plants, 24,619; mammals, 5,806; birds, 10,105; reptiles and amphibians, 888; fishes, 768. The following new materials have been added:—

ANTHROPOLOGICAL ACCESSIONS

The B. F. Cryer Collection.—(Gift.) A small collection of archæological materials from the Chemainus area, donated by Mrs. B. F. Cryer, Victoria.

The Dr. Garnet Montgomery Collection.—(Gift.) A collection of implements made by the Alaskan Eskimos, donated by Dr. Garnet Montgomery, Qualicum Beach.

Haida

Hand-hammer. O. F. L. King, Victoria.
" Soul catcher." Mrs. J. G. Fordham, Victoria. (Purchase.)
Goat-horn spoon. Mrs. J. G. Fordham, Victoria. (Purchase.)
Argillite dish. Mrs. J. G. Fordham, Victoria. (Purchase.)
Silver spoons with incised Haida design, four. Mrs. J. G. Fordham, Victoria. (Purchase.)
Woven spruce-root rain-hat. Mrs. F. W. Skinner, Victoria.

Tsimshian

Sheep-horn spoons, two. Mrs. J. G. Fordham, Victoria. (Purchase.)

Kwakiutl

Skull and mandible. B. A. McKelvie, Victoria.

Nootka

Small wood carvings, two. Miss Mary F. Dawson, Victoria.
Bottles covered with woven basketry, three. From collection of J. B. Munro (per Provincial Archives)

Coast Salish

Stone hammer. In Cryer collection.
Stone hammer fragments. In Cryer collection.
Stone club. In Cryer collection.
Rubbing-stone. In Cryer collection.
Antler wedges, four. In Cryer collection.
Nephrite celts, seven. In Cryer collection.
Bone harpoon-barb. In Cryer collection.
Ground slate knives, nine. In Cryer collection.
Ground slate whetstone. In Cryer collection.
Ground slate lances, five. In Cryer collection.
Ground slate points, twelve. In Cryer collection.
Stone hammer. W. W. Chittenden, Sardis.
Nephrite celt. W. W. Chittenden, Sardis.
Soapstone bird-shaped bowl. W. W. Chittenden, Sardis.
Skull and other bones. W. Kennedy, Victoria.
Bone barbed harpoon. W. Kennedy, Victoria.
Skeleton. Royal Canadian Mounted Police, Victoria.
Ground slate knife. V. N. Bigwood, Victoria.
Ground slate knife. A. H. Pullinger, Langford.
Ground slate point. A. H. Pullinger, Langford.
Paddle for racing-canoe. O. H. Thames, Bowser.
Ground slate point. Mrs. G. Netzer, Victoria.
Ground slate blade. Mrs. G. Netzer, Victoria.
Ground slate knives, two. Mrs. G. Netzer, Victoria.
Bone pin carved as lizard. Gary Leboutillier, Victoria.

Interior Salish

Complete skeleton. R. C. Thurber, Victoria.
Skull. Royal Canadian Mounted Police, Blue River.

Déné

Beaded tobacco-bag. Miss Mary F. Dawson, Victoria.
Beaded bag. Miss Mary F. Dawson, Victoria.

Carrier

Woven spruce-root baskets, two. From collection of J. B. Munro (per Provincial Archives).

Miscellaneous

Twenty-six mounted photographs of Indian subjects from I. W. Powell collection. Mrs. J. G. Fordham, Victoria.
Painting of Mungo Martin by Miss B. C. Newton, Victoria.

Alaskan Eskimo

Harpoons, two. Dr. Garnet Montgomery collection.
Bow and wrist-guard. Dr. Garnet Montgomery collection.
Boat-hook. Dr. Garnet Montgomery collection.
Decorated staff. Dr. Garnet Montgomery collection.
Atlatl darts, two. Dr. Garnet Montgomery collection.
" Bull roarer " (?). Dr. Garnet Montgomery collection.
Arrows, five. Dr. Garnet Montgomery collection.
Leister. Dr. Garnet Montgomery collection.
Lances, two. Dr. Garnet Montgomery collection.

ZOOLOGICAL ACCESSIONS

Mammals

By gift—
Miss Sandra Bastin, Victoria, one silver-haired bat.
A. J. Braun, Oliver, one hoary bat.
British Columbia Cement Company, Victoria, whale jaw-bones.
British Columbia Game Department, Victoria, two cougars.
Brian Car, Victoria, one piece of whale-bone.
A. Garcin, Victoria, one embryo-whale specimen.
H. F. Hughes, Dawson Creek, one Canada lynx.
Dan Leavens, Pender Harbour, one mouse, one shrew.
Fred Sherman, Victoria, one mink.
G. Buchanan Simpson, Cowichan Lake, one mink.
Mrs. W. C. Strand, Errington, one big brown bat.

Birds

By gift—
D. Anderson, Ladysmith, one mallard, one pintail drake.
Cowichan Field-Naturalists' Club, Duncan, per J. A. Flett, one box of bird-skins.
C. Fewang and N. Sistern, Victoria, one red-breasted sapsucker.
Lawrence Fletcher and Michael Corry, Victoria, one bush-tit nest.
Eric H. Garman, Victoria, one dwarf hermit thrush.
R. E. Heald, Victoria, one nest of water ouzel.
Mrs. M. I. Newton, Victoria, one sparrow-hawk.
Mrs. P. T. Rowe, Victoria, one saw-whet owl.
E. Vickerman, Saanich, one owl.
Bruce Wilby, Victoria, one saw-whet owl.

Amphibians and Reptiles

By gift—

Richard Ballandine, Victoria, one garter-snake.
Mr. and Mrs. Banning, Victoria, two garter-snakes.
W. N. Burgess, Port Alberni, one green turtle.
J. M. Chapman, Mill Bay, one alligator.
H. R. Foxlee, Robson, one alligator-lizard.
Carl Gustaffson, Victoria, collection of tadpoles.
Bruce Irving, South Pender Island, one coast garter-snake.
Gailynne Ross, Victoria, one painted turtle.
Cory Small, Victoria, one alligator-lizard.
G. Sutcliffe, Belton, Texas, two horned lizards.

Fish

By gift—

Arthur Ives, Victoria, one grunt-fish.
F. C. Rumsby, Victoria, one sailor-fish.

Invertebrates

By gift—

Gary Brander, Victoria, collection of leeches.
Jerry Brohman, Victoria, one armadillo bug.
Terry Clement, Campbell River, one red rock-crab.
E. Fisher, Victoria, one California prionus.
Lawrence Fletcher and Michael Corry, Victoria, spider eggs.
Barry Gerrard and John Power, Victoria, one green grasshopper and three red grasshoppers.
G. H. Larndner, Errington, collection of spiders.
Tom Ramsay, Victoria, one polyphemus moth.
Andrew Romage, Victoria, one horntail.

Palæontology

By gift—

Ronald Nicholson, per R. K. Bradley, Westview, two fossil bivalves.
Victor Parrell, Port Alberni, one fossil bivalve.

Miscellaneous

By gift—

Cowichan Field-Naturalists' Club, Duncan, per J. A. Flett, Langford, collection of books.

THE NATURAL HISTORY OF THE FORBIDDEN PLATEAU AREA VANCOUVER ISLAND, BRITISH COLUMBIA

By G. A. Hardy, Provincial Museum, Victoria, B.C.

CONTENTS

INTRODUCTION

The Forbidden Plateau is one of the most outstanding recreational areas on Vancouver Island. Situated only a short distance from the Island Highway and yet accessible only by trails, this park-like area has become more and more popular as an outdoors resort.

The name itself is intriguing and undoubtedly attracts many visitors who otherwise would pass it by. Based upon Indian legends which attribute mysterious and supernatural powers to the area, the name suggests a " taboo " which arouses the curiosity. The Plateau was supposed to be the sequestered spot of medicine men; women and children disappeared when they visited the area; an unknown tribe was believed to live there. Such beliefs served to mark this upland area of lakes and mountains as forbidden ground.

Previous to 1925 the Plateau area was known only to prospectors and timber-cruisers, but since that time its recreational possibilities have been recognized and an increasing number of persons have visited the district each year.

The recreational possibilities of the Forbidden Plateau area, of which natural history plays an important part, and the policy of the Provincial Museum to provide information to the public in this sphere of activity, suggested that a natural-history survey of the region would be of interest to residents and visitors.

Accordingly, a number of visits to this region have been made by Museum members so that the necessary information could be obtained. The first of these, in 1943, was made to the Plateau proper, with a base camp at Croteau Lake. The results of this

(B.C. Government Travel Bureau.)

Hairtrigger Lake, Forbidden Plateau; Mount Albert Edward and Mount Regan in the background.

(B.C. Government Travel Bureau.)

Mariwood Lake and Kwai Lake, Forbidden Plateau; Cruickshank Canyon in right background.

survey were published in the original report (*see* Report of the Provincial Museum for 1943) and form the basis for the present account. More material has been added as a result of extending the survey beyond the official boundaries of the park for the purpose of this revision, as will be mentioned later, and further records have been made available by recent publications as listed in the Bibliography.

More recently, during each of the years 1950 to 1954, inclusive, George A. Hardy, Botanist and Entomologist at the Provincial Museum, made short trips to the Plateau Lodge where the fauna and flora, particularly in the lodge area, was intensively studied; records and other information obtained on these trips are also incorporated into the present account.

DESCRIPTION OF THE AREA

Location and Size

The Forbidden Plateau is a district the centre of which lies approximately 16 miles west of Courtenay, Vancouver Island. In area it comprises about 100 square miles. Boundaries have not been defined, since the Plateau lies within the Esquimalt and Nanaimo Railway land grant. However, in 1929 the greater part of the district known as the Forbidden Plateau was taken in as a part of the Strathcona Park Reserve in order to protect its wildlife population. The boundaries of this reserve were fixed by Order in Council approved January 17th, 1929, as follows:—

" Commencing at a point on the easterly shore of Buttle Lake where the easterly boundary of Strathcona Park intersects the said easterly shore of said lake; thence in a straight line in an easterly direction to the top of Mount Washington; thence in a straight line south-easterly to the top of Mount Beecher (Becher); thence astronomically west to the easterly boundary of Strathcona Park; thence northerly, following said easterly boundary to the point of commencement."

Since the 1943 expedition, which went into the Plateau via Dove Creek, a more accessible route from Courtenay is by way of a good motor-road up to the Forbidden Plateau Lodge, at an elevation of 2,100 feet and a distance of 13 miles. The lodge is efficiently operated by Mr. and Mrs. T. G. S. Chambers, who provide every convenience for would-be explorers into the Plateau itself.

As many visitors do not wish to proceed beyond the lodge, it is thought that by extending the coverage of the survey eastwards down to and including the lodge area, and by summarizing its natural history, this report would appeal to a wider public and be of more general use to all visitors.

Accordingly, the area covered by the present survey is now extended to include the ridge dominated by Mount Becher on the west, the Comox Overlook down to the 2,100-foot level, the headwaters of Boston Creek, the Forbidden Plateau Lodge site, Trickle Creek, and the upper reaches of Browns River and Waterways River.

The new area also includes Woods Mountain, Little Woods, part of a broad ridge extending in a roughly north-south direction, along and over which the trail from the lodge leads to Mount Becher and the interior of the Plateau.

A forestry lookout is maintained on Woods Mountain at an elevation of 3,500 feet—one of the first stations of its kind on the Island.

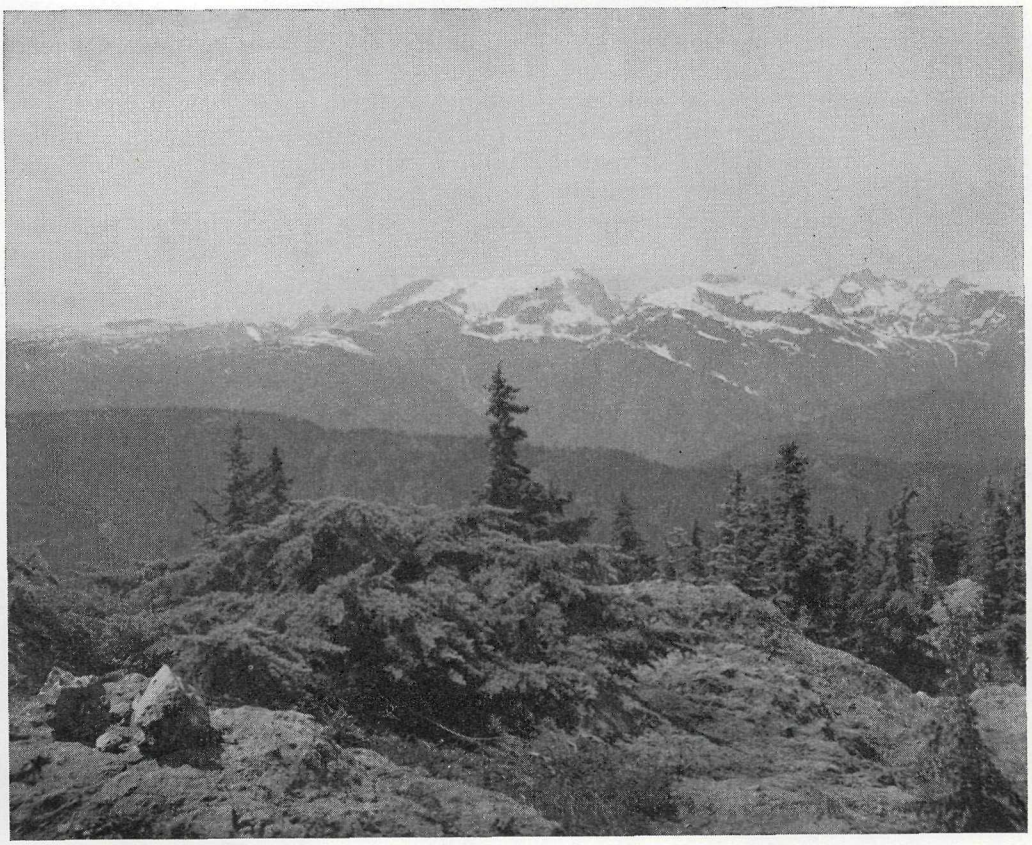
Headquarters for the interior of the Plateau is at Kwai Lake (formerly Woods Lake), where a camp is maintained by Mr. and Mrs. Chambers for the convenience of visitors during the summer months. Kwai Lake lies 12 miles from the lodge. A half-way cabin, also owned and operated by Mr. Chambers, at McKenzie Lake, 7 miles from the lodge, makes a pleasant break in the journey.

Topography

The use of the term " plateau " for this area is somewhat misleading, since only a small part of the region is flat or plateau-like. In general it consists of a series of

ridges, sloping wet meadows, and open park land at various elevations ranging from 3,500 to 4,000 feet. Towering above these general levels are several peaks, such as Becher (4,538 feet), Indian Head (4,304 feet), Elma (4,519 feet), Washington (5,415 feet), Brooks (4,960 feet), Strata (4,722 feet), Jutland (6,003 feet), Castle Crag (5,700 feet), and Albert Edward (6,968 feet).

Cutting the southern boundary of the reserve is the deep valley of the Cruickshank River, which flows at the bottom of a canyon with walls rising almost sheer for over 1,000 feet.



(Photo by G. A. Hardy.)

Comox glacier from the summit of Mount Becher.

Numerous lakes, ponds, and streams form a confusing watershed pattern draining to the sea by three routes; namely, via Cruickshank River to the south-east, Browns River to the east, and Oyster River to the north.

Geology

In general terms the rocks of the Forbidden Plateau area fall into two main groups. The first and older group is an assemblage of volcanic rocks with some interbedded limestone, argillite, and quartzite, varying in age from late Palæozoic to Triassic and possibly Jurassic. These form the greater part of the Plateau. The second group, of more recent origin, consists of sandstones, shales, and conglomerates of Upper Cretaceous age—the same as that which contains the important coal-beds of Cumberland and vicinity. The sedimentary rocks of this group are found in three isolated areas; the first

includes the height of land between Harris Lake and Goss Creek; the second includes Strata Mountain and Mount Brooks; while the third consists of Mount Washington. These more or less pronounced elevations are separated by narrow areas of the older, underlying rocks exposed along intervening valleys. Fossils may be found in these Cretaceous sediments, particularly at Limestone Ridge, just west of Helen Mackenzie Lake and at Mount Strata.

Mount Albert Edward is composed entirely of volcanic rocks, including pillow lava, andesite, dacite, and breccia cut by a variety of diabase and other basic dykes, all intruded by two or three small bodies and many associated dykes of granodiorite. A few mineral deposits of some economic importance occur within the area. These include deposits of iron pyrites and small amounts of gold, silver, and copper. (Data taken from Gunning, 1931.)

The earthquake of 1946 had several noticeable effects in the Plateau region. In particular the evidence on the upper reaches of Mount Brooks is very noticeable in that the limestone formations there show fresh fractures and a mass of recently broken limestone block and debris, as if shattered by a dynamite charge.

The south face of the mountain is scored by a series of nearly horizontal parallel troughs, suggestive of giant steps; these hold snow that apparently rarely completely disappears, as they are shaded from the direct rays of the sun.

Climate

There is little information and there are no precise data available regarding the climate of the Forbidden Plateau area. From our own observations and from details supplied by others, the climate appears to be more or less typical of sub-alpine regions with heavy precipitation mostly in the form of snow. Depths of 20 feet are said to be not uncommon in many parts of the Plateau, and snow is present usually from the end of September until the end of May. Heavy rains may occur during the remaining months, although relatively fine weather is usually experienced during the month of August.

Certain indications of the severity of the winter may be seen in many parts of the Plateau. For example, the majority of the trees are of small size and have short, bushy branches characteristic of trees in regions of heavy snowfall. Moreover, the trees and shrubs growing on hillsides have their main trunks bent sharply down-hill just above the ground-level. This " elbowed " appearance is very striking on most steep slopes and apparently is induced by the pressure of snow which tends to slide to the valley below. The innumerable ponds and lakelets of shallow depth—that is, less than 3 feet—are devoid of life except for a few insect larvæ and occasionally tadpoles of the tree-toad, *Hyla regilla,* apparently because they freeze solidly each winter. The banks of many of these small water-bodies and even of some of the larger lakes are often raised in ridges to form a lip higher than their surroundings, seemingly by the force of expanding ice.

Despite the heavy precipitation, the Plateau area does not appear to have suffered from floods and rapid run-offs. On the contrary, much of the area is exceedingly wet underfoot, even at the end of summer, indicating that the ground-cover is sufficient to retain and store water for long periods.

Life Zones

Within the Plateau area there are to be found several types of animal and plant life due largely to the varied climate resulting from differences in altitude between the valley-bottoms and the mountain-tops. Four belts or life zones may be distinguished; these are characterized as follows:—

Transition Zone.—This includes the Plateau Lodge area where there is a merging of the coastal forest fauna and flora with that of the Canadian zone. The dominant trees

and shrubs of this zone include Douglas fir (*Pseudotsuga taxifolia*), western hemlock (*Tsuga heterophylla*), red cedar (*Thuja plicata*), black cottonwood (*Populus trichocarpus*), red alder (*Alnus rubra*), smooth maple (*Acer glabrum douglasii*), Oregon grape (*Berberis nervosa*), devil's club (*Echinoplanax horrida*), salal (*Gaultheria shallon*), and red huckleberry (*Vaccinium parvifolium*). Of birds, the hermit thrush, varied thrush, and pileated woodpeckers may be mentioned.

(Photo by G. A. Hardy.)

Devil's club, Trickle Creek near Forbidden Plateau Lodge.

Canadian Zone.—The forested belt covering the valleys, low ridges, and lower slopes of the mountains. The dominant trees in this zone are mountain hemlock (*Tsuga mertensiana*), yellow cedar (*Chamæcyparis nootkatensis*), Douglas fir (*Pseudotsuga taxifolia*), white pine (*Pinus monticola*), and lovely fir (*Abies amabilis*). The dominant shrubs include rhododendron and several species of blueberries (*Vaccinium*). Animal species characteristic of this zone include the deer, bear, red squirrel, white-footed mouse, ladder-backed woodpecker, whisky jack, blue grouse, northern raven, Oregon junco, northwestern salamander, and northwestern toad. While many of these plants and animals are commonly found in this zone, they are not necessarily confined to it but may be found in adjoining zones as well.

Hudsonian Zone.—A comparatively narrow belt of dwarfed hemlock, yellow cedar, and juniper in the timber-line region, which is about 5,000 feet in elevation in the Forbidden Plateau. Other dominant plants in this zone are heather (*Cassiope mertensiana* and *Phyllodoce empetriformis*), teaberry (*Gaultheria ovatifolia*), and rhododendron

(*Rhododendron albiflorum*). Among the animals the marmot is the most characteristic species found in this zone.

Arctic-Alpine Zone.—The treeless zone on mountain-tops above timber-line, ranging above 5,000 feet in the Forbidden Plateau area. Dominant forms in the plant kingdom here include *Saxifraga tolmiei, Spiræa pectinata, Arenaria verna, Erigeron compositus, Phacelia sericea, Lomatium martindalei* v. *angustatum,* and *Phlox diffusa,* such as are found near the summit of Mount Albert Edward. Here also are found ptarmigan, pipits, and rosy finches among the birds.

PLANTS

The following list includes all plants up to date as collected or recorded from various sources, chief of which is the Museum personnel. Most identifications are by George A. Hardy or by specialists consulted by him, and acknowledged under the species involved. Those followed by the initials L.J.C. were reported by Lewis J. Clark, while the initials K.C. refer to K. Christiansen.

The arrangement is based on Henry's "Flora of Southern British Columbia and Vancouver Island," 1915, with slight changes in some instances. Common names are given wherever possible. Most of the species mentioned may be seen in the Museum herbarium.

ALGÆ

The following list is taken from G. H. Wailes and L. H. Tiffany (1929):—

Cœlastrum microporum Nægeli. Forbidden Plateau.
Microspora pachyderma (Wille) Lagerheim.
Closterium parvulum Næg.
Closterium striolatum Ehr.
Closterium subtruncatum W. & G.S.W.
Closterium tumidulum Johnson.
Closterium ulna Focke.
Cosmarium amœnum Breb.
Cosmarium blytti Wille var. *novæsylvæ* W. & G.S.W.
Cosmarium botrytis Manegh.
Cosmarium brebissoni Manegh.
Cosmarium cucumis Corda.
Cosmarium hammeri Reinsch.
Cosmarium galeritum Nordst.
Cosmarium humile (Gay) Nordst.
Cosmarium margaritatum Roy & Bliss.
Cosmarium pseudoexiguum Racib.
Cosmarium pygmeum Archer.
Cosmarium rectangulare Grun. var. *hexagonum* W. & G.S.W.
Cosmarium speciosum Lund.
Cosmarium speciosum var. *rostafinski* (Gutw.) W. & G.S.W.
Cosmarium subcucumis Schmid.
Cosmarium tumidum Lund.
Euastrum elegans (Breb) Kuetz.
Mesotænium mirificum Archer.
Netrium digitis (Ehr.) Itzig. & Roth.
Netrium oblongum (De Bary) Lutkem.
Netrium oblongum var. *cylindricum* W. & G.S.W.
Pleurotænium coronatum Rabenh.
Pleurotænium trabecula (Ehr.) Næg.
Sphærozosma excavatum Ralfs.

Staurastrum alternans Breb.
Staurastrum gracile var. *coronulatum* Boldt.
Tetmemorus lævis (Kuetz.) Ralfs.
Bulbochæte intermedia var. *depressa* Wittrock.
Œdogonium pyrulum var. *amplius* W. R. Taylor.
Œdogonium tapeinosporum Wittr.
Dinobryon sertularia Ehr.
Peridinium inconspicuum Lemm.

(Photo by G. A. Hardy.)

Bunchberry (*Cornus canadensis*).

Tribonema bombycinum (Ag.) D. & S.
Tribonema bombycinum f. *tenue* Hazen.
Chroococcus turgidus (Kuetz) Næg.
Oscillatoria sancta Kuetz.
Rivularia biasolettiana Menegh.

The following is from Carl (1943):—

Glœotrichia echinulata (J. E. Smith) P. Richter.

A colonial alga of the blue-green group found free-floating in Croteau Lake and no doubt in other lakes of the district.

Sphærella nivalis (Bauer) Summerfelt. Red Snow.

The patches of "red snow" commonly seen on Mount Albert Edward are produced by large numbers of minute, spherical plants, probably of the above species.

LICHENES: Lichens

Usnea florida Arn. Old Man's Beard.

A light-green lichen hanging in festoons from tree branches and dead snags.

Alectora jubata (Linn.).

A dark-brown or black lichen frequently seen intermixed with the above-mentioned species.

HEPATICÆ: Liverworts

The following list of liverworts known to occur in the Forbidden Plateau area was kindly supplied by the late Mrs. Hugh MacKenzie, of Victoria, B.C.:—

Lephozia Kunzeana (Hub.) Evans.
Lophozia alpestris (Schleich.) Evans.
Diplophyllum taxifolium (Wahl.) Dum.
Marsupella emarginata (Ehrh.) Dum.
Marsupella sullivantii (De Not.) Evans.

OPHIOGLOSSACEÆ: Adder's Tongue Family

Botrychium silaifolium Presl. Grape Fern.

POLYPODIACEÆ: Fern Family

Cryptogramma acrostichoides R. Br. Parsley Fern.
Croteau Camp; dry ridge.

Struthiopteris spicant (L.) Scot. Grape Fern.
Paradise Meadow.

Polypodium vulgare var. *hesperium* (Maxon) Nels. & McBr. Polypody Fern.
Mount Becher, Cruickshank Canyon (L.J.C.).

Adiantum pedatum aleuticum Rupr. Western Maiden-hair Fern.
Mount Becher Trail, Browns River.

Athyrium filix-femina L. Roth. Lady Fern.
Croteau Lake; damp hillside.

Dryopteris dryopteris L. Oak Fern.
Croteau Camp; damp hillside.

Asplenium viride Huds. Green Spleenwort.
In vertical face of rock (K.C.).

Polystichum lonchitis (L.) Roth. Holly Fern.
Mount Brooks, Lake Beautiful.

Cystopteris fragilis (L.) Bernh. Bladder Fern.
Paradise Meadows.

SELAGINELLACEÆ

Selaginella wallacei Hieron.

LYCOPODIACEÆ: Club Moss Family

A few specimens of club mosses were collected; these were identified as follows by Mrs. Hugh MacKenzie:—

Lycopodium annotinum L.

Lycopodium clavatum L. Common Club Moss.
Croteau Camp.

Lycopodium lucidulum L. var. *occidentale* (Clute) L. R. Wilson.

Lycopodium alpinum L.
Mount Albert Edward.

Lycopodium obscurum L.
Lycopodium complanatum L.
Lycopodium inundatum L.

CONIFERÆ: Pine Family

Juniperus communis var. *montana* Ait. Juniper.
Mount Albert Edward; not common.

Chamæcyparis nootkatensis (Lamb.) Spach. Yellow Cedar.
Common throughout the lower parts of the Plateau.

Pinus contorta Dougl. Scrub Pine.
Lone individuals were seen at Paradise Meadows and stunted forms were present on Mount Albert Edward.

Pinus monticola Dougl. Western White Pine.
Common.

Abies amabilis Forbes. Lovely Fir.
Common.

Pseudotsuga taxifolia Lamb. Douglas Fir.
Dominant in the lodge area; or it was before logging operations were undertaken.

Tsuga heterophylla Sarg. Western Hemlock.
Abundant at the lodge level.

Tsuga mertensiana Carr. Mountain Hemlock.
Common.

SPARGANIACEÆ: Bur-reed Family

Sparganium simplex Huds. Bur-reed.
Croteau Lake; backwater.

GRAMINEÆ: Grass Family

The grasses, sedges, and rushes have kindly been identified by Mr. J. W. Eastham, formerly Provincial Plant Pathologist, Vancouver.

Danthonia intermedia Vasey. Wild Oat-grass.
Paradise Meadows and Murray Meadows.

Calamagrostis canadensis (Michx.) Beauv. Reed Bent Grass.
Murray Meadows and Paradise Meadows.

Deschampsia atropurpurea (Wahl.) Scheele. Mountain Hair Grass.
Murray Meadows and Mount Albert Edward.

Agrostis exarata Trin. Spike Redtop.
Murray Meadows; alpine form.

Agrostis thurberina Hitchc. Thurber Redtop.
Murray Meadows.

Hierochlœ odorata (L.) Beauv. Sweet Grass.
Murray Meadows.

Phleum alpinum L. Mountain Timothy.
Murray Meadows.

Glyceria pauciflora Presl.
Murray Meadows.

Poa alpina L. Alpine Meadow-grass.
Mount Albert Edward (L.J.C.).

CYPERACEÆ: Sedge Family

Carex mertensii Prescot. Merten's Sedge.
Mount Becher Trail.

Carex læviculmis Meinsh. Smooth-stemmed Sedge.
Mount Becher Trail.

Carex hindsii Clarke. Hind's Sedge.
Paradise Meadows and Croteau Lake; lake-shore.

Carex physocarpa Presl.
Paradise Meadows and Croteau Lake; lake-shore.

Carex pyrenaica Wahl. Pryenaen Sedge.
Mount Albert Edward.

Carex nigricans Mey. Blackish Sedge.
Mount Albert Edward; lower slope.

Carex limosa L. Shore Sedge.
Panther Lake.

Carex cephalantha (Bailey) Bicknell. Larger Stellate Sedge.
Panther Lake.

Carex spectabilis Dewey. Showy Sedge.
Half Dome Ridge.

Eriophorum polystachion L. Cotton Grass.
Croteau Camp.

Scirpus cæspitosus var. *callosus* Bigel. Tufted Club-rush.
Paradise Meadows.

JUNCACEÆ: Rush Family

Luzula piperi Coville. Piper's Wood-rush.
Half Dome Ridge and Mount Albert Edward; between rocks.

Juncus mertensianus Bong. Merten's Rush.
Paradise Meadows and Croteau Lake; lake-shore.

Juncus drummondii Meyer. Drummond's Rush.
Mount Albert Edward; in rocky earth pocket.

Juncus ensifolius Wiks. Three-stamened Rush.
Croteau Lake; along shore.

LILIACEÆ: Lily Family

Trillium ovatum Pursh.
Lodge area.

Smilacina racemosa L. Solomon's Seal.
Trickle Creek.

Smilacina sessilifolia Nutt. Nuttal's Solomon's Seal.
Croteau Camp; in woods.

Streptopus curvipes Vail. Twisted Stalk.
Meadow Lake (L.J.C.).

Streptopus amplexifolius D.C. Twisted Stalk.
Lodge area.

Veratrum viride Ait. False Hellebore.
Croteau Lake.

Tofieldia intermedia Rydb. False Asphodel.
Murray Meadows, Paradise Meadows, and Croteau Lake.

Stenanthium occidentalis (Gray) Rydb. Mountain Bells.
Paradise Meadows and Croteau Lake; wooded hillside.

Allium crenulatum Wiegard. Fringed Onion.
Mount Becher.

Lilium columbianum Hands. Wild Tiger-lily.
Paradise Meadows.

Clintonia uniflora (Schult.) Hunth. Queen Cup.
Lodge area.

(Photo by G. A. Hardy.)

Mount Becher Trail; bunchberry in foreground.

ORCHIDACEÆ

Habenaria stricta Lindl. Slender Bog Orchid.
Croteau Camp; bog.

Habenaria dilatata (Pursh) Hook. Boreal Bog Orchid.
Croteau Camp; lake-shore.

Listera nephrophylla Rydb. Heart-leaved Twayblade.
Meadows; wooded slope.

Peranium decipiens (Hook). Rattlesnake Plantain.
Lodge area. (L.J.C.).

Spiranthes Romanzoffiana Cham. Ladies' Tresses.
Brink of Cruickshank Canyon and Paradise Meadows.

SALICACEÆ: Willow Family

Salix mackenziana (Hooker). (Identified by Dr. C. R. Ball, U.S. Department of Agriculture, Washington, D.C.).
Murray Meadows and Croteau Lake; not common.

Salix scouleriana Hook. Scouler's Willow.
Abundant at lodge level.

Salix hookeriana Barr. Hooker's Willow.
Occasional near lodge.

Salix sitchensis Bong. Sitka Willow.
Abundant in lodge area.

Salix sp. either *mackenziana* Barr. or *prolixa* Anders., not fully determined at this time. It is abundant in the logged-off area and its lower levels.

Populus trichocarpa T. & G. Black Cottonwood.
Lodge level.

BETULACEÆ: Birch Family

Alnus oregona Nutt. Red Alder.
Common at lodge level.

Alnus sitchensis (Regel.) Sarg. Green Alder.
Croteau Camp; fairly common.

POLYGONACEÆ: Buckwheat Family

Polygonum viviparum L. Alpine Bistort.
Near Croteau Lake and Murray Meadows.

Polygonum minimum Wats. Leafy Knotweed.
Brink of Cruickshank Canyon.

Oxyria digyna (L.) Camptdera. Mountain Sorrel.
Half Dome Ridge.

CARYOPHYLLACEÆ: Pink Family

Cerastium beeringianum C. & S. Mouse-ear Chickweed.
Mount Albert Edward (L.J.C.).

Silene acaulis L. Moss Campion.
Mount Albert Edward.

Silene douglasii Hook. Douglas Pink.
Mount Becher.

Arenaria verna L. Sandwort.
Mount Albert Edward; summit.

PORTULACACEÆ

Lewisia columbiana (Howell) Rob. Bitter-root.
Mount Becher, common on rocks at 3,500-foot level and up. First reported by K. Christiansen for interior of plateau.

Montia parvifolia (Dougl.) Howell. Miner's Lettuce.
Mackenzie Lake (L.J.C.). Mount Becher and at lower elevations.

NYMPHACEÆ

Nymphæa polysepala (Englm.) Greene. Yellow Pond-lily.
Shallow ponds off Becher Trail. These plants are small and poorly developed compared to the same species at lower levels. Possibly it has reached its altitudinal limit here at 3,000 feet.

RANUNCULACEÆ: Buttercup Family

Anemone multifida Poir. Wind Flower.
Mount Albert Edward; near summit.

Caltha leptosepala D.C. Mountain Marsh Marigold.
Croteau Lake.

Ranunculus eschscholtzii Sehl. Buttercup.
Mount Albert Edward (L.J.C.).

Ranunculus flammula reptans Mey.
Pond and wet places at lower levels.

Trollius laxus Salisb.
Murray Meadows; in marshy ground.

Aquilegia formosa Fischer. Columbine.
Panther Lake; in flower by lakeside.

Actaea arguta Nutt. Baneberry.
Mount Strata.

Coptis trifoliata Salisb. Gold-thread.
Paradise Meadows.

BERBERIDACEÆ

Berberis nervosa Pursh. Oregon Grape.
Lodge level, Mount Becher Trail.

Achlys triphylla D.C. May Leaves.
Trickle Creek, Mount Becher Trail.

CRUCIFERÆ: Mustard Family

Arabis drummondii Gray. Drummond's Rock-cress.
Mount Strata.

Cardamine oligosperma Nutt. Rock Cress.
Paradise Meadow (L.J.C.).

Erysimum elatum Nutt. Western Wallflower.
Mount Albert Edward, Mount Becher; a sweet-smelling, conspicuous, yellow flower.

DROSERACEÆ: Sundew Family

Drosera longifolia L. Sundew.
Paradise Meadows; a sticky secretion on the leaves serves to trap insects which in part supply the plant with nourishment.

CRASSULACEÆ: Orpine Family

Sedum divergens Wats. Stonecrop.
Mount Albert Edward and Cruickshank Canyon.

SAXIFRAGACEÆ: Saxifrage Family

Ribes bracteosum Dougl. Stink Currant.
Trickle Creek.

Ribes lacustre Poir. Swamp Gooseberry.
Mount Strata; rock-slide.

Parnassia fimbriata Banks. Fringed Grass of Parnassus.
Murray Meadows, Paradise Meadows, and Croteau Lake.

Mitella pentandra Hook. Mitrewort.
Croteau Camp; streamside.

Tiarella laciniata Hook. Cut-leaved Tiarella.
Lodge area.

Tiarella trifoliata L. Three-leaved Tiarella.
Lodge level.

Tiarella unifoliata Hook. Simple-leaved Tiarella.
Croteau Camp; damp woods.

Heuchera glabra Willd. Smooth Alum Root.
Mount Albert Edward (L.J.C.).

Boykinia occidentalis T. & G. Western Boykinia.
Trickle Creek.

Leptarrhena amplexifolia (Sternb.) Ser. Pear-leaf.
Mount Albert Edward (L.J.C.). Common along streams at altitudes of 3,500 feet and over.

Saxifraga bongardi Presl. Pursh. Bongard's Saxifrage.
Lodge area.

Saxifraga bronchialis var. *austromontana* (Wiegand) Piper.
Mount Albert Edward; crevices of rock near summit.

Saxifraga tolmiei T. & G. Tolmie's Saxifrage.
Mount Albert Edward and Mount Strata.

Saxifraga ferruginea Graham. Rusty Saxifrage.
Mount Becher, Comox Overlook.

Saxifraga lyallii Engler. Lyall's Saxifrage.
Lake Beautiful (Mrs. Stevens).

Saxifraga mertensiana Bong. Merten's Saxifrage.
Half Dome Ridge (L.J.C.).

ROSACEÆ

Prunus emarginata Dougl. Wild Cherry.
Slope east of lodge.

Rubus pedatus Smith. Creeping Raspberry.
Croteau Lake.

Rubus macropetalus Dougl. Trailing Blackberry.
Abundant at lodge level.

Rubus leucodermis Dougl. Black-cup.
Vicinity of the lodge.

Rubus strigosus Michx. Wild Raspberry.
Lodge area.

Rubus spectabilis Pursh. Salmonberry.
Mount Becher Trail, lodge level.

Rubus parviflorus Nutt. Thimbleberry.
At lodge level.

Rosa gymnocarpa Nutt. Woodland Rose.
Lodge level.

Sanguisorba sitchensis Meyer. Burnet.
Murray Meadows and Paradise Meadows; both white and dark purple flowers are represented.

Holodiscus discolor (Pursh). Ocean Spray.
Lodge level, its altitudinal limit.

Spiræa pectinata T. & G. Comb-leaved Spirea.
Mount Albert Edward and Croteau Lake.

Spiræa douglasii var. *Menziesii* Presl. Hardhack.
Panther Lake.

Potentilla palustris L. Marsh Cinquefoil.
Panther Lake.

Potentilla diversifolia Lehm.
Plateau above Cruickshank Canyon, Croteau Camp, and Mount Albert Edward.

Aruncus sylvester Kost. Goats' Beard.
Trickle Creek.

Pond on summit of Mount Becher. (Photo by G. A. Hardy.)

Sibbaldia procumbens L. Sibbaldia.
Mount Albert Edward.

Sorbus occidentalis Wats. Mountain Ash.
Lodge area.

Sorbus sitchensis (Piper). Sitka Mountain Ash.
At lodge level, where it reaches its near altitude limit, mingling with the western mountain ash of the higher levels, which reaches its near lower limit in the vicinity of the lodge, or about the 2,000-foot mark.

Amelanchier florida Lindl. Saskatoon.
Brink of Cruickshank Canyon.

LEGUMINOSÆ: Pea Family

Lupinus latifolius Agh. var. *columbianus* (Hel.). Lupine.
Croteau Camp and Half Dome Ridge.

EMPETRACEÆ: Crowberry Family

Empetrum nigrum L. Crowberry.
Mount Becher, Paradise Meadows, and Mount Albert Edward; locally common.

CALLITRICHACEÆ: Water Starwort Family

Callitrichæ autumnalis L.
Ponds on summit of Mount Becher. Occasionally to be seen in a continuous layer on the bottom of dried-up ponds.

CELASTRACEÆ: False Box Family

Pachystima myrsinites Raf. False Box.
Edge of Cruickshank Canyon.

ACERACEÆ: Maple Family

Acer glabrum ssp. *douglasii* (Hook.) Wesml. Smooth or Dwarf Maple.
Near Browns River.

HYPERICACEÆ: St. John's Wort Family

Hypericum perforatum L. Common St. John's Wort.
Introduced near lodge.

Hypericum scouleri Hook. Scouler's St. John's Wort.
Lodge area (L.J.C.).

VIOLACEÆ

Viola palustris L. Marsh Violet.
Murray Meadows (L.J.C.).

Viola sempervirens Greene. Evergreen Violet.
Mount Becher Trail.

Viola sempervirens ssp. *orbiculoides* M. S. Baker.
Near summit of Mount Becher.

Viola glabella Nutt. Yellow Violet.
Mount Becher Trail.

Viola adunca Smith. Blue Violet.
Mount Becher, where it is associated with *V. orbiculoides.*

ONAGRACEÆ: Evening Primrose Family

Epilobium angustifolium L. Fireweed.
Abundant in the logged-off areas. A small patch of a white-flowered form flourishes from year to year near the lodge. This is well established and in 1952 occupied an area of about 60 square feet.

Epilobium latifolium L. Broad-leaved Willow Herb.
Mount Albert Edward.

Epilobium alpinum L. Alpine Willow Herb.
Croteau Lake; streamsides.

UMBELLIFERÆ: Parsley Family

Lomatium martindalei var. *angustatum* C. & R. Alpine Fennel.
Mount Albert Edward.

Heracleum lanatum Mich. Cow Parsnip.
Murray Meadows, Mount Becher.

ARALIACEÆ: Gensing Family

Echinopanax horridum (Smith) Dec. & Planch. Devil's Club.
Lodge area, Boston Creek.

CORNACEÆ: Dogwood Family

Cornus unalaskensis Ledeb. Bunchberry.
Near Croteau Lake, lodge area. Very abundant in the logged area and along the forest trails, where it forms dense mats of considerable extent, and trailing up old stumps and dead trees.

ERICACEÆ: Heath Family

Vaccinium parvifolium Smith. Red Huckleberry.
Abundant near lodge.

Vaccinium occidentale A. Gray. Western Bog Bilberry.
Mount Albert Edward, Croteau Camp, and Paradise Meadows.

Vaccinium cæspitosum Mich. Dwarf Bilberry.
Croteau Camp, plateau above Cruickshank Canyon, and Paradise Meadows.

Vaccinium deliciosum Piper. Blue-leaved Bilberry.
Croteau Camp.

Vaccinium ovalifolium Smith. Tall Blue Bilberry.
Croteau Camp, Mount Albert Edward, and Mount Becher Trail.

Vaccinium membranaceum Dougl. Mountain Bilberry.
Croteau Camp, Mount Albert Edward and summit of Mount Becher; close to tree-trunk in shade. Leaves were also found in the crop of a blue grouse.

Pyrola asarifolia Michx. Wintergreen.
Croteau Lake.

Moneses uniflora (L.) Gray. Single Delight.
Woodland trails near lodge.

Chimaphila umbellata (L.) Nutt. Prince's Pine.
Lodge area.

Chimaphila menziesii Spreng. Menzies' Pipsissiwa.
Near lodge.

Pyrola minor L. Lesser Wintergreen.
Half Dome Ridge.

Pyrola secunda L. One-sided Wintergreen.
Croteau Lake; damp woods.

Cladothamnus pyrolæflorus Bong. Copper Bush.
Croteau Lake and Mount Becher Trail, along streams.

Arctostaphylos uva-ursi Spreng. Kinnikinick.
Croteau Lake.

Gaultheria shallon Pursh. Salal.
Lodge area.

Gaultheria ovatifolia Gray. Western Teaberry.
Croteau Camp and Paradise Meadows, on stream-bank. Frequent at the lodge level.

Cassiope Mertensiana Don. Moss Heather.
Common in all areas; flowers, white.

Phyllodoce empetriformis Don. False Heather.
Common; flowers, pink.

Phyllodoce glanduliflorus (Hook.) Cov. False Heather.
Half Dome Ridge; flowers, greenish-yellow.

Kalmia polifolia Wang. Pale Laurel.
Croteau Camp and Mount Becher.

Menziesia ferruginea Smith. False Azalea.
Lodge area and Mount Becher Trail.

Rhododendron albiflorum Hook. White-flowered Rhododendron.
Croteau Camp; common, forming dense thickets. A large proportion of the leaves show a brilliant yellow spotting.

Allotropa virgata T. & G. Barber's Pole.
Woods, Boston Creek.

Hypopites hypopites (L.). Small Pinesap.
Croteau Lake; in woods.

PRIMULACEÆ: Primrose Family

Dodecatheon Jeffreyi Moor. Shooting Star.
Paradise Meadows, McKenzie Lake.

Trientalis arctica Fisch. Northern Star Flower.
Paradise Meadows.

GENTIANACEÆ: Gentian Family

Gentiana sceptrum Pall. Swamp Gentian.
Paradise Meadows; common.

Menyanthes trifoliata L. Buckbean.
Woodland ponds off Mount Becher Trail.

Menyanthes crista-galli L. Deer Cabbage.
Crouteau Lake.

POLEMONIACEÆ: Phlox Family

Phlox diffusa Benth. Phlox.
Mount Albert Edward.

HYDROPHYLLACEÆ: Water-leaf Family

Romanzoffia sitchensis Bong. Cliff Romanzoffia.
Mount Albert Edward; among rocks at summit.

Phacelia sericea Gray. Grey Phacelia.
Mount Albert Edward; near summit.

SCROPHULARIACEÆ: Figwort Family

Pentstemon menziesii Hook. Menzies' Beard-tongue.
Mount Strata, Mount Albert Edward, and Mount Becher; rock-slide.

Pentstemon diffusus Dougl. Spreading Beard-tongue.
Mount Strata and Mount Becher; rock-slide.

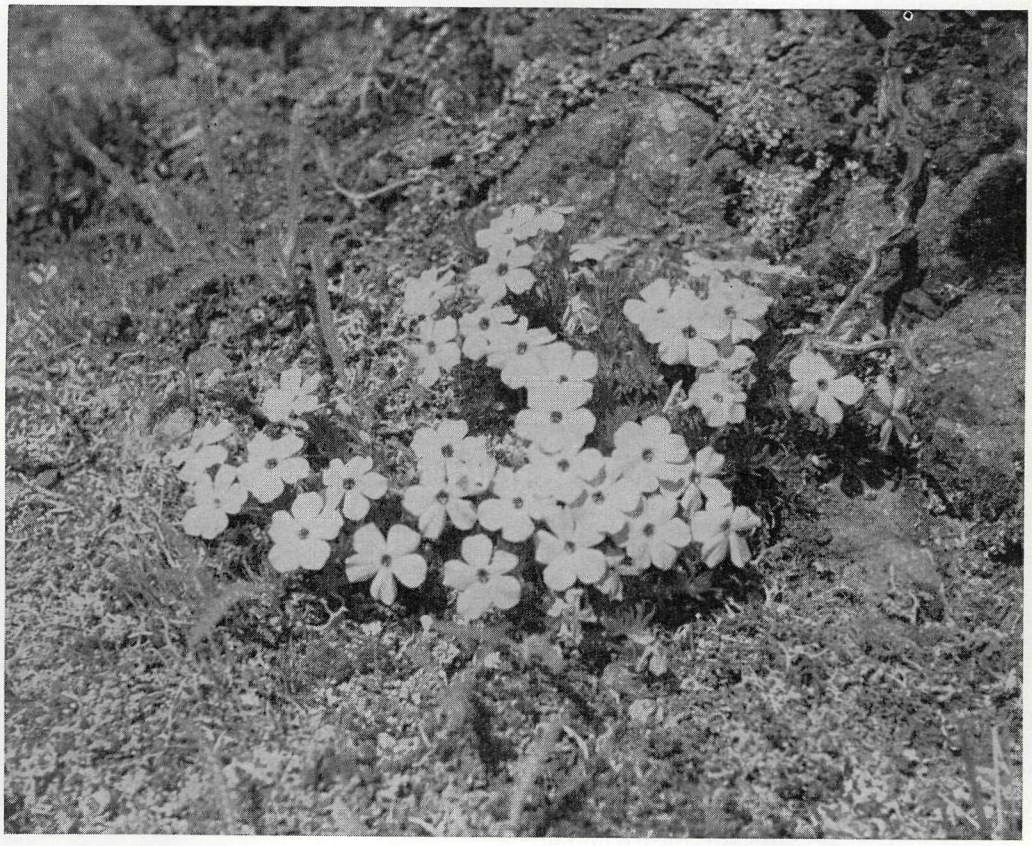
Veronica alpina L. Alpine Speedwell.
Croteau Lake and Half Dome Ridge.

Veronica americana Schwein. Brookline.
Croteau Lake.

Mimulus langsdorfi Donn. Langsdorff's Monkey Flower.
Murray Meadows.

Mimulus moschatus Dougl. Musk Flower.
Damp places near lodge. At one time this species was famed for its pleasant scent. This scent seems to have completely vanished in the present-day species.

Castilleja miniata Dougl. Common Paint-brush.
Half Dome Ridge and Croteau Camp. Agrees with *crispula* of Piper.



(Photo by G. A. Hardy.)

Phlox douglassi on Mount Becher.

Castilleja rhexifolia Rydb. Paint-brush.
Croteau Lake.

Castilleja angustifolia var. *bradburyi* Fern.
Mount Becher.

Pedicularis bracteosa Benth. Bracted Lousewort.
Croteau Camp; lake-shore.

Pedicularis racemosa Hook. Leafy Lousewort.
Paradise Meadows and Cruickshank Canyon brink.

Pedicularis ornithorhyncha Benth. Bird's Bill Lousewort.
Mount Albert Edward, Half Dome Ridge, and Mount Becher.

LENTIBULARIACEÆ

Pinguicula vulgaris L. Butterwort.
Hairtrigger Lake, Kwai Lake, and wet ground. The thick, slimy leaves serve as insect traps.

RUBIACEÆ: Madder Family

Galium trifidum L. var. *pacificum* Wiegand. Small Bedstraw.
Paradise Meadows.

Galium triflorum Michx. Sweet-scented Bedstraw.
Lodge area.

CAPRIFOLIACEÆ

Symphoricarpos racemosa Michx.
Mount Becher Trail.

Sambucus glauca Nutt. Blue-berried Elder.
Near lodge, where it reaches its upper limit.

VALARIANACEÆ. Valerian Family

Valeriana sitchensis Bong. Valerian.
Mount Albert Edward and Croteau Lake.

CAMPANULACEÆ: Bluebell Family

Campanula rotundifolia L. Bluebell.
Lake Beautiful, Mount Strata, and Mount Albert Edward.

Campanula scouleri Hook. Scouler's Bluebell.
Lodge area.

COMPOSITÆ: Compositæ Family

Erigeron salsuginosus (Richards.) Gray. Aster Fleabane.
Croteau Lake, Half Dome Ridge, Mount Albert Edward, and Mount Becher.

Erigeron compositus Pursh. Dwarf Mountain Fleabane.
Mount Albert Edward.

Erigeron compositus var. *trifidus* (Hook.) Gray.
Mount Albert Edward (L.J.C.).

Solidago corymbosa Nutt. Northern Goldenrod.
(*S. multiradiata* var. *scopulorum* Gray and *S. algida* Piper, synonyms.) Mount Albert Edward.

Achillea borealis Bong. Northern Yarrow.
Mount Albert Edward; near summit.

Petasites frigida (L.) Fries. Alpine Coltsfoot.
Murray Meadows.

Arnica latifolia Bong. Broad-leaved Arnica.
Mount Albert Edward and Croteau Camp; stream side.

Arnica mollis Hook. Hairy Arnica.
Mount Albert Edward.

Senecio triangularis Hook. Spearhead Ragwort.
Croteau Lake.

Senecio pauciflorus Pursh and
Senecio pauciflorus Pursh. var. *fallax* Greenm. Few-flowered Ragwort.
Mount Albert Edward and Half Dome Ridge.

Luina hypoleuca Benth. Silver-back.
Plateau above Cruickshank Canyon.

Antennaria media Greene. Alpine Everlasting.
Mount Albert Edward; near summit.

Antennaria parvifolia Nutt. Everlasting.
Summit of Mount Becher.

Anaphalis margaritacea var. *subalpina* Gray. Alpine Pearly Everlasting.
Mount Strata.

Agoseris aurantiaca (Hook.) Greene. Golden Agoseris.
Mount Albert Edward.

Aster foliaceus Lindl. Leafy Aster.
Paradise Meadows.

Hypochæris radicata L. Hawk-weed.
Introduced; near lodge.

Hieracium gracile Hook. Mountain Hawkweed.
Mount Albert Edward (R.C.) and Mount Becher.

MISCELLANEOUS INVERTEBRATES

Sponges

Spongilla probably *lacustris* (Linn.). Fresh-water Sponge.

Green, finger-like colonies of sponges were seen in several lakes, particularly Panther Lake and Lady Lake. In most cases the colonies were attached to submerged stones or sticks in water of medium depth.

Bryozoa, Moss Animals

Plumatella repens var. *fructosa* (Allman).

Colonies of this fresh-water bryozoan were found attached to stones and other supports in the shallows of Upper Lake Beautiful. These colonies resemble many-branched rootlets, brownish in colour and forming small mats about one-quarter inch in thickness.

Cristatella mucedo Cuvier.

Colonies of this moss animal have the appearance of small gelatinous masses; they were found fastened to stones in association with the above-mentioned bryozoan.

The *Bryozoa* were identified by Dr. Mary D. Rogick, of the United States National Museum.

Leeches

Helobdella stagnalis stagnalis (Linn.).

Specimens of this leech from Lady Lake were identified by Dr. Percy Moore, of the United States National Museum.

Molluscs

Ariolimax columbianus (Gould). Pacific Giant Slug.

Many of these large slugs were seen on the Dove Creek Trail, but no specimens were observed on the Plateau itself.

Prophysaon andersoni (Cooper). Anderson's Slug.

Several specimens of this slug were found under decaying wood on damp hillsides near Croteau Lake. The specimens may be recognized by the diamond-mesh reticulations, the two dark bands on the mantle, and the light dorsal stripe posterior to the mantle. The largest specimen measured 1½ inches in length.

Monodenia fidelis fidelis (Gray). Common Snail.

This large land snail was seen on several occasions in various parts of the Plateau, usually in damp woods.

Pisidium casertanum (Poli) and
Pisidium medianum Sterki. Fresh-water Clam.

These two species of small clams have been tentatively identified by Mr. H. B. Herrington, of Keene, Ont. Specimens were found in the silt in Lady Lake and in Croteau Lake; they are probably present in most of the lakes in the Plateau area.

In Croteau Lake these molluscs formed part of the diet of salamander larvæ.

Crustaceans

With the exception of the bottom-loving amphipods ("shrimps") the *Crustacea* of the Forbidden Plateau lakes are almost entirely composed of free-swimming forms such as water-fleas and copepods. These, together with other free-floating minute animals and plants, are usually termed "plankton" and provide a source of food for fish, particularly in the fry and fingerling stage. Samples were obtained from a few representative lakes on the Plateau by towing a fine-meshed net through the water or by pouring water through the net. Of the following records, those from McKenzie, Woods, Beautiful, Meadow, and Mariwood Lakes, and Mount Becher Pond are from samples collected in 1936 by Dr. W. A. Clemens, formerly of the Department of Zoology, University of British Columbia; the remainder are from collections made by G. C. Carl in 1943.

Water Fleas (Cladocera)

Sida crystallina (O. F. Müller).
McKenzie, Kwai, Beautiful, Meadow, and Mariwood Lakes.

Diaphanosoma brachyurum (Lieven).
McKenzie Lake.

Holopedium gibberum Zaddach.
Panther and Croteau Lakes.

Daphnia longispina (O. F. Müller).
Panther and McKenzie Lakes; Mount Becher Pond.

Simocephalus serrulatus (Koch).
Mount Becher Pond.

Scapholeberis mucronata (O. F. Müller).
Panther, McKenzie, Kwai, Beautiful, Meadow, and Mariwood Lakes.

Bosmina obtusirostris Sars.
Panther, Croteau, McKenzie, Kwai, Beautiful, and Mariwood Lakes.

Acroperus harpae Baird.
Croteau, McKenzie, and Kwai Lakes.

Alona affinis (Leydig).
Panther, Kwai, and Mariwood Lakes.

Alona costata Sars.
Beautiful and Mariwood Lakes.

Chydorus sphæricus (O. F. Müller).
Croteau, McKenzie, Beautiful, and Meadow Lakes; Mount Becher Pond.

Polyphemus pediculus (Linné).
Panther, Croteau, McKenzie, Kwai, and Beautiful Lakes; Mount Becher Pond.

Copepods

Diaptomus shoshone Forbes.
Panther, Croteau, and McKenzie Lakes.

Diaptomus oregonensis Lilljeborg.
McKenzie Lake.

Cyclops viridis Jurine.
Panther Lake.

Cyclops serrulatus Fischer.
Croteau, McKenzie, Kwai, Beautiful, and Meadow Lakes.

Cyclops albidus Jurine.
Croteau, Kwai, Beautiful, and Meadow Lakes; Mount Becher Pond.

Amphipods

Hyalella azteca Saussure. Fresh-water Shrimp.

Shrimps were seen and collected in Lady Lake, Panther Lake, and Upper Lake Beautiful, where they were found among the stones in shallow water. Stomachs of trout taken from Upper Lake Beautiful contained numbers of shrimps, indicating that these crustaceans are an important article of food.

INSECTS

Records of insects of the Forbidden Plateau were obtained from the following sources: Collections made by the Museum party in 1943; specimens collected by Mr. J. D. Gregson, Director of the Livestock Insect Laboratory, Kamloops, in 1930–31; butterflies and moths obtained by the late J. R. J. Llewellyn Jones in 1947 and 1948; beetles and stoneflies collected and recorded by R. Guppy (Schmid and Guppy, 1952); dragonflies recorded by F. C. Whitehouse (1941); stoneflies recorded by W. E. Ricker (1943); and additional butterflies and moths collected by G. A. Hardy, 1950–54.

We are indebted to Dr. T. N. Freeman and Dr. D. F. Hardwick at Ottawa, Mr. H. B. Leech at Berkeley, Calif., and to Mr. Wm. Downes of Victoria, B.C., for identification of specimens.

ORTHOPTERA (STRAIGHT-WINGED INSECTS)

Locustidæ: Locusts, Grasshoppers

Camnula pellucida (Scudder). Clear-wing Grasshopper.

Trimerotropis suffusus (Scudder). Snapping Locust.
Both common on summit of Mount Becher. August, 1951.

Odonata: Dragonflies

Engallagma cyathigenum (Chap.). Forbidden Plateau, 3,200 feet. August 26th, 1937.
Æschna juncea L. (race *americana* Bartenof). Forbidden Plateau, Courtenay, 3,200 feet.
Æschna palmata Hagen. 3,200 feet.
Somatochlora semicircularis (Selys).
Somatochlora albicincta (Burm.)
Sympetrum pallipes (Hagen).

Sialidæ (Alder Flies, Dobson Flies)

Chauliodes disjunctus Walker. Dobson Fly.

With a wing expanse of 5 inches, this is the largest insect in the district. A fine specimen was collected by Mrs. W. V. Hardy near the lodge, August 15th, 1953.

The larva is aquatic, living in mountain streams; when available, it is considered to be a fine trout bait.

Plecoptera: Stoneflies

Isocapnia sp. possibly *I. spenseri* s. *thujæ* from a specimen taken by J. D. Gregson, and now in the Canadian national collection.

Kathroperla perdita Banks. 6,000 feet, J. D. Gregson.

Trichoptera: Caddis Flies

Rhyacophila norctua Ross.
Dolophilodes pallidipes (Bks.).
Polycentropus flavus Bks.
Polycentropus remotus Bks.
Mystacides alafimbriata H. Gr.
Limnephilus fuscoradiatus Schm.
Limnephilus lopho Ross.
Clistoronia magnifica Bks. Very conspicuous during August at dusk.
Chyranda centralis Bks.
Hesperophylase designatus Walk.
Ecclisomyia conspersa Bks.

COLEOPTERA (BEETLES)

Carabidæ: Ground-beetles

Pterostichus castaneus Dej.
R. Guppy, 1950.

Pterostichus brunneus Dej.
R. Guppy, 1950.

Carabus tædatus Fab.

Bembidium incertum (Mots.).
R. Guppy, 1950.

Dytiscidæ: Western Beetles

Agabus tristis Aube.
Croteau Lake, September 1st, 1943.

Agabus vancouverensis Leech.
July 7th, 1931, J. D. Gregson.

Agabus hypomelas Mannh.
R. Guppy, 1950.

Acilius semisulcatiis Aube.
Mount Stratta, July 20th, 1931. J. D. Gregson.

Gyrinidæ: Whirligig Beetles

Gyrinus picepes Aube.
Croteau Lake, September 1st, 1943.

Staphylinidæ: Rove Beetles

Anthobium species?
A tiny beetle that swarms on all flowers. R. Guppy, 1950.

Tilea cavicollis Four.
R. Guppy, 1950.

Isomalus mancus.

Lycidæ: Net-winged Beetles

Eros hamatus (Mann.)
Common everywhere. R. Guppy, 1950.

Cantharidæ: Leather-winged Beetles

Podabrus piniphilis (Esch.).
Very common. R. Guppy.

Elateridæ: Click-beetles

Etenicera (ludius) resplendens Esch.
From fish stomach and on herbage.

Etenicera lateralis LeC.
From fish stomach. Panther Lake, August 24th, 1943.

Etenicera angusticollis Mann.
From fish stomach. Panther Lake, August 24th, 1943.

Etenicera bombycinus Geog.
Common. R. Guppy, 1950.

Etenicera lobatus Mann.
Common everywhere. R. Guppy, 1950.

Etenicera sagitticolis Esch.
Local. R. Guppy.

Etenicera lutescens Fall.
Rarely met with. R. Guppy, 1950.

Etenicera uliginosa Van D.
A new record from Vancouver Island. R. Guppy, 1950.

Eanus striatipennis Brown.
New to Vancouver Island. R. Guppy, 1950.

Eanus granicollis Van D.
New to Vancouver Island. R. Guppy, 1950.

Dalopius tristis Brown.
Very common everywhere. R. Guppy, 1950.

Megapenthes stigmosus LeC.
On flowers of *Anaphalis margaritacea.*

Buprestidæ: Flat-headed Borers

Buprestis læviventris (LeC.).
R. Guppy, 1950.

Melanophila fulroguttata drummondi (Kby.).
July 7th, 1931. J. D. Gregson.

Byrrhidæ: Pill-beetles

Byrrhus kirbyi LeC.
Mount Albert Edward, July 27th, 1931. J. D. Gregson.

Cucujidæ: Cucujid Beetles

Cucujus puniceus Mann.
July 11th, 1930. J. D. Gregson.

Coccinellidæ: Lady-bird Beetles

Hippodamia tredecim-punctata (L.).
R. Guppy, 1950.

Hippodamia quinquesignata Kby.
July 26th, 1931. J. D. Gregson.

Scarabæidæ: Dung Beetles

Aphodius congregatus Mann.
A mountain representative of our common small dung beetles. R. Guppy, 1950.

Cerambycidæ: Long-horned Beetles

Tragosoma depsarium Harrisi LeC.
This large brown beetle occasionally comes to artificial light at the lodge.

Rhagium lineatum L.
Croteau Camp, July 11th, 1930. J. D. Gregson.

Pachyta armata LeC.
Murray Meadows, August 31st, 1943. On flower of *Veratrum viride* on Mount Becher by R. Guppy, 1950.

Evodinus vancouveri Csy.
Croteau Camp, July 11th, 1930. J. D. Gregson.

Anoplodera dolorosa LeC.
Common on flowers of *Anaphalis margaritacea* and *Achillea millifolium* at the lower levels, Croteau Camp, July 10th, 1930. J. D. Gregson.

Anoplodera crassipes LeC.
Common on flowers at the lower levels near the lodge.

Anoplodera aspera LeC.
Mariwood Lake. R. Guppy, 1950.

Anoplodera tibialis (LeC.).
On flowers at the higher levels. Guppy records it from Mount Becher and McKenzie Lake, 1950.

Leptura propinqua Bland.
Mount Becher, a mountain species.

Leptura chrysocoma Kby.
Common on flowers everywhere except at the higher levels.

Ulochætes leoninus LeC. Bumble-bee Longhorn.
Closely resembles a bumble bee in both flight and appearance. Generally seen buzzing about newly felled fir logs. One was taken on the Mount Becher Trail, flying about a fallen *Abies amabilis,* August, 1951.

Chrysomelidæ: Leaf-eating Beetles

Donacia gemari Mann.
Locally plentiful at McKenzie Lake among sedge. R. Guppy, 1950.

Syneta simplex LeC.
Rare. R. Guppy.

Syneta carinata (Mann.).

Galerucella decora carbo LeC.
A willow leaf-defoliator. R. Guppy, 1950.

Altica tombacina Mann. Fireweed Beetle.
R. Guppy, 1950.

Dyslobius verrucifer Csy.
Mount Becher. R. Guppy, 1950.

Dyslobius decoratus LeC.
McKenzie Lake. R. Guppy, 1950.

Scolytidæ: Bark Beetles

Pseudohylesinus nobilis Sw.
Under bark of hemlock. R. Guppy, 1950.

Pythidæ

Priognathus monilicornis (Rand).
Mount Albert Edward, July 21st, 1931, J. D. Gregson.

Curculionidæ: Weevils

Rhyncholus brunneus Mann.

BUGS

Chlorochroa uhleri Stal.
Mount Albert Edward, July 21st, 1931, J. D. Gregson.

Aradus heidmanni Bergr. Fungus Bug.
Mount Albert Edward, July 21st, 1931, J. D. Gregson.

LEPIDOPTERA (BUTTERFLIES AND MOTHS)

RHOPALOCERA (BUTTERFLIES)

Papilionidæ: Swallowtails

Papilio zelicaon Luc. Mountain Swallowtail.
Summit of Mount Becher down to the lodge area.

Parnassius clodius claudianus Stick. Apollo Butterfly.
The dark Vancouver Island and Lower Fraser Valley form. Common on the open meadows.

Pieridæ

Colias occidentalis Scud. Western Sulphur.
Several specimens presumed to be of this species were seen flying near the summit of Mount Becher, August 7th, 1952. One alighted on the flower of a phlox, but was too wary to be taken.

Neophasia menapia F. & F. Pine White.
Abundant in 1943, particularly around pine-trees. Several adults were taken on the snow-fields of Mount Albert Edward.

Pieris napæ L. Cabbage White.
Recorded by Jones (1949) on the slopes of Mount Becher.

Satyridæ: The Satyrs

Œneis nevadensis F. & F. Great Arctic.
Summit of Mount Becher.

Nymphalidæ: Brush-footed Butterflies

Speyeria hydaspe rhodope Edw. Dusky Silver-spot Fritillary.
The characteristic phase of Vancouver Island and the Lower Fraser Valley. The latter is the type locality.

Speyeria rhodope ab. *gregsoni* Gund.
J. D. Gregson took it in 1931 on Mount Washington, described by Gunder in 1932.

Boloria epithore Edw. Western Meadow Fritillary.
A typical west coast butterfly. To be found in moist open meadows in hilly situations from Alaska to California.

Polygonia satyrus Edw. Brown Comma.
Mount Becher Trail and lodge area.

Polygonia oreas silenus Edw. Western Comma.
Woodland trail to Mount Becher and near the summit.

Nymphalis milberti Godt. Milbert's Tortoise-shell.
Mount Becher Trail just above the lodge.

Vanessa cardui L. Painted Lady.
Near the summit of Mount Becher. This cosmopolitan butterfly is very erratic in occurrence; in some years it is to be seen everywhere, in others it is completely absent.

Basilarchia lorquini burrisoni Mayn. White Admiral.

In the lodge area a fairly common butterfly which feeds, in the larval stage, on willows.

Lycænidæ: "Blues," "Coppers," and "Hairstreaks"

Strymon melinus atrofasciata McD. Grey Hairstreak.

Frequenting the flowers of the pearly everlasting, *Anaphalis margaritacea,* bordering the old logging-trails in late July and early August. This is the western race of a species found throughout temperate America.

Strymon sylvinus Bdv. Sylvan Hairstreaks.

Similar in appearance and habits to the former, only the underside is spotted with black, wherever *melinus* is streaked. This species seems to occur a little later in the season, around the middle and end of August and the beginning of September.

Lycæna mariposa Reak. Dusky Copper.

A mountain species ranging from British Columbia to California. The clear ashy grey of the underside of the hind wings is very distinctive.

Lycæna helloides Edw. Purple Copper.

Much more common than the former and chiefly at lower altitudes.

Plebeius melissa Edw. Orange-margined Blue.

Mount Becher and Comox Overlook.

Plebeius aquilo megalo McD. Cascade Blue.

Essentially a northern species, occurring from Labrador to Arctic America; the race *megalo* is the south-western mountain form found on most of the high mountains in the Province.

Plebeius icarioides montis Blkmre. Blackmore's Blue.

Assumed to be this form but not definitely determined. Frequenting lupine flowers on Mount Brooks, Comox Overlook (Hardy), Mount Becher (Jones).

Hesperidæ: Skippers

Erynnis persius Scud. Variable Dusky Wing.

A sight record, presumed to be this species, was obtained on the summit of Mount Becher.

Hesperia comma manitoba Scud. Canadian Skipper.

Also based on a sight record on the summit of Mount Becher.

HETEROCERA (MOTHS)

The following list includes what will eventually prove to be only a small number of the species that should occur here, as all the species recorded from Southern British Columbia in the most recent list of moths (Jones, 1951) will likely also be found in the Forbidden Plateau district.

While a few moths may be seen flying by day, the majority are night fliers, and are often attracted to artificial light.

Sphingidæ: Hawk-moths

Smerinthus cerisyi opthalmicus Bdv. The Eyed Hawk Moth.

Lodge light, June, 1952. Mrs. Chambers.

Nycteolidæ: Midget Moths

Sarrothripus columbiana Hy. Edw. Variegated Midget.

Phalænidæ: Owlet Moths

Merolonche ursina Sm. The Little Bear.
Flying by day on summit of Mount Becher, also at the lodge light.

Euxoa perfusca cocklei Sm. Cockles Dart.
Lodge light, August 3rd to 8th, 1952. Apparently the first record for Vancouver Island.

Euxoa messoria Harr. Reaper Dart.
Lodge area.

Euxoa tessellata Harr. Striped Cutworm.
Lodge area.

Euxoa colata Grt. Oregon Dart.
At lodge light, August 4th, 1952. Also a first Vancouver Island record.

Agrotis vancouverensis Grt. Vancouver Dart.
At light.

Eurois asticta subjugata Dyar. Great Brown Dart.

Ochropleura plecta L. Flame-shouldered Dart.
At lodge light. A circumpolar species.

Diarsia esurialis Grt. Hungry Dart.

Graphiphora oblata Morr. Ruby Dart.

Graphiphora flavotincta Sm. Yellow-tinted Dart.

Protolampra rufipectus Morr. Red-breasted Dart.

Lacinipolia cuneata Grt. Western Polia.

Anarta melanopa lærta Sm. Black-mooned Anarta.
A day-flying species; closely resembles the rocks on which it often rests.

Pseudorthodes communis Dyar. Common Stylus.

Zosteropoda hirtipes Grt. Angled Straw.

Leucania farcta roseola Sm. Rosy Wainscot.

Oncocnemis chorda extremis Sm. Marbled Beauty.
Near summit of Mount Albert Edward, August, 1943. Mrs. G. C. Carl. The first record for Vancouver Island.

Sympistis wilsoni B. & B. Columbian Arctic.
Taken by J. R. J. Llewellyn Jones on Mount Becher, July 9th, 1947.

Lycanades pulchella Sm. Purple Swallow.
Lodge light (Jones).

Septis lignicolora Gn. Wood-coloured Quaker.

Septis castanea Grt. Chestnut Quaker.

Septis finitima cerivana Sm. Pale-bandad Quaker.

Agroperina dubitans cogitata Sm. Ruby Quaker.

Crymodes devastator Brace. Glassy Cutworm.

Aseptis binotata Wlk. Red-spot Quaker.

Aseptis adnixa Grt. Twin-spot Quaker.

Oligia indirecta Grt. Common Quaker.

Hyppa xylinoides Gn. Common Hyppa.

Zotheca tranquilla Grt. Western Elder Moth.

Syngrapha orophila Hamp. Yellow-winged Y.
Lake Beautiful. July, 1948 (Jones).

Syngrapha celsa Hy. Dew. Plain Silver Y.

Autographa metallica Grt. Shaded Gold-spot.
Lodge area.

Autographa californica Speyer. Common Silver Y.
Lodge area.

Melipotis juncunda Hbr. The Puritan.
Lodge light.

Synedoida divergens Behr. Divergent Arches.
The colour of this pretty day-flying moth closely resembles the ground or rocks on which it often rests. It flies rapidly and erratically, making it difficult to catch. Lodge area, Comox Overlook, and the lower slopes of Mount Becher.

Lasiocampidæ

Malacosoma pluvialis Dyan. Tent-caterpillar.

Geometridæ: Loopers

Chlorosea banksaria Sperry. Bank's Emerald.
Lodge area.

Neodezia albovittata Gn. White-striped Black, "Razzle-dazzle."
Razzle-dazzle aptly describes its appearance when in rapid flight, the blurring effect on the eyes making it very difficult to gauge its exact position when trying to net it. Fairly common in the forested portion of the Mount Becher Trail.

Triphosa hæsitata Gn. Brown Tissue.

Eupithecia columbiata Dyar. Columbia Pug.

Eupithecia cretaceata Pack. White Pug.

Eustroma semiatrata Hlst. Clouded Brown.

Diactinia silaceata albolineata Pack. Small Phœnix.

Plemyria georgii benesignata B. & McD. Eyed Carpet.

Dysstroma sobria Swett. Sober Carpet.

Dysstroma citrata Linn. Dark Marbled Carpet.

Ceratodalis gueneata Pack. Plain Wave.

Hydriomena furcata Thun. Common Highflyer.

Xanthorhœ incursata harveyata C. & S. Vancouver Carpet.
Woods along Mount Becher Trail.

Xanthorhœ pontiaria Tayl. Chalky Carpet.

Mesoleuca ruficillata Gn. Red-fringed Carpet.
Lodge area.

Epirrhœ sperryi Herb. (*tristata* L.).
Mount Becher Trail.

Epirrhœ alternata Mull. Striped Carpet.

Euphyia multiferata Wlk. Many-lined Carpet.

Eulype hastata gothicata Gn. Black Spear-mark.
Mount Becher Trail (Jones). A day-flying species. Common along the woodland part of the trail.

Venusia cambrica Curt. Cambric Wave.
Recorded by Jones near McKenzie Lake, July 23rd, 1948. Also at the lodge light.

Deilinia pacificaria Pack. Western Wave.

Semiothisa granitata Gn. Spotted Granite.

Neoalcis californiaria Pack. California Carpet.

Æthalura anticaria Wlk. Smokey Carpet.

Euchlæna tigrinaria sirenaria Sthn. Variable Thorn.

Campæa perlata Gn. Pale Emerald.

Philedia punctomacularia Hlst. Chain-spotted Girdle.

At rest on alder trunk near the lodge, where it looked like a splash of mud. September, 1951.

Pero giganteus Grossb. Grant Umber.

Pero occidentalis Hlst. Western Umber.

Enypia pachardata Tayl. Pale-grey Girdle.

Lodge area; Mount Becher.

Tabanidæ: Horse-flies

Large numbers of a small tabanid fly were found in trout stomachs taken from fish caught at Circle Lake on August 29th, 1943.

Fleas

A few specimens of fleas collected from some of the mammals taken in the Forbidden Plateau area were sent to Mr. George P. Holland, of the Science Service, Ottawa, who has identified them as follows:—

Opisodasys keeni (Bak.).

Catallagia charlottensis (Bak.).

Malaræus telchinum (Roths.).

Monopsyllus w. wagneri (Bak.).

All taken from Vancouver Island white-footed mice from Croteau and Mariwood Camps.

Thrassis spenceri (Wag.).

From Vancouver Island marmot taken on Mount Washington.

VERTEBRATES

Fishes

Salmo gairdneri kamloops Jordan. Kamloops Trout.

The many lakes of the Plateau were apparently originally barren of sport fish, possibly because of insurmountable falls between them and the sea. A stocking programme therefore was commenced in 1929 when the Dominion Department of Fisheries planted 40,000 eyed eggs of Kamloops trout from Lloyd's Creek Hatchery in Panther Lake. This initial introduction was followed by other plantings from Penask Lake Hatchery as follows:—

In 1930: Circle, 40,000; Francis, 10,000; Isabella, 20,000; Johnston, 40,000; Mariwood, 10,000; McKenzie, 40,000; and Meadow, 40,000.

In 1931: Amphitheatre, 40,000; Battleship, 30,000; Bell, 20,000; McPhee, 10,000; Moat, 30,000; Rolland, 60,000; and Syms, 10,000.

In 1932: Amphitheatre, 30,000; Battleship, 30,000; McPhee, 24,000; Moat, 30,000; Isabella, 10,000; Johnston, 3,000; Mariwood, 30,000; McIntyre, 30,000; Summit, 6,000; and Sunrise, 30,000.

In general the plantings have resulted in successful introductions; many of the lakes now provide excellent sport-fishing and in many the trout appear to be maintaining the population by spawning in the tributary streams. In addition to the lakes into which eyed eggs were placed, the following bodies of water now contain trout: Croteau, Beautiful, Upper Beautiful, Helen Mackenzie, Pierce, and Lady.

In most lakes the fish are of small size, measuring between 8 and 10 inches in length. Large fish up to 15 pounds are reported to be present in Circle Lake and in Moat Lake.

An examination of stomach contents of a number of trout taken in Panther, Beautiful, and Circle Lakes during the last week of August, 1943, revealed that the fish at that season were feeding mostly on insects taken from the surface of the water. The following kinds of insects were found:—

Panther Lake: Winged ants, wasps, leaf-hoppers, ground-beetles, click-beetles, stone-fly.

Lake Beautiful: Winged ants, ichneumon flies, horse-flies, click-beetles, Dobson fly.

Circle Lake: Midge flies, horse-flies.

Stomachs from Lake Beautiful trout also contained numbers of fresh-water shrimp (*Hyallella azteca*), indicating that these Crustacea form an important part of the diet of the fish in this body of water.

Cottus sp. Sculpin.

An unidentified species of fresh-water sculpin is reported by Mr. Clark to be present in Panther Lake from observations made in 1942. No specimens were seen when a search was made in 1943.

This fish, if present, is probably the only species native to the area.

Amphibians

Ambystoma gracile gracile (Baird). Northwestern Salamander.

The northwestern salamander appears to be abundant in the Forbidden Plateau area. The larvæ are particularly noticeable along the margins of lakes, especially by flashlight at night. At this time many larvæ from 3 to 6 inches in length may be seen lying motionless on the bottom or slowly moving along looking for food. When disturbed they dash off suddenly to disappear into the mud or under stones or other cover. At first sight they may be momentarily confused with fish but are easily distinguished by the presence of two pairs of legs and by the feather-like gills on either side of the neck.

The larvæ apparently transform to the adult stage toward the end of summer; eight or ten individuals, each still with gill-stumps showing, were found under logs and bark along the shore of Croteau Lake over a period of a few days during the last week in August.

Adults measuring about 5½ inches in length were found in several instances under logs on damp hillsides not far from the lake-shore. The colour patterns of these varied somewhat, a typical salamander being chocolate brown with bronze-coloured irregular spots on sides of head, body, and legs, with slate grey on the under-parts.

The greenish jelly-like remains of egg-masses of this salamander were observed in Panther Lake and in many ponds at Paradise Meadows; larvæ were collected in the latter area and in Croteau Lake. The main food of the larvæ in Croteau Lake appeared to be small clams (*Psidium casertanum* and *P. medianum*) which were abundant in the bottom ooze.

Ambystoma macrodactylum macrodactylum Baird. Long-toed Salamander.

An individual of this brightly coloured salamander was found associated with a northwestern salamander under a log on a damp hillside near Croteau Lake on August 24th. The species has previously been reported from Forbidden Plateau by Brown and Slater (1939).

In life the present specimen was dark chocolate in colour with a bright greenish-yellow stripe down the back from the back of the head to the tip of the tail. Small irregular spots of the same colour were on the head and limbs while the sides and under-surfaces were speckled with small, whitish spots.

Taricha granulosa granulosa Skilton. Rough-skinned Newt.

Mr. Clark reports finding a newt in the stomach of a trout taken from Circle Lake.

Bufo boreas boreas Baird and Girard. Northwestern Toad.

By far the most widely spread amphibian in the area is the common toad. Individuals were seen in almost all parts of the Plateau, even near the summit of Mount Strata (at about 4,600 feet), in the rock-slide at the base of Strata, and on Mount Washington. They were common along most trails and in thickets, sometimes some distance from ponds or lakes.

No tadpoles of the toad were seen, but the adults probably spawn in both ponds and lakes soon after the ice leaves. Mr. J. Ward, of Dove Creek, reported seeing a migration of young toads across the trail some years ago toward the end of summer.

Hyla regilla Baird and Girard. Pacific Tree-toad or Tree-frog.

The tree-toad is common throughout the Plateau, particularly along lake-shores and stream edges. Adults were heard croaking on many occasions, and both juveniles and adults were observed.

Tadpoles were numerous in small ponds in various parts of the Plateau; they were often seen crowded together in the shallow water of the margin, supposedly to take advantage of the warmer water, sunshine, and possibly greater food-supply. Larvæ with hind legs about half developed were present in most pools; tadpoles changing to the adult stage were seen in only a few cases. Since the majority of the individuals were just beginning to show development of the hind limb, it seemed likely that many would be killed by the first freeze-up, which usually occurs by mid-September.

Several tadpoles were seen in a small stream draining into Circle Lake, a most unusual habitat for this species. It is possible that they originated from a near-by pond draining into the stream. Adults seen in a pond on the summit of Mount Becher in September, 1951, had colours matching the dead sedges among which they hid.

Reptiles

The reptiles are apparently represented in the area by garter snakes only, and these appear to be rare, since only two have been seen—one at Lake Beautiful in 1942 (L. J. Clark) and a large one on the Mount Becher Trail at the 2,000-foot level in September, 1951 (Hardy).

Birds

Only a very incomplete idea of the bird-life of the Forbidden Plateau area can be gained by short visits and at only one season. However, the impression gained was that birds were remarkably few in number of species, despite the wide range of habitats and the apparently abundant food-supply. Common birds, such as robins, thrushes, golden-crowned sparrows, and woodpeckers, which one might expect to find in numbers, appeared to be either absent or extremely rare. Only a few water-birds were observed. The following annotated list is based on the first report (Carl 1943), Sutton's published records for Paradise Meadows (1936), and observations made in 1950 to 1954.

Gavia sp. Loon.

An unidentified loon was seen flying on one occasion over Croteau Lake and was heard in other parts of the Plateau.

Ardea herodias fannini Chapman. Northwest Coast Heron.

Herons are reported as being occasionaly seen.

Branta canadensis (Linnæus). Canada Goose.

A flock of nine geese was seen or heard several times in 1943. The birds were first observed on Kwai Lake on August 25th; they were seen or heard in flight on several later occasions, but not within range so that they could be identified as to subspecies.

Glaucionetta clangula americana (Bonaparte). American Golden-eye.

Three golden-eyes were seen on Lower Lake Beautiful on August 25th, 1943, and a pair was observed on Hairtrigger Lake the following day. An immature bird, possibly a female, was present on Croteau Lake. It apparently was unable to take off from the water. On July 22nd, 1951, a female and eight well-grown young frequented Kwai Lake.

Astur atricapillus striatulus Ridgway. Western Goshawk.

A goshawk was seen on more than one occasion during the 1943 visit.

Accipiter velox velox (Wilson). Sharp-shinned Hawk.

Several sharp-shinned hawks were seen. On one occasion a pair were observed harrying two ravens which had been feeding upon a deer carcass at the foot of Mount Strata (1943).

Aquila chrysætos canadensis (Linnæus). Golden Eagle.

Pearse (1943) provides a possible sight record of this bird near Mount Albert Edward in August, 1924.

Haliæetus leucocephalus alascanus Townsend. Northern Bald Eagle.

Two immature individuals were seen soaring over the western slope of Mount Elma (1943).

Falco columbarius suckleyi Ridgway. Black Merlin; Black Pigeon Hawk.

A black merlin was seen to chase Canada jays into cover on one occasion near the 1943 camp. A second individual was seen pursuing a blue grouse near the summit of Mount Washington.

Falco sparverius Linnæus. Sparrow Hawk.

Heard and seen near Trickle Creek.

Dendragapus fulginosus fulginosis (Ridgway). Blue Grouse; Sooty Grouse.

Blue grouse are common; individuals and small flocks were seen in all parts of the Plateau. Males were heard hooting on several occasions.

Bonasa umbellus bunnescens Conover. Ruffed Grouse .

One individual only was seen below Paradise Meadows (1943).

Lagopus leucurus saxatilis Cowan. Vancouver Island White-tailed Ptarmigan.

Ptarmigan are present on Mount Albert Edward above 5,000 feet elevation. In 1943 a hen bird with three three-quarters-grown young was seen on the lower reaches of the ridge leading to the summit and two other adult birds were seen higher up, one almost at the peak. The adults were in preliminary winter plumage; that is, as follows: Ground colour of back and sides of breast rich brown mottled with black; feathers of wings, belly, legs, and tail, white. The coloration of the juveniles was brownish with dark and light brown barring on the head, neck, and breast; the wing feathers only were white.

Fulica americana Gmelin. American Coot.

Coots or mud-hens were seen on McKenzie Lake by Mr. C. P. Lyons about September 23rd, 1941. They are probably regular visitors.

Columba fasciata fasciata Say. Band-tailed Pigeon.

Two individuals were seen at Croteau Lake. Sutton (1936) reports them to be present at Paradise Meadow. Occasionally seen in small flocks near the Forest Lookout, 1951–52.

Chordeiles minor (Forster). Nighthawk.

Often seen near the lodge, where they swoop down on insects attracted by the artificial lights.

Nephœcetes niger borealis (Kennerly). Black Swift.

Swifts were seen on one occasion, near the summit of Mount Washington. They probably also occur in other parts of the Plateau near the high peaks where strong updraughts carry food in the form of insects to a high elevation.

Selasphorus rufus (Gmelin). Rufous Hummingbird.

A hummingbird was seen at Panther Lake and at Half Dome near the lower slopes of Mount Albert Edward. Common about the lodge.

Megaceryle alcyon caurina (Grinnell). Western Belted Kingfisher.

Kingfishers are reported to be present by Mr. C. P. Lyons.

Colaptes cafer cafer (Gmelin). Red-shafted Flicker.

Several flickers were seen during 1943, but they do not appear to be common.

Ceophlœus pileatus (Linnæus). Pileated Woodpecker.

Lodge district.

Picoides tridactylus fasciatus Baird. Alaska Three-toed Woodpecker; Ladder-backed Woodpecker.

This species has been reported from Paradise Meadows by Sutton (1936). It may be distingushed by the black back banded with broken white bars and by the presence of three instead of four toes; the male has a yellow cap. A single bird, possibly of this species, was seen near Croteau Lake on August 30th, 1943.

Empidonax hammondi (Xantus). Hammond Flycatcher.

This small flycatcher has been reported from Paradise Meadows by Sutton (1936).

Nuttallornis borealis (Swainson). Olive-sided Flycatcher.

Woods in the lodge area.

Perisoreus obscurus griseus Ridgway. Canada Jay; Whisky Jack; Camp-robber.

Jays are one of the most noticeable birds in the Plateau area due to their bold nature and fearless behaviour around camp. Their graceful gliding flight from tree to tree and the variety of their cries make them interesting if not welcome visitors.

Several immature birds of the year were noted at Croteau Camp; in these, the head and face were dark instead of light grey as in the adult.

Cyanocitta stelleri stelleri (Gmelin). Steller Jay.

Individuals were seen on the trail below Paradise Meadows but none was noted on the Plateau.

Corvus corax principalis Ridgway. Northern Raven.

Ravens were one of the most conspicuous birds in the district, owing to their large size and raucous calls. A pair was observed almost daily at the 1943 camp and others were seen in all parts of the Plateau, even near the summit of Mount Albert Edward. On one occasion a pair was disturbed in the act of feeding upon a dead deer near the foot of Mount Strata. As they wheeled overhead they were attacked by a pair of sharp-shinned hawks which they easily eluded.

Penthestes rufescens rufescens (Townsend). Chestnut-backed Chickadee.

Chickadees were numerous in the area; they were seen in all the wooded sections of the area, usually in flocks.

Sitta canadensis Linnæus. Red-breasted Nuthatch.

Nuthatches were heard calling " quank, quank " in all parts of the Plateau, usually in company with chickadees. No specimens were collected for identification; it is believed those of the Plateau belong to this species, since birds of this species are known to occur in Mount Arrowsmith vicinity.

Certhia familiaris occidentalis Ridgway. Brown Creeper.

With a flock of chickadees, on Mount Becher Trail.

Cinclus mexicanus unicolor Bonaparte. American Dipper.

Dippers are occasionally seen along streams.

Mannus hiemalis pacificus (Baird). Western Winter Wren.

Winter wrens appeared to be common in the area.

Turdus migratorius propinquus Ridgway. Western Robin.

A robin was heard on only one occasion. They appear to be uncommon in the Plateau area.

Ixoreus nævius nævius (Gmelin). Pacific Varied Thrush.

Several birds were seen about Croteau Camp.

Hylocichla guttata nanus (Audubon). Dwarf Hermit Thrush.

One individual only was seen, near Croteau Lake (1943).

Regulus satrapa olivaceus Baird. Western Golden-crowned Kinglet.

These birds were noted on several occasions, often associated with chickadees. They were also observed at Paradise Meadows by Sutton (1936).

Anthus spinoletta rubescens (Tunstall). American Pipit.

Pipits were seen in a flock on the slope of Mount Albert Edward at about 5,000 feet elevation in 1943. In all likelihood these birds breed in this region. They are easily distinguished by the long bill, the long hind claw, and the skylark-like habit of mounting and singing high in the air.

Dendroica auduboni (Townsend). Audubon Warbler.

A flock was seen at Kwai Lake, September, 1951.

Dendroica townsendi (Townsend). Townsend Warbler.

Warblers of this species have been reported from Paradise Meadows (Sutton, 1936).

Leucosticte tephrocotis littoralis. Hepburn Gray-crowned Rosy Finch; Leucosticte.

Several rosy finches were observed on Mount Albert Edward in 1943, one of them at the very summit. The birds were exceedingly shy, flitting from rock to rock or diving from the sheer face into space at the approach of a human. This bird is not likely to be confused with any other in this habitat; it is easily recognized by the suffusion of light rose colour over rump, flanks, abdomen, and the greater part of the wings. It probably breeds on Mount Albert Edward.

Spinus pinus pinus (Wilson). Northern Pine Siskin.

Several flocks of siskins were seen about the 1943 camp and in other parts of the Plateau.

Loxia curvirostra Linnæus. Red Crossbill.

Reported at Kwai Lake by Mrs. D. Stevens, September, 1951.

Pipilo maculatus oregonus Bell. Oregon Towhee.

Lodge area.

Junco oregonus oregonus (Townsend). Oregon Junco.

Juncos were common; a flock visited the 1943 camp almost daily in the early morning. Fledglings just learning to fly were seen at Croteau Lake on August 29th. A nest with four eggs was seen on the lower slopes of Mount Becher, July 20th, 1952.

Zonotrichia leucophrys. White-crowned Sparrow.

Lodge area.

Zonotrichia coronata (Pallas). Golden-crowned Sparrow.

Lodge area.

Melospiza melodia morphna Oberholser. Song Sparrow.

Thickets in lodge area.

Mammals

Myotis lucifugus (LeConte). Little Brown Bat.

Bats, possibly of this species, were seen at Panther Lake on two occasions; no specimens were obtained for positive identification. Bats were also seen around the lodge lights in 1950–54 where they were attracted by the insects there.

Euarctos americanus vancouveri Hall. Vancouver Island Black Bear.

Bears are common throughout the Plateau area. Signs of their presence were seen in almost all parts, and individuals were seen at Panther Lake and at Paradise Meadows. In the blueberry season bears are commonly seen in the open feeding upon the fruit; one was met with near the lodge in September, 1950, thus engaged.

Martes caurina vancouverensis Grinnell and Dixon. Vancouver Island Pine Marten.

Marten are probably occasionally present in the Forbidden Plateau area. An individual was seen on the Dove Creek Trail below Camp 5 by Mr. Clark in 1942.

Mustela erminea anguinæ Hall. Vancouver Island Weasel.

An individual in summer pelage was found one morning at the 1943 camp, drowned in a water-bucket. The animal had apparently fallen in while examining a freshly used landing-net hanging on the cabin wall above the bucket.

Canis lycaon crassodon Hall. Vancouver Island Wolf.

Wolves apparently pass through the district occasionally. From the presence of tracks and a " deer kill " a wolf was known to have been present in the Plateau in 1936 according to Mr. Ward.

About 1933 Mr. J. Cecil (" Cougar ") Smith, of Campbell River, shot a female at Mount Washington and reared four cubs found in the litter.

Felis concolor vancouverensis Nelson and Goldman. Vancouver Island Cougar.

Cougars are apparently occasionally present in the Plateau area. Fresh tracks were seen on Mount Elma and on the trail below Paradise Meadows, and the remains of a deer possibly killed by a cougar were seen on Paradise Meadows.

Marmota vancouverensis Swarth. Vancouver Island Marmot.

Marmots are known to be present on Mount Washington and Mount Strata within the Plateau area. The colony on Mount Washington appears to be quite small, occupying an area of open country on the southern slope at about 5,000 feet elevation. Here there are a number of burrows and other signs of marmot activities.

The animals are very dark in appearance; except for a white spot on the forehead and a white streak down the midline of the belly, the fur is almost black with a few grizzled hairs around the shoulders of adults. A large male may be over 2 feet in length. Their chief food appears to be blueberry shrubs (*Vaccinium*). Like other ground-squirrels, this rodent has a loud chirping call and a piercing whistle of alarm. Only one burrow appeared to be occupied in the small colony on Mount Strata slope. A lone individual was seen there in 1942 by Mr. Clark, but no animals were noted in 1943.

Sciurus hudsonicus lanuginosus Backman. Vancouver Island Red Squirrel.

Squirrels were not commonly seen, although heaps of cone fragments and ground workings at the bases of trees were numerous; individuals were observed on only a few occasions.

Castor canadensis leucodontus Gray. Vancouver Island Beaver.

A beaver presumed to be this subspecies was seen swimming in one of the small lakes off the Mount Becher Trail not far from the Forest Lookout. As beaver do not appear to have established themselves permanently here, it is presumed that the one seen was a wanderer from the Puntledge River, where it is known to occur.

Peromyscus maniculatus interdictus Anderson. Vancouver Island White-footed Mouse.

Several mice of this subspecies were taken at Croteau and Mariwood Camps. They are apparently common in the Plateau area, but appear to be most abundant around the cabins, where they occasionally do some damage to foodstuffs and stored blankets.

The original specimens described by Anderson (1932) were collected on the Forbidden Plateau by Mr. Hamilton M. Laing, of Comox.

Microtus townsendi ssp. Meadow Mouse.

Burrows, runs, droppings, and an abandoned nest indicated that meadow mice were present at Paradise Meadows, but no specimens were taken. On a geographical basis it is likely that *M.t. laingi* Anderson is the subspecies occurring here.

Ondatra zibethica osoyoosensis (Lord). Rocky Mountain Muskrat.

Signs of muskrat activities in the form of cut grasses and sedges and burrows in the bank were noted in sloughs at Paradise Meadows. One individual was seen in 1943.

The muskrat is not native to Vancouver Island; it was introduced some years ago and is spreading through all water systems suitable to its well-being. It has apparently reached Paradise Meadows within recent years since it has not been noted previously.

Odocoileus hemionus columbianus (Richardson). Coast Deer.

Deer are common throughout the Plateau region. Lone individuals and groups of two or three were seen on several occasions.

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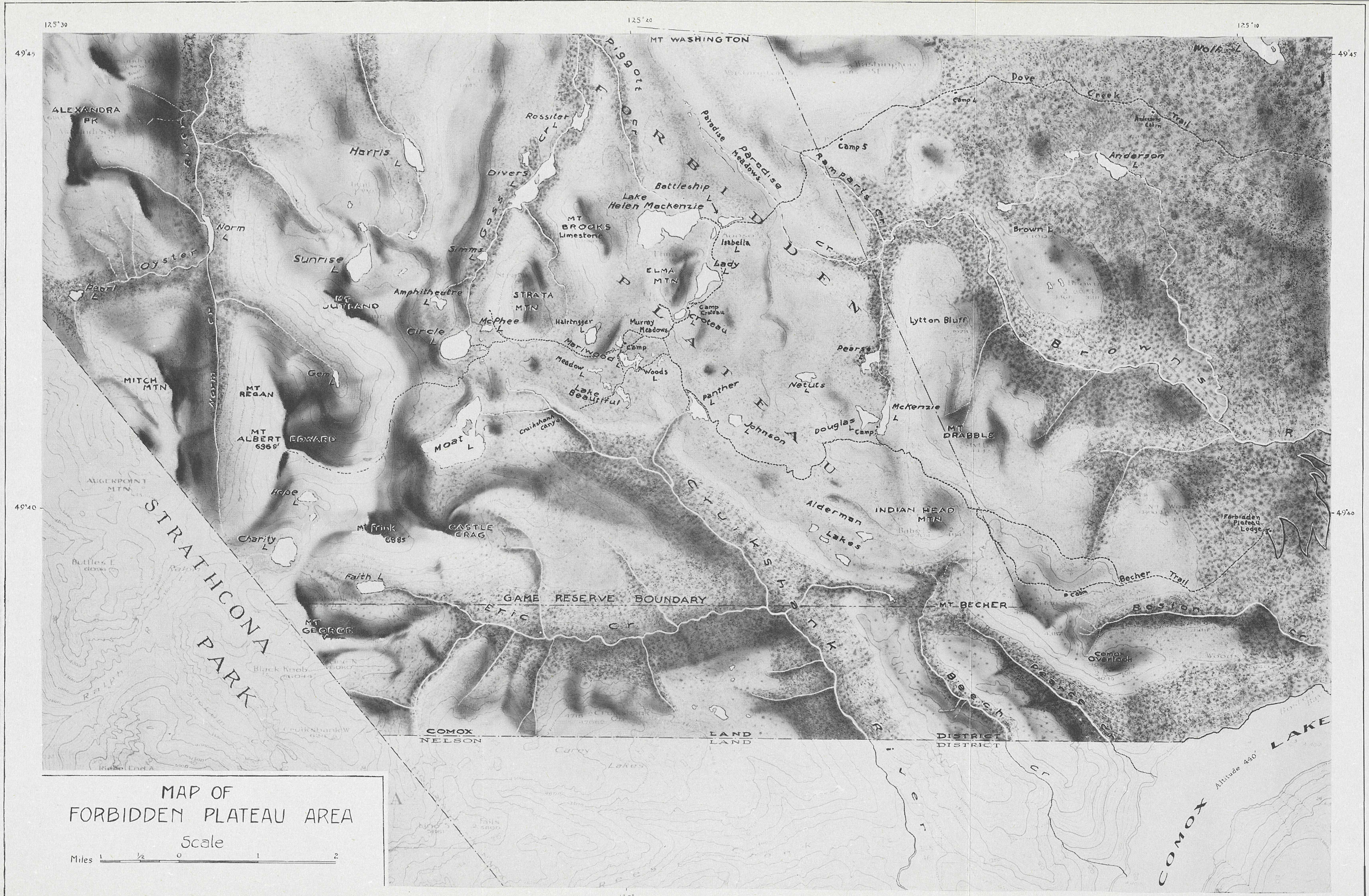

MAP OF
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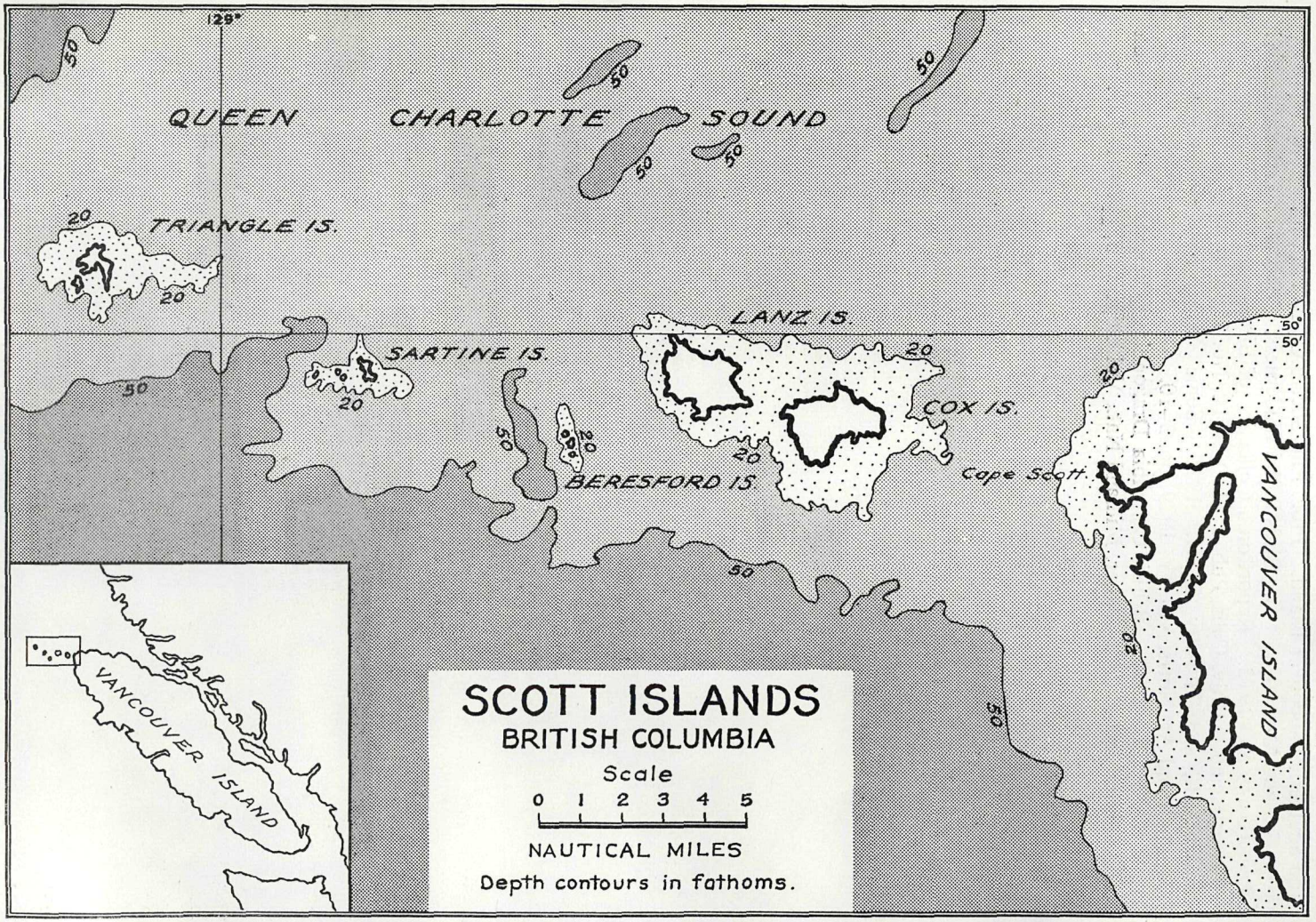


Fig. 1. Chart showing location and geographic relationships of the Scott Islands, British Columbia.

UNDESCRIBED MAMMALS (*PEROMYSCUS* AND *MICROTUS*) FROM THE ISLANDS OF BRITISH COLUMBIA

By C. J. Guiguet, Provincial Museum, Victoria, B.C.

INTRODUCTION

The earlier work by McCabe and Cowan (1945) revealed the unusual potentialities for study of the extent of short-term evolutionary change in isolated populations of small mammals available on the islands off the coast of British Columbia.

Since 1948 the Provincial Museum has been undertaking a series of insular explorations largely centred in the archipelago skirting the north and west coasts of Vancouver Island. These expeditions have brought to light several populations with very distinctive characteristics. These populations are described and named below.

In 1949 and 1950 the Scott Island group was visited. This is composed of five islands extending seaward from Cape Scott, the northernmost tip of Vancouver Island (*see* Fig. 1). Cox Island, the one nearest Vancouver Island, is separated from it by a deep strait 7 miles in width. It is 2¼ miles long by 1½ miles wide. Elevations run to 655 feet, and the vegetation is typical coast forest association. Half a mile to seaward lies Lanz Island, similar in size and general ecology (Fig. 2).

Seaward of these two larger islands lies Beresford Island (Fig. 3) and Sartine Island, formerly called the West and East Haycocks. They are 2½ miles southwest of Lanz Island and are separated from each other by 4½ miles of open water. Sartine is one-half mile in length and 200 yards wide with an altitude of 350 feet. Beresford is only 400 yards long and roughly oval in shape. Its shores rise abruptly to 300 feet. Both are precipitous. Beresford bears a few wind-wracked Sitka spruce, but Sartine is treeless. Both are clothed in a dense vegetation of shrubs, forbs, and grasses dominated by *Rubus spectabilis* (Beresford) and *Elymus mollis* (Sartine).

Triangle Island (Figs. 4 and 5), the outermost of the group, lies 26 miles off Cape Scott, where it rises as a sheer-sided pinnacle from deep water to a summit 690 feet above the sea. Its greatest dimension is three-quarters of a mile.

This is an area exposed to the full sweep of the Pacific Ocean, the currents sweeping past the islands reaching velocities of 3 knots; storms are frequent and fierce.

The present understanding of the geology of the region involves a maximum submergence of the entire coast-line during the Vashon glaciation of between 700 and 800 feet. If this interpretation is correct, it follows that none of these islands can be regarded as having a relic population surviving since pre-Vashon periods.

The geological history and possibilities for recolonization of the islands subsequent to their emergence are fully discussed in McCabe and Cowan (op. cit.) and Carl, Guiguet, and Hardy (1951). Raft transport of populations from the mainland coast is the most probable source of stocks, with incidental transport in native canoes another strong possibility.

It is not my present purpose to discuss the evolutionary forces that have operated to guide the development of the populations that now inhabit the islands, but gigantism is general, and the several populations bear characteristics, some of them unique, that set them apart more widely than named subspecies of what is presumed to be the same species inhabiting the continental mainland.

Two potential species stocks exist, *Peromyscus maniculatus* and *Peromyscus sitkensis*. When the latter species was described, the true characteristics of the north coast races of *maniculatus* were unknown. Recent work cited above has extended our knowledge of the range of variation in the two species until it must presently be admitted that the qualitative and quantitative characteristics used in separating these two are now in doubt. However, some breeding experiments of a limited scope have been undertaken

using stocks of *Peromyscus maniculatus* from the central British Columbia coast and islands and *P.s. prevostensis* from Frederick Island, Q.C.I., B.C. These experiments indicate an antipathy between animals of the two species of comparable size with no hybrid litters produced. It is suggested that the genetic affinities of these species and of several other insular populations from the same region can only be determined in the laboratory.

Also, investigations on the Queen Charlotte Islands have revealed *sitkensis* as a relatively implastic species. Populations have been discovered on Frederick Island, Hippa Island, and Kunghit Island, islands of small size along a coast-line of 150 miles and completely isolated from one another. Yet these populations are indistinguishable from one another, a situation most unlikely in the highly plastic *maniculatus*.

(Photo by G. C. Carl.)

Fig. 2. Forest association, Lanz Island: Sitka spruce, hemlock, and salal.

Thus, in the meantime, although there are now no consistent morphological characteristics that can be used to separate all members of the two species, it seems desirable to retain the established nomenclature until sound reasons appear for altering it.

The small mammal fauna of the Scott Island group is comprised of *Peromyscus* on all islands, *Microtus* on Triangle, and *Sorex* on Cox where only one specimen was taken. Of these, the *Microtus* of Triangle Island and the *Peromyscus* on Triangle, Sartine, Beresford, and Cox Islands appear to be distinctive. They are characterized and named below.

Microtus

Triangle Island is alone among the five islands in supporting a population of *Microtus*. The species represented is *M. townsendi* that elsewhere ranges on the mainland from northern California to Burrard Inlet and on Vancouver Island throughout its length. It occurs on Hope, Hurst, and Nigei Islands adjacent to Port Hardy, Vancouver Island. The new race is the largest member of the species so far described and may be known as—

*Microtus townsendi cowani** ssp. nov.

Type.—Adult female, skin and skull, British Columbia Provincial Museum No. 5460, taken June 28th, 1949, on Triangle Island, B.C., 129° 5′ west, 50° 55′ north.

Diagnosis.—Dorsal colour dark, grizzled grey-brown, under-parts grey, faintly washed with pale buff in some individuals. Chin white, tail tip white, 88 per cent of the sample of twenty-three specimens have a white blaze on the crown behind the eyes. These white markings particularly noticeable in all immature individuals taken and in most adults—reduced to a few white hairs in some adults. Skull large and robust with broad rostrum.

Comparisons.—*M.t. cowani* is most like *M.t. laingi* but differs from that race (the largest previously described (*see* Anderson, 1943)) in larger size, more robust build, and in the white markings described above. Pelage in the sample taken has a peculiar coarse woolly texture not apparent in other series of *townsendi* examined; this characteristic is apparent in all age-classes, including very young animals. In body colour somewhat darker than *M.t. laingi* below, more grizzled above. Differs from mainland and southern insular forms in much larger size, darker colour below, and in characteristic white markings.

Measurements.—There are no significant differences in size between males and females of this subspecies. Measurements of eighteen specimens, fully adult, are: Total length, 219.5 mm. (202–235); tail length, 69.7 mm. (61–75); length of hind foot, 28 mm. (27–29); basilar length of hensel, 32.1 mm. (30.4–33.3); zygomatic width, 18.1 mm. (17.0–19.4); interorbital breadth, 4.3 mm. (4.0–4.6); mastoid breadth, 13.8 mm. (13.0–14.2); length of nasals, 9.2 mm. (8.7–9.7); width of nasals, 4.2 mm. (4.0–4.8); width of rostrum, 6.3 mm. (5.9–6.8); length of upper tooth row, 7.6 mm. (7.0–8.1); width of brain case between squamosal fenestra, 11.2 mm. (11.0–11.7).

Distribution.—Known only from the type locality, Triangle Island, B.C.

Specimens Examined.—Triangle Island, 23; Hope, Negei, and Hurst Islands, 12; Vancouver Island, 20; Lower Mainland, 12; Bowen Island, 1.

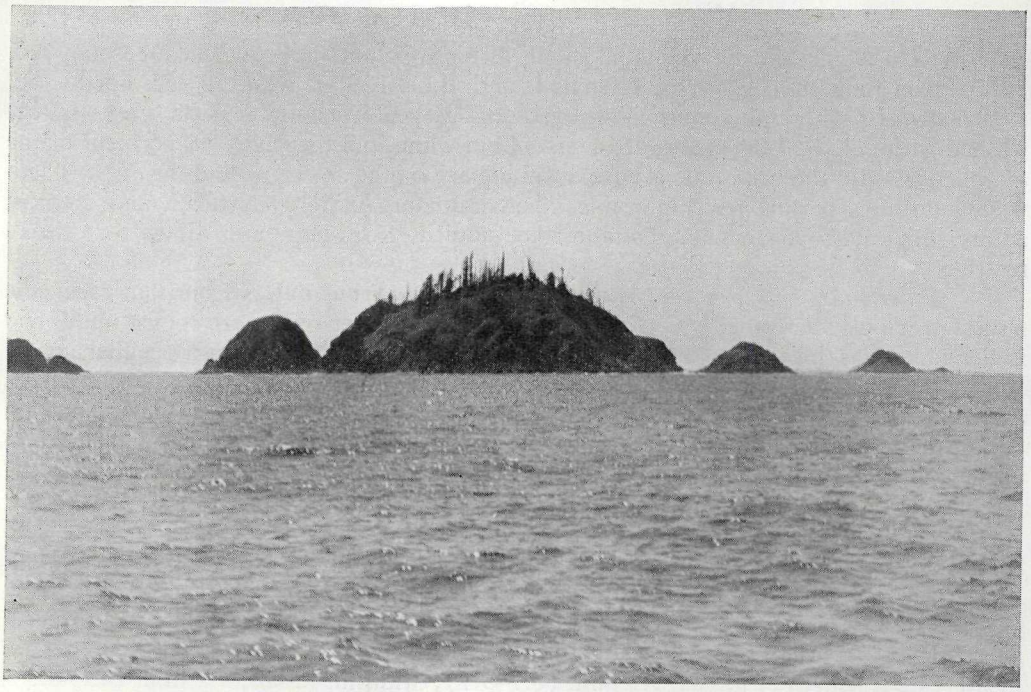
Peromyscus

In analysing the characteristics of the *Peromyscus* populations on these islands, three external measurements and twelve cranial dimensions have been used. Each has been subject to the usual statistical treatment leading to the comparison of means by the "student" *t* test at the .01 level of probability. In addition to comparison of these island populations inter se (Table 1), they have each been compared at the .01 level with populations of *P. maniculatus* from Port Hardy and Cape Scott, the nearest adjacent point on Vancouver Island; with a series from Neckis River on the mainland, representing *P.m. macrorhinus;* and with topotypes of *Peromyscus sitkensis prevostensis* from the Queen Charlotte Islands. The results of these comparisons are shown in Table 2.

It will be apparent from these comparisons that we are dealing with populations differing widely from those already described. For instance, the least differentiated population (Lanz Island) is significantly different from *P.m. interdictus* on adjacent Vancouver Island in eleven of the sixteen characteristics examined, from *macrorhinus* in seven of the sixteen, and from *sitkensis* in nine of them.

Comparing the populations on the five islands—Triangle, Sartine, Beresford, Lanz, and Cox—between themselves, the mice of Lanz and Cox are found to differ significantly in only five quantitative characteristics of fifteen treated. In colour they are indistinguishable, and it seems best to regard them as but slightly differentiated varieties of a single race. The other islands support populations differing greatly not only in the number of variates involved in differences, but in the degree of these differences. It is therefore

* Named after Dr. I. McT. Cowan, head of the Department of Zoology, University of British Columbia, in recognition of his outstanding contributions to the scientific knowledge of wildlife in British Columbia.



(Photo by G. C. Carl.)

Fig. 3. Beresford Island and associated rocks.

(Air photo by Royal Canadian Air Force.)

Fig. 4. Triangle Island from the air.

concluded that Triangle, Sartine, and Beresford are each inhabited by distinctive subspecies of *Peromyscus* while the two closely approximated islands adjacent to Vancouver Island (Cox and Lanz) support another.

It is of first importance to decide whether these insular populations represent the species *maniculatus* or *sitkensis*. As has been explained above, it is most difficult to decide on morphological grounds. For instance it will be seen from Table 2 that the new subspecies differ in their general dimensions of body and skull less from *sitkensis* than they do from the other races of *maniculatus* used in comparison, except in the case of Lanz and Triangle with Neckis River, which differ in about the same number of criteria. However, Dr. Cowan points out that the differences between the new forms and *P. sitkensis prevostensis* involve several changes in cranial proportion not indicated in comparison with *P. maniculatus,* which suggests the operation of different relative growth forces. For example, the new forms are larger than *P.m. interdictus* in all but one of the characteristics in which they differ, and from *P.m. macrorhinus* in all but least interorbital width in each instance and nasal length (Beresford), length of palatal slits (Beresford), and least width of the maxillary plate of zygoma.

On the other hand, in comparison with *sitkensis* the new populations are larger in some features and smaller in others.

It is therefore suggested that the new races seem morphologically more closely related to *maniculatus* than to *sitkensis*. Furthermore, the geographical proximity to the range of *maniculatus,* the lack of possibility of a relic fauna surviving, along with the occurrence on the island of a race of *Microtus townsendi*—a species of Vancouver Island and the Puget Sound lowlands—lend emphasis to the conclusion that the *Peromyscus* fauna of these islands is southern in affinity, and thus *maniculatus*. The new subspecies are here described and named:—

Peromyscus maniculatus triangularis ssp. nov.

Type.—Adult female, skin and skull, British Columbia Provincial Museum No. 5454, taken June 29th, 1949, on Triangle Island, B.C.

Diagnosis.—A very large *Peromyscus,* resembling *P.m. pluvialis* in colour, with back and sides dull brownish-buff, the general hue cold, lacking the warmer tones of *sitkensis*. Under-parts grey, whitish in inguinal region. Tail brown above, grey beneath. A distinctive feature is a white blaze present on the forehead of all the young individuals taken and in about 80 per cent of the series of sixteen adults.

Measurements.—No significant size differences between the sexes. Total length, 231 mm. (215–239); tail, 121 mm. (111–125); hind foot, 28 mm. (27–29); for cranial measurements *see* Table 3.

Comparisons.—Does not differ in external measurements from the race on Sartine Island but is significantly smaller than it in basilar length, greatest cranial length, zygomatic width, palatal length, diastma, maxillary tooth row, and in post-palatal length. At the same time *triangularis* is larger than the Sartine race in interorbital width, nasal length (.05 level), and maxillary plate of the zygoma. The differences between *triangularis* and the other races are more extensive and can be read from Table 1.

Distribution.—Confined to Triangle Island, B.C.

Peromyscus maniculatus sartinensis ssp. nov.

Type.—Adult male, skin and skull, British Columbia Provincial Museum No. 5632, taken June 22nd, 1950, on Sartine Island, B.C.

Diagnosis.—A very large *Peromyscus* slightly more reddish in dorsal colour than *triangularis* and somewhat nearer white beneath. No white blaze on forehead. Skull larger than any other *Peromyscus,* save only geographically remote species *californicus.*

(Photo by G. A. Hardy.)

Fig. 5. Precipitous slopes predominating all approaches on Triangle Island.

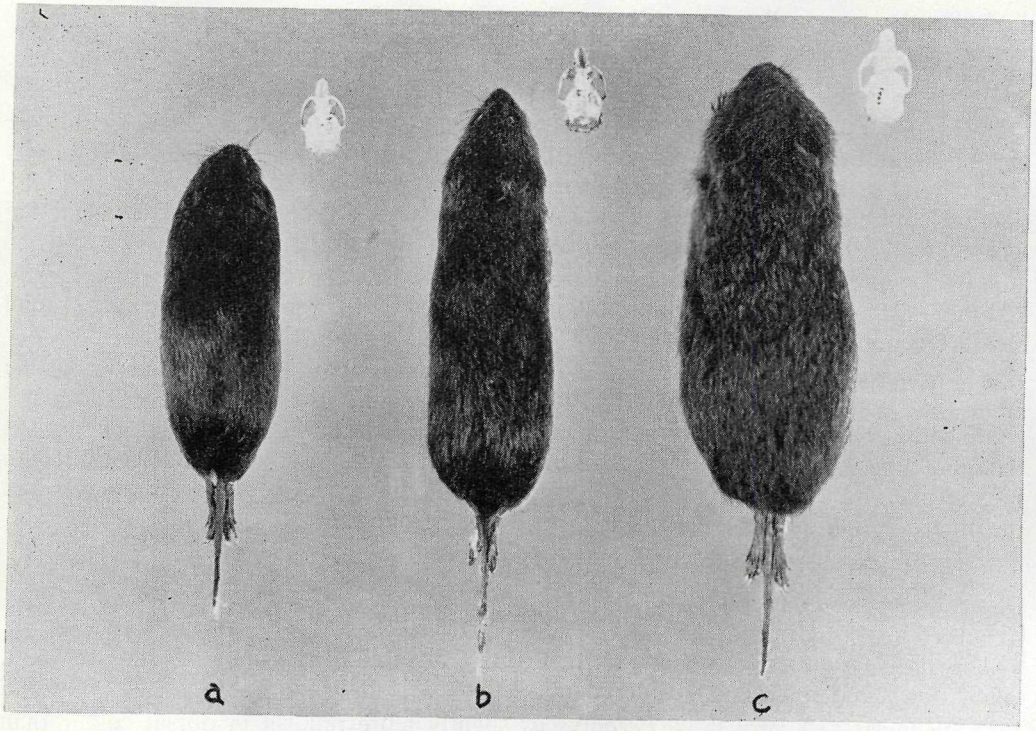


Fig. 6. Field-mice (*Microtus townsendi*): (*a*) *M.t. tetramerus* (Rhoads) from southern end of Vancouver Island, (*b*) *M.t. laingi* Anderson from north end of Vancouver Island, (*c*) *M.t. cowani* from Triangle Island.

Measurements.—External measurements of fourteen adults are: Total length, 236 mm. (225–250); tail, 118 mm. (112–125); hind foot, 28 mm. (27–29); cranial measurements are given in Table 3.

Comparisons.—Distinguishable from all other races but *triangularis* in its large size, and from that race in the cranial features described above. Externally the brighter colour and absence of white blaze separates this race from *triangularis*. Quantitative comparison with other races is made in Tables 1 and 2.

Peromyscus maniculatus beresfordi ssp. nov.

Type.—Adult male, skin and skull, British Columbia Provincial Museum No. 5575, taken June 21st, 1950, on Beresford Island, B.C.

Diagnosis.—A large *Peromyscus* but smaller than *triangularis* and *sartinensis*. Dorsal colour brighter and more reddish than either of the two above-described races. Dorsal stripe prominent, broad and dark. Under-parts white. Upper tail dark brown, under tail white. Interparietal broad.

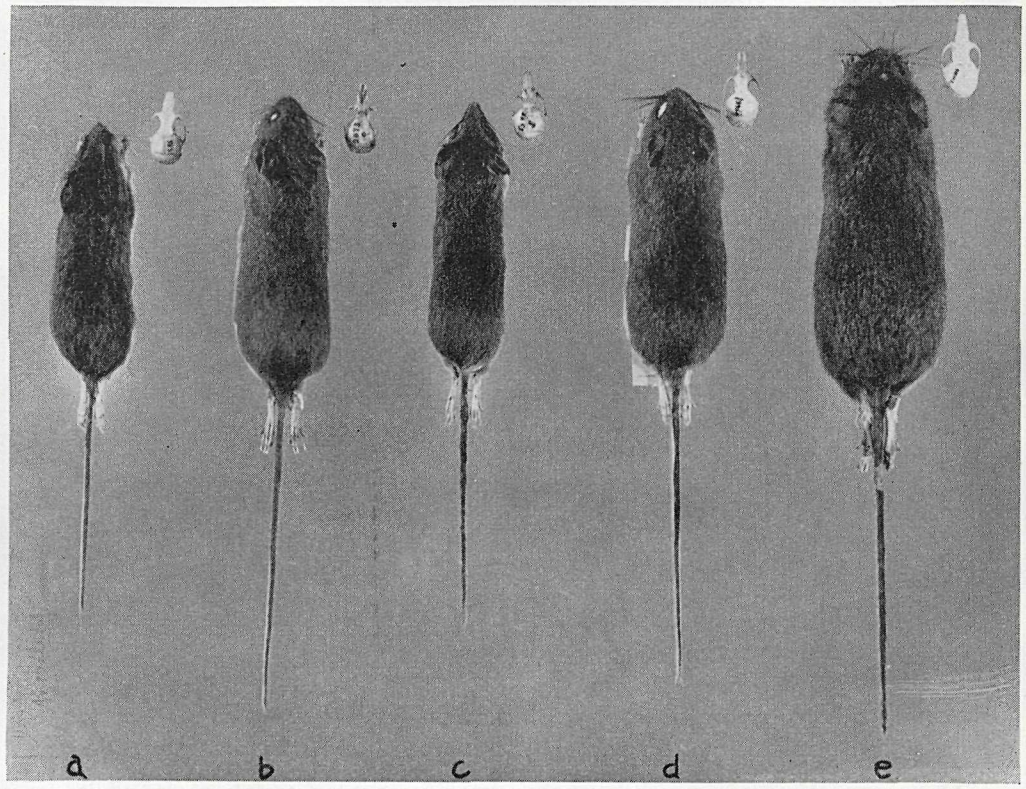


Fig. 7. White-footed mice (*Peromyscus*): (*a*) *P. maniculatus austerus* (Baird) from the Lower Mainland, (*b*) *P.m. macrorhinus* (Rhoads) from Northern Mainland, (*c*) *P.m. angustus* Hall from coastal Vancouver Island, (*d*) *P.m. interdictus* Anderson from interior Vancouver Island, (*e*) *P.m. triangularis* from Triangle Island.

Measurements.—Twelve adults of both sexes measure: Total length, 225 mm. (223–237); tail length, 116 mm. (112–122); hind foot, 26 mm. (25–27).

Comparisons.—The dark dorsal stripe and dark upper surface of tail are uniformly distinctive from *triangularis* and *sartinensis*. In external dimensions it is smaller than the two above named and yet larger than the Lanz-Cox Island population. It differs further

from this population in the darker dorsal stripe and more reddish colour of the sides. The details of cranial comparisons are given in Tables 1 and 2.

Distribution.—Confined to Beresford Island, B.C.

*Peromyscus maniculatus carli** ssp. nov.

Type.—Adult female, skin and skull, British Columbia Provincial Museum No. 5608, taken June 21st, 1950, on Cox Island, B.C.

Diagnosis.—External dimensions like that of *interdictus* from the northern end of Vancouver Island; smaller than *macrorhinus*. Smaller in external dimensions than the other subspecies on the Scott Islands. Colour of sides duller and less reddish than *beresfordi*. Dorsal stripe apparent but blending at the edges into general colour of back. Skull long and relatively narrow, palatal slits relatively large.

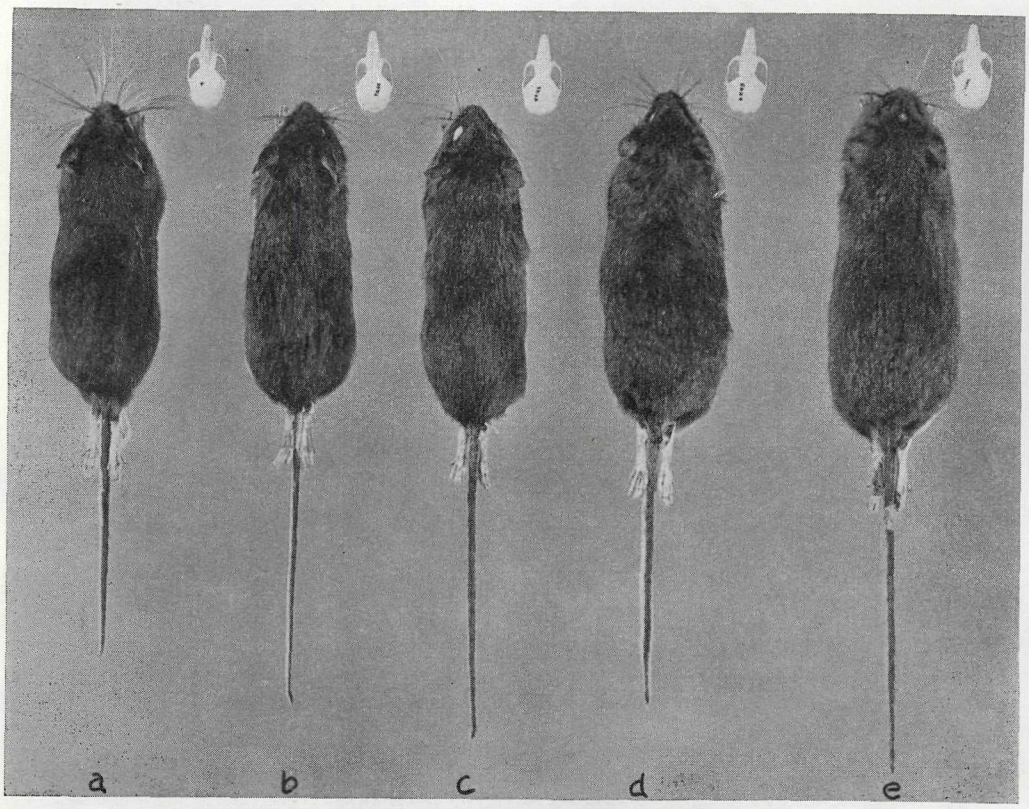


Fig. 8. White-footed mice (*Peromyscus*): (*a*) and (*b*) *P. maniculatus carli* from Cox and Lanz Islands respectively, (*c*) *P.m. beresfordi* from Beresford Island, (*d*) *P.m. sartinensis* from Sartine Island, (*e*) *P.m. triangularis* from Triangle Island.

Measurements.—Average and extreme measurements of twenty-seven adults from Lanz Island are: Total length, 209 mm. (189–223); tail, 105 mm. (94–113); hind foot, 26 mm. (23–27).

Comparisons.—Smaller than the other races on the Scott Island group but with a rostrum longer than *beresfordi,* the race nearest in size, while the other cranial features are mainly smaller. Quite similar in general features to some populations of *macrorhinus* but smaller in total length and tail measurements and having hind foot longer and skull narrower. Quantitative comparisons with other races are given in Tables 1 and 2.

* Named after Dr. G. Clifford Carl, Director of the Provincial Museum of British Columbia, leader of the 1949–50 expeditions to the Scott Islands, in recognition of his outstanding contributions in the field of wildlife education.

Distribution.—Found on Cox and Lanz Islands of the Scott Islands group, British Columbia.

ACKNOWLEDGMENTS

The author gratefully acknowledges the co-operation and assistance of the following: Miss Y. Henrion, for statistical treatment of the raw data; Dr. I. McT. Cowan for his encouragement and assistance in analysing the data and in preparing the manuscript in reference to *Peromyscus;* Dr. G. Clifford Carl, Mr. George A. Hardy, and Mr. Frank L. Beebe, for assistance in preparation of specimens; and Miss Betty Newton, for assistance in preparation of the tables for publication. In addition, the author is deeply grateful to Captains Redford, Ernshaw, and Gay and crews of the Federal Fisheries patrol vessels who so ably carried out the difficult landings on these relatively inaccessible islands.

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Table 1.—Values of " t " in Comparison of Scott Island Populations of Peromyscus

(n.s. indicates no significance at the .01 level of probability.)

Populations Compared	Variates															
	Total Length	Tail Length	Hind Foot	Greatest Length of Cranium	Basilar Length of Hensel	Zygomatic Width	Least Interorbital Width	Inter-parietal	Nasal Length	Palatal Length	Palatal Slits	Diastema	Maxillary Tooth Row	Post-palatal Length	Least Width of Max. Plate of Zygoma	Degree of Freedom
Sartine-Lanz	10.24	8.1	10.40	6.27	8.59	5.65	—6.9	n.s.	6.19	6.67	3.81	11.8	5.00	9.71	n.s.	39
Triangle-Lanz	10.10	10.5	8.08	4.85	4.89	2.54	2.56	n.s.	8.70	n.s.	2.67	3.57	n.s.	5.94	6.25	41
Sartine-Cox	7.4	4.1	8.10	6.70	9.64	7.37	—2.90	4.24	3.70	9.52	2.65	15.7	6.25	11.94	2.78	37
Beresford-Lanz	6.9	6.9	n.s.	n.s.	1.72	3.37	n.s.	6.29	—6.19	—1.94	—4.06	3.49	—4.76	4.72	—3.08	37
Sartine-Beresford	4.03	n.s.	10.80	9.8	22.8	n.s.	—5.26	—4.26	15.80	11.5	7.56	8.45	7.14	5.52	2.17	26
Triangle-Cox	6.8	6.2	6.31	4.56	5.19	3.06	5.77	3.41	5.93	n.s.	n.s.	5.06	n.s.	6.10	8.51	39
Cox-Lanz	4.3	4.4	n.s.	n.s.	n.s.	n.s.	—4.4	—3.95	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	—3.85	50
Beresford-Cox	3.7	2.5	n.s.	—2.05	n.s.	3.94	3.39	9.80	—6.57	—2.86	—5.14	5.41	—5.56	5.56	n.s.	35
Triangle-Beresford	2.9	3.4	6.2	8.87	4.00	n.s.	2.24	—5.83	15.70	3.82	6.67	n.s.	3.57	n.s.	6.15	26
Sartine-Triangle	n.s.	n.s.	n.s.	3.6	7.08	4.71	—7.6	n.s.	—2.65	6.11	n.s.	7.23	3.85	3.26	—4.48	28

Table 2.—Values of "t" in Comparisons of Scott Islands and Adjacent Populations of Peromyscus

(n.s. indicates no significance at the .01 level of probability.)

Populations Compared	Variates															
	Total Length	Tail Length	Hind Foot	Greatest Length of Cranium	Basilar Length of Hensel	Zygomatic Width	Least Interorbital Width	Inter-parietal	Nasal Length	Palatal Length	Palatal Slits	Diastema	Maxillary Tooth Row	Post-palatal Length	Least Width of Max. Plate of Zygoma	Degree of Freedom
Beresford-Port Hardy and Cape Scott	6.70	3.49	9.78	12.11	10.36	7.96	n.s.	9.09	n.s.	13.87	n.s.	12.95	4.52	8.95	n.s.	21
Sartine-Port Hardy and Cape Scott	9.65	4.21	15.96	19.83	31.18	11.78	−6.12	5.05	12.42	24.15	10.27	22.55	9.33	13.44	n.s.	23
Triangle-Port Hardy and Cape Scott	9.45	5.77	13.36	20.95	16.28	9.36	n.s.	4.79	13.39	14.68	10.90	12.08	8.51	9.07	5.28	25
Lanz-Port Hardy and Cape Scott	n.s.	n.s.	8.69	6.94	14.86	6.41	n.s.	5.21	7.50	10.35	21.72	10.37	10.44	4.32	n.s.	36
Neckis River-Port Hardy and Cape Scott	4.65	4.78	4.55	7.98	10.64	7.22	4.24	5.91	5.47	15.25	9.14	12.22	3.22	4.42	8.13	33
Kunghit Island, Q.C.I.-Port Hardy and Cape Scott	3.52	n.s.	6.03	13.86	5.59	9.16	6.11	4.45	5.41	n.s.	7.19	10.99	9.04	5.86	15.41	19
Beresford-Neckis River	3.10	n.s.	7.46	n.s.	17.95	5.53	−6.22	5.94	−3.97	2.95	−5.62	n.s.	n.s.	5.79	−9.40	35
Sartine-Neckis River	7.29	n.s.	16.23	10.47	31.67	12.32	−11.64	n.s.	7.53	18.63	2.98	11.64	3.12	11.02	−5.85	36
Triangle-Neckis River	6.53	n.s.	13.68	8.95	27.24	6.05	−5.30	n.s.	10.31	8.10	n.s.	n.s.	n.s.	6.99	n.s.	38
Lanz-Neckis River	−5.37	−9.47	6.92	n.s.	12.59	n.s.	−7.93	n.s.	n.s.	4.51	n.s.	n.s.	n.s.	n.s.	11.30	49
Kunghit Island, Q.C.I.-Neckis River	n.s.	−5.57	5.30	6.95	10.85	8.95	n.s.	n.s.	n.s.	n.s.	n.s.	4.35	5.97	3.62	9.31	32
Beresford-Kunghit Island, Q.C.I.	2.86	4.74	n.s.	−6.07	6.25	n.s.	−9.04	3.86	−5.06	n.s.	−5.29	n.s.	−7.42	n.s.	24.59	20
Sartine-Kunghit Island, Q.C.I.	6.20	5.56	6.79	n.s.	16.33	n.s.	−10.41	n.s.	4.04	n.s.	n.s.	4.25	−4.75	4.68	−13.15	22
Triangle-Kunghit Island, Q.C.I.	5.46	7.74	3.71	n.s.	11.63	−3.90	−8.18	n.s.	6.01	n.s.	n.s.	n.s.	−6.28	n.s.	−7.14	24
Lanz-Kunghit Island, Q.C.I.	−3.7	n.s.	n.s.	4.13	n.s.	−6.65	−9.80	n.s.	n.s.	n.s.	−4.12	−5.16	−8.66	−2.99	−23.55	35

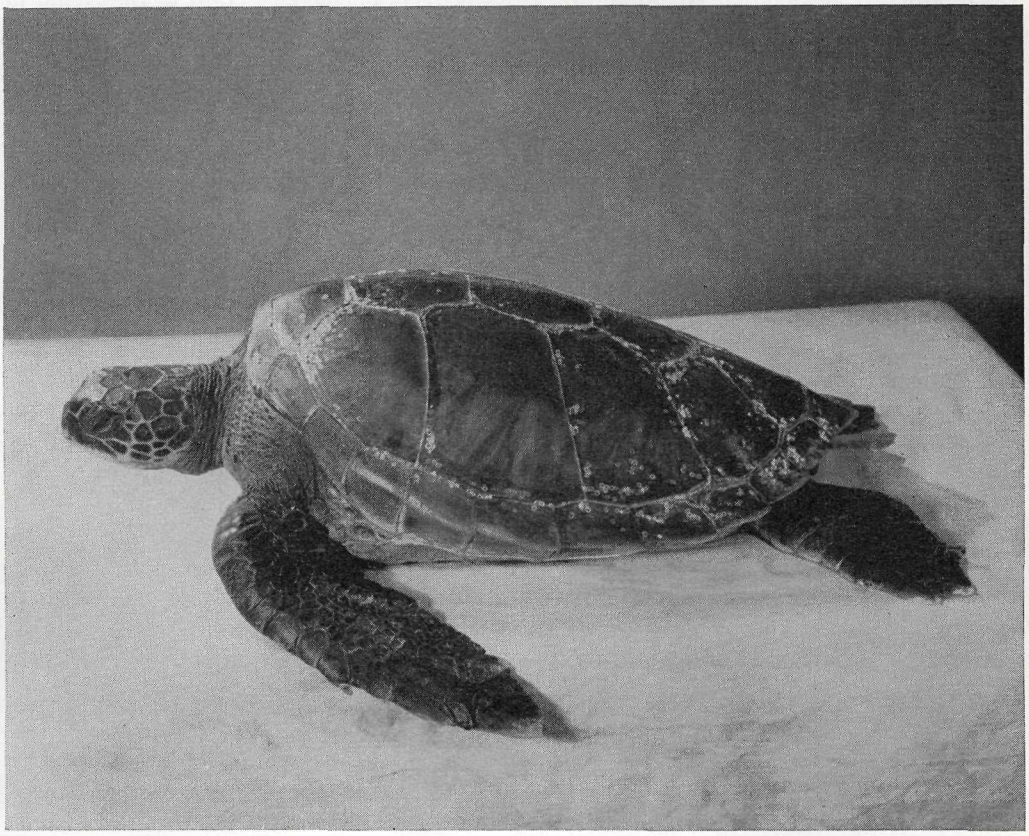
Table 3.—Means and Ranges of Skull Dimensions in Scott Island Peromyscus

Scott Island Subspecies	Skull Measurements (in Millimetres)											
	Greatest Length of Cranium	Basilar Length of Hensel	Zygomatic Width	Least Inter-orbital Width	Inter-parietal	Nasal Length	Palatal Length	Palatal Slits	Dias-tema	Maxil-lary Tooth Row	Post-palatal Length	Least Width of Max. Plate of Zygoma
Triangularis—												
Mean	29.7	24.7	14.7	4.0	3.2×8.7	12.9	12.7	6.3	8.5	4.0	10.6	2.5
Range	29.3–30.1	24.2–25.1	14.3–15.0	3.9–4.3	.....	12.5–14.0	12.1–13.5	6.0–6.5	8.1–8.8	4.0–4.1	10.2–11.0	2.3–2.8
Sartinensis—												
Mean	30.24	25.5	15.1	3.5	3.1×9.2	12.6	13.5	6.4	9.1	4.1	10.9	2.3
Range	29.5–30.8	25.1–26.0	14.9–15.5	3.1–3.9	.....	12.2–13.0	13.1–14.0	6.3–6.7	9.0–9.5	4.1–4.2	10.5–11.1	2.1–2.6
Beresfordi—												
Mean	28.6	24.2	14.9	3.9	3.7×9.4	11.2	12.2	5.7	8.5	3.9	10.5	2.1
Range	28.2–29.1	23.9–24.5	14.0–15.7	3.7–4.0	.....	11.0–11.5	11.9–12.7	5.3–6.3	8.2–8.9	3.8–4.0	10.2–10.7	2.0–2.2
Carli—												
Mean	28.6	23.8	14.4	3.9	3.2×8.6	11.9	12.5	6.0	8.2	4.0	10.0	2.2
Range	27.0–30.3	22.4–25.0	13.7–15.1	3.6–4.0	.....	11.1–12.9	11.1–13.2	5.4–6.6	7.5–8.5	3.9–4.0	9.3–10.5	2.0–2.3

THE GREEN TURTLE IN BRITISH COLUMBIA

By G. Clifford Carl, Provincial Museum, Victoria, B.C.

A small specimen of the green turtle, *Chelonia mydas* Linnæus, was donated to the Museum by Mr. W. Norman Burgess, of Port Alberni, B.C., in December, 1954. The turtle was found on the beach at Spring Cove, on the west side of the entrance to Ucluelet Inlet, by Mr. Tom Kimoto, of the fishing-vessel "Le Perouse," on December 6th, 1954. It appears to be the first record of this turtle for British Columbia or, for that matter, north of Southern California. Presumedly it can be assigned to the subspecies *C. mydas agassizi* Bocourt, the East Pacific green turtle.



(Photo B.C. Government Travel Bureau.)

Green turtle (*Chelonia mydas*) found at Spring Cove, near Ucluelet, Vancouver Island.

When the reptile was found by Mr. Kimoto, it was near the high-tide mark on a gravel beach and was covered with oil and slime from a near-by reduction plant. Apparently it was in a weakened condition because it died a week later at Port Alberni at the head of Alberni Canal, where it was being held in temporary confinement. It measured 18¾ inches in length of carapace and weighed 32 pounds. A number of small barnacles, *Balanus crenatus* Bruguière, the largest being 4 millimetres in diameter, were attached to the upper surface of the carapace.

The normal range of this sea-turtle is "Tropical Pacific coasts of the Americas, straying northward to the California coast" ("Check List of North American Amphibians and Reptiles," K. P. Schmidt, 1953). The northernmost previous record appears to

be "the bays of San Diego County" ("Reptiles of the Pacific World," Arthur Loveridge, 1945). The Atlantic counterpart of this species is occasionally carried northward in the Gulf Stream to Long Island and the shores of Massachusetts.

The green turtle sometimes attains a length of 4 feet and a weight of 500 pounds, but the average size of those finding their way to the food market is between 50 and 70 pounds. The flesh is highly esteemed as food; the fat is greenish in colour, which gives the turtle its common name.

Another marine turtle, the Pacific leather-back (*Dermochelys coriacea schlegeli* Garman) has been recorded previously from British Columbia (*see* Report of Provincial Museum for 1930) and is represented in the Museum collection by a carapace. Large turtles are sighted almost each summer off the west coast of Vancouver Island, and one was reported near Denman Island and off Cordova Bay on the east coast of the island in 1947 (*see* Victoria Naturalist, Vol. 4, No. 4, 1947, and B.C. Provincial Museum Handbook No. 3, 1951). Such turtles were formerly considered to be leather-backs, but since the green turtle has now been found in British Columbia waters, sight identifications will have to be made with caution.

We are indebted to both Mr. Kimoto and Mr. Burgess for turning the specimen over to the Provincial Museum, and to Mr. I. E. Cornwall, of Victoria, for the identification of the barnacles.

THE BIRDS OF THE CARIBOO PARKLANDS: A SUPPLEMENT

By J. A. Munro

A paper describing the bird life and ecology of the Cariboo Parklands Biotic Area, British Columbia (Munro, Can. Journ. Research D, 23:15–103, June, 1945) lists a total of 212 species and subspecies of birds for that area. The present contribution, which records several forms not hitherto reported, more precise information concerning some of the less common forms, and additional life-history data, is a supplement to the earlier paper.

Trumpeter Swan. *Olor buccinator* (Richardson).

Two immature birds, considered to be young of the previous year, were seen on Rush Lake, May 6th and 20th, 1946. These birds when first seen were feeding in water about 2 feet deep, "tipping up" in the manner of pond ducks. They were relatively fearless, as so often is the case with trumpeter swans, and when disturbed by my continued approach paddled slowly toward the opposite shore.

White-fronted Goose. *Anser albifrons* (Scopoli).

A flock of seven was seen at close range, May 19th, 1946, on a small plateau lake west of Alkali Lake. This represents the second record for the region.

Lesser Snow Goose. *Chen hyperborea* (Pallas).

The following are additional sight records for the Lac la Hache Valley in the year 1946. On April 26th a flock of twenty alighted on a pasture near the 122 Mile Ranch buildings and remained in the vicinity for two days. Grain was put out for them and, perhaps because of this, they became used to the presence of people and allowed an approach to within 30 yards or so. Sometimes they swam in 122 Mile Creek in company with tame white ducks. During this two-day period approximately 100 snow geese in small flocks flew north over the ranch buildings. The above information was supplied by the owner of the ranch, Mr. F. G. Forbes.

At 105 Mile Lake, May 4th, a single immature snow goose accompanied a flock of sixteen cackling geese. Four days later at the same place, one, presumably the same bird, was observed feeding over a grassy slope with thirteen Canada geese and one cackling goose.

On May 13th a flock of fifteen alighted on an open pasture at 116 Mile, and as I walked toward them and reached a point where I was about 60 yards distant they stopped grazing. When I was 10 yards closer the flock rose, circled the field, and alighted again. Upon approaching them twenty minutes later they flew to the near-by Lac la Hache and alighted there. Later it was learned that the flock had been using this pasture for two weeks. Three immature birds that reportedly had frequented one of the small lakes on the plateau west of Alkali Lake for approximately two weeks were seen by me on May 19th.

Gadwall. *Anas strepera* Linnæus.

On May 19th, 1946, close observations were made of at least two pairs in a round-stem bulrush marsh bordering a stream that drains Alkali Lake to the south. Once two males and a female were seen in display flight. This and more recent observations in the Williams Lake region indicate a local increase of the species. There are no records for British Columbia north of the Cariboo Parklands.

Barrow Golden-eye. *Bucephala islandica* (Gmelin).

On a small lake near Alexis Creek, May 27th, 1946, a pair of Barrow golden-eye, drifting about on still water close to shore and about 100 feet from where I stood above them on a hillside, were studied carefully through 7x35 binoculars. Under these exceptionally favourable conditions of observation was seen an exhibition of the courtship ritual

carried to the climax which took place in this manner: The female lay motionless, neck outstretched and body submerged to a depth which showed only the top of the head and line of the back above the surface. The male swam about within a few feet, stretching his neck and bowing in characteristic fashion for approximately ninety seconds. He then approached the female from behind, mounted, and grasped her crest feathers in his bill. The female then submerged completely. Coition completed, a matter of seconds, the female appeared to slide out from under the male. She immediately stood upright and flapped her wings several times.

RED-BREASTED MERGANSER. *Mergus serrator* Linnæus.

At Lac la Hache, May 8th, 1946, two adult males and one female together were examined through binoculars as they swam close to shore. This represents the second record of the species in the Cariboo Parklands.

COOPER HAWK. *Accipiter cooperi* (Bonaparte).

In June, 1947, a pair of Cooper hawks, the male in fully adult plumage, the female in the plumage of the first year, nested on a Douglas-fir ridge at Lac la Hache near 120 Mile. The presence of the pair was first detected through the sudden appearance of the male coming toward me in response to a succession of "squeaks." It was not demonstrative, as nesting Cooper hawks usually are, and only once gave the familiar cackle. The location of the nest was about 10 feet from the top of a 60-foot fir. The female was on it and invisible from below when I first visited the site on June 5th. Not until the tree was pounded vigorously several times did she leave.

SPARROW HAWK. *Falco sparverius* Linnæus.

An observation of the behaviour of a pair of sparrow hawks in the act of copulation is quoted from my field note-book: "Lac la Hache, May 22, 1946. A female sparrow hawk stood on the tip of an upright branch near the top of a tall, dead Douglas fir. From the distant woods, about one-half mile away across an open prairie, a male flew directly to the tree, hovered for a few moments over the female then, with no further preliminaries, descended and coition took place. The male then flew to another upright branch and remained there."

BLUE GROUSE. *Dendragapus obscurus* (Say).

Specimens from Clinton and Hanceville were incorrectly referred to in my earlier paper as *D.o. richardsonii* Douglas. The current identification is *D.o. pallidus* Swarth. The Hanceville specimens are extreme examples of the pale coloration characteristic of this race.

EUROPEAN PARTRIDGE. *Perdix perdix* (Linnæus).

During the winter of 1947–48 a flock of ten, later reduced to eight, was seen frequently by Mr. F. G. Forbes and others along the shore of Lac la Hache near 122 Mile. None has been reported subsequently.

LONG-BILLED CURLEW. *Numenius americanus* Bechstein.

An adult female, probably on migration, was collected at 122 Mile, Lac la Hache, May 17th, 1950.

DOWITCHER. *Limnodromus griseus* (Gmelin).

One was seen in company with a single greater yellow-legs on the edge of a flood-pond at 105 Mile, May 3rd, 1946. This is the only spring record known to me.

HERRING GULL. *Larus argentatus* Brunnich.

It was stated in my earlier paper that the only known breeding colony of herring gulls in the Cariboo Parklands is at Bridge Lake. Since that was written a pair nested at 108 Mile Lake in two successive years—1947 and 1948. This lake had been visited regularly in previous years and it was certain that no herring gulls had nested there.

On June 27th, 1947, when two of us paddled around this lake, a pair of herring gulls was seen in flight and alighting on the water after short intervals in the air. As we approached the smallest of three islets—one of boulders and lacking trees or brush—the gulls became excited, flying overhead and calling raucously. When one of us landed, the smaller gull, undoubtedly the female, swooped down repeatedly, thus indicating the position of the nest in a dense growth of silver-weed (*Potentilla anserina*). The nest was lined with dry grass-roots, silver-weed stems, aspen leaves, and several Canada goose feathers, and contained a single egg of the dark olive-brown type. This nesting was not successful. On June 12th, when the nest was next visited, it was found that the egg had been punctured on both sides and the contents eaten, perhaps by a crow. The gulls were not on the lake.

The following year a pair nested on the same island and on almost precisely the same site among thick silver-weed. On June 23rd the nest contained the fragments of two eggs. One, which was broken in half and showed a thick integument attached to the inner side of the shell, evidently had hatched. The second, also broken, appeared to have been infertile and the contents had drained out, or had been eaten. Beside the nest was a small trampled place in the vegetation, evidently the resting-place of the male. While the nest was being examined, the gulls defended the nest-site in the manner common to the species; that is, they circled overhead making a continual outcry and swooping toward me. Evidently the single young bird was concealed somewhere on the island, but we did not succeed in finding it.

MOURNING DOVE. *Zenaidura macroura* (Linnæus).

The species was recorded on the basis of two occurrences, namely, at Clinton and at Buffalo Lake. More recently Mr. Mario Reidemann has reported that at least one pair of mourning doves nested at Alkali Lake in several successive years.

YELLOW-BELLIED SAPSUCKER. *Sphyrapicus varius* (Linnæus).

The subspecies *Sphyrapicus varius nuchalis* Baird reaches the northern periphery of its nesting range in the Cariboo Parklands Biotic Area and, like other migrant bird species near the limits of an extended range, is subject to wide fluctuation in numbers. Thus the period 1936–45 was one of relative abundance—at no time is the species so common as it is in the Dry Forest Biotic Area to the south. In 1946 I was unable to locate a single individual in the Lac la Hache Valley, whereas the ensuing four-year period, 1947 to 1950, was one of expanding population.

It has been observed that a certain nesting-tree, usually as aspen, may attract a breeding pair for several successive years. Thus at 103 Mile Lake an aspen, measuring 10 inches in diameter at the base, was occupied in 1947, 1948, 1949, and had also been used once earlier. The 1947 nest entrance was eight feet above ground. Three feet above and a little to the left was a second nest entrance, occupied in an earlier year, as has been noted. On June 14th young could be heard in the nest; the female flew out when the tree was tapped and returned soon after to feed the young at the nest entrance. The male then appeared, and one or other of the pair flew to the nest with food every five minutes, approximately, during the half-hour I remained there. Soon the first uneasiness showed at my presence disappeared; several times both parents alighted on the nesting-tree while I stood about 5 feet from it taking photographs.

On June 22nd, 1948, when next I visited the nesting-tree, it was noted that a new nest had been excavated 18 inches above and a few inches to the right of the 1947 nest. The nest contained young that could plainly be heard, but none appeared at the entrance. The 1947 nest was occupied by a pair of tree swallows.

In 1949 a fourth nest was excavated, with its entrance 6 inches above the 1947 nest entrance; that is, between the nest of 1947 and that of 1948. On May 13th a female flew out when the tree was tapped. No further observations were made.

HAIRY WOODPECKER. *Dendrocopos villosus* (Linnæus).

A typical example of the race, *D.v. septentrionalis (Nuttall)*, undoubtedly a migrant, was taken at 120 Mile, Lac la Hache, October 8th, 1946. This is the only known record of the subspecies in the Cariboo Parklands. The resident subspecies is *D.v. monticola* Anthony.

ARCTIC THREE-TOED WOODPECKER. *Picoides arcticus* (Swainson).

At Lac la Hache, October 3rd, 1952, two were seen in a group of Douglas fir near the lake at 120 Mile, and one of them, a male, was collected. This is the second specimen record for the region.

AMERICAN THREE-TOED WOODPECKER. *Picoides tridactylus* (Linnæus).

A male and female were collected near 103 Mile Lake, May 5th, 1947. These are typical examples of the subspecies *P.t. fasciatus* Baird, and represent the only specimens known to have been taken in the Cariboo Parklands to that date.

WESTERN KINGBIRD. *Tyrannus verticalis* Say.

One pair was recorded on the Alkali Lake Ranch, May 18th, 1946; these reportedly arrived on April 25th.

HORNED LARK. *Eremophila alpestris* Brehm.

The subspecies *E.a. arcticola* Oberholser was noted in my earlier paper as common in autumn but recorded only once in spring. Additional spring records are: Elliott Lake, May 5th, 1947—100±, one specimen taken; Lac la Hache at 122 Mile, May 17th, 1950—3, sight record.

RAVEN. *Corvus corax* Linnæus.

In late October, 1948, Mr. Ian McMillan, of Shandon, Calif., saw ravens on several occasions at a place about 13 miles north-east of Clinton. He reported (personal letter) that " ravens were common where we killed our moose. What was probably the same group of six to ten was seen at various times and especially on our return to the moose carcass. On one occasion, when we returned to pack in a moose, the liver and heart which had been left on a log were gone and a group of about six ravens was flushed from the spot. The guides knew of no such occurrences in the past and were surprised at the presence of so many of these birds." This would seem to be the first reliable record of ravens in the Cariboo Parklands.

Other subsequent records concern a flock of six seen in January, 1950, by Mr. Tom Barton on the winter hay-meadows of the 122 Mile Ranch, and one heard by me at Lac la Hache, September 10th, 1951.

BLACK-CAPPED CHICKADEE. *Parus atricapillus* Linnæus.

Until recently the black-capped chickadee, from early April to late October, was one of the commonest members of the bird population in a habitat of mixed lodgepole pine and aspen. Deciduous woodlands along lake-shores was another favoured habitat. It was an ordinary event in autumn to call up a score or more at one place, by means of the pygmy owl call, and to equal or exceed that count at many other places during a morning's walk.

For a long period (1931–49) the numerical status of the species appeared stable enough so that through the years one neither remarked a scarcity nor an excessive abundance. The bird was ubiquitous and taken for granted. That was so in the summer of 1949. In the spring of 1950, however, some accustomed element in the woods was lacking—something that vaguely troubled me for a time until I realized that the black-capped chickadee was missing. The familiar voice no longer was heard, and none of the customary lures attracted a single individual. In the following year some recovery took place, but the species continued to be scarce, neither had it built up to normal proportions by September, 1952.

Possibly this unusual reduction in numbers may be attributed to the low temperature, unparalleled in many previous years, which persisted for several weeks in the winter of 1949–50. For example, at Lac la Hache a January reading of minus 65° Fahrenheit was recorded, and temperatures farther south in British Columbia also were unusually low. It has been observed that the winter status of the species in the Cariboo Parklands is not known; however, this is not important to the argument because whether the Cariboo Parklands population wintered there or many miles farther south, they still would have been subjected to extremely low temperatures.

MOUNTAIN CHICKADEE. *Parus gambeli* Ridgway.

What has been said concerning the decline in numbers of black-capped chickadees, following the abnormally cold winter of 1949–50, applies equally to this species. Observations at Lac la Hache in September, 1952, indicated that the population was recovering but had not yet reached normal proportions.

BROWN-HEADED CHICKADEE. *Parus hudsonicus* Forster.

At Lac la Hache in lodgepole-pine habitat on October 4th, 1952, and again on the following day, a flock of six to eight of this species, in company with black-capped chickadees, came under observation. One specimen taken on each of these days represent the first records for the Cariboo Parklands Biotic Area. Both are males, one apparently adult; the other, with skull granulation approximately 50 per cent, is a bird of the year. The pileum of the younger bird closely matches the Chætura Drab of Ridgway, while that of the adult is slightly darker; otherwise the plumages are nearly identical. Except for the darker shade of the pileum, the Lac la Hache specimens resemble three specimens in my collection from Creston, British Columbia, identified as *P.h. cascadensis* Miller. Compared with atypical specimens of *P.h. columbianus* Rhoads from Monashee Pass, British Columbia, the Lac la Hache specimens are more richly brown on flanks and darker on the pileum and on the back.

BROWN CREEPER. *Certhia familiaris* Linnæus.

Known to be rare in the region. A specimen taken at Lac la Hache, October 16th, 1946, and reported as *C.f. montana* Ridgway (Munro and Cowan, "A Review of the Bird Fauna of British Columbia," B.C. Prov. Mus. Spec. Publ. No. 2, 1947), proves on further study to be an example of the eastern race, *C.f. americana* Bonaparte. There are two additional sight records of single birds at Lac la Hache, namely, October 10th, 1946, and October 3rd, 1952.

CATBIRD *Dumetella carolinensis* Linnæus.

One was seen in the brush along the shore of Lac la Hache numerous times in the summer of 1946. On June 20th, 1947, in the thickets along the San Jose River where it enters Williams Lake, one was seen and another heard singing. In 1948 the population at the same place was estimated to be six pairs. The additional records seem to indicate a definite increase of numbers in a species formerly considered scarce.

AMERICAN ROBIN. *Turdus migratorius* Linnæus.

An adult male taken on migration at Lac la Hache, October 12th, 1946, is a typical example of the subspecies *T.m. migratorius* Linnæus that occupies a wide area in British Columbia north of the Cariboo Parklands. It is one of a number of forms which apparently have colonized the northern regions by invasion from the east. The subspecies nesting in the Cariboo Parklands is nearest to *T.m. propinquus* Ridgway.

VARIED THRUSH. *Ixoreus nævius* (Gmelin).

Recorded previously on the basis of sight records only. On May 6th, 1947, an adult male was collected near Murphy Lake, 140 Mile. That the species nests in the region was indicated by the actions of a pair at McArthur Slough, 120 Mile, June 3rd, 1947, that became much disturbed at my presence and were believed to be defending

young in the nest. This seemed to be substantiated when a week later I collected a juvenile male in the first plumage near the same place.

VEERY. *Hylocichla fuscescens* (Stephens).

On June 20th, 1947, one was seen, and at least two others were heard singing, in an area along the San Jose River which also was occupied by a catbird population, as has been noted. As with the catbird, so with the veery; both these characteristic Dry Forest Biotic Area species have recently become more plentiful. The particular section in which they nest is separated from their centre of abundance by many miles of unsuitable teritory not occupied by them. It seems likely that both reach this remote nesting-ground by way of the Fraser River route which, because of its relatively low elevation and affinity with the Dry Forest Biotic Area, provides the only attractive means of entry.

YELLOW-HEADED BLACKBIRD. *Xanthocephalus xanthocephalus* (Bonaparte).

Annual counts of the yellow-headed blackbird indicate that the population is far from being stable. The year 1942, one of relative abundance, was followed by a year of scarcity, and in general only the most acceptable marshes were occupied by nesting colonies. The 1947 population was notably large, and invasions of marginal nesting-grounds, not usually occupied, were observed. Nesting colonies in the preferred marshes showed increases over those of 1942. Thus at Watson Lake the population of adults on June 13th, 1942, was twenty-six, while on June 19th, 1947, totals of thirty-seven adult males and twenty adult females were counted. Another example is 103 Mile Lake, where in 1942 and 1947 the populations were twenty-four adults and approximately forty adults respectively. While the 1947 population would seem to have reached a peak, not all nesting was successful. Thus on a marsh along the San Jose River at 130 Mile there were, in addition to twelve breeding pairs established on territories, thirty additional females associated in one flock that preserved its unity both during feeding periods and when settled in the marsh vegetation. Hostility toward these surplus females was exhibited by the nesting males. During the height of the nesting season it was common to see vagrant flocks, composed chiefly of males, in attendance on cattle and acting in the same manner as cowbirds.

The following year, 1948, the population was again at a low ebb, with nesting colonies even smaller than in 1943. For example, the 103 Mile Lake colony was reduced to five pairs, and other colonies in the Lac la Hache Valley were similarly reduced.

The status of the species west of the Fraser River in the Chilcotin section of the Cariboo Parklands remains in doubt. On May 27th, 1947, two pairs were recorded at Canyon Lake near the village of Alexis Creek; one other, a female, was seen the same day close to the village. This bird accompanied a small group of Brewer blackbirds of both sexes, and several times she displayed before one or another of the males.

COWBIRD. *Molothrus ater* Boddært.

Relatively common in 1947 along the Cariboo Highway. Two males and two females were seen accompanying cattle at 134 Mile on June 19th, and on June 20th a total of twelve was counted between 122 Mile and Williams Lake.

ROSY FINCH. *Leucosticte tephrocotis* (Swainson).

The occurrence of the species in spring was recorded April 27th, 1945, when a flock of five was observed walking along the edge of the ice on Lac la Hache, which, on that date, extended about 50 feet out from shore. On the two days following, a flock of about 50 was noted at the same place, apparently attracted by the numerous midges that swarmed there.

AMERICAN GOLDFINCH. *Spinus tristis* (Linnæus).

Two were seen on the Alkali Lake Ranch, May 18th, 1946, where it is reported to be a regular summer visitant. On geographical probabilities the subspecies is *S.t. pallidus* Mearns.

WHITE-WINGED CROSSBILL. *Loxia leucoptera* Gmelin.

Recorded again, and specimens taken, at Horse Lake, September 9th, 1951. The species was noted that year as common elsewhere in central British Columbia.

LARK SPARROW. *Chondestes grammacus* (Say).

An adult male with fully developed testes was collected at 130 Mile, May 11th, 1946. The subspecies is *C.g. strigatus* Swainson. This is the first record of the species for the Cariboo Parklands.

GOLDEN-CROWNED SPARROW. *Zonotrichia coronata* (Pallas).

An adult male collected at 122 Mile, Lac la Hache, May 22nd, 1950, represents the first record for the species in the Cariboo Parklands.

PUBLICATIONS OF THE PROVINCIAL MUSEUM

The following is a list of publications which have been issued by the Provincial Museum or which have been prepared by members of the staff for publication elsewhere. Copies of some of these publications are still available; these are marked in each case by a sales price, and copies may be obtained by application to the office of the Provincial Museum, Victoria, B.C. Orders by residents of the Province of British Columbia should include the 5-per-cent sales tax.

ANNUAL REPORTS

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