

PROVINCE OF BRITISH COLUMBIA

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REPORT

OF THE

PROVINCIAL MUSEUM

OF

NATURAL HISTORY

AND

ANTHROPOLOGY

FOR THE YEAR 1944



PRINTED BY  
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

VICTORIA, B.C. :  
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1945.

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REPORT

OF THE

PROVINCIAL MUSEUM

NATURAL HISTORY

ANTHROPOLOGY

FOR THE YEAR 1911



PRINTED BY THE GOVERNMENT OF BRITISH COLUMBIA

EDMONTON, CANADA  
1912

To His Honour W. C. WOODWARD,  
*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 1944.

H. G. T. PERRY,  
*Minister of Education.*

*Office of the Minister of Education,  
Victoria, B.C.*

PROVINCIAL MUSEUM OF NATURAL HISTORY  
AND ANTHROPOLOGY,

VICTORIA, B.C., March 15, 1945.

*The Honourable H. G. T. Perry,  
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 year 1944.

I have the honour to be,

Sir,

Your obedient servant,

G. CLIFFORD CARL,  
*Director.*

## DEPARTMENT OF EDUCATION.

The Honourable H. G. T. PERRY, *Minister.*

Dr. S. J. WILLIS, *Superintendent.*

### PROVINCIAL MUSEUM OF NATURAL HISTORY AND ANTHROPOLOGY.

#### *Staff:*

G. CLIFFORD CARL, Ph.D., *Director.*

GEORGE A. HARDY, *Botanist.*

A. E. PICKFORD, *Assistant in Anthropology (from May 15th).*

LILLIAN C. SWEENEY, *Assistant Preparator (Artist).*

MARGARET CRUMMY, B.A., *Clerk-Stenographer.*

FRANK L. BEEBE, *Laboratory Assistant and Illustrator (to May 10th).*

H. H. PEGLER, *Attendant.*

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## PROVINCIAL MUSEUM OF NATURAL HISTORY AND ANTHROPOLOGY.

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### 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," R.S.B.C. 1936, c. 231.)

### ADMISSION.

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

DEPARTMENT OF EDUCATION

The Registrar H. O. T. [unclear]

Dr. E. J. [unclear]

PROVINCIAL MUSEUM OF NATURAL HISTORY AND ANTHROPOLOGY

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ADMISSION.

The Provincial Museum is open to the public, free of charge, from 10 a.m. to 5 p.m. and on Sunday afternoon, 1 p.m. to 5 p.m.

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# REPORT of the PROVINCIAL MUSEUM FOR THE YEAR 1944.

## REPORT OF THE DIRECTOR.

The Provincial Museum has again experienced a busy year from the standpoint of both attendance and activities of the various staff members. The following report contains accounts of the services rendered and the progress made in the work of the Museum during the year 1944.

### EXHIBITION AND PREPARATION.

Living animals and plants have again been featured in the natural history displays on the main floor of the building. Of greatest interest in this section is a demonstration hive of honey-bees, prepared and loaned by the Department of Agriculture through Mr. J. B. Munro, Deputy Minister. The hive is glass-encased so that all the activities of the insects are open to view. A glass tube leading from the hive to the outside via a hole through the window-frame permits the workers to enter and leave at will. This exhibit has been a source of great interest to both children and adults.

Among the insects, an enlarged model of the mosquito has been completed and placed on display. Among the fishes, a series of wax replicas of introduced fresh-water species has been placed on exhibit along with recently prepared models of certain other salt-water species. Other models prepared by Mrs. Sweeney during the year are as follows: goldfish, pickerel, wolf-eel (juvenile), fringed greenling, white sturgeon, and Spanish flag (rock-fish).

In the palæontological section, small-scale models of the Wood bison (*Bison bison athabascæ*) and Columbian horse (*Equus columbianus*) have been sculptured by Mrs. Sweeney and placed on display.

In addition to the preparation of the above Mrs. Sweeney has been engaged in the painting of a number of panels depicting various phases in the life of the native tribes of this Province just prior to the coming of the white man. Material upon which these scenes are based has been supplied by the researches of Mr. A. E. Pickford, a new member of the staff. The following units have been prepared: Haida—Village on Queen Charlotte Islands (prepared in part by F. L. Beebe); Tsimshian—Eulachon Fishery on the Nass; Kwakiutl—Wolf Dance; Interior Salish—Winter Scene; Interior Salish—Summer Scene; Coast Salish—Salmon-fishing on the Fraser; Coast Salish—Potlatch on the Cowichan.

A display case on the main floor has featured several subjects during the year, such as "Sea-shore Life," arranged by Mr. Hardy; "Aleutian Baskets" and "Recent Accessions," both arranged by Mr. Pickford.

### SPECIAL EXHIBITIONS.

During the period of May 15th to 31st an exhibition of Indian art work and handicrafts was held in the Museum under the auspices of the Society for the Furtherance of British Columbia Indian Arts and Crafts. Outstanding was the work of George C. Clutesi, of Alberni, a member of the Seshart Tribe, whose entries included water colours, pastels, and oils featuring the dances, costumes, and legends of his people. Many beautiful baskets, some of extremely fine workmanship, were also entered by West Coast natives. Schools contributing to the exhibition included: St. Catherine's School (Duncan), Christie Indian School (Kakawis), Indian Residential

School (Kuper Island), Penticton Indian Day School, and Songhees School (Craigflower).

Commencing December 6th a display of art work prepared by men of the Casualty Conditioning Centre, Gordon Head, was featured on the main floor. Entries consisted of oils, water colours, pencil, pen and ink sketches, and soap carvings, part of the creative work carried on by the Canadian Legion War Services under the direction of Mr. Anthony Walsh. The exhibition was opened by Mrs. Ina D. D. Uhthoff, Vice-Chairman of the newly formed Vancouver Island Division of the Federation of Canadian Artists.

#### FIELD-WORK.

The major activity under this heading during the past season was a collecting trip through Southern British Columbia to the Paradise Mine area near Windermere during the period August 14th to September 5th, inclusive. The party consisted of the Director and the Botanist; at Kamloops we were joined by Mr. George P. Holland, of the Dominion Livestock Insect Laboratory, who accompanied us for most of the time in the field. Our route took us south through Vernon to Keremeos; thence east to Osoyoos, through Trail, Nelson, and Creston to Cranbrook, where we met and were entertained by Mr. and Mrs. Walter B. Johnstone. Accompanied by Mr. Johnstone we turned north to Invermere and then west up a mountain road to Paradise Mine, where we spent the greater part of our time. The Museum staff members returned to the coast via the Monashee Pass to Vernon, Mr. Holland having returned to Kamloops by train some days previous to our departure from the mine.

While camping out *en route* we collected specimens wherever possible, particularly plants and small mammals. Among the latter we were fortunate in trapping at Osoyoos two specimens of harvest mice (*Reithrodontomys meglotis nigrescens* Howell), a mouse but lately added to the list of species known to occur in the Province (see Holland, George P., Murrelet, Vol. 23, No. 2, p. 60, 1942). A detailed account of the field-work carried out at Paradise Mine will be found elsewhere in this report.

At several points in our trip we were entertained and otherwise assisted by several friends whom we wish to thank here. These include Mr. and Mrs. J. D. Gregson and Mr. and Mrs. George P. Holland, of Kamloops; Major and Mrs. Allan Brooks, of Okanagan Landing; Mr. H. H. Currie, of Nelson; and Mr. and Mrs. Walter B. Johnstone, of Cranbrook.

During the period September 11th to 15th Mr. Pickford carried on an investigation into the structure and contents of a prehistoric mound at Duncan, of which further details are given in a later section.

#### PUBLICATIONS.

The following articles and publications have originated from the Museum during the past twelve months:—

"The Reptiles of British Columbia." G. Clifford Carl. Handbook Number 3, British Columbia Provincial Museum, pp. 1-60, April, 1944.

"The Natural History of the Forbidden Plateau Area, Vancouver Island, British Columbia." G. Clifford Carl. Report of the Provincial Museum for 1943, pp. 18-40, 1 plate, 1 map, 1944.

"Some Slugs of British Columbia." G. Clifford Carl. Canadian Nature, Volume 6, Number 1, pp. 5 and 6, 1944.

"Wildlife and Man." G. Clifford Carl. Victoria Naturalist, Volume 1, Number 1, pp. 5-6, 1944.

"Fairy Shrimps, Harbingers of Spring." G. Clifford Carl. Victoria Naturalist, Volume 1, Number 2, p. 19, 1944.

- "The Vancouver Island Marmot." G. Clifford Carl. *Victoria Naturalist*, Volume 1, Number 6, pp. 77-78, 1944.
- "Pacific Salmon." G. Clifford Carl. *Victoria Naturalist*, Volume 1, Number 3, pp. 36-38, 1944.
- "Bracket Fungus—The Dryad's Saddle." George A. Hardy. *Canadian Nature*, Volume 5, Number 3, pp. 80-81, 1944.
- "Mushroom Time." George A. Hardy. *Victoria Naturalist*, Volume 1, Number 5, pp. 60-64, 1944.
- "Further Notes on the Cerambycidae of Vancouver Island (Coleoptera)." George A. Hardy. *Proceedings of the Entomological Society of British Columbia*, Volume 41, pp. 15-18, 1944.
- "Northern Bald Eagle." Frank L. Beebe. *Victoria Naturalist*, Volume 1, Number 2, pp. 20-21, 1944.
- "A Corner Stone of Canadian Culture." Alice Ravenhill. *Occasional Paper Number 5*, Provincial Museum, pp. 1-103, 20 plates, March, 1944.

The Occasional Paper by Miss Alice Ravenhill, which presents a brief outline of the arts, crafts, and legends of the native tribes, has been in such demand since its appearance that the supply of copies has become exhausted; a second issue is planned for 1945. The reptile handbook has also been well received. These two contributions have done much to publicize the work of the Museum.

#### MOTION-PICTURES.

A motion-picture film in colour, entitled "Nature's Amphibians" and featuring salamanders, frogs, and toads of the Province, has been completed through the co-operation of Mr. C. R. D. Ferris, of the British Columbia Travel Bureau. Copies of the film have already been shown to many groups and have been well received.

From time to time during the year other material has been recorded on film for possible future use.

#### EDUCATION.

##### MUSEUM LECTURES.

A series of illustrated lectures was again presented at the Museum for school children of the Greater Victoria area during February and March. The following table summarizes the programme and the attendance:—

Date.	Subject.	Speaker.
February 19.....	"A Trip to the Moon".....	Dr. J. A. Pearce, Director, Astrophysical Observatory, Victoria, B.C.
February 26.....	"The Game of Life".....	Dr. G. Clifford Carl, Provincial Museum.
March 4.....	"Merry-go-round of Plant Life".....	Mr. George A. Hardy, Provincial Museum.
March 11.....	"Fortune in the Forest".....	Mr. Eric H. Garman, Forest Branch, Department of Lands.
March 18.....	"Birds of a Feather".....	Dr. G. Clifford Carl, Provincial Museum.
March 25.....	"From Sea to Can".....	Mr. George J. Alexander, Assistant Commissioner, B.C. Department of Fisheries.

Total attendance, 2,533.

We are again indebted to Mr. A. T. Goward, Vice-President of the British Columbia Electric Railway Company, for granting special travelling privileges to school children attending the lectures. We wish to thank also Dr. Joseph A. Pearce, Director of the Dominion Astrophysical Observatory; Mr. Eric H. Garman, of the B.C. Forest Branch; and Mr. George J. Alexander, Assistant Commissioner of Fisheries, for their contribution to the programme; and Mr. Clarence Ferris, of the Department of Trade and Industry, for providing and operating the sound motion-picture projector.

## OTHER LECTURES AND ACTIVITIES.

Illustrated lectures were given to the following schools during the spring term: Burnside, George Jay, Margaret Jenkins, North Ward, Oaklands, Quadra, Sir James Douglas, South Park, and Victoria West (Victoria City); Royal Oak, McKenzie Avenue, Strawberry Vale, Gordon Head, Tillicum, Cedar Hill, Cloverdale, Tolmie, and Craighflower (Saanich); Songhees Indian Day School, St. Margaret's, Mount Douglas High School, St. Michael's School, and Central Junior High School.

Other lectures were given during the year to the following organizations: Rotary Club, Outdoor Club, Esquimalt Dock Yard Y.M.C.A. Hut, Victoria Natural History Society, Hard of Hearing Club, Lions Club, Capital City Commercial Club, Pacific North West Bird and Mammal Society, Macaulay Point Y.M.C.A. Hut, Association of Radio Technicians, Victoria Horticultural Society, Comitas Club, Lions Auxiliary, and St. Mary's Men's Guild.

The Botanist and Director also contributed to the Playground programmes presented during the summer at Beacon Hill Park, Central Park, Willows Park, and Windsor Park.

## RESEARCH.

As opportunity and time allow a certain amount of research is carried on by staff members in addition to the regular duties. For example the Director has been engaged at intervals in compiling a complete list of literature references concerning the fresh-water fishes of the Province. Other material referring to the occurrence and distribution of the various species is also being gathered for use in the preparation of a proposed handbook to this group.

During the year Mr. Hardy has been engaged in gathering information concerning the identification and ecology of local fungi, which also is being prepared for publication. In addition, he has been able to devote a little time to the study of the life-histories of certain insects occurring in the vicinity of Victoria.

Since joining the staff in May, Mr. Pickford has spent much time in research in connection with the preparation of the series of panels already mentioned depicting Indian life. He was also engaged in the study of a prehistoric mound at Duncan which was opened during September.

## STAFF CHANGES.

On May 10th Mr. F. L. Beebe left the Museum staff after a twelve-month association. During this period he prepared several sets of illustrations featuring reptiles, amphibians, fishes, crustaceans, fungi, and other animal and plant groups, some of which have already appeared in Museum publications. He was also of assistance in gathering, preparing, and caring for natural history specimens, both in the field and in the Museum. The remaining staff members wish him well in his new venture.

On May 15th Mr. A. E. Pickford severed his connection with the Forest Branch, Department of Lands, with whom he had been associated for over twenty-four years, to join the staff of the Provincial Museum, where he has taken on the responsibilities connected with the Museum's anthropological activities. His long interest in the study of anthropology and his wide experience in the field in various parts of the Province enable him to be of great assistance in this important work.

During the spring months Mrs. H. Burt assisted on a part-time basis, in mounting, labelling, and cataloguing plant specimens in the herbarium under the direction of Mr. Hardy.

## BUILDING MAINTENANCE.

In May painters from the Department of Public Works redecorated the stairway leading to the basement and also painted the basement hallways and rest-rooms.

In December the old-style metal letters on three of the windows were removed and replaced by gold-leaf.

## ATTENDANCE.

The number of visitors registering at the Museum during 1944 and the estimated attendance based on counts during certain periods is as follows:—

	Registered.	Estimated.
January .....	2,127	3,146
February .....	2,064	3,192
March .....	2,399	3,621
April .....	3,597	5,684
May .....	3,490	5,574
June .....	4,800	6,834
July .....	6,223	10,112
August .....	8,005	11,850
September .....	4,842	6,140
October .....	3,254	4,800
November .....	2,433	3,250
December .....	1,735	3,220
Totals .....	45,569	67,423

To these figures are to be added 2,533 school children who attended the lecture series in February and March and in addition thirty-six school classes, four British Columbia Police classes, and four other organizations who visited during the year. Also to be included are eight groups of Canadian Army men and officers who were conducted through the Museum under the guidance of Mr. Pickford. Some of the latter groups were French-Canadians; these Mr. Pickford was able to address in their own language.

Compared with the 1943 attendance record the total number of visitors in 1944 showed an increase of 4,296 or over 9 per cent., the largest registration recorded by the Museum. The estimated attendance is also one of the largest on record.

The attendance record for the month of July, as shown by the Visitors' Register, has been analysed by Mr. Pegler as follows:—

Residence.	Registration.	Residence.	Registration.
British Columbia .....	2,117	Washington .....	2,010
Alberta .....	353	Oregon .....	189
Saskatchewan .....	316	Other States .....	617
Manitoba .....	220	Yukon Territory .....	3
Ontario .....	226	Newfoundland .....	2
Quebec .....	51	United Kingdom .....	49
New Brunswick .....	9	Other countries .....	31
Nova Scotia .....	16	Country not stated .....	8
Prince Edward Island ..	6		
Total .....	3,314	Total .....	2,909
Grand total .....			6,223

Compared with a similar analysis of the July attendance in 1943 the number of registered visitors in 1944 is greater by 495. It is interesting to note, however, that the number of British Columbians is less by 1,071 (33-per-cent. decrease) possibly as a result of war conditions. On the other hand, the number of Washington visitors has increased from 476 to 2,010, probably due to the fact that travelling in other directions has been discouraged by crowded conditions prevailing during these abnormal times.

## REPORT OF THE BOTANIST.

### ACTIVITIES.

The season of 1944 has been a very successful one from the accessions' view-point, the total from all sources comprising 3,032 entries.

Sheets filed and shelved in the classified series amount to 1,361. This work was greatly facilitated by the help of Mrs. H. Burt, who was engaged for this purpose in the early part of the year; in addition to filing, 700 of these were mounted on the standard herbarium sheets by her, while the balance was done by Mrs. L. C. Sweeney, of the Museum staff. Fifty species were filed as new to the herbarium.

Plant identification and the dissemination of information concerning them continues to be an important feature of this office, some 578 specimens being thus dealt with.

As in past years the seasonal wild-flower exhibit is a perennial attraction and is well worth the effort expended. The salient floral objects of the countryside pass in living review throughout the twelve-month period, inspiring and informing a constant succession of visitors. An average of twenty-five plants is always on view.

A certain amount of time has been devoted to the continuation of studies on the higher fungi, in line with the objective already expressed elsewhere.

A museum field-trip to the Paradise Mine area in the Windermere district of British Columbia yielded some 500 sheets of specimens, including material taken *en route* both going and returning. Details of the former are given in the special report.

In addition to checking and recording current additions, time has been spent in maintaining the herbarium in good order as regards preservation and storage, and to the preparation and delivery of lectures and demonstrations to the schools listed in another part of this report.

Among the recent donations is the fine collection of southern Vancouver Island plants from Mr. V. E. L. Goddard, comprising approximately 1,000 specimens, all well mounted on standard sheets and accompanied by full data and notes of occurrence.

Mr. J. W. Eastham, Provincial Plant Pathologist, Vancouver, has further enriched our herbarium with the addition of over 150 specimens from the north-central part of the Province, including many rare and uncommon species.

Mr. Eastham has also been instrumental in acquiring for the herbarium a small collection of fifty plants from Kiska and Great Sitkin Islands in the Aleutians. These were obtained by Lieutenant H. R. McCarthy and Corporal N. Kellas in September and October, 1943. They were identified by Mr. A. E. Porsild, National Museum of Canada, Ottawa, who recently published the list in the *Canadian Field-Naturalist*, July-August, 1944.

These plants are of very great interest to British Columbia botanists as nearly half of them occur in our Province while the remainder are closely related to British Columbia species.

Mr. N. C. Stewart, of the Topographic Surveys Branch, has maintained his interest and willingness to collect plants for the Museum as in former years. His efforts have resulted in eighty examples of very desirable specimens from the Arrow Lakes area.

Mr. D. M. Trew, of the Forest Branch, went to the trouble of gathering a nice series of forty-five specimens from Tweedsmuir Park.

Mr. J. R. Shenstone, of Saanich, contributed an extensive collection from the Comox district and other points on Vancouver Island.

Mr. A. H. Brinkman, Craigmyle, Alberta, has kindly supplied us with valuable material appertaining to British Columbia and adjacent territory comprising in all 208 specimens.

Dr. W. A. Weber, Pullman, Washington, through the good offices of Mr. J. W. Eastham, has been most co-operative in providing us with duplicates of material col-

lected by him when in British Columbia some years ago. This material, including plants from adjacent areas, amounts to 235 species.

Dr. Leon Kelso, Washington, D.C., has generously contributed 112 plants from eastern America, forming an interesting basis for comparison with our western flora.

Mr. W. M. Tildesley, Plant Products Division, Department of Agriculture, Ottawa, has very kindly augmented our seed collection by 487 named samples, neatly packaged and labelled.

This brings our wild-flower seed collection up to 600 species and varieties and now includes many of economic importance. It is also a convenient reference in connection with biological surveys as to food plants of birds or as a final criterion in the placing of closely related plant species.

A complete list of contributors to the herbarium will be found under Accessions.

#### ACKNOWLEDGMENT.

We have great pleasure in conveying our sincere thanks and appreciation to all those who have contributed specimens and to the specialists mentioned below for their willingness to co-operate in unravelling the many problems involved in identification and confirmation of specimens.

Dr. Carleton R. Ball, Extension Service, United States Department of Agriculture, Washington, D.C. Willows.

Mr. J. W. Eastham, Provincial Plant Pathologist, Vancouver. Grasses, sedges, and rushes.

Mr. A. E. Porsild, National Museum of Canada, Ottawa. General.

Dr. J. Walton Groves, Dominion Experimental Farm, Ottawa. Fungi.

Dr. C. L. Hitchcock, University of Washington, Seattle. Draba.

#### REPORT OF THE ENTOMOLOGIST.

A percentage of the Botanist's time is taken up with checking over the collections to ensure their continued preservation.

As in past years, insects have aroused considerable popular interest as is evinced by the numbers brought in for identification. Many of these are large or otherwise conspicuous species such as the Electric-light bug, large Long-horn beetles, Hawk and Silkworm moths, and so forth. These specimens of special interest are in addition to specimens retained for the Museum collection which are listed under Accessions.

George Forbes, of Lac la Hache, sent in a very interesting collection of butterflies, moths, and beetles from his district. Local collections of this type are invaluable for distributional studies of our British Columbia insects.

A trip to Vancouver was made in February, where a paper was read to the British Columbia Entomological Society.

Our cordial thanks are extended to Mr. George R. Hopping and Mr. Hugh B. Leech, of the Dominion Entomological Laboratory, Vernon, B.C., for their ready willingness to assist in the identification and confirmation of many of the difficult genera.

#### REPORT OF THE ANTHROPOLOGIST.

The anthropological division has come in for its full share of the interest shown by visitors, and particularly by visiting schools. In several instances school teachers have brought their classes to the Museum for the direct purpose of studying the Indian material under the direction of the newly appointed Anthropologist.

It is some years since personnel was assigned to take charge of this division. While there has been no lapse in recordings or in the care of the specimens during that

period, yet the burden of keeping pace with the growing interest in the Indian culture of the North-west has made necessary the new appointment above mentioned. With this additional help some reorganization of records and an expansion in school education have now been made possible. Several new projects entailing considerable research are under way; particulars of these will appear in subsequent reports.

Field-work in this division was confined to the excavation of a prehistoric mound in the vicinity of Duncan. This mound long antedates the present tribes, belonging to an era which is now past native memory; it is a relic of a culture in which the remains of persons of importance were cremated and their ashes enclosed in a stone cyst over which a large mound of earth or rocks was heaped. A full report of this and of similar mounds which have been investigated on the south end of Vancouver Island and adjacent mainland will be published shortly.

#### ACKNOWLEDGMENT.

Thanks are again tendered to Commissioner T. W. S. Parsons, of the Provincial Police, for his continued interest in our anthropological work, and particularly for assistance rendered in connection with the J. P. Drewett collection from Lytton, B.C.; also for information and sketches placed on file in regard to pictographs on Stein Creek, B.C.

A similar acknowledgment and thanks are due to The Okanagan Society for the Revival of Indian Arts and Crafts, of Oliver, B.C., for photographs and accompanying paper entitled "The Artifacts of the Okanagan Indians in British Columbia and Washington State," as presented to the Society by Mr. Reginald N. Atkinson, of Penticton, B.C.

#### ACCESSIONS.

During 1944 the following numbers of specimens were added to the catalogued collections (figures in parentheses denote the total number on December 31st, 1944): Indian material, 774 (5,901); plants, 676 (17,192); mammals, 82 (5,106); birds, 94 (9,104); reptiles, 6 (262); amphibians, 8 (533); fishes, 34 (639).

The year saw considerable acceleration in the number of accessions to the anthropological collection in particular. Valuable additions were made to the Salishan material in the following collections:—

*The F. J. Barrow Collection.*—On the demise of Mr. F. J. Barrow, of Sidney, B.C., his will was found to contain a clause passing to the Museum an archæological collection containing about 550 pieces from various shell-mounds in the Gulf Islands which had been under the investigation of the collector over a long period of years. This collection is left in the custody of Mrs. Barrow during her life-time.

In addition to the above Mrs. Barrow has passed over to the Museum a valuable series of nearly 200 photographs of petroglyphs and pictographs including many newly discovered by Mr. Barrow. These are all carefully listed as to location. The plates, films, and records are on file in the Museum.

*The J. P. Drewett Collection.*—This collection of archæological material from Lytton, B.C., was purchased during the year; it comprises several hundred specimens, principally of stone and bone, including some interesting examples of primitive incised decoration.

*The Mrs. Herbert Corfield Donation.*—On her retirement from business at Koksilah, B.C., Mrs. Corfield generously donated to the Museum five large house pillars with typical Salishan carvings in high relief. These had been removed, under permission of the Indian Department, from the Quamichan Indian Reserve at Duncan, B.C., after the collapse of an old house. These items are much valued since the Museum was short of carvings of this nature.

In addition to the above, Mrs. Corfield donated an interesting series of three canoes with Indians and equipment carved in miniature by Simon Charlie, a native craftsman.

*The Mrs. G. S. McTavish Donation.*—This collection comprises some six pieces gathered by Mr. McTavish while in the service of the Hudson's Bay Company. It includes some interesting pieces of Kwakiutl origin.

The following list includes the names of other contributors and the number and type of specimens contributed in 1944.

## ANTHROPOLOGICAL ACCESSIONS.

## HAIDAN.

By gift—

Two silver bracelets, engraved. (Anonymous donor.)

## NOOTKAN.

By gift—

Fish toaster, wood. R. B. Inverarity, Seattle, Washington.

By purchase—

Modern basketwork button (example of fine workmanship).

Circular basket and lid (examples of fine workmanship).

Dance-mask, bird design, painted.

## KWAKIUTL.

By gift—

Large war canoe, carved and painted with native designs. H. S. Howard,  
C.P.R. Freight Office, Victoria, B.C.

## SALISHAN.

By gift—

Jadeite chisel. C. A. Gibbard, Victoria.

Jadeite chisel. G. S. Tilley, Saltspring Island.

Jadeite chisel. A. Colquhoun, Duncan.

Eight spear-heads and jadeite chisel. J. F. Bledsoe, Victoria.

Sandstone knife. Miss D. Holmes, Victoria.

Sinker stone, grooved. Bill Parker, Victoria.

Hammer stone and associated human remains. Mrs. V. M. Aitken, Victoria.

Human skull. Arthur Peake, Duncan.

By purchase—

Soapstone mat-creaser, engraved.

Beaver-shaped concretion.

Nephrite gouge.

Totem-pole, model, painted.

Cedar-bark matting.

Large (coiled) basket, rainstorm pattern.

## ATHAPASCAN.

By gift—

Beaded fire-bag, tobacco-bag, and moccasins. J. F. Bledsoe, Victoria.

## BOTANICAL ACCESSIONS.

T. Astley, Victoria, one; A. M. Bolton, Metchosin, one; G. C. Boyd, Cowichan Lake, nine; A. H. Brinkman, Craigmyle, Alberta, 210; Mrs. H. Burt, Victoria, two; C. Christianson, Saanich, one; A. Dendoff, Victoria, one; W. Downes, Victoria, one; J. W. Eastham, Vancouver, 194; A. Frayne, Victoria, one; O. C. Furniss, Alberni, three; V. E. L. Goddard, Victoria, collection of Vancouver Island plants; E. R. Hall, Sidney, one; Dr. J. D. Hunter, Victoria, 172; Mrs. Janke, Sidney, one; W. B. Johnstone, Cranbrook, four; Dr. Leon Kelso, Washington, D.C., 112; Marilyn and Allan King, Victoria, one; Mrs. A. Lane, Victoria, two; Dr. M. D. McKichin, Saanich, twelve;

H. B. Neaves, Victoria, one; A. Nicholls, Duncan, six; S. O. Norwood, Quesnel, one; Mrs. A. E. Planta, Nanaimo, one; Patsy Ritchie, Victoria, eight; F. M. Shillaker, Redstone P.O., eleven; Veronica Stevens, Rainbow Beach, one; N. C. Stewart, Victoria, collection of plants from Arrow Lakes; W. Tildesley, Ottawa, collection of 487 samples of seeds; D. M. Trew, plants from Tweedsmuir Park; W. A. Weber, Pullman, Washington, 236.

## ZOOLOGICAL ACCESSIONS.

## MAMMALS.

By gift—

- Mrs. Arbuckle, Victoria. One pair whale's ear-drums.  
 G. C. Boyd, Lake Cowichan. One lump-nosed bat.  
 J. Grant, Trinity Valley. One lynx skull.  
 Chris Hansen, Paradise Mine. One wood rat.  
 G. P. Holland, Kamloops. Thirty-five mammal specimens.  
 W. B. Johnstone, Cranbrook. One weasel, one flying squirrel.  
 Keith Notte, Victoria. Vertebrae of cat.  
 Leon Notte, Victoria. One hoary bat.  
 Constable J. Blakiston-Gray, Lytton, per Commissioner T. W. S. Parsons, Victoria. One Tahltan Indian bear dog.  
 J. Sowerby, Ta Ta Creek. Two bobcat skulls, one coyote skull.

By the staff ..... 39

## BIRDS.

By gift—

- L. J. Clark, Victoria. One Virginia rail, one shrike.  
 Olive Cleghyn, Victoria. One winter wren.  
 J. A. Flett, Duncan. One goshawk.  
 Don McAllister, Victoria. Bird's-nest.  
 G. W. Lake, Victoria. One golden eagle.  
 Mrs. R. P. Rithet, Victoria, per Mrs. L. A. Genge. Three mounted specimens (bob-white and quail).  
 Mrs. P. Stout, Victoria. One surf scoter.

By the staff ..... 3

## AMPHIBIANS AND REPTILES.

By gift—

- G. C. Boyd, Lake Cowichan. One salamander.  
 Major Allan Brooks, Okanagan Landing. One gopher snake, one salamander.  
 H. H. Currie, Nelson. Two garter snakes, one alligator lizard.  
 H. C. Dalziel, Okanagan Landing. One garter snake, one gopher snake.  
 Jack Elliot, Jordan River. One salamander.  
 George Jay School, per Miss Jean Roberts, Victoria. One garter snake.  
 Miss F. Hepburn, Fulford Harbour, B.C. One alligator lizard.  
 R. C. W. Lett, Gordon Head. Two garter snakes.  
 F. H. Martin, Cultus Lake. Tailed toad tadpoles. (Received in 1943.)  
 Mrs. H. C. Northcote, Cracroft. Three salamanders.  
 Paul Parizeau, Victoria. One salamander larva.  
 Arthur Peake, Duncan. Dessicated body of salamander.  
 Patsy Ritchie, Victoria. Three salamanders.  
 Norman F. Robb, Princeton. One rubber snake.  
 Dr. R. C. Shaw, per H. H. Currie, Nelson. One skink.  
 R. B. Smith, per H. H. Currie, Nelson. One skink.

By the staff ..... 2

## FISH.

By gift—

- B.C. Packers, per W. A. Ashby, Victoria. One electric ray.  
 Dick, Harry, and Ed. George, per Wilson & Lenfesty, Victoria. One handsaw fish.  
 L. W. Patmore, Victoria. Two rock trout.  
 H. H. Pegler, per Askey's Fish Market, Victoria. One Spanish flag.  
 Patsy Ritchie, Victoria. One fish.  
 Miss M. E. Scholfield, Cadboro Bay P.O. One wolf-eel.  
 G. H. Smith, R.R. 3, Victoria. Two alligator fish, two cabezon, one eel-pout, sixteen sculpins, two wolf-eels, one rat-fish egg-case, cluster of eggs of squid.  
 W. Tompkinson, New Westminster. One sturgeon.

## INVERTEBRATES.

By gift—

- Mrs. G. Ballantyne, Redonda Bay. One electric-light bug.  
 Beacon Hill School, Victoria. One electric-light bug.  
 W. Belobara, Victoria. Polyphemus moth and sawfly.  
 Mrs. Boyd, Victoria. Chrysalis of butterfly.  
 Dr. V. C. Brink, Vancouver. Collection of ice-worms.  
 A. Burns, Victoria. One polyphemus moth.  
 George Church, Marigold P.O. One ichneumon fly.  
 Miss D. Cox, Victoria. Collection of shells.  
 W. W. Deans, Duncan. One electric-light bug.  
 Miss Doris Duke, Victoria. Goose barnacles on glass float.  
 Gordon Eye, Crofton. One leaf-cutter bee.  
 George Forbes, Lac la Hache. Collection of butterflies, moths, and beetles.  
 V. E. L. Goddard, Royal Oak. One teredo.  
 R. Guppy, Wellington. One dobson fly.  
 J. D. Gregson, Kamloops. Four long-horn beetles.  
 E. G. Hart, Victoria. Specimen showing damage of teredos, one serpulid worm tube.  
 G. A. Lyon, Victoria. One sawfly.  
 John McKinnon, Victoria. One moth.  
 G. T. Mercer, Victoria. One garden spider.  
 Darling Newing, Victoria. One bumble-bee.  
 Mrs. H. C. Northcote, Cracroft. One hermit crab.  
 Dorita Palin, Victoria. Caterpillar of White Admiral butterfly.  
 Paul Parizeau, Victoria. Two leeches, collection of teredos, one horse-clam shell.  
 Richard Phillips, R.R. 4, Victoria. One Aranea spider.  
 J. F. Piper, Munro, Jamaica. Two scorpions.  
 M. L. Prebble, Victoria. Two long-horn beetles.  
 W. H. A. Preece, Saanich. One moth, one long-horn beetle.  
 S. W. Raven, Victoria. One black widow spider.  
 Bill Richards, Robert Day, and Gerald Stark, Victoria. One starfish.  
 Patsy Ritchie, Victoria. Cluster of slug's eggs, five centipedes.  
 J. Sandercock, Victoria. One crab spider.  
 G. H. Smith, R.R. 3, Victoria. One chiton, two sand-dollars, one octopus, one shrimp, one sea-worm, one sea-slug, one sea-lily.  
 M. Tate, Esquimalt. One cicada.

## PALÆONTOLOGY.

By gift—

- N. A. McDowell, Victoria. Three agates.  
 John Zarelli, Oliver. One fossil plant.

## FLORA AND FAUNA OF THE PARADISE MINE AREA, BRITISH COLUMBIA.

BY G. CLIFFORD CARL AND GEORGE A. HARDY, PROVINCIAL MUSEUM, VICTORIA, B.C.

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### INTRODUCTION.

One of the very few places where it is possible to reach elevations above timberline by a good road is to be found in the vicinity of Windermere, in the Columbia Valley. Here there is an excellent mountain-road to Paradise Mine at an elevation of 7,800 feet in an area hitherto relatively unknown biologically. For this reason, when we received an invitation from Mr. Walter B. Johnstone, of Cranbrook, to accompany him on a visit to this area we accepted with alacrity and planned our season's collecting trip with this objective in mind. Accordingly, accompanied by Mr. George P. Holland, of the Dominion Livestock Insect Laboratory, Kamloops, we met Mr. Johnstone in Cranbrook and proceeded to Paradise Mine, where we spent the period of August 24th to 31st intensively collecting specimens and studying the natural history of that area. The following account is based on the specimens collected and the information gathered during this period.

### DESCRIPTION OF THE AREA.

#### LOCATION AND SIZE.

The Paradise Mine is located near the source of Spring Creek, a tributary of Toby Creek, which rises near the summit of the Purcell Range and flows eastward to empty into the Columbia River near Wilmer. The mine is reached by a road from Wilmer up Toby Creek and Spring Creek Valley, a distance of 19 miles.

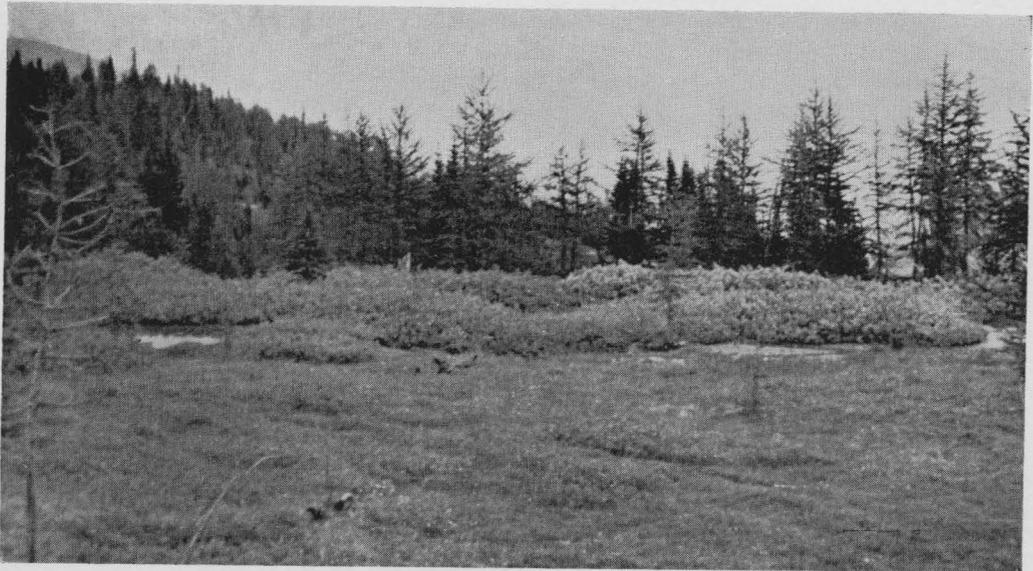
The valley in which the mine is located and where our collections were made is of typical cirque formation facing toward the east. The floor of the valley in the vicinity of the mine buildings is about 7,800 feet elevation; the mine itself, which is on the north side of the basin, is at the 8,000-foot level, while the ridge which surmounts the valley on three sides rises to about 9,000 feet in elevation. The region roughly enclosed by the surrounding ridge is about 1,000 acres in area and includes habitats of several different types, as noted in a section to follow.

#### GEOLOGY.

In general terms the Paradise Mine area is made up of metamorphosed sedimentary rocks of Precambrian age divisible into two series known as the Purcell and Windermere series (Walker, 1926). The Purcell series includes magnesian limestone



Spring Creek Valley; ravine in background. Paradise Mine.



Tree and shrub association at timber-line. Paradise Mine.

quartzite and slate; overlying these are formations of the Windermere series made up of slate, quartzite, and pebble conglomerate containing thin interbeds of crystalline limestone.

Much of the area toward the head of the valley above the mine buildings is composed of crystalline limestone which renders the water of the Spring Creek and its tributaries extremely hard. Where it is weathered and broken the limestone forms small crevices and rock-piles where conies or rock rabbits find habitats to their liking. On the south side of the valley are large rock-slides consisting of boulders, blocks, and slabs of quartzite and limestone of many sizes and shapes. To the north the ridge above the mine is composed largely of loose, weathered shale providing poor support for life of any kind.

The ore produced by the mine consists mainly of lead carbonate containing some galena, sphalerite, and pyrite in association. It occurs in isolated pockets in the limestone and must be located by exploratory drilling.

#### CLIMATE.

Little is known about the climate in this area as no precise data are available. Mr. Ed. Barbour, an employee who has spent several seasons at the mine, informs us that light snowfalls may occur at any time, even in summer, but that permanent snow is not usually present until October 15th. Drifts 7 to 8 feet in depth are common and snow usually persists until the end of June. On June 15th of the year of our visit, snow was just clear of the eaves of the mine buildings.

Winter temperatures of 10 degrees below zero are common, but in general the climate is not as severe as experienced in the Columbia Valley several thousand feet below.

#### BIOTIC AREAS AND HABITATS.

In a report on the birds and mammals of Kootenay National Park, Munro and Cowan (1944) recognize three biotic areas as being present in the area studied, namely, Southern Alplands, Sub-alpine Forest, and an area of transition between Sub-alpine and Dry Forest. Two of these areas or life zones may be identified in the region of Paradise Mine as follows:—

*Sub-alpine Forest.*—According to the above authors this biotic area occupies a zone approximately between 4,000 and 6,500 feet. In the protection of the ravine below the mine this zone appears to extend some distance above this elevation, the upper limit being about 7,800 feet. In this area the dominant trees are Alpine fir (*Abies lasiocarpa*), Lyall's larch (*Larix Lyallii*), and White-barked pine (*Pinus albicaulis*) with an occasional Lodgepole pine (*Pinus contorta*) and Englemann's spruce (*Picea englemanni*).

In these wooded tracts occurred *Vaccinium scoparium*, *Phyllodoce glanduliflora*, *Leptarrhenia amplexifolia*, *Fragaria bracteosa*, *Arnica cordifolia*, *A. latifolia*, *Erigeron salsuginosus*, and *Aster aprica*. *Castilleja rhexifolia* occurred sparingly and *Rhododendron albifolia*, *Vaccinium membranaceum*, *Stenanthus occidentalis*, and *Silene douglasii* found their upper limits.

*Southern Alplands.*—This life zone consists of the high meadows and summit country above timber-line. All the region from the level of the mine buildings (7,800 feet) and upwards falls within this zone and several widely differing types of habitats are found here.

Along the streams and over portions of the meadows, willows of various species were a feature of the shrub flora. Here, *Salix barrattiana* formed dense thickets in moist places along with *S. anglorum* var. *araioclada*. Near the source of the spring mats of *Salix nivalis* grew between the rocks. On the banks of the stream such plants

as *Senecio triangularis*, *Epilobium Hornmannii*, and *Arnica chamissonis* occurred, while on the moist muddy or gravelly flats *Draba præalta*, *Sagina saginoides*, and *Rhodiola integrifolia* could be seen.

Rock outcrops supported *Saxifraga austromontana*, *S. cespitosa*, and the ferns *Cystopteris fragilis* and more rarely *Cryptogramma acrostichoides*.

On the slopes rising up from the meadow-land were *Pentstemon confertus*, *Potentilla fruticosa*, *Aquilegia flavescens*, *Saxifraga Lyallii*, *S. occidentalis*, *Achillea borealis*, and the ubiquitous *Epilobium angustifolium*.

Patches of *Dryas octopetala* occupied well-drained slopes and knolls in company with *Eriogonum subalpinum* and *Cassiope Mertensiana*.

On the summit of the north ridge, at an elevation of close on 9,000 feet, the characteristic plants noted growing in a small basin included the following:—

*Oxyria digyna*, *Potentilla nivea*, *Draba paysonii* var. *treleasii*, *D. nivalis*, *Saussurea densa*, *Aplopappus lyallii*, *Phacelia ciliosa*, *Androsace subumbellata*, *Erigeron aureus*, *E. lanatus*, *Physaria didymocarpa*, *Salix nivalis*.

Both of these biotic areas, the Sub-alpine Forest and the Alplands, have the following plants in common: *Sibaldia procumbens*, *Aster Richardsonii*, *Erigeron debilis*, *Antennaria media* and *A. lanata*, *Valeriana sitchensis*, *Pentstemon fruticosa*, *Arenaria nardifolia*, and many others.

The two zones thus arbitrarily defined by no means give a clear picture of the flora complex as a clear line of demarcation is non-existent; only at the opposite extremes of each zone are the separate associations discernible. Much depends on the nature of soil, exposure, and drainage as to the extent of commingling.

Fuller details will be found in the annotated list.

## PLANTS.

The following annotated list includes the records of the late W. B. Anderson, of Victoria, B.C., who collected here during the years 1923, 1925, and 1927, and those of Mr. W. B. Johnstone, of Cranbrook, B.C., who visited the region in 1943 and again in 1944 and to whom we are indebted for our own opportunity to visit the district.

The arrangement closely follows that of J. K. Henry in his *Flora of Southern British Columbia* (1915).

All material mentioned is accessible for reference in the herbarium of the Provincial Museum unless otherwise stated.

### OPHIOGLOSSACEÆ.

*Botrychium lunaria* (L.) Sw. Grape Fern.

A small, scattered colony was found growing in company with *Agoseris pubescens* above timber-line on the north ridge.

### POLYPODIACEÆ.

*Cryptogramma acrostichoides* R. Br. Parsley Fern.

Very scarce. In rock crevices on wooded slope east of basin.

*Cystopteris fragilis* (L.) Bernh. Bladder Fern.

Abundant in rock crevices.

### EQUISETACEÆ.

*Equisetum variegatum* Schleich. Northern Scouring Rush.

Locally common. It was the dominating plant on a water-logged flat by the stream.

## SELAGINELLACEÆ.

*Selaginella scopulorum* Maxon.

Forming ground-cover at all elevations, conspicuously so above timber-line.

## CONIFERÆ.

*Juniperus communis* L. var. *montana* Ait. Juniper.

Scattered bushes in woods below timber-line.

*Pinus contorta* Dougl. Lodgepole Pine.

A few dwarfed and scrubby specimens. A small example about 8 inches in height was found on the summit far above the average timber-line.

*Pinus albicaulis* Engelm. White-barked Pine.

Of frequent occurrence, occasionally attaining considerable size in girth but not proportionately in height. The tops are much deformed by severities of the climate.

As with the preceding, small specimens were seen at the summit in rock crevices.

*Larix Lyallii* (Parl.). Lyall's Larch.

Quite common in the basin where it formed pure stands or intermixed with the Alpine Fir. It attained considerable size; some trees were approximately 3 feet in diameter at the base. The spirally twisted growth of the trunk was very noticeable. The exit holes of Cerambycid beetles were evident on dead or dying parts of the trunk. Their holes were noticeably more numerous on the southern side of trees. The Columbian ground-squirrels were occasionally seen some 12 or 15 feet up among the branches, where one was observed to nibble at the needles.

It was found with the Alpine Fir to near timber-line.

*Abies lasiocarpa* (Hook.) Nutt. Alpine Fir.

The dominant tree of the area. It was the last to disappear at timber-line, where it dwindled to small wind-pruned shrubby growths, characteristically occurring in park-like formations of clumps of several closely associated individuals with open meadow-like spaces between clumps.

Porcupines had paid destructive attention to a group in which one tree some 12 inches in diameter and about 40 feet in height had been completely debarked, while others near-by were not much better off.

*Picea Engelmanni* Engelm. Engelmann's Spruce.

Fine stands exist in the wood just east of the mine basin where it drops to lower levels.

In the basin itself it was not evident. One small seedling 6 inches in height was found on the summit of the south ridge at 8,500 feet.

## GRAMINEÆ.

*Phleum alpinum* L. Alpine Timothy.

*Calamagrostis purpurascens* R. Br. Purple Reed-grass.

*Calamagrostis canadensis* (Michx.) Beauv. Blue-joint.

*Agrostis humilis* Vasey. Mountain Bent-grass.

*Deschampsia atropurpurea* (Wahl.) Scheele. Mountain Hair-grass.

*Poa arctica* R. Br. Arctic Blue-grass.

*Poa alpina* L. Alpine Blue-grass.

In pika hay.

*Poa compressa* L.

*Poa gracillima* Vasey. Pacific Blue-grass.

*Poa rupicola* Nash.

*Festuca ovina brachyphylla* (Schult.) Piper. Sheep Fescue.

*Agropyron trachycaulon* (Link.) Malte. Wheat-grass.

In pika hay.

*Trisetum spicatum* (L.) Richt. Downy Oat-grass.

In pika hay. In scattered tufts on slopes and benches.

*Sitanion hystrix* (Nutt.) J. G. Smith. Bottle-brush Squirrel-tail.

In widely scattered tufts on the open shaly slopes above timber-line.

#### CYPERACEÆ.

*Carex albo-nigra* Mack. Black- and White-scaled Sedge.

*Carex festivella* Mack. Mountain Meadow Sedge.

In pika hay.

*Carex Hepburnii* Boott. Hepburn's Sedge.

*Carex Hoodii* Boott. Hood's Sedge.

*Carex incurviformis* Mack. Curved Sedge.

*Carex phæocephala* Piper. Mountain-hare Sedge.

*Carex angara* Steud. (*C. Halleri* Gunn.).

W. B. Johnstone.

#### JUNCACEÆ.

*Juncus balticus* Willd. Baltic Rush.

*Juncus Drummondii* Mey. Drummond's Rush.

*Juncus Parryi* Englm. Parry's Rush.

*Luzula Piperi* (Cov.) M. E. Jones. Piper's Wood-rush.

Not uncommon in wooded sections.

#### LILIACEÆ.

*Zygadenus elegans* Pursh. Glaucous Zygadene.

Scarce. A small stand at west end of basin and another on summit of south ridge on limestone soil. In fruit.

*Stenanthium occidentale* (Gray) Rydb. Bronze Bells.

In wood below east end of basin, mostly in fruit.

#### SALICACEÆ.

We are indebted to Dr. Carleton R. Ball, of Washington, D.C., for the following statement regarding the Willows of Paradise Valley and for the distributional data included in the notes.

"That area of the Rocky-Selkirk Ranges, lying in south-eastern British Columbia, is the meeting place for both eastern and western species and northern and southern species of willows. This is true both for the species of the valleys at lower elevations and for the alpine species of elevations from 7,000-9,000 feet as in Paradise Valley."

*Salix anglorum* var. *araioclada* Schn. Smooth Alpine Willow.

Stream borders and shady slopes. Matted growth 6 to 12 inches in height. Much affected by a rust fungus. "Extends south and eastward but its northern range has not been established."

*Salix anglorum* Chamisso.

Matted growth in open woods. ". . . nearing the southern limits of its extensive northern distribution."

*Salix barrattiana* var. *angustifolia* Ands.

A dense stand on flooded flat by stream. "Extends both north and south from this area."

*Salix commutata* Bebb. Variable Willow.

Dense clumps 2-3 feet in height, wooded slope east of basin. "Extends north and south of this area."

*S. commutata* var. *denudata* Bebb. W. B. Anderson.

*S. Eastwoodiae* Cockerell.

"Farthest north of known range." W. B. Anderson.

*Salix Farrae* Ball. Farr's willow.

Stream-side border of wood; rusted. "Near the northern limits of the known distribution."

*Salix "glaucops"* Ands.

Clumps among rocks on shaly slope north ridge 8,500 feet and south ridge 8,000-9,000 feet. Bank of stream 7,000 feet, east of basin. "Extends both north and south from this area."

*Salix nivalis* Hooker. Snow Willow.

Low, dense mats or carpets on the ridges at 8,000-9,000 feet and among boulders on margin of stream in basin. "Near the northern limits of the known distribution."

*Salix pseudocordata* var. *aequalis* Anders.

Dense growth near stream east end of basin. "Near the northern limits of the known distribution."

*Salix stricta* var. *erecta* Ands.

W. B. Anderson.

*Salix vestita* Pursh. Rock Willow.

Among rocks on south ridge, where it was much dwarfed with tiny oboval leaves  $\frac{3}{4}$  inch long; a bushy clump 2 feet in height at east end of basin on wooded slope. "Extends eastward to the Atlantic area."

#### POLYGONACEÆ.

*Eriogonum ovalifolium* Nutt. Oval-leaved Eriogonum.

At and above timber-line, north ridge, forming clumps and "islands" on the loose shale.

*Eriogonum subalpinum* Greene. Sub-alpine Eriogonum.

Common on lower slopes of basin.

*Oxyria digyna* (L.) Camptdera. Mountain Sorrel.

At all levels. The topmost plant on the north ridge. One specimen, growing in loose shaly soil, had a root 38 inches long.

*Polygonum viviparum* L. Alpine Knotweed.

Banks of alpine stream. W. B. Johnstone.

#### CARYOPHYLLACEÆ.

*Sagina saginoides* (L.) Brit. Arctic Pearlwort.

Mud or gravel patches near stream-side not far from snow-bank at head of basin.

*Arenaria formosa* Fisch. Mountain Sandwort.

Frequent at all levels.

*Arenaria obtusiloba* (Rydb.) Fern. Blunt-leaved Sandwort.

Closely related to the Siberian *A. sajanensis*. Tufts among rocks above timber-line.

*Arenaria verna* L. var. *propinqua* (Rich.) Fern. Alpine Sandwort.

Scarce. In tufts among rocks above timber-line.

*Cerastium Beeringianum* C. & S. Beering's Chickweed.

South ridge on north face among loose rocks. Not common.

- Cerastium alpinum* L. Alpine Chickweed.  
Among rocks above timber-line.
- Stellaria laeta* Rich. Glaucous Starwort.  
Above timber-line among rocks on ridges and slopes.
- Silene Douglasii* Hook. Douglas Catchfly.  
In the woods east of basin.

## RANUNCULACEÆ.

- Anemone occidentalis* Freyn. Mountain Pasque Flower.  
Abundant on the meadows and lower slopes. Its fruiting tassels were very evident.
- Anemone parviflora* D.C. Northern Anemone.  
East slope in open woodland.
- Anemone Drummondii* Wats. Alpine Anemone.  
Frequent, north and south ridges above timber-line.
- Anemone multifida* Poir. Wind-flower.  
Clumps at base of rocks.
- Thalictrum occidentale* Gray. Western Meadow Rue.  
In wood east of basin.
- Ranunculus saxicola* Rydb. Mountain Buttercup.  
Not common. On moist flats in basin.
- Ranunculus acris* L. Tall Buttercup.  
One or two colonies near buildings in basin. Possibly introduced with hay.
- Ranunculus Eschscholtzii* Schlect. Eschscholtz's Buttercup.  
W. B. Anderson.
- Aquilegia flavescens* Wats. Yellow Columbine.  
Common up to and above timber-line in sheltered places, especially on the shaly slopes where they often form "islands" holding the soil about which other plants tended to gather.

## CRUCIFERÆ.

- Physaria didymocarpa* Gray. Mountain Bladder-pod.  
On shaly slopes, summit of the north ridge. It was growing as single plants, dotting the area in widely scattered individuals.
- Radicula obtusa* (Nutt.) Greene. Blunt-leaved Yellow Cress.  
Prostrate mats of it were growing luxuriantly in the vicinity of the camp buildings, possibly brought in by human agency as it was not seen elsewhere.
- Draba incerta* Pays. Uncertain Whitlow-grass.  
Scarce. In the basin and on both north and south ridges among rocks.
- Draba nivalis* Lilj. Snow Whitlow-grass.  
Scarce. South ridge, soil-pockets among rocks.
- Draba nivalis* var. *elongata* Wats.  
On talus above timber-line. W. B. Johnstone.
- Draba aligosperma* Hook. Few-seeded Whitlow-grass.  
North and south ridges.
- Draba Paysonii* var. *Treleasii* Hitch. Payson's Whitlow-grass.  
Forming compact pincushion-like pads. North and south ridges among rocks.
- Draba praealta* Greene. Tall Whitlow-grass.  
Open woods east of basin. Rare.

- Arabis Lemmoni* Wats. Lemmon's Rock-cress.  
Above timber-line. North and south ridges. Rare.
- Arabis Lyallii* Wats. Lyall's Rock-cress.  
W. B. Anderson.

## CRASSULACEÆ.

- Sedum stenopetalum* Pursh. Narrow-petaled Stonecrop.  
Frequent at all levels, occurring in open woods and on exposed summits.
- Rhodiola integrifolia* Raf. Western Roseroot.  
Gravel flats near stream and on shaly slope.

## SAXIFRAGACEÆ.

- Ribes lacustre* Poir. Prickly Currant.  
In woods and also at 8,000-foot level on steep slope at timber-line.
- Parnassia fimbriata* Banks. Fringed Grass of Parnassus.  
Common; in full flower; moist slopes and levels in meadow or open woodland.
- Mitella pentandra* Hook. Five-point Mitrewort.  
In wood east of mine.
- Heuchera ovalifolia* Nutt. Oval-leaved Heuchera.  
Open woods and trail-sides. In flower.
- Leptarrhena amplexifolia* (Sternb.) Ser. Pear-leaf.  
In dense mats in woods. Not in flower.
- Suksdorfia violacea* A. Gray. (Abrams).  
Rock crevices, 8,700 feet. W. B. Johnstone.
- Saxifraga oppositifolia* L. Purple Saxifrage.  
Occasionally found on or near the summit of the ridges, in rock crevices or near-by terraces and soil-pockets. In fruiting stage only.
- Saxifraga bronchialis* L. var. *austromontana* (Wiegand) Piper.  
The most abundant Saxifrage wherever suitable rock crevices were to be found. At all levels. Conspicuously in flower.
- Saxifraga caespitosa* L. Tufted Saxifrage.  
Rock crevices in ravine. In flower. Not common.
- Saxifraga delicatula*. Small Slender Saxifrage.  
Sparingly in basin, flats, and crevices among rocks. Flower and fruit.
- Saxifraga occidentalis* Wats. Western Saxifrage.  
Occasionally, on shaly slopes among rocks. Mostly in fruiting stage.
- Saxifraga Lyallii* Engler. Lyall's Saxifrage.  
In fruit; forming loose colonies on flats and slopes near stream.

## ROSACEÆ.

- Fragaria bracteata* Heller. Strawberry.  
Common, at all levels. The berries just ripening, were greedily devoured by chipmunks and Columbian ground-squirrels.
- Potentilla fruticosa* L. Shrubby Cinquefoil.  
Common on the slopes above basin. In flower.
- Potentilla nivea* L. Snow Cinquefoil.  
Rock crevices on the summits of the ridges.
- Potentilla dissecta* Pursh. Mountain Meadow Cinquefoil.  
Occurs at all levels from the wooded ravine to the summits. In flower at the higher levels only.

*Dryas octopetala* L. White Mountain Avens.

Common, forming dense mats on well-drained slopes and ridges, more especially at the higher levels. Not in flower.

*Geum macrophyllum* Willd. Large-leaved Avens.

Only in the vicinity of the camp building.

*Sibbaldia procumbens* L. Sibbaldia.

Common to all levels and of frequent occurrence, banks and rock-pockets.

#### LEGUMINOSÆ.

*Hedysarum sulphurescens* Rydb. Yellow Loments.

On summit of south ridge only. In flower.

*Oxytropis.* } Too withered for exact identification. South ridge.  
*Astragalus.* }

#### EMPETRACEÆ.

*Empetrum nigrum* L. Crowberry.

Recorded by Lady Byng for Paradise Mine (1937).

#### VIOLACEÆ.

*Viola adunca* Smith. Western Long-spurred Violet.

W. B. Anderson.

#### ONAGRACEÆ.

*Epilobium angustifolium* L. Fire-weed.

Common by trail-sides and moist places in the basin. A favourite food of the pika. In full flower.

*Epilobium latifolium* L. Broad-leaved Willow-herb.

On moist slopes and by stream-sides. Not in flower. As with so many fruiting species, the pods are much sought after by rodents as food.

*Epilobium Hornemannii* Reich. Hornemann's Willow-herb.

Frequent along stream-sides and on sheltered benches and slopes among rocks.

#### ERICACEÆ.

*Vaccinium membranaceum* Dougl. Mountain Bilberry.

One or two specimens in the ravine. It appears to reach its upper limits here as none was seen in the basin.

*Vaccinium scoparium* Leiberg. Red Alpine Bilberry.

The predominant ground-cover in the open woods, both in the ravine and well up towards timber-line.

*Vaccinium oreophilum* Rydb.

W. B. Anderson.

*Arctostaphylos uva-ursi* Spreng. Bearberry.

One specimen near summit of the south ridge, between 8,000 and 9,000 feet.

*Cassiope Mertensiana* Don. Keeled Moss Heather.

Growing in patches in the *Vaccinium scoparium* association. In tufts among the rocks at higher elevations. Not in flower.

*Cassiope tetragona* (L.) Don. Channeled Moss Heather.

One specimen collected near the top of the south ridge about 9,000 feet. Owing to the absence of blooms it could easily have been overlooked elsewhere as it superficially resembles the commoner *C. Mertensiana*.

*Phyllodoce empetrifolia* Don. Rose Heather.

In the open woodlands of the ravine, much less common than the following. Not in flower.

*Phyllodoce glanduliflora* (Hook.) Cov. White Heather.

Most frequently seen in the *Vaccinium scoparium* association. Abundant.

*Kalmia polifolia* Wang. Swamp Laurel.

W. B. Anderson. Also recorded by Lady Byng.

*Rhododendron albiflorum* Hook. White-flowered Rhododendron.

Small specimens, 2 feet in height, evidently the extreme upper limit at this point. In the ravine east of basin.

#### PRIMULACEÆ.

*Androsace subumbellata* (A. Nels.) Small. Small Mountain Androsace.

One small group, summit of north ridge. In fruit. Growing in a soil-pocket among rocks.

#### GENTIANACEÆ.

*Gentiana acuta* Michx. Northern Gentian.

Common, borders of trails, moist slopes, and in the meadow. In full flower.

#### HYDROPHYLLACEÆ.

*Romanzoffia sitchensis* Bong. Mist Maidens.

Among rocks on south ridge, 8,500 feet. Not in flower.

*Phacelia ciliosa* Rydb. Ciliate Phacelia.

In the ravine and on summit of the north ridge where it was more common and in flower.

#### SCROPHULARIACEÆ.

*Pentstemon fruticosus* (Pursh.) Greene. Shrubby Pentstemon.

Frequent on slopes, and among rocks, mostly in fruit.

*Pentstemon confertus* Dougl. Yellow Pentstemon.

In the ravine and on the slopes bordering the basin. In flower.

*Pentstemon albertinus* Greene.

W. B. Anderson, 6,000 feet. From the altitude recorded it was possibly taken lower down on the trail and not in the valley proper.

*Castilleja angustifolia* (Nutt.) G. Don.

"While apparently agreeing with the species var. *Bradburyi* Fernald, its low habit and alpine habitat make it doubtful." Dr. Leon Kelso.

*Castilleja rhexifolia* Rydb. Narrow-leaved Paint-brush.

In the wooded ravine.

*Castilleja occidentalis* Torr. Western Paint-brush.

W. B. Anderson, 8,000 feet. W. B. Johnstone. Alpine meadow.

*Pedicularis bracteosa* Benth. Bracted Pedicularis.

Ravine east of basin.

#### VALERIANACEÆ.

*Valeriana sitchensis* Bong. Northern Valerian.

Common at all levels. In flower.

## CAMPANULACEÆ.

*Campanula rotundifolia*. Bluebell.

One specimen in flower. Wooded ravine east of basin.

## COMPOSITÆ.

*Aster Richardsonii* Spreng. Richardson's Aster.

In the ravine to summit of the north ridge, very sparingly. In flower.

*Aster occidentalis* Nutt. Western Aster.

Trail up to mine, 6,000 feet. W. B. Johnstone.

*Aster foliaceus* Lindl. Leafy Aster.

W. B. Anderson, 8,000 feet.

*Aster foliaceus* Lindl. var. *apricus* Gray.

In the ravine.

*Aster modestus* Lindl.

Trail up to mine, 6,000 feet. W. B. Johnstone.

*Erigeron acris* L. var. *debilis* Gray. Bitter Erigeron.

At all levels, among rocks.

*Erigeron compositus* Pursh. Dwarf Mountain Erigeron.

One of the most representative and widely distributed of the erigerons in this area.

*Erigeron compositus* var. *discoideus* Gray. Rayless Mountain Erigeron.

Open rocky places in ravine.

*Erigeron compositus* var. *trifidus* (Hook.) Gray.

North ridge.

*Erigeron aureus* Greene. Golden Erigeron.

In the basin and on the summits, rock-pockets and terraces.

*Erigeron lanatus* Hook. Woolly Erigeron.

On the summits 8,500 feet to 9,000 feet, among rocks.

*Erigeron salsuginosus* (Rich.) Gray. Aster Erigeron.

In the open woods of the ravine.

*Erigeron uniflorus* L.

Grassy talus above timber-line. W. B. Johnstone.

*Aplopappus Lyallii* Gray. Lyall's Aplopappus.

Summits and slopes above timber-line.

*Solidago corymbosa* Nutt. Northern Goldenrod.

On the higher slopes above timber-line where it was most abundant. In open places in the ravine.

*Achillea borealis* Bong. Northern Yarrow.

Common, especially by trail-sides.

*Artemisia discolor* Dougl.

Paradise Basin, limestone cliffs above timber-line, could be located by the scent. W. B. Johnstone.

*Arnica cordifolia* Hook. Heart-leaved Arnica.

In the wooded ravine.

*Arnica alpina* (L.) Olm. Alpine Arnica.

On the higher slopes.

*Arnica Chamissonis* Less. Chamisson's Arnica.

Near stream in ravine.

- Arnica Rydbergii* Greene.  
W. B. Anderson, 8,000 feet.
- Arnica latifolia* Bong. Broad-leaved Arnica.  
In the ravine.
- Senecio pauciflorus* Pursh. Few-flowered Senecio.  
On the higher slopes.
- Senecio triangularis* Hook. Spear-head Senecio.  
In masses on margin of stream in ravine.
- Senecio pseud aureus* Rydb. Golden Ragwort.  
Open spaces in the ravine and along trail-side.
- Senecio Fremontii* T. & G. Fremont's Senecio.  
On the higher slopes above timber-line.
- Senecio Balsamitae* Muhl.  
Alpine meadows. W. B. Johnstone.
- Antennaria racemosa* Hook. Slender Everlasting.  
In the ravine.
- Antennaria media* Greene. Alpine Everlasting.  
Common, on flats and slopes at the higher levels; also in the ravine.
- Antennaria rosea* Greene. Rosy Everlasting.  
Sparingly in the basin, on flats among rocks.
- Antennaria lanata* Greene. Woolly Everlasting.  
On the summits among rocks. West end of basin.
- Anaphalis margaritacea* var. *subalpina* Gray. Pearly Everlasting.  
Ravine and basin.
- Saussurea densa* (Hook.) Rydb. Saw-wort.  
On the higher slopes; in shaly soil.
- Agoseris pubescens* Rydb. Downy Agoseris.  
On the shaly slopes above timber-line on the north ridge.
- Crepis nana* Rich. Dwarf Hawksbeard.  
On the summits, not common. Flower and fruit.
- Hieracium gracile* Hook. Alpine Hawkweed.  
Open wood in ravine.

## FUNGI.

At the time of our visit rainfall was frequent, and previous to this 3 inches of snow had covered the ground. It was, however, comparatively warm.

The combination of moisture and warmth resulted in conditions conducive to the development of any fungoid growth existing in the area.

Mushrooms sprang up everywhere, on or under logs, by trail-sides, and even on the decaying debris at the base of such plants as *Dryas octopetala* at an altitude of close on 9,000 feet.

The higher fungi were mostly in evidence and represented by the Agaricaceæ and Boletaceæ. Their abundance in species and especially in individuals was comparable to similar areas at sea-level. A difference, however, was noticeable in the habit of growth of many individuals, in that the sporophores tended to develop close to the edges of logs or, very often, in hollow spaces beneath, resulting in much distortion of stem and cap as they endeavoured to expand in such cramped quarters. This could be due to the wide-ranging temperature which at the altitude varied from 75° Fahrenheit at noon to below freezing at night, discouraging a more open position. Those that did develop in open situations had very short stems.

The mine tunnels furnished an ideal opportunity for mycelial growth; here the timbers in places were covered with its soft woolly-like appearance. Several sporophores arising from it were obtained.

From a small collection made in the vicinity of the mine the following genera of fungi have been tentatively determined:—

- Hypholoma*, possibly *fasicularis* Huds. Cæspitose clump at base of old fir-stump.  
*Collybia*. The species growing in the mine seems to belong to this genus.  
*Russula*. Grassy places in open woods.  
*Tricholoma*. Under logs.  
*Hygrophorus*. Trail-sides.  
*Cortinarius*. At base of *Dryas octopetala* at 9,000 feet and other more sheltered places.  
*Laccaria*. Near logs and stumps.  
*Inocybe*. On decaying vegetable debris.  
*Flammula*. On decaying logs.  
*Clyocybe*. On ground in woods and under logs.  
*Boletus*. At least two species—open woods.  
*Lycoperdon*. Puffballs were frequently observed in open grassy places.

## LICHENS.

*Evernia vulpina* L.

Abundant on dead or dying branches of trees, particularly in the sheltered ravine.

*Cladonia* species.

Common on the ground on the summits and exposed rocky slopes. Closely associated with *Selaginella* and Bryophytes.

## MOSSES.

*Bryum turbinatum* (Hedw.) Schwaegr.

*Bryum bimum* Schreber.

Along margins of running stream.

*Grimmia* species.

Margin of stream; damp ground.

*Hygrohypnum dilatatum* Wils.

In running stream.

*Philonotis fontana* Brid.

*Philonotis fontana* (Mol.) var. *tormentella*.

Margin of alpine stream.

*Pholia nutans* Lindl.

Moist soil near alpine streams or spring seepage.

*Polytrichum juniperinum* Willd.

A feature of the ground-cover at high elevations in company with *Selaginella* and *Cladonia*.

*Polytrichum piliferum* Schreb.

*Rhacomitrium canescens* Brid.

Very dwarf form. South ridge 9,000 feet.

*Schleropodium cæspitosum* (B. & S.).

*Tortula ruralis* Ehrh.

## BIRDS.

Birds were not particularly conspicuous in the vicinity of the mine at the time of our visit. The following notes are based mainly on observations made by the members of our party and consequently can give only an incomplete picture of the bird life of this area.

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

A lone individual was seen.

*Aquila chrysaetos canadensis* (Linnæus). Golden Eagle.

A bird in juvenile plumage was seen near the mine buildings on several occasions. A mine-worker reported seeing an eagle perched on a dead snag overlooking a rock-slide, apparently on the watch for marmots.

*Circus hudsonius* (Linnæus). Marsh Hawk.

An immature bird was seen flying low over the alpine meadows apparently searching for mice. The bird paid no attention to pikas which were calling from the near-by rock-slides.

*Dendragapus obscurus richardsoni* (Douglas). Richardson's Grouse.

Common in the wooded area immediately below the mine buildings.

*Lagopus leucurus altipetens* Osgood. Southern White-tailed Ptarmigan.

A flock of nine individuals, of which two were adults, was seen among the rocks at the upper end of the valley on one occasion. The crops of an adult and a juvenile taken a few days previously by Mr. Johnstone were found to contain galls of Arctic willow and leaves of Alpine buttercup, *Ranunculus saxicola*.

*Surnia ulula caparoch* (Müller). American Hawk-owl.

According to Mr. Ed Barbour, an employee of the mine, a hawk-owl was seen almost daily preying upon ptarmigan.

*Colaptes cafer collaris* Vigors. Red-shafted Flicker.

Commonly seen and heard in the wooded area.

*Dryobates villosus monticola* Anthony. Rocky Mountain Hairy Woodpecker.

A lone bird was seen.

*Otocoris alpestris articola* Oberholser. Arctic Horned Lark.

A flock of six birds, presumedly of this subspecies, was seen near the summit of the ridge overlooking the valley from the south.

*Perisoreus canadensis capitalis* Ridgway. Rocky Mountain Jay; Whiskey Jack.

Jays are said to be commonly seen later in the season; none was observed during our stay at the mine.

*Nucifraga columbiana* (Wilson). Clark's Nutcracker; Clark's Crow.

A small flock of these birds was seen or heard almost daily in the vicinity of the camp and occasionally high up the rock-slides.

*Penthestes gambeli gambeli* (Ridgway). Mountain Chickadee.

Small flocks of chickadees, apparently of this subspecies, were seen on several occasions.

*Sitta canadensis* Linnæus. Red-breasted Nuthatch.

Individuals probably of this species were occasionally seen and heard.

*Cinclus mexicanus unicolor* Bonaparte. American Dipper; Water-ouzel.

A dipper was seen along the upper reaches of Spring Creek.

*Corthylio calendula calendula* (Linnæus). Eastern Ruby-crowned Kinglet.

Present in small numbers.

*Dendroica auduboni auduboni* (Townsend). Audubon's Warbler.

A group of five was seen on one occasion.

*Leucosticte tephrocotis* (Swainson). Rosy Finch; Leucosticte.

A flock of about twenty-five of these birds was seen near the summit of the north ridge on August 30th, but as no specimens were secured the subspecies could not be determined.

*Junco oreganus shufeldti* Coale. Shufeldt's Junco.

Several immature individuals, probably of this subspecies, were seen on a number of occasions.

*Zonotrichia leucophrys gambeli* (Nuttall). Gambel's Sparrow.

Several immature birds were seen.

*Passerella iliaca schistacea* Baird. Slate-coloured Fox Sparrow.

#### MAMMALS.

During the short time at our disposal an attempt was made to obtain as complete a picture as possible of the mammals in the area under study. This was mainly accomplished by extensive and intensive trapping, aided by observation and information supplied by some of the mine employees. The following list is based on the results of these activities; while incomplete, it gives a measure of the variety and abundance of the mammalian fauna of the region.

*Sorex obscurus obscurus* Merriam. Dusky Shrew.

A few shrews were taken along the stream-banks in the same runs used by field mice.

*Sorex palustris navigator* (Baird). Rocky Mountain Water Shrew.

A pair of these large shrews was taken in traps set along the edge of Spring Creek not far from the mine buildings.

*Microtus longicaudus mordax* (Merriam). Long-tailed Meadow Mouse.

The meadow mouse seemed to be by far the most numerous rodent in the meadow lands bordering Spring Creek and its tributaries. A series of eighteen specimens was taken; one-half were females and, of these, six were carrying young. Individuals were seen occasionally in broad daylight.

*Microtus richardsoni richardsoni* (De Kay). Richardson Meadow Mouse.

Judging by the numerous runways this largest of meadow mice, attaining a length of 9 inches, was apparently common in the Spring Creek area near the mine buildings, but we succeeded in trapping two immature specimens only.

*Peromyscus maniculatus artemisiæ* (Rhoads). Sage-brush White-footed Mouse.

White-footed mice were the most common rodent around the mine buildings. The greater proportion of those taken were juveniles.

*Clethrionomys gapperi saturatus* Rhoads. British Columbia Red-backed Mouse.

Red-backed mice were found to be most commonly taken in the forested area immediately below the mine building. One female contained well-developed embryos and several of the males were in breeding condition.

*Zapus princeps idahoensis* Davis. Idaho Jumping Mouse.

Jumping mice were taken in the open meadow-land where long-tailed voles were also collected. They did not appear to be common.

*Phenacomys intermedius intermedius* Merriam. Rocky Mountain Phenacomys.

Specimens of this mouse-like rodent were taken in traps set in "runs" also used by meadow mice. They appeared to be fairly numerous.

*Citellus columbianus columbianus* (Ord). Columbian Ground-squirrel.

Ground-squirrels, locally called "gophers," were exceedingly common in the mine area. Although those of the main valley, 4,500 feet below, had gone into hibernation about August 22nd (date supplied by Mr. Johnstone) those at timber-line were still

active up to the last day of our stay and showed no signs of retiring to their burrows for the winter.

Individuals were occasionally seen 10 to 12 feet up trees, down which they scampered at the least alarm. The trees ascended were mostly larch and the attraction seemed to be cones and tender needles on new shoots. Three ground-squirrels were seen in three separate trees at one time on one occasion.

This colony near the mine workings was also noteworthy for the fact that a number of the members were albinos. At least three white individuals were observed; one, collected as a specimen, possessed the pure white pelt and pink eyes characteristic of complete albinism. The albinos also appeared to be more fearless than the normal coloured individuals, permitting close approach for observation and photography.

Dr. John F. Walker, Deputy Minister of Mines, informs us that albino ground-squirrels were observed by him in the same location in 1922. It would appear that albinistic individuals are not rapidly annihilated by their natural enemies, despite the fact that their lack of pigment renders them comparatively conspicuous.

*Callospermophilus lateralis tescorum* Hollister. Hollister's Mantled Ground-squirrel.

Mantled ground-squirrels were said to be numerous around the mine in 1943, but at the time of our visit only one was observed. This was an immature male taken within a few yards of the office building.

*Eutamias minimus oreocetes* Merriam. Timber-line Chipmunk.

This small chipmunk was fairly common in the vicinity of the mine buildings. It is distributed from Glacier Park, Montana, through timber-line areas of the mountains to the Banff-Kootenay Park region.

*Tamiasciurus hudsonicus streatori* Allen. Streater Red Squirrel.

Squirrels were fairly numerous in the ravine below the mine buildings. They seemed to be engaged in removing cones from balsam fir, an activity which resulted in their fur becoming much matted with pitch.

One of three specimens taken at the mine is referable to the subspecies *richardsoni*; the remaining two also have tendencies toward this subspecies, according to Dr. Cowan.

*Glaucomys sabrinus latipes* Howell. Broad-footed Flying Squirrel.

One pair of flying squirrels was taken in a trap baited with meat and set in the wooded ravine below the camp.

*Neotoma cinerea occidentalis* (Baird). Western Bushy-tailed Wood Rat.

Wood rats or pack rats were apparently numerous around the mine buildings, as indicated by droppings and the sickly odour peculiar to these animals.

An adult male was taken in a trap near the mine compressor; two others were seen in broad daylight near the office building.

Dr. Cowan states that specimens examined show some trend to the subspecies *drummondi*, which is found in Southern British Columbia and southward.

*Ochotona princeps princeps* (Richardson). Rocky Mountain Pika; Rock-rabbit; Cony.

Pikas were abundant in rock-slides opposite the mine buildings and near the head of the valley among rocky ledges. At least one individual frequented a rock embankment a few yards from the office and a juvenile was frequently seen seeking refuge under the building itself.

Accumulations of cuttings were found in all suitable places and were often the only signs of the presence of the animals themselves. A few of the larger "hay-stacks" were examined and found to contain plant material identified as follows: *Anemone multifida*, *Antennaria media*, *A. lanata*, *Arnica alpina*, *Fragaria bracteata*, *Salix nivalis*, *S. anglorum* var. *araioclada*, *Potentilla nivea*, *Pinus albicaulis*, *Valeriana sitchensis*, *Aquilegia flavescens*, *Dryas octopetala*, *Epilobium latifolium*, *Phyllodoce glanduliflora*, *Carex festivella*, *Agropyron trachycaulon*, *Trisetum spicatum*.

*Marmota caligata okanagana* (King). Okanagan Hoary Marmot; Whistler.

About a dozen marmots occupied the large rock-slide directly opposite the mine buildings. One or two appeared to be of large size and particularly wary. A medium-sized individual was shot but it disappeared beneath a large boulder before it died. The following day its body was found on top of the boulder; the throat portion was eaten away. We were unable to decide whether the animal climbed to the top of the boulder to die or whether the body was dragged there by other marmots.

Grizzly bears and Golden eagles appear to be their chief enemies.

*Erethizon epixanthum nigrescens* Allen. Dusky Porcupine.

A porcupine was seen in an abandoned building near the cook-house the day before we arrived at the mine, but none was seen during our stay. Several pine-trees in the vicinity showed extensive damage by porcupine, the bark being almost entirely removed in some cases.

*Mustela frenata oribasa* (Bangs). Mountain Weasel.

An adult female was taken in the wooded ravine below the camp.

Mr. Barbour, an employee who has spent much time at the mine, told us that he had often seen a weasel hunting ground-squirrels opposite the engine-house.

*Mustela cicognani richardsonii* (Bonaparte). Richardson Weasel.

One individual, apparently of this subspecies, was observed a few yards from the office building.

*Martes americana* ssp. Marten.

Traps set in likely places for marten failed to catch a specimen during the period of our stay. Nevertheless, it is known that marten visit the area at times since one was seen almost weekly during the previous year near the engine-house of the mine.

*Euarctos americanus americanus* (Pallas). American Black Bear.

An occasional bear is seen near the mine. A few days after our departure one was observed near camp by Mr. Fred Reger, officer in charge of the mine.

*Ursus horribilis* Ord. Grizzly Bear.

No grizzlies were observed by us during our stay but fairly recent droppings and diggings for ground-squirrels were present both near the mine and at the end of the valley, indicating that these animals occasionally visit the valley.

*Canis latrans* ssp. Coyote.

Coyotes are said to be commonly seen in the vicinity of the mine. One was noted shortly before our arrival; tracks were observed in several places above the mine-shafts. A lone individual was seen on the road near Toby Creek on our way to the highway.

*Canis lupus* ssp. Timber Wolf.

A large-sized wolf is said to be a common visitor to the valley. According to Mr. Barbour, a typical individual is black with white chest and grey on shoulders and weighs about 150 lb.

A wolf of this description was seen by one of us on the hillside above the mine workings. The animal trotted across the slope leaving 4-inch tracks in the loose shale fragments.

*Gulo luscus* Linnæus. Wolverine.

Dr. and Mrs. I. A. Richards, of Cambridge, Mass., who used Paradise Mine as a base camp for an ascent of Mount Nelson, report seeing a wolverine on the ridge behind the mine.

*Odocoileus hemionus hemionus* (Rafinesque). Mule Deer.

Deer were quite common and several were seen, particularly at a point not far from the mine buildings where a quantity of old blasting-powder had been destroyed

by fire. Here, the earth apparently contained a concentration of salts and mineral matter which was attractive to game; the ground was much pawed, trampled, and browsed.

*Alces americana* (Clinton). Moose.

Although the territory in the vicinity of the mine does not include typical moose habitat, individuals occasionally ascend to this elevation. A bull was shot not far below the mine-site sometime previous to our visit.

*Rangifer montanus* Seton-Thompson. Mountain Caribou.

Caribou are reported to be seen occasionally in the Spring Creek Valley during periods of hot weather, when they apparently seek shelter from flies, according to Mr. Barbour.

*Oreamnos americanus americanus* (Blainville). Rocky Mountain Goat.

Mountain-goat are common in the Purcell Mountains in the higher altitudes. A flock of three adults and two juveniles was seen on the north slope of the valley on the first morning of our visit. Two other individuals were seen over the south ridge a few days later.

#### MISCELLANEOUS INVERTEBRATES.

##### SPIDERS.

Several spiders obtained on the summit have been determined by Mr. T. B. Kurata, of the Royal Ontario Museum of Zoology at Toronto. They are listed below, together with his comments.

*Lycosa fumosa* Emerton.

"This is a rather rare species." North ridge, 9,000 feet.

*Pardosa Mackenziana* Keys. North ridge, 9,000 feet.

*Pardosa albomaculata* Emerton.

"Pardosas are rather common right through northern Canada."

*Gnaphosa brumalis* Thorell.

North ridge, 9,000 feet. "Distribution as in *Pardosa* but less common."

All the above spiders were found as they were running actively over the ground in search of prey.

##### INSECTS.

Attention was chiefly centred on the Lepidoptera and Coleoptera among the insects, more as an auxiliary to other pursuits than as the main purpose. The lateness of the season and absence of sunshine over the greater part of the time spent in the area was not conducive to insect activity; even annoying species such as mosquitoes and black-flies were conspicuous by their absence.

##### *Grylloblatta.*

*Grylloblatta campodeiformis* Walker.

In rotten logs, both in the ravine and at the west end of basin; uncommon.

##### *Ground Beetles.*

*Carabus taedatus* Fab.

Under logs in ravine.

*Nebria crassicornis* Vand.

Frequent under logs and decaying debris.

*Nebria labridorica* Csy.

With the former; while not very common it was perhaps more often met with than any other one species of beetle.

*Pseudonomareetus relictus* Horn.

Occasionally found under logs and stones.

*Cymindis cribricollis* Dej.

Among vegetable debris.

*Click-beetles.*

*Ludius aeripennis* Kby.

*Ladybird Beetles.*

*Hippodamia 5-signata* Kirby.

On rock at summit, 9,000 feet.

*Long-horn Beetles.*

*Anoploclera canadensis* (Oliv.) Swaine & Hopping.

One dead specimen of the form with red elytra was dug out of an old pupal cell in the stump of *Larix Lyallii*. The stump was riddled with exit holes evidently of this species. The larvæ seemed to have reacted to the southern sunny side, for this aspect of the stump or dead portions of living trees always bore more exit holes than any other, wherever the affected trees were isolated or exposed. The species ranges across the continent.

*Criocephalus asperatus* LeC.

One was taken outside a building window, whither it had no doubt been attracted by artificial light the preceding evening. This is a species western in distribution.

*Anoploclera chrysocoma* (Kirby) Swaine & Hopping.

On flowers of *Senecio pseud aureus*. Of wide distribution across the continent.

*Anoploclera tibialis* (LeC) Swaine & Hopping.

On flowers, *Senecio pseud aureus* and *Achillea borealis*. A mountain species of wide American distribution.

*Butterflies.*

*Parnassius smintheus* D. & Hew.

Flying on the high slopes above timber-line. The flight was steadily maintained 2 or 3 feet above the ground; occasionally the insect rested to sun itself on the shale with outspread wings. Three or four specimens were seen in addition to the one captured.

*Argynnis hydaspe* race *sakuntula* Skin.

One newly emerged specimen was taken near camp as it flew along a trail.

*Brenthis bischoffi* race *washingtonia* B. & McD.

A worn individual was taken at rest on a log near camp.

*Polygonia progne* Cramer.

Flying about flowering banks; or sunning themselves on the ground.

*Eurymus eurytheme* fr. *amphidusa* Bdv. Boiduval's Sulphur.

One female was obtained.

*Eurymus eurytheme* fr. *eriphyle* Edw. Yellow Sulphur.

Several specimens of this species were taken, including both yellow and pale females.

*Moths.*

*Eustroma nubilata* Pack. Clouded Brown.

Flying about during the afternoon in open woods near timber-line.

*Hepialus hyperboreus* Mosch. Northern Ghost Moth.

Several were seen. Specimens were taken as they hovered about the woodland vegetation in late afternoon or at dusk.

## Bees.

*Bremus edwardsii* (Cress.)

*Bremus occidentalis* (Greene).

Both of these bees were abundant on flowers of *Senecio triangularis*, where they could be found resting during the evening or early morning, clinging half-numbed until warmed by the sun. On wet days some specimens could always be found under the flower-heads or on the stems of the plant.

*Psitherus insularis* (Smith).

Taken with the former. Members of this genus have no worker. The female deposits her eggs in the nest of a species of *Bremus*; the larvæ are reared to maturity by the workers of the host species.

## Fleas.

In connection with his research on Canadian fleas, Mr. George P. Holland, of the Dominion Livestock Insect Laboratory, Kamloops, made special efforts to collect all available flea specimens from the mammals taken at Paradise Mine. He has kindly supplied the identification and notes presented in the following list.

*Catallagian decipiens* Rothschild. Common on mice, especially at lower altitudes.

Host: Long-tailed meadow mouse.

*Ctenophyllus terribilis* (Rothschild). Regularly found on pikas.

Host: Rocky Mountain pika.

*Delotelis telegoni* (Rothschild). Rarely found.

Host: Long-tailed meadow mouse.

*Megabothris abantis* (Rothschild). Fairly common on mice at high altitudes.

Hosts: White-footed mouse, Red-backed mouse, Rocky Mountain phenacomys, Rocky Mountain pika, Mountain weasel.

*Megarhroglossus divisus exsecatus* Wagner. Rarely found.

Host: Broad-footed flying squirrel.

*Monopsyllus e. eumolpi* (Rothschild). Very commonly found.

Host: Timber-line chipmunk.

*Monopsyllus vison* (Baker). Common on red squirrels east of the Cascades.

Host: Streater red squirrel.

*Monopsyllus w. wagneri* (Baker). Common on mice, especially at lower altitudes.

Hosts: White-footed mouse, Red-backed mouse.

*Nearctopsylla brooksi* (Rothschild). Rarely collected.

Host: Mountain weasel.

*Orchopeas caedens durus* (Jordan).

Host: Streater red squirrel.

*Orchopeas sexdentatus agilis* (Rothschild). The common flea of wood rats.

Host: Bushy-tailed wood rat.

*Oropsylla idahoensis* (Baker). The common flea of ground-squirrels in British Columbia.

Hosts: Columbian ground-squirrel, Mountain weasel (by predation), Rocky Mountain pika (by accident).

*Peromyscopsylla selenis* (Rothschild). Fairly common on mice at high altitudes.

Hosts: Long-tailed meadow mouse, Rocky Mountain phenacomys.

*Peromyscopsylla ravalliensis* (Dunn). Rarely taken.

Host: Bushy-tailed wood rat.

*Rectofrontia fraterna* (Baker).

Host: Rocky Mountain phenacomys.

*Tarsopsylla* sp. [*coloradensis* (Baker) ?]. Rarely collected.

Hosts: Streater red squirrel, Broad-footed flying squirrel.

*Thrassis spenceri* Wagner.

Host: Okanagan hoary marmot.

*Molluscs.**Vitrina alaskana* Dall.

On two occasions a few of these small land snails were found creeping over mammal traps set in damp situations. Other specimens were found under forest debris in the ravine below the road.

The species is generally distributed in the Rocky Mountains from New Mexico northward.

*Hemphillia camalus* Pilsbry and Vanotta.

Several of these slugs were found in cavities beneath rotting logs in the ravine. One was taken on a trap where it was apparently attracted by the nut and oatmeal bait.

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