

PROVINCE OF BRITISH COLUMBIA
DEPARTMENT OF EDUCATION

PROVINCIAL MUSEUM
of NATURAL HISTORY
and ANTHROPOLOGY

Report for the Year 1951



PRINTED BY
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VICTORIA, B.C.

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*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 1951.

WM. T. STRAITH,
Minister of Education.

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

PROVINCIAL MUSEUM OF NATURAL HISTORY
AND ANTHROPOLOGY,

VICTORIA, B.C., May 2nd, 1952.

The Honourable W. T. Straith,
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 1951.

I have the honour to be,

Sir,

Your obedient servant,

G. CLIFFORD CARL,

Director.

DEPARTMENT OF EDUCATION

The Honourable W. T. STRAITH, *Minister.*

F. T. FAIREY, B.A., LL.D., *Deputy Minister and Superintendent.*

PROVINCIAL MUSEUM OF NATURAL HISTORY AND ANTHROPOLOGY

Staff:

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

GEORGE A. HARDY, *Assistant in Botany and Entomology.*

CHARLES J. GUIGUET, M.A., *Assistant in Biology.*

WILSON DUFF, B.A., *Assistant in Anthropology.*

MARGARET CRUMMY, B.A., *Secretarial Stenographer.*

BETTY C. NEWTON, *Artist.*

SHEILA GRICE DAVIES, *Typist.*

E. J. MAXWELL, *Attendant.*

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REPORT OF THE PROVINCIAL MUSEUM FOR THE YEAR 1951

REPORT OF THE DIRECTOR

NEW EXHIBITS

No major changes have been made in the public galleries during 1951. Two new anthropological exhibits were installed, as noted later in this Report, and two displays of small mammals were reorganized. A demonstration colony of bees installed by Dr. J. B. Munro and maintained through the spring and summer months received a great deal of attention from both adults and children.

SPECIAL EXHIBITS

In May examples of wild-life illustrations by a local artist and illustrator, Robert H. Savery, were placed on view. These included paintings and black-and-white studies of both native and foreign birds, mammals, and fishes. During the first week of July a temporary exhibit featured portrait studies and wild-flower paintings, the work of the Museum staff artist, Miss Betty C. Newton.

The Tenth Annual Exhibition of British Columbia Indian Arts and Crafts was held in the Museum, commencing on July 9th, under the sponsorship of the British Columbia Indian Arts and Welfare Society. The display was officially opened by the Honourable W. T. Straith, Minister of Education, and prizes were awarded by Lieut.-Col. G. Howland, president of the society.

In August a collection of bird portraits was on display, the work of a young local artist, Fenwick Lansdowne.

FIELD WORK

Apart from local field work undertaken by various staff members as reported elsewhere, one major collecting trip was made in May of this year to the Okanagan Valley. Personnel consisted of G. C. Carl, C. J. Guiguet, and G. A. Hardy, and the areas studied included Osoyoos Lake region near the town of Osoyoos and also Anarchist Mountain and White Lake. A day trip was made to mountain-sheep range up McIntyre Creek, east of Vaseaux Lake, in company with A. J. Braun, of Oliver, and a visit was made to two small lakes near Vernon in company with S. J. Darcus, of Penticton. Specimens of plants, insects, small mammals, and birds were taken in these areas for the Museum's collections and motion pictures were made for future use.

In April Mr. Duff was able to visit the Indian eulachon-fishery at the head of Knight Inlet through the courtesy of the Dominion Fisheries Service, who provided transportation.

In June Mr. Guiguet accompanied Mr. Duff on a reconnaissance trip to the central portion of the Province, where Mr. Duff obtained preliminary information on Indian occupation of the Tweedsmuir Park area in preparation for a detailed archaeological study to be made by Dr. Charles E. Borden of the University of British Columbia. While this was being done, Mr. Guiguet made a general collection of birds and mammals in the areas visited.

For two months from June 15th the Director was away on leave of absence in order to join the Summer School staff of the University of Washington Oceanographic Labora-

ories at Friday Harbor, Wash. While there he collected some research material on the rat-fish and took further motion pictures on marine life for use in the Museum's series of films.

On October 5th and 6th the Director attended the Western Museums' Conference, held in San Francisco at the California Academy of Sciences. One hundred and seventeen delegates representing forty organizations were present to hear papers presented on a variety of topics concerning museums and museum techniques. While in California the Director visited the following institutions: California Academy of Sciences, M. H. DeYoung Memorial Museum, California Palace of the Legion of Honor, San Francisco Museum of Art, Josephine D. Randall Junior Museum (all of San Francisco), Santa Barbara Museum of Natural History (Santa Barbara), Los Angeles County Museum, Allan Hancock Foundation Museum (Los Angeles), San Diego Museum of Natural History, San Diego Museum of Man, San Diego Zoological Gardens, Scripps Institute of Oceanography (La Jolla), Pacific Grove Museum of Natural History (Pacific Grove), California Junior Museum (Sacramento), Portland Junior Museum (Portland, Ore.), Oregon Museum of Science and Industry (Portland). The following aquariums were also studied: Seaside Aquarium (Seaside, Ore.), Depoe Bay Aquarium (Depoe Bay, Ore.), Crescent City Aquarium (Crescent City, Calif.), Steinhart Aquarium (San Francisco, Calif.), Thomas Wayland Vaughan Aquarium-Museum (Scripps Institute of Oceanography, La Jolla, Calif.).

Appreciation is expressed here of the many courtesies extended by the staff members of the various museums, galleries, and aquariums visited on this tour. Thanks are also extended to Dr. Robert C. Miller, Director of the California Academy of Sciences in San Francisco; Dr. Arthur S. Coggeshall, Director of the Santa Barbara Museum of Natural History; and C. B. Perkins, Curator of Reptiles, San Diego Zoological Gardens, for permission to photograph certain of the living animals in their care.

PUBLICATIONS

During 1951 the following publications originated from the Museum:—

By G. Clifford Carl—

“Simple Models as Teaching Aids. I—Adaptations in Fins of Fishes.”
British Columbia Schools, Elementary Edition, Vol. 7, No. 1, pp. 53–56.

“The Reptiles of British Columbia.” British Columbia Provincial Museum
Handbook No. 3 (Second Edition, revised), pp. 1–65.

“The Thresher Shark in British Columbia.” Canadian Field-Naturalist, Vol.
65, No. 2, p. 83.

By G. Clifford Carl, C. J. Guiguet, and George A. Hardy—

“Biology of the Scott Island Group, British Columbia.” Report of the Pro-
vincial Museum for 1950, pp. 21–63.

By Wilson Duff—

“Indian Natural History.” Victoria Naturalist, Vol. 7, No. 8, pp. 92–94; Vol.
7, No. 9, pp. 103–106; and Vol. 8, No. 2, pp. 16–17.

“Notes on Carrier Social Organization.” Anthropology in British Columbia,
No. 2, pp. 28–34.

By Wilson Duff (editor)—

“Anthropology in British Columbia.” No. 2, British Columbia Provincial
Museum, pp. 1–52.

By Viola E. Garfield and Wilson Duff—

“Anthropological Research and Publications.” Anthropology in British Co-
lumbia, No. 2, pp. 2–13.

By C. J. Guiguet—

“Notes on Blue Grouse.” *Victoria Naturalist*, Vol. 8, No. 5, pp. 49–50.

“An Account of Wolverine Attacking Mountain Goat.” *Canadian Field-Naturalist*, Vol. 65, No. 5, p. 187.

By G. A. Hardy—

“The Vapourer Moth, *Notolophus antiqua badia* Hy. Edw.” *Victoria Naturalist*, Vol. 7, No. 7, pp. 79–80.

“Wild Flowers.” *Victoria Naturalist*, Vol. 7, No. 8, pp. 91–92.

“The Plant and Insect World in September.” *Victoria Naturalist*, Vol. 8, No. 3, pp. 27–29.

“The Hard-skinned Earth Star, *Scleroderma geaster* Fr.” *Victoria Naturalist*, Vol. 8, No. 4, pp. 37–38.

“The Dryad’s Broom.” *Victoria Naturalist*, Vol. 8, No. 4, p. 37.

“Two Recent Plant Additions to Vancouver Island.” *Victoria Naturalist*, Vol. 8, No. 5, pp. 54–55.

“Notes on the Life History of the February Highflyer, *Hydriomena Nubilofasciata* f. *vulnerata* Swet.” *Proceedings B.C. Ent. Soc.*, 47, pp. 25–26.

By Barbara S. Lane—

“The Cowichan Knitting Industry,” *Anthropology in British Columbia*, No. 2, pp. 14–27, 7 illustrations.

By Charles E. Borden—

“Facts and Problems of Northwest Coast Prehistory.” *Anthropology in British Columbia*, No. 2, pp. 35–52, 2 plates.

Material on game fishes taken from “The Fresh-water Fishes of British Columbia,” by Carl and Clemens (*B.C. Prov. Mus. Handbook No. 5, 1948*), was reprinted in “Fisherman’s Guide,” produced by Island Agency, Victoria, B.C.

A “Programme of Native Dances,” prepared for presentation to Princess Elizabeth and the Duke of Edinburgh on the occasion of the Royal Visit to Victoria on October 22nd, was based on material provided by Mr. Duff.

MOTION PICTURES

During the year, motion-picture material of various sorts has been gathered for incorporating in existing films or for use in films planned for the future. Thus several hundred feet of colour film on the following have been gathered: Birds (chiefly in the Okanagan Valley), marine fishes, and reptiles. Some of the reptile material was obtained during a trip to California, as noted elsewhere. In the anthropological field, motion pictures were made of a revival of dances of the Alberni Indians in connection with their contribution to the May 24th celebrations in that district and with the Royal Visit.

EDUCATION

MUSEUM LECTURES

A spring programme of motion pictures was again presented to school-children of the Greater Victoria area, as shown in the following schedule:—

Date	Topic	Attendance
February 3	“The Beginning of Things”	729
February 10	“Creatures of the Sea-shore”	729
February 17	“Beetles and Bees”	601
February 24	“Birds of a Feather”	672
March 3	“Animals in the Wild”	481
March 10	“Animals in Modern Life”	582
March 17	“Peoples of the World”	561
	Total	4,455

These programmes are made possible by the co-operation of many persons. We wish to especially thank the British Columbia Electric Railway Company for granting special travel privileges to school-children attending the film-show, the Audio-Visual Education Branch of the Greater Victoria School Board for distribution of tickets to the schools, and the Public Relations Branch, British Columbia Forest Service, for the loan of a phonograph turn-table.

A similar but augmented series of films was presented each Sunday at 2.30 p.m. for the general public. More than 2,750 persons attended the seven presentations. Many persons were turned away from the doors due to the large attendance on several occasions.

OTHER LECTURES

Other lectures and film-shows were given by the Director to the following groups: Victoria Natural History Society (two lectures), Doncaster School Parent-Teacher Association, Oak Bay Kiwanis Club (two lectures), Victoria Aquarium Society (two lectures), Victoria Kiwanis Club, St. Martin's-in-the-Field Church, Victoria Fish and Game Protective Association, Victoria Electric Club, Zoology Group of the Victoria Natural History Society, Cloverdale Parent-Teacher Association, Margaret Jenkins Parent-Teacher Association, Federal Fisheries Officers (Nanaimo), West Saanich School (two lectures), Quadra Parent-Teacher Association, Belmont United Church Men's Group, Victoria Gyro Club, Oak Bay High School Parent-Teacher Association, Capital City Commercial Club, Victoria West United Church, North Kiwanis Club (Victoria), Victoria Lions Club (two lectures), Victoria West Parent-Teacher Association, Greater Victoria Teachers' Association, Greater Victoria Boy Scouts Council, St. Mary's Junior A.Y.P.A., Victoria College, Seattle Audubon Society, Alberni Canadian Club, Comox Canadian Club, Qualicum-Parksville Canadian Club, Nanaimo Canadian Club, Duncan Canadian Club, St. Andrew's Men's Club (Victoria), Victoria Normal School (two lectures), Oceanographic Laboratories (Friday Harbor), First United Church Women's Group, Esquimalt Lions Club, Victoria Amateur Movie Club, Western Museums' Conference (San Francisco), Senior Citizens Campaign Council, Y.M.C.A. Women's Social Club, St. Aidan's Men's Group, Victoria Comitas Club, Vancouver Island Teachers' Convention (Nanaimo), Lake Cowichan Parent-Teacher Association, Vancouver Natural History Society, Victoria Outdoor Club, Ladysmith Fish and Game Protective Association, Mount View High School Parent-Teacher Association, Mount View High Biology Class, and general public in Museum (two lectures).

The Director also took part in a radio interview in connection with the film "Kon Tiki," being shown in a local theatre.

SCHOOL LOAN MATERIAL

A new addition to the series of dioramas depicting Indian life of the Province was completed by Miss Betty Newton. Entitled "Kootenay Sun Dance Number 2," it shows details of this colourful ceremony, including methods of construction of the mat and skin lodges used on these occasions. About three dozen photographic sets of other dioramas were cut out and coloured by Miss Newton for the Division of Visual Education, which is now undertaking to circulate these materials through the schools.

Miss Newton has also prepared a series of twenty-four studies of wild flowers in colour for future use as illustrations.

ATTENDANCE

The number of visitors to the Museum during 1951 is summarized as follows:—

	Registered	Estimated
January	808	1,077
February	5,373	7,164
March	4,570	6,009
April	1,498	1,997
May	2,407	3,209
June	5,530	7,373
July	10,437	13,916
August	11,376	15,168
September	5,154	6,872
October	1,474	1,965
November	998	1,330
December	630	840
Totals	50,255	66,920

In addition to these visitors, there were 4,455 children who attended the Saturday morning film programmes, 33 school classes, 30 meetings of Junior Naturalist classes, and 2,787 persons who attended the Sunday afternoon programmes in February and March and 200 members of the Victoria and District Parent-Teacher Council, making an estimated grand total of 75,973.

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

Residence	Registration	Residence	Registration
British Columbia	1,726	Washington	1,764
Alberta	444	Oregon	1,108
Saskatchewan	353	California	2,256
Manitoba	196	Alaska	12
Ontario	383	Other States	1,758
Quebec	72	Great Britain	68
New Brunswick	5	Other countries	278
Nova Scotia	11		
Prince Edward Island	3	Total	7,244
Total	3,193	Grand total	10,437

The sum of \$495.73, collected by the Solarium donation-box during the year, was turned over to the Queen Alexandra Fund for Crippled Children.

OBITUARY

We regretfully record here the passing of Walter S. Maguire on March 5th, 1951, at New Westminster, B.C. In biological circles he was well known locally as a popular lecturer, and in the field of oology he was known throughout the continent. On several occasions in recent years he had been of service to this Museum both as a lecturer and as a specialist in preparing sets of birds' eggs for scientific purposes. While his extensive collection of beautifully prepared birds' eggs, now housed at the University of British Columbia, will stand as a memorial to his interest in the wild life of this Province, fellow-students will miss his cheerful companionship.

GIFTS RECEIVED

A gift to the Museum, not previously acknowledged publicly, in the form of a cheque for \$25 was received in 1950 from Francis R. Cope, Jr., of Dimock, Pa. It was used in

the purchase of a set of balances for weighing small mammals and birds in the field, a piece of equipment which has already proved most useful.

The Museum library has also received a copy of the two-volume set "Oceanic Birds of South America," by Robert Cushman Murphy, through the generosity of Mrs. E. J. T. Woodward, the well-known wild-life artist of Victoria, B.C. Mrs. Woodward has also presented to the Museum two large paintings in oils—one of the Coast deer and one of the cougar—painted and framed especially for the purpose. The studies now hang in the exhibition hall on the main floor of the building.

We wish to express our thanks to Mr. Cope and to Mrs. Woodward for these gifts.

BUILDING MAINTENANCE AND EQUIPMENT

Early in the year the painting and redecorating of the main floor was completed. The basement rooms remain to be done, possibly when the Indian exhibits are reorganized. In the fall, fluorescent lights were installed in the Anthropologist's office.

REPORT OF THE ASSISTANT IN BOTANY AND ENTOMOLOGY

BOTANY

ACTIVITIES

The total number of plants acquired by the herbarium amounted to 500 specimens. Most of these were collected by the botanist on the several field-trips undertaken during the year.

Sheets mounted, filed, and ready for shelving amounted to 600. This work was efficiently attended to by Mrs. S. Davies. Many additional sheets are in the course of preparation.

As hithertofore, inquiries from the public from varied sources throughout the Province have demanded considerable attention, particularly during the spring and summer months. These queries cover a wide field, including identification and uses of plant species, loans of specimens for specialistic work, and requests for information for publication and school purposes.

Among collections examined or under examination by specialists may be mentioned those of the genus *Dodecatheon* by Miss Katherine Beamish at the University of British Columbia, the family Araceæ by Dr. Huttleston at the Brooklyn Botanic Garden, Brooklyn, N.Y., and the genus *Oenothera* by Dr. H. H. Bartlett, Botanical Garden, University of Michigan, Ann Arbor, Mich.

The exhibit of seasonal wild flowers maintained as in past years continued to be an attractive feature of the Museum displays.

Several groups of plants, including weeds, poisonous plants, seaweeds, and ferns, which have for many years been stored in the office, have been placed on exhibit in the main hall, where they are now available for immediate reference by the public. An addition to the exhibited series of fungi has been installed, in the form of specimens of the *sclerotia*, a resting stage of a species of mushroom, arranged to show the internal and external structure, together with a diagram to illustrate its place in the life-cycle of the fungus.

W. B. Johnstone donated an excellent collection of some forty specimens of plants from the Cranbrook district, including two possible new records for British Columbia, and several other species either poorly represented in the herbarium or absent altogether.

Dr. Leon Kelso has also kindly provided us with a collection of ten Colorado plants that afford means of comparison with plants of adjacent territories.

P. W. Martin and Ralph Ritcey submitted an instructive series from Wells Gray Park.

Field work included a trip to Osoyoos, where a collection of plants was made and a study was collected of the species in the field. This was undertaken at the end of May and early part of June. In July a short visit was made to the Forbidden Plateau, where additional studies in the plant and insect life of that region were made particularly in the Lodge area. A trip of three days' duration was taken into the Kwai (Woods) Lake district, in the heart of the plateau, where unusually fine weather made it possible to cover a considerable area, including the summit of Mount Brooks and the upper reaches of Mount Albert Edward.

A couple of days was spent at Cameron Lake; Cokely Station on Mount Arrow-smith was climbed, and floral and entomological investigations undertaken.

In between these excursions, many short day or half-day jaunts were made to districts adjacent to Victoria. These included Saanichton Spit, Goldstream, Langford, Millstream, Malahat, Mount Prevost, and Sooke River, the chief object being to note the natural plant association of these areas before they completely succumb to the ravages of civilization. Some time has been spent in working up the report on Manning Park. As it is intended to include the results of previous workers in this area, the study has involved considerable research of plant and insect records, necessitating many changes to the more recent concepts of nomenclature.

A shortage of shelving space continues to be a major problem, making it impossible to amalgamate recent additions with the general classified series.

The Botanist was called upon to participate in the water-fowl census held under the auspices of the Federal Wildlife Service each year early in January. The data are incorporated in the results of a nation-wide survey. He also attended relevant meetings of the Resources Conference held in February, in Victoria.

MISCELLANEOUS NOTES

Plants not hitherto known to have been recorded for British Columbia:—

Oenothera andina Nutt. Plateau Primrose. West side of Osoyoos Lake in gravelly soil growing among sage-brush, June, 1951, G. A. Hardy.

Anthemis tinctoria L. Golden Marguerite. An adventive from Europe. Kit-chener, August 17th, 1950, W. B. Johnstone.

Mimulus breviflorus Piper. Short-flowered Monkey-flower. Newgate, June 24th, 1950, W. B. Johnstone.

Plants additional to the "Flora of Vancouver Island and Queen Charlotte Islands":—

Linaria dalmatica L. Butter and Eggs. Specimens were collected on Saanichton Spit and adjoining Island View Beach on June 14th, 1951, by George A. Hardy. One strong colony and several small isolated groups were discovered.

ENTOMOLOGY

Activities in this section have absorbed a considerable percentage of time in the year's work. As in previous years, innumerable specimens have been brought in for identification, varying according to the season from silk moths in the spring to spiders in the fall.

New shelving has been installed in the attic for storage of boxes, while an important innovation has been the acquirement of two cabinets of glass-topped drawers, in which it is proposed to place the more important or better class of specimens for easier reference. A start has been made with the Hemiptera, which W. Downs has kindly undertaken to arrange. A large part of the Cerambycidae, chiefly concerned with the published lists which have been issued from time to time, has been already dealt with. These are placed

in individual species trays, which allow of easy rearrangement without touching the specimens. To date, nine drawers have been used to house this collection. The family of flat-headed borers (Buprestidæ) has also been transferred to trays which occupy two drawers.

Next in line is a new series of Lepidoptera from the Hanham and Jones collection, which will be accommodated when time and further cabinet room allow.

Of outstanding interest is a representative collection of British Columbia Hemiptera which has been presented to the Museum by W. Downs, who has also arranged the material in classified order complete with names. The collection consists of 1,200 specimens, representing some 200 species.

A most important acquisition has been a number of local Lepidoptera, amounting to over 1,200 specimens, donated by J. R. J. Lewellyn Jones, of Cobble Hill. All have full data and are in first-class condition.

The writer has spent considerable time in the study of the Museum collections, especially in the Lepidoptera, in the course of identifying material that has accumulated from the activities of field work and donations extending over many years.

Notes and lists of species investigated will be published from time to time in reports on field-trips or similar publications.

REPORT OF THE ASSISTANT IN BIOLOGY

The Museum Biologist took part in two major field-trips during 1951—a two weeks' investigation in the Osoyoos area and ten days in the Ootsa Lake country which is to be flooded by the Alcan project.

Investigations on the islands off Oak Bay were continued this year with a view of setting up the area as a natural laboratory for the study of speciation in the coastal white-footed mouse (*Peromyscus*). The results and progress of these projects appear as short papers at the end of this report.

One day per week was allocated to field work on Southern Vancouver Island in order to keep a record of local bird and mammal conditions and movements. The notes accruing from the data so gathered, together with data collected during the week-ends, constitute a substantial mass of information which we hope to analyse and publish in the Annual Report at two- or three-year intervals.

In September the Museum Biologist accompanied the Dominion Wildlife Management Officer, David Munro, in band-tailed pigeon investigations on Vancouver Island. Points of reported concentration and other areas said to be frequented by the species were visited; data and specimens were collected. Mr. Munro's publications dealing with the results of these researches will appear when sufficient additional data have been gathered by the Dominion Wildlife Service.

A short visit was made to Manning Park in October with Parks Biologist York Edwards. The object of this visit was to secure data and specimens in the mule deer-Coast deer zone of intergradation which theoretically exists near the western reaches of the park. No specimens were secured; the deer had not descended to the valley-bottoms at that time, and we were not equipped to go up after them. However, we traversed the Snass River area, which previous Museum field-parties had been unable to visit through lack of time. Data gathered are incorporated with the major Manning Park report, which will appear shortly as an Occasional Paper of the Provincial Museum.

Routine curatorial activities entailing care of large collections of birds and mammals housed at the Provincial Museum, preparation, cataloguing, and indexing of incoming material, specimen identification, lectures, research, writing, and the host of minor activities associated with museum work, combined with field activities, more than utilized the Biologist's time in 1951.

During the year several papers were prepared and published, as noted elsewhere, and the following have been submitted and accepted for publication: "An Unusual Occurrence of Turkey Vulture on Vancouver Island"; "The Occurrence of European Starling on Vancouver Island"; bird and mammal section of a report on Manning Park; excerpts from Museum field-notes; "Three Cetacean Records for British Columbia" (with I. McT. Cowan); "An Ecological Survey of the Goose Islands, B.C." (for Occasional Paper series); "The Mammals of British Columbia" (with I. McT. Cowan, for Handbook series).

The manuscript on the Goose Islands is nearing completion, while that of the mammals is in rough draught.

Descriptions of new races of mammals taken during insular work off the west coast have been delayed due to certain complexities and problems arising from previous systematics of the groups involved. Work continues on these, and it is planned that acceptable races will appear in the handbook of mammals previously mentioned.

We wish to acknowledge the voluntary co-operation of the many citizens of this Province who contribute annually to our biological knowledge, especially members of the Victoria branch of the Game Commission, Inspector Stevenson, Game Wardens Joseph Jones and R. Sinclair and Mr. Don Kiers; Game Warden W. Webb and Constable D. Drapper, R.C.M.P., of the Albernis; Bruce Irving, George Hillier, Vince Madden, and Bill Hillier, of Carmanah Point and Ucluelet; Bert Robson, of Atnarko; Morris Jackson, of Fanny Bay; Len Newbigging, of the Greater Victoria Water Board; Don Robinson, of the British Columbia Game Commission at Nanaimo; R. H. Mackay and David Munro, of the Dominion Wildlife Service; and the many others whom we may have failed to mention here.

REPORT ON THE FRANCOIS-OOTSALAKE AREA VISITED IN JUNE, 1951

On June 9th a two-man Museum field-party—Wilson Duff, the Anthropologist, and C. J. Guiguet, the Biologist—left Vancouver for the Francois-Ootsa Lake district, Mr. Duff to locate ancient Indian camp-sites in that area, and the Biologist to investigate the fauna and to collect specimens.

Unfortunately, the trip was of short duration and distances traversed in the course of the anthropological work were great, and in consequence only very short periods of time could be spent on biological work in any given locale.

We arrived at Vanderhoof on June 11th, spending the night at the Stony Creek Indian Reserve. Time did not permit the setting of traps, so the last moments of daylight were utilized in hunting bats and recording birds at Nulki Lake. There were no bats to be seen in the area, and the numbers of birds and bird species observed at the lake were small.

On June 12th the party proceeded to Fraser Lake, where Mr. Duff interviewed some of the natives. Later in the day we continued on to Francois Lake, established camp, and broke out equipment for the preparation of specimens. The Biologist worked here until June 17th, while the Anthropologist visited various tribes in the neighbourhood. On June 18th we broke camp and proceeded to Burns Lake. Here Mr. Duff made contact with some Carrier Indians from Ootsa Lake, with the result that we proceeded to Ootsa Lake the same evening, arriving long after dark.

We stayed at Ootsa Lake only two days, and on June 21st began the return journey to Vancouver, interviewing natives at various points along the highway. We arrived at Vancouver on June 25th, after what had proved to be a hurried and arduous trip.

MAMMALS

Populations of practically all species of small mammals in the Francois and Ootsa Lake districts were at a very definite low. In 768 "trap nights" a total of 29 specimens was taken, an average of 26.5 trap nights per animal. The take included only four species—*Peromyscus maniculatus borealis* Mearns, *Clethrionomys gapperi saturatus* (Rhoads), *Zapus princeps saltator* Allen, and *Sorex obscurus obscurus* Merriam.

Local residents at Francois Lake informed us that two years previous to our visit (1949), "all kinds" of mice were present in plague proportions. From their descriptions, *Zapus*, *Peromyscus*, *Clethrionomys*, and *Microtus* species actually overran their homes and associated buildings. House cats were continually bringing their "kills" into the houses, and one saw mice at large in the fields and woods by day. "Curly" Pease, at Francois Lake, informed me that the following year, 1950, there were no mice, and that the cats caught none until the summer of 1951, the time of our visit. G. Hansen, at Ootsa Lake, reported precisely the same sequence, but a year later, in that the "high" was during the summer prior to our visit (1950) and that the "crash" was in the current year. Our trapping results upheld this report, as we ran five dozen traps for two nights, catching nothing and finding all baits intact in the morning. Mr. Hansen reported, however, that there was a current "high" in mouse populations at Cheslatta Lake, some 20 miles to the north. From his description these were probably *Microtus* species, but we were unable to verify this report.

We observed only two mule deer, a large doe and her fawn, *Odocoileus hemionus* (Rafinesque); from all reports they were not abundant in the area. Moose (*Alces americana* (Clinton)) were "not plentiful" in the Francois Lake area according to local residents, although we saw a cow at the Stony Creek reserve near Vanderhoof and considerable evidence of both fresh and old browsing in the surrounding country. At Ootsa Lake, moose were increasing, according to resident Mr. Hansen, and indeed there was considerable fresh evidence of these animals in the very limited area covered during our short stay. Mr. Hansen attributed this to the almost complete disappearance of wolves from the Ootsa Lake area during the past three years. Mr. Hansen said also that bears, both grizzly and black, were not uncommon in the region south and west of Ootsa Lake.

We saw no coyotes (*Canis latrans* Say) and found little evidence of them during our trip, which is not surprising when the time spent in the area is considered. Local reports varied from "a few" to "lots of them."

Red squirrels (*Tamiasciurus hudsonicus* (Erxleben)), chipmunks (*Eutamias amoenus* (Allen)), marmots (*Marmota monax* (Linnæus)), were seen occasionally along the highway and in the course of our travels afield, but at none of the areas visited could any of these rodents be termed abundant; in fact, only one marmot was seen, this near Ootsa Lake. However, muskrats (*Ondatra zibethica* (Linnæus)) frequented most of the suitable habitats visited and varying hares (*Lepus americanus* Erxleben), were seen regularly along the roadsides in the Fraser Lake region.

The most well-represented group of mammals in the areas visited were bats. Little brown bats (*Myotis lucifugus* Le Conte) and the big brown bat (*Eptesicus fuscus* (Beauvais)) were abundant at Francois and Ootsa Lakes respectively, where several specimens were collected.

Of the many other species of mammals that are known to occur in this area, we saw nothing and gathered very little information.

BIRDS

Apart from a male ruby-throated hummingbird seen and positively identified near Vanderhoof, we saw nothing unusual in the way of birds. The species noted are all common or fairly common birds for these regions and there is little need to elaborate on a check-list of species seen.

Bird life appeared to be much more varied and abundant south of Quesnel than it was in the areas north and west of that point. The following species, observed in the Francois Lake and Ootsa Lake regions, follows the order of Munro and Cowan (1947). It is by no means a complete list, and while the many gaps may be attributed in part to the short length of time spent in the area, we did indeed find the northern areas comparatively birdless.

List of Birds Observed at the Francois and Ootsa Lake Camps

Common Loon. *Gavia immer* (Brunnich).

Red-necked Grebe. *Colymbus grisegena* Boddaert.

Great Blue Heron. *Ardea herodias* Linnæus.

American Bittern. *Botaurus lentiginosus* (Montagu).

Whistling Swan. *Cygnus columbianus* (Ord). Skeleton picked up.

Mallard. *Anas platyrhynchos* Linnæus.

Lesser Scaup Duck. *Aythya affinis* (Eyton).

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

American Merganser. *Mergus merganser* Linnæus.

Sharp-shinned Hawk. *Accipiter striatus* Vieillot.

Golden Eagle. *Aquila chrysaetos* (Linnæus).

Osprey. *Pandion haliaetus* (Linnæus).

Sparrow Hawk. *Falco sparverius* Linnæus.

Franklin Grouse. *Canachites franklini* (Douglas).

Ruffed Grouse. *Bonasa umbellus* (Linnæus).

American Coot. *Fulica americana* Gmelin.

Killdeer Plover. *Charadrius vociferus* (Linnæus).

Spotted Sandpiper. *Actitis macularia* (Linnæus).

Herring Gull. *Larus argentatus* Pontoppidan.

Black Swift. *Nephæcetes niger* (Gmelin).

Rufous Hummingbird. *Selasphorus rufus* (Gmelin).

Ruby-throated Hummingbird. *Archilochus colubris* (Linnæus). A bright metallic green-backed hummingbird with a full red gorgette was observed at close range near Vanderhoof, but was not collected. The possibility of a ruby-throat occurring so far off its normal range is small, but the only other explanation for a bird so marked would be that it was an atypically pigmented rufous hummer, an equally remote possibility.

Belted Kingfisher. *Megaceryle alcyon* (Linnæus).

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

Traill Flycatcher. *Empidonax traillii* (Audubon).

Wright Flycatcher. *Empidonax wrightii* Baird.

Violet-green Swallow. *Tachycineta thalassina* (Swainson).

Tree Swallow. *Iridoprocne bicolor* (Vieillot).

Rough-winged Swallow. *Stelgidopteryx ruficollis* (Vieillot).

Barn Swallow. *Hirundo rustica* Linnæus.

Cliff Swallow. *Petrochelidon pyrrhonota* (Vieillot).

Canada Jay. *Perisoreus canadensis* (Linnæus).

Steller Jay. *Cyanocitta stelleri* (Gmelin).

American Crow. *Corvus brachyrhynchos* Brehm.

Red-breasted Nuthatch. *Sitta canadensis* Linnæus.

American Robin. *Turdus migratorius* Linnæus.

Swainson Thrush. *Hylocichla ustulata* (Nuttall).

Mountain Bluebird. *Sialia currucoides* (Bechstein).

Warbling Vireo. *Vireo gilvus* (Vieillot).

Orange-crowned Warbler. *Vermivora celata* (Say).

Yellow Warbler. *Dendroica petechia* (Linnaeus).
 Purple Finch. *Carpodacus purpureus* (Gmelin).
 Pine Grosbeak. *Pinicola enucleator* (Linnaeus).
 Pine Siskin. *Spinus pinus* (Wilson).
 Chipping Sparrow. *Spizella passerina* (Bechstein).
 Lincoln Sparrow. *Melospiza lincolni* (Audubon).
 Song sparrow. *Melospiza melodia* (Wilson).

RESEARCH IN SPECIATION IN COASTAL WHITE-FOOTED MICE (Preliminary Report)

Much speculation on the speciation of small insular mammals is found in the literature dealing with evolutionary processes. Among the more contentious points are such factors as elapsed time, plasticity of the species, and inherent individual characteristics. While wild mice or other small mammals may be easily caged, and so isolated, most zoologists contend that from the point of view of speciation such experiments are invalid, in that careful as the researcher may be there are many factors which man is unable to discern, measure, or control—and that such factors probably (some say certainly) have a profound effect upon morphological and physiological attributes of such animals.

In 1950 the Provincial Museum instituted a long-term insular research programme with a view to indicating, perhaps, how time and other measurable factors affect newly established insular populations under natural conditions.

The prime requisite for such a programme is a series of easily accessible small islands which are not already populated by small mammals. These islands could then be stocked by introducing small mammals such as native mice in varying numbers. Upon some islands a single breeding pair could be planted, on others a pregnant female or a female with her young. From these, if a population "took," we might get some indication as to the importance of inherent individual characteristics as a factor effecting change. In addition, the length of time necessary to effect discernible changes in such a population could be determined—probably by scientists 50 or 100 years from the time of the introduction. At any rate, a record of the date of arrival of the animals upon the islands would be available to future students of evolution—and such knowledge may prove invaluable as time passes.

On other islands a restocking programme could be maintained over a period of time by the introduction of many mice (possibly 50 or 100 pairs). These we could consider as controls, in that a continual gene flow would be maintained from the ancestral stock, and whether change takes place or not in such populations, we may discover indications of the relative importance of ecological factors as an agent in effecting change.

Briefly this is the problem and how we proposed to set up the experiment. The many factors and side problems which arise in any such research are detailed and varied, and little would be gained by including them in a preliminary report of this nature.

PROGRESS IN 1951—SNAP-TRAPPING RECORDS AT OAK BAY, VICTORIA, B.C.

The most readily accessible islands having ample cover and food and otherwise ecologically suited as habitat for the white-footed mouse lie off Oak Bay and Shoal Bay at Victoria, B.C. In order to determine whether these islands were already occupied by small mammals, a programme of snap-trapping was undertaken. The following is a list of islands so far investigated and the number of trap nights run upon each. Upon none of these islands was there any sign of the white-footed mouse, and none was taken. In addition, no trap showed signs of having been visited by mice during the entire trapping programme.

Mary Tod Island: January 20th to February 4th, 782 trap nights.
 North Trial Island: March 20th to April 2nd, 819 trap nights.

South Trial Island: April 2nd to April 11th, 670 trap nights.
 Greater Chain Island: April 11th to April 22nd, 693 trap nights.
 Back Chatham Island: December 6th to December 16th, 732 trap nights.
 Strongtide Island: December 16th to December 24th, 732 trap nights.

LIVE-TRAPPING RECORD

The most readily available small mammal on Southern Vancouver Island is the white-footed mouse, *Peromyscus maniculatus angustus* Hall. The following is a record of a live-trapping programme carried out in this area in 1951:—

Mount Douglas Park, Victoria, B.C.:

April 14th—A total of nine live-traps set in the woodlands near the beach at this point were all set off by white-footed mice (droppings in all traps). One suitable animal taken; later escaped in transit.

April 17th—Eight live-traps were all visited by white-footed mice. Two suitable mice secured (adult male and adult female).

March 22nd — Nineteen live-traps, eleven visited by white-footed mice. Four suitable mice secured (three adult females and one adult male).

Hudson Bay Woods, Victoria, B.C.: March 24th—Sixteen live-traps, fourteen visited by mice. Four suitable mice taken (two adult males and two adult females).

Otter Point, Sooke, B.C.: July 17th—Eight live-traps set in beach debris took two pregnant female white-footed mice; six traps untouched. These mice bore their young (five in one litter—three males, two females; six in the other—four males, two females) about July 23rd. These families were maintained in captivity until August 16th, when the young were taking solid food.

It is much more difficult to catch small mammals in box-type live-traps than it is in snap-traps. The live-trapping records on Vancouver Island show a total of 44 visitations for 63 trap nights, while snap-trapping on the experimental islands showed no visitation whatsoever in 4,428 trap nights. These results serve to corroborate the conclusion that no mice were present on these islands.

Releases of white-footed mice (*Peromyscus maniculatus angustus* Hall):—

North Trial Island: April 18th—One adult male and one adult female, selected at random, were released on this island. Female apparently not pregnant, no mammary development or apparent "heaviness."

South Trial Island: August 17th—An adult female taken at Otter Point was released on this island with her litter of six young (four males, two females).

Greater Chain Island: August 17th—Litter (three males, two females) of second adult female (deceased, April 15th) taken at Otter Point were released on this island.

REPORT OF THE ASSISTANT IN ANTHROPOLOGY

Early in the year much effort was directed toward investigating and calling to the attention of the Government the danger of flooding of important archaeological sites in the Interior of the Province as a result of power projects. In this, University of British Columbia officials gave full support. As a result, the Provincial Government made a grant available to the University for an archaeological reconnaissance of the vast area in Tweedsmuir Park to be flooded by the Alcan project. As a preliminary part of this survey, the Assistant in Anthropology made an ethnographic survey of the Carrier Indian sub-

tribes of that area between June 6th and 30th, and during July and August a party under Dr. Charles E. Borden, of the University, accomplished an extensive archæological survey of the river and lake margins to be flooded. A paper on Carrier social organization based on the ethnographic survey was written and published in "Anthropology in British Columbia, No. 2, 1951."

A visit was paid in April to the Indian eulachon-fishery at the head of Knight Inlet, thanks to the hospitality of the crews of the Federal Fisheries Department boats "Stuart Post" and "Atlin Post." Motion pictures obtained were added to the Museum film on eulachons.

Four trips were made to the Alberni area to observe and photograph a revival of Indian masked dances. One of the trips, May 19th and 20th, was in the company of the Director, and several hundred feet of good colour motion pictures were obtained. More movies and information were obtained on the other trips. Further field work included several visits to local reserves, attendance at two Indian dances in the Duncan area, and an interesting exploration of a burial cave on Thetis Island, from which a human skull and several wooden boxes were obtained.

Activities in the educational field increased considerably over the previous year. Lectures and film-shows were given to the following local organizations: Victoria Natural History Society, Cordova Bay Scouts banquet, Colwood Community Club, Victoria Outdoor Club, Cadboro Bay Men's Club, Victoria Electric Club, B.C. Indian Arts and Welfare Society (twice), Quadra School Grade III classes, Victoria Film Festival, and C.P.R. Veterans Club. Twenty-seven school classes (about 870 pupils) made supervised visits to the Museum specifically to see the Indian exhibits, and they were given talks illustrated by material from the storage collections. Several other classes, visiting the whole Museum, were shown the same material. During the fall the Assistant in Anthropology gave a night-school course of twelve lectures at Victoria College on the Indian tribes of the British Columbia coast. Two of the sessions were held in the Museum, where the lectures were illustrated by material from the storage collections. The lecture material was prepared in such a way that it will form the basic outline for a handbook on these tribes. Also during the fall, on the invitation of the University, the Assistant in Anthropology participated in several sessions of a graduate seminar held at the University on British Columbia Indians and their culture.

Considerable time was spent gathering material, editing, and preparing for publication the second number of our new publication series "Anthropology in British Columbia," which was distributed early in October. Work was continued on the ethnography of the Fraser Valley Indians, begun the previous year.

The closest possible co-operation has been maintained with other museums, universities, and field-workers interested in our area. Sizeable loans of Northwest Coast Indian material for special exhibitions were made to the Montreal Museum of Fine Arts; the Taylor Museum, Colorado Springs, Colo.; the Seattle Art Museum; and the Portland Art Museum. A loan of tump lines was made for study purposes to the Washington State Museum. Two anthropological conventions were attended during the year—those of the Northwest Anthropological Association, May 4th to 6th in Portland, Ore., and the Pacific States Branch of the American Anthropological Association, December 27th and 28th, in Eugene, Ore. At the latter meeting a film on Alberni Indian dances was shown.

Routine museum work, including correspondence, visitors, acquisition and care of collections, film-editing, etc., consumed considerable time. Display work was confined to the installation of two small cases—one on the Indian doctor, the other on Northwest Coast art—and a temporary display of photographs of the Alberni dances. Supervision of the repainting of some of the totem-poles in Thunderbird Park and planning for further restoration of totem-poles were other activities of importance.

The visit in October of Their Royal Highnesses Princess Elizabeth and the Duke of Edinburgh resulted in further activities. As a member of the sub-committee planning the Indians' part of the proceedings, the Assistant in Anthropology was responsible for the arrangements and programme of the Alberni Indian dances in Thunderbird Park. Movies of this event, obtained by the Director, were added to other movies of Alberni dances to make a very colourful and interesting film.

ACCESSIONS

During 1951 the following specimens were added to the catalogued collections (figures in parentheses indicate the total number on December 31st, 1951): Indian material, 94 (7,123); plants, 500 (22,695); mammals, 62 (5,719); birds, 33 (9,956); reptiles and amphibians, 6 (881); fishes, 13 (759).

ANTHROPOLOGICAL ACCESSIONS

The Mr. and Mrs. Herbert Corfield Collection.—(Gift.) A collection of Nootka and Coast Salish material donated by Mr. and Mrs. Corfield, of Sidney, Vancouver Island.

HAIDA

Album of old photographs. Mrs. R. B. Young, Westview.

TSIMSHIAN

Perforated wolf canine. Capt. L. A. Peck, Prince Rupert.

Ground slate knife. Capt. L. A. Peck, Prince Rupert.

Stone hammer. Herbert Deichen, Dorreen.

Soapalallie spoon. E. A. Richards, Victoria.

KWAKIUTL

Human skeleton. R.C.M.P., Campbell River.

Mask. Allan Brooks, Victoria.

Box. P. Walker, Victoria. (Purchase.)

Carved wooden bear. F. C. Cox, Victoria.

NOOTKA

Twined trinket baskets, two. Miss J. M. Clay, Victoria. (Purchase.)

Mask. In Corfield collection.

Bone dagger. In Corfield collection.

Human skull. In Corfield collection.

Board inlaid with sea-otter teeth. Mrs. S. A. Dickinson, Victoria.

Basket in process of manufacture. Mrs. Emma David, Port Alberni. (Purchase.)

Large storage chest. Harry Dee, Victoria.

COAST SALISH

Human skeletal fragments. J. Claxton, East Saanich.

Human skeleton. D. A. MacLeod, Victoria.

Stone dish. Tom Ross, Victoria.

Human skull. F. K. Brawn, Victoria.

Fish-shaped whetstone. Ian Ross, Cordova Bay.

Ground slate point. Ian Ross, Cordova Bay.

Human skull. A. Shiner, Victoria.

Human skull. R. Emerson, Victoria.
 Small stone hammer. Capt. C. R. Peters, Victoria.
 Antler implements, five. Capt. C. R. Peters, Victoria.
 Bone pendant. Capt. C. R. Peters, Victoria.
 Human skull. Cave, Thetis Island, Museum staff.
 Cedar boxes, four. Cave, Thetis Island, Museum staff.
 Wooden spoon. Cave, Thetis Island, Museum staff.
 Wooden comb. Cave, Thetis Island, Museum staff.
 Open-twined basket. Cave, Thetis Island, Museum staff.
 Small wood figure. Mrs. Sheila Davies, Victoria.
 Stone net-sinkers, two. T. Brown, Ganges.
 Ground slate knife fragments, three. L. Smith, Alberni.
 Chipped stone point. L. Smith, Alberni.
 Bone barb. L. Smith, Alberni.
 Human skeleton. Lieutenant Darbyshire, Victoria.
 Hair head-dress. M. E. McVicker, Parksville. (Purchase.)
 Mat-creaser. In Corfield collection.
 Wooden spoons, two. In Corfield collection.
 Tump lines, four. In Corfield collection.
 Coiled burden-basket. In Corfield collection.
 Drum and drumstick. In Corfield collection.
 Head-dress ornament of feathers. In Corfield collection.
 Ceremonial rattles, three. In Corfield collection.
 Dancing-staff with deer-hoof rattles. In Corfield collection.
 Stone hammer fragment. Mr. Smith, Victoria.

INTERIOR SALISH

Coiled baskets, eight. Miss J. M. Clay, Victoria (Purchase.)
 Bulrush mat. R. I. McPhee, Notch Hill.
 Basketry cradle. Robert James, Becher Bay. (Purchase.)

DÉNE

Snowshoes, two pairs. Miss F. H. Burns, Victoria. (Purchase.)
 Chipped stone knife. A. L. Bryant, Anahim Lake.
 Beaded moccasins, one pair. Mrs. M. E. Swindell, Victoria. (Purchase.)
 Snowshoes, one pair. E. A. Richards, per Provincial Archives.
 Model birch-bark canoe. E. A. Richards, per Provincial Archives.
 Birch-bark basket. Maxine George, Fort Fraser. (Purchase.)
 Stone pestle. Mr. Gerhardy, Fort Fraser.
 Stone celt. Mr. Gerhardy, Fort Fraser.
 Stone spear-head. Mr. Gerhardy, Fort Fraser.
 Stone pestle. Museum staff.

CREE

Model birch-bark canoe. Capt. C. R. Peters, Victoria.
 Small drum. Capt. C. R. Peters, Victoria.
 Stone maul. L. R. Alton, Victoria.

WEST INDIES

Stone axe. Mrs. Theed Pearse, Comox.
 Wire bracelet. Mrs. Theed Pearse, Comox.

ZOOLOGICAL ACCESSIONS

MAMMALS

By gift—

- E. W. Adshead, Victoria, one bison skull.
 British Columbia Game Department, Victoria, two cougar specimens.
 J. Helmusen, Kyuquot, one marten skull.
 N. Kennedy, Sooke Lake, one marten skeleton.
 B. Robson, Atnarko, three beaver skulls.
 E. L. Sullivan, Jeune Landing, one marten skull.
 L. H. Talbot, Ahousat, two marten skulls.
 V. R. Taylor, Winter Harbour, one sea-lion skull.
 Allan P. Watson, Victoria, one wolf skull.
 R. Wherry, Victoria, two marten skulls, one marten skeleton, one weasel skeleton, one wolverine skin (by purchase).

By the staff 51

BIRDS

By gift—

- Harry Barber, Victoria, one golden-crowned kinglet.
 Mrs. H. M. S. Bell, Victoria, one sharp-shinned hawk and nine English sparrows.
 Buckley's Sport Shop, Nanaimo, one gadwall.
 Miss D. Gordon Cox, Victoria, one chestnut-backed chickadee, one black-headed grosbeak.
 Mrs. D. R. Doucet, Victoria, one dwarf hermit thrush.
 Bob Glenny, Victoria, one tufted puffin.
 Col. S. Goode, Victoria, one cedar waxwing.
 Dr. Haines, H.M.S. "Challenger," one Cassin's auklet.
 H. E. Hillier, Ucluelet, one mallard.
 F. L. Jancowski, Gabriola Island, one snowy owl.
 Alex Johnson, Victoria, one sharp-shinned hawk.
 Max Lohbrunner, Victoria, two greater scaup ducks, one Holboell's grebe, one western grebe.
 Miss M. C. Melburn, Victoria, one barn owl.
 J. Payne, Victoria, one vulture's egg.
 Mrs. L. M. Parris, Victoria, one Macgillivray's warbler.
 J. F. Rowe, Victoria, three red crossbills.
 R. Wherry, Victoria, two snowy owls, one horned owl, one short-eared owl, one barn owl.
 Major Yardly, Victoria, one Cooper hawk.
 Anonymous donations, one fox sparrow, one kingfisher.

By the staff 34

AMPHIBIANS AND REPTILES

By gift—

- Ronald Montgomery, Victoria, one alligator lizard.
 R. Palmer, Winter Harbour, one red-backed salamander.
 A. Peake, Haney, one north-western salamander.
 W. E. Stevens, Vancouver, one wood frog.
 Mrs. M. E. Thacker, Hope, one rubber boa snake.
 J. H. Whitehouse, Victoria, shell of marine turtle.
 Bob Wild, Gordon Head, one wandering garter-snake.

By the staff 3

FISH

By gift—

- Mrs. G. C. Carl, Victoria, one quill-fish.
 K. W. Collins, Victoria, one set of fish eggs.
 A. J. Craddock, Victoria, one banded rock-fish.
 W. Egeland, Sidney, one lamprey.
 Fishermen's Co-operative Association, Victoria, one wolf-fish.
 Mrs. Theed Pearse, Comox, one fish skeleton.
 G. H. Smith, Victoria, one Denny's liparid.
 Harry Way, Sooke, one scad.

By the staff..... 8

INVERTEBRATES

By gift—

- Richard Bowles, Victoria, one decorator crab.
 A. Buckle, Victoria, one jumping spider.
 J. R. J. L. Jones, Cobble Hill, four boxes of lepidoptera.
 Jimmy Loiselle, Victoria, one crayfish.
 Mrs. R. Maze, Victoria, one trap-door spider.
 H. Mills, Victoria, one snake-fly.
 Clifton Parker, Victoria, one mussel shell.
 Gordon Pike, Nanaimo, two specimens of whale barnacles.
 Mrs. C. F. Ricketts, Victoria, one false scorpion spider.
 J. B. Tighe, Victoria, one wood-tick.
 Mrs. Van Ness, Victoria, one California silk moth.

PALÆONTOLOGY

- Ted Brown, Ganges, one specimen from Cretaceous formation.
 Grant Cooley, Victoria, one mammoth-tooth.
 J. W. Tarbuck, Victoria, fossil bones.

STATUS OF BIRDS AND MAMMALS OF THE OSOYOOS AREA IN MAY, 1951

BY C. J. GUIGUET, PROVINCIAL MUSEUM, VICTORIA, B.C.

INTRODUCTION

On May 22nd, 1951, a Museum party took to the field in the Osoyoos and Anarchist Mountain region of Southern British Columbia. The party, led by Dr. G. C. Carl, included George Hardy, Museum botanist, and myself. Camp was established on the east side of Osoyoos Lake, from which point the surrounding orchard lands, sage flats, mountain-slopes, marshes, and lakes were visited. The party remained in the area until June 2nd, returning to Vancouver on June 3rd after a one-day trip into some small unnamed sloughs north-east of Kelowna.

The object of an expedition to this much worked area was primarily to obtain movies and specimens of the indigenous plants and animals, and to record existing conditions regarding these creatures with a view of co-ordinating data which have previously been gathered in this unique and interesting dry belt. This information at present remains buried in separate papers, field-notes, diaries, and collections. A very real need exists for a published co-ordinated treatise of the area.

The topography, climate, and flora of the Osoyoos arid region need not be elaborated here, nor do those of the dry forest which we visited on Anarchist Mountain. Adequate descriptions may be found in the preface of Provincial Museum Special Publication No. 2, entitled "A Review of the Bird Fauna of British Columbia," by Munro and Cowan, 1947 (*see also* Figs. 1 and 2).

MAMMALS

From a record of snap-trapping in the valley, it appeared that small-mammal populations were at a "low" at the time of our visit. A total of 840 trap nights yielded only 45 specimens, 55.6 per cent of which were introduced European house mice, *Mus musculus*. The remaining 44.4 per cent of the catch was composed of four species: The harvest mouse (*Reithrodontomys megalotis nigrescens*), white-footed mouse (*Peromyscus maniculatus artemisiæ*), meadow mouse (*Microtus pennsylvanicus modestus*), and pocket mouse (*Perognathus parvus lordi*). No shrews (*Sorex* species) were taken or observed.

Trap nights were distributed in four major habitat types occurring on the valley-floor. These and the respective catches in each appear in Table 1.

Larger mammals were also scarce in the area, with the exception of marmots, which were plentiful on the western slopes of Anarchist Mountain, and muskrats, which frequented even the smallest ponds.

The annotated list of mammals follows the order of Anderson (Catalogue of Canadian Recent Mammals, Bull. No. 102, Nat. Mus. of Canada, 1946).

Table 1

Habitat	Species and Number Taken	Trap Nights
Orchards.—Fruit-trees over untilled soil—bearing grasses, forbes, and weeds.	Harvest mouse 2 House mouse 18	240
Desert Flats.—Rabbit-brush, sage, cactus, and sparse grasses over sand.	Pocket mouse 3	60
Deciduous Ravine.—Erosion gullies vegetated with willow, rose, thorn, and poplar; grass margins.	Harvest mouse 5 House mouse 4 White-footed mouse 8	360
Roadside Ditches.—Vegetated with heavy grass, weeds, and feral-crop plants such as oats.	Meadow mouse 3 House mouse 2	180

ANNOTATED LIST

SHREWS. *Sorex* species.

We caught no shrews in our traps and found no evidence of their presence in the area worked.

LITTLE BROWN BAT. *Myotis yumanensis sociabilis* H. W. Grinnell.

Bats were not numerous in the area east of Osoyoos Lake, to which our bat-hunting was confined. One of nine bats observed, when collected, proved to be of this species.



Fig. 1. Osoyoos arid region looking south; camp-site in copse in middle distance; foot of Anarchist Mountain on the left.

(Photo by G. C. Carl.)

BLACK BEAR. *Euarctos americanus* Pallas.

Bear sign was observed in the high country east of Vaseaux Lake, but no animals were actually seen. Local residents say they are numerous at higher altitudes on the east side of the valley.

COYOTE. *Canis latrans* Say.

We heard no coyotes "sing" in the evening; the only evidence of their occurrence was old sign, tracks, and droppings, mostly in the high country on the east side of the valley. One very old set of tracks was found on the valley-floor near the base of the cliffs east of Osoyoos Lake.

MARTEN. *Martes americana* (Turton).

Evidence of these animals was found in the form of droppings at timber-line east of Vaseaux Lake. No animals were seen.

LONG-TAILED WEASEL. *Mustela frenata nevadensis* Hall.

Our only record of this species in the area was provided by a specimen found dead on the roadway at the north end of Osoyoos Lake.

STRIPED SKUNK. *Mephitis mephitis* (Schreber).

One very flattened specimen picked up on the highway east of Osoyoos provided our only record for the area.

BADGER. *Taxidea taxus neglecta* (Mearns).

Old workings of these animals were numerous on Anarchist Mountain and near White Lake to the west. Fresh burrows were also seen in both areas.

A large adult was observed in the dry forest near the summit of Anarchist Mountain. The animal was travelling by day, down one of the many trails which interlace this area.



Fig. 2. Osoyoos arid region looking north from camp-site; Osoyoos Lake on the left.

(Photo by G. C. Carl.)

It approached to within 30 feet before becoming aware of the observer on the trail. After an interesting twenty-minute chase it burrowed into a sandy bank, where an attempt to dig it out failed miserably.

VARYING HARE. *Lepus americanus* Erxleben.

Winter sign of this species was abundant in the pine forests on Anarchist Mountain. Considerable fresh sign was found around the deciduous shrubbery bordering grassy openings, but no animal was seen.

COTTON-TAIL RABBIT. *Sylvilagus nuttalli nuttallii* (Bachman).

Fresh tracks of this animal were seen throughout the sage-brush flats on the east side of Osoyoos Lake. Such tracks were obliterated from the sands by heavy winds which occurred daily, but every morning after a calm night a mosaic of tracks was apparent, especially along the edge of ravines filled with heavy deciduous growth. Several animals were seen; one was collected.

YELLOW-BELLIED MARMOT. *Marmota flaviventris avara* (Bangs).

These animals were numerous on the eastern slopes and top of Anarchist Mountain; otherwise scattered individuals appeared to be dispersed widely throughout the hills bordering the valley.

COLUMBIAN GROUND SQUIRREL. *Citellus columbianus columbianus* (Ord).

This ground squirrel was plentiful throughout the high country and slopes east of Osoyoos Lake. None was seen in the valley-bottom.

CHIPMUNK. *Eutamias amoenus affinis* (Allen).

A specimen taken east of Vaseaux Lake was of this species. Chipmunks were also observed on the slopes and top of Anarchist Mountain. None was seen in the valley-bottom.

RED SQUIRREL. *Tamiasciurus hudsonicus* (Erxleben).

Squirrels were heard and seen only twice during our stay, on both occasions in the high country east of Osoyoos Valley.

FLYING SQUIRREL. *Glaucomys sabrinus columbiensis* Howell.

Our only record consists of one desiccated specimen picked up on the forest-floor east of Vaseaux Lake.

POCKET GOPHER. *Thomomys talpoides* (Richardson).

A large population existed in the high country east of Vaseaux Lake, judging from the great amount of old winter sign seen on Grouse Mountain. Fresh workings were also in evidence.

POCKET MOUSE. *Perognathus parvus lordi* (Gray).

This species occurred in small numbers in the sage flats east of Osoyoos Lake. Three were taken—two adult males and one adult female.

HARVEST MOUSE. *Reithrodontomys megalotis nigrescens* Howell.

These little animals were caught in uncultivated orchard lands and in the ravines vegetated with deciduous shrubbery and grasses. Six of the seven animals caught in the course of the snap-trapping were adult males, the seventh an immature female (young of the year), indicating perhaps that the females were busy with young and not wandering so much as the males.

WHITE-FOOTED MOUSE. *Peromyscus maniculatus artemisiae* (Rhoads).

These animals were taken in one locale along a deciduous ravine. Three adult animals (two females, one male) and five large juveniles (four males and one female) made up the total catch.

MEADOW MOUSE. *Microtus pennsylvanicus modestus* (Baird).

This species was found along a grassy roadside ditch. Three specimens were taken, all in the same set of traps; very little sign of runways or droppings was found in the area. One adult female, an adult male, and one small immature animal was the total catch for the species.

MUSKRAT. *Ondatra zibethica osoyoosensis* (Lord).

Although only three or four animals were seen, this rodent appeared to be well distributed throughout the valley and surrounding ponds. Runs, cuttings, and "houses" were observed in practically all of the fresh-water ponds and lakes.

HOUSE MOUSE. *Mus musculus domesticus* Ruddy.

This introduced species occupied most of the habitat types of the valley-bottom, except sage flats. None was caught at higher elevations. Twenty-four specimens were taken, the great majority of them from the cover in uncultivated orchard lands.

MULE DEER. *Odocoileus hemionus hemionus* (Rafinesque).

No deer were observed in the valley-bottom, although old tracks and droppings, probably from the previous winter, were seen at the base of the cliffs east of Osoyoos Lake. Deer sign was more plentiful and fresh on top of Anarchist Mountain; abundant sign and several animals were observed in the high country east of Vaseaux Lake.

We saw no sign of white-tailed deer, although they were reported in the deciduous bottoms of the area by local residents.

BIGHORN SHEEP. *Ovis canadensis californiana* Douglas.

A band of bighorn ewes and kids was observed at the top of the rock-slides bordering the roadside along Vaseaux Lake. The sheep appeared to be in good condition; seven ewes and five kids about 2 weeks old made up the band. We observed the agility of these animals, when one of the kids accidentally slid down a short steep "chimney" to the rock-slide below. The ewe immediately descended the precipitous slope in a series of slides and bounding leaps, nuzzled the youngster in the hind-quarters, guiding it back to safety apparently unhurt. A small ram was observed below the timber-line on the western slopes of Grouse Mountain, east of Vaseaux Lake. None of the big rams observed in this area last fall by A. Braun, of Oliver, was seen on this trip; apparently the animals were using another part of the range at this season.

BIRDS

Birds were much more varied and plentiful than were mammals during the time spent at Osoyoos Lake. Some birds appeared to be in migration, while others had commenced to nest. The erosion gullies, vegetated by aspen, cottonwood, saskatoon, thorn, and other deciduous shrubbery, appeared to be a favourite stopping-place for many species and a nesting-ground for others.

Birds were not so plentiful in the orchard lands. S. J. Darcus, at Naramata, whom we visited, reported a 100-per-cent kill of nesting birds in his orchard by parathyon thermal sprays. In effect, he said that bird life was gone from the orchard lands since spraying began.

The following annotated list of birds follows Munro and Cowan (Review of the Bird Fauna of British Columbia. Prov. Mus. Spec. Pub. No. 2, 1947).

ANNOTATED LIST

COMMON LOON *Gavia immer* (Brunnich).

We observed no loons on the lakes and ponds visited in this area.

HORNED GREBE. *Colymbus auritus* Linnæus.

Several small thick-necked grebes observed well out at the south end of Osoyoos Lake on May 31st were believed to be of this species, although distance made identification uncertain. Small grebes observed at a distance on a large slough near Kelowna also seemed too heavy in the neck and head to be eared grebes and were also recorded as probably of this species.

WESTERN GREBE. *Aechmophorus occidentalis* (Lawrence).

This species was seen only once. A single bird was observed on Osoyoos Lake on May 23rd, remaining only a few moments in the early morning before flying northward up the lake.

AMERICAN BITTERN. *Botaurus lentiginosus* (Montagu).

Many of these birds were present in the marsh at the north end of Osoyoos Lake. Several were seen and flushed; others were heard throughout the area.

CANADA GOOSE. *Branta canadensis* (Linnæus).

Large "honkers" were observed throughout our stay at Osoyoos Lake, and at Vaseaux Lake. In the early morning from May 26th to 30th geese flew northward past our camp in small flocks every day. On May 31st twelve flocks numbering from ten to seventeen individuals passed by between daylight and 8.30 a.m. On no occasion did we see flocks of geese passing southward over Osoyoos Lake, and it is believed that those recorded were probably migrating.

MALLARD. *Anas platyrhynchos* Linnæus.

Paired mallards were observed throughout the area wherever suitable habitat occurred.

CINNAMON TEAL. *Anas cyanoptera* Vieillot.

Each small slough that we visited in the valley and country west of Osoyoos was occupied by a pair of these birds. They were also seen on sloughs near Kelowna.

SHOVELLER. *Spatula clypeata* (Linnæus).

A pair seen on a small slough near Kelowna was our only record of this species in the area.

REDHEAD. *Aythya americana* (Eyton).

These birds were present in pairs on most of the small sloughs in the Osoyoos-Oliver area and also at Kelowna.

RUDDY DUCK. *Erismatura jamaicensis* (Gmelin).

Ruddy ducks were nesting in the sloughs near Kelowna; several nests examined contained no eggs, although many "mulled" eggs were found floating in the water and among the reeds. These had apparently been washed out by high water the previous season.

Courting was in full swing, between ten and twelve pairs performing on the sloughs visited.

AMERICAN MERGANSER. *Mergus merganser* Linnæus.

It seems noteworthy that we recorded none of these birds in the area visited.

SHARP-SHINNED HAWK. *Accipiter striatus* Vieillot.

We observed this species only once; a single bird was seen working deciduous shrubbery along the bluffs east of Osoyoos Lake.

RED-TAILED HAWK. *Buteo jamaicensis* (Gmelin).

A pair of red-tailed hawks was observed at Manning Park and another at Princeton *en route*. Two pairs were located in the Osoyoos area—one at Richter Pass and the other east of Osoyoos Lake. At Kelowna another pair was seen circling the sloughs to the northeast.

GOLDEN EAGLE. *Aquila chrysaetos* (Linnæus).

Only three golden eagles were observed in the area—one at Vaseaux Lake, one at Osoyoos Lake, and one near Kelowna. All were in high circling flight.

MARSH HAWK. *Circus cyaneus* (Linnæus).

Three adult males were observed during the third week in May—one at Keremeos, one at Osoyoos, and the other east of Osoyoos Lake. All were hunting low over grassy fields. No females were seen.

OSPREY. *Pandion haliaetus* (Linnæus).

An osprey nest containing three eggs was situated in a tall fir on the hillside at the north end of Osoyoos Lake. None other was found in the area.

A bird was photographed on the nest and in flight, on May 31st. On this occasion, another, presumed to be the male, brought the tail end of a large carp to the nest, where it was deposited, apparently as food for the incubating parent.

SPARROW HAWK. *Falco sparverius* Linnæus.

This was the most common raptor in the area. Pairs were observed in the high country east of Vaseaux Lake, throughout the main valley, at White Lake, Richter Pass, and at Kelowna.

BLUE GROUSE. *Dendragapus obscurus* (Say).

Blue-grouse sign was locally abundant in the high country east of Vaseaux Lake. Here several large middens were found below firs which had been used as roosts by wintering birds. No birds were seen.

In the valley-bottoms only one individual was recorded. This bird, probably a female, was flushed in the sage flats at White Lake.

RUFFED GROUSE. *Bonasa umbellus* (Linnæus).

Single birds were occasionally seen along the roadsides in the evening, and two were observed on the lower slopes east of Vaseaux Lake. They were not abundant in the area.

EUROPEAN PARTRIDGE. *Perdix perdix* (Linnæus).

There appeared to be a small evenly distributed population of these introduced birds along the east side of Osoyoos Lake. They were heard and seen daily in the orchard lands and sage flats. On May 29th a nest containing fourteen eggs was located under a sage-bush near the lake-shore.

CALIFORNIA QUAIL. *Lophortyx californica* (Shaw and Nodder).

Quail were numerous about the orchard lands on the east side of Osoyoos Lake. The birds were still in flocks of six to eight at the time of our visit. They were encountered continuously during the trapping operations, and their calls were an integral part of the early-morning bird chorus.

RING-NECKED PHEASANT. *Phasianus colchicus* Gmelin.

There were ten or twelve crowing cocks in the immediate vicinity of our camp on the east side of the lake. These birds were heard calling throughout the day, although in the early morning and evening the activity was intensified.

Two hens found dead on the road west of Osoyoos Lake had apparently been killed by automobiles. One of these birds, found on May 27th, had bare brood patches, indicating a nesting condition.

SORA. *Porzana carolina* (Linnæus).

Numerous rails calling from the marsh at Osoyoos Lake on May 31st and from the reeds of the large slough north-east of Kelowna on June 2nd were identified as of this species by their calls. No specimens were seen or collected.

AMERICAN COOT. *Fulica americana* Gmelin.

These birds were very abundant on all the fresh-water lakes and ponds. Several freshly prepared nests were examined on June 2nd, but none contained eggs at that time.

KILLDEER PLOVER. *Charadrius vociferus* (Linnæus).

This species was observed on the east side of Osoyoos Lake, where one seen acted as though a nest were located in the area. They were much more numerous around the small sloughs near Kelowna, where several pairs were observed in the short-grass meadows. A specimen collected on June 2nd was in breeding condition.

LONG-BILLED CURLEW. *Numenius americanus* Bechstein.

A pair of these birds was nesting in the White Lake area. Courtship behaviour was observed, but no nest was found.

SPOTTED SANDPIPER. *Actitis macularia* (Linnæus).

We saw these birds only on the east shores of Osoyoos Lake, where three individual adults were observed in widely separated areas. None was seen about the smaller sloughs.

WILSON PHALAROPE. *Steganopus tricolor* Vieillot.

This species was recorded only once; two highly coloured females were seen on the larger of two sloughs north-east of Kelowna.

HERRING GULL. *Larus argentatus* Pontoppidan.

Gulls were not numerous in the area; six fully plumaged adults of this species appeared on Osoyoos Lake on May 23rd. They departed northward the same day.

MOURNING DOVE. *Zenaidura macroura* (Linnæus).

These birds were observed in pairs throughout the area. They frequented the sage flats during the heat of the day, where they were often flushed from under the rabbit-bush by members of the party. Many pairs were observed perched on telephone-wires and on the uppermost branches of dead cottonwoods about the camp.

SCREECH OWL. *Otus asio* (Linnæus).

This species was recorded twice. On May 26th one was heard calling during the night near the camp-site. At dusk on May 29th a screech owl flew by the camp pursued by a very indignant robin. Despite a close scrutiny of the suitable nesting-sites in the cottonwoods about camp, we found no nest and never saw this bird again.

BURROWING OWL. *Speotyto cunicularia* (Molina).

We found no evidence of the occurrence of these birds in the White Lake area, where previous observations have been recorded.

POORWILL. *Phalænoptilus nuttallii nuttallii* (Audubon).

Two of these birds were observed in the high country east of Vaseaux Lake. They were frequenting an open hillside on the east side of Grouse Mountain on May 28th. One collected, a female, showed no evidence of breeding. Another specimen was presented by A. Braun, who found an injured bird near Oliver.

NIGHTHAWK. *Cordeiles minor* (Forster).

It is noteworthy that we did not record this species in the area at this time of the year.

BLACK SWIFT. *Nephæcetes niger* (Gmelin).

We observed black swifts on two occasions over our camp. A small flock of seven or eight individuals passed over in the early morning on May 26th. On May 30th three individuals were seen moving along the east side of the lake. All were in very high flight.

VAUX SWIFT. *Chætura vauxi* (Townsend).

A concentration of vaux swift numbering about forty individuals was seen feeding low over the forest along the highway near the south end of Vaseaux Lake; otherwise they were not recorded in the area.

WHITE-THROATED SWIFT. *Aeronautes saxatalis* (Woodhouse).

The well-known nesting-site in the high cliffs immediately east of Vaseaux Lake was still occupied by this species on May 22nd. We observed fifteen or twenty individuals; some were in flight, some were perched.

BLACK-CHINNED HUMMINGBIRD. *Archilochus alexandri* (Bourcier and Mulsant).

A male and two females were observed along the edge of a deciduous woods west of Oliver on May 30th. The male was collected. None other was recorded during our stay.

RUFIOUS HUMMINGBIRD. *Selasphorus rufus* (Gmelin).

Males and females of this species occurred throughout the area wherever flowering plants occurred.

CALLIOPE HUMMINGBIRD. *Stellula calliope* (Gould).

A pair of these birds was seen on Anarchist Mountain on May 31st, and a lone male was seen east of the camp on May 27th. None other was recorded during our stay.

BELTED KINGFISHER. *Megaceryle alcyon* (Linnæus).

We saw only one kingfisher during the trip. On May 26th a noisy individual flew along the shore-line past the camp.

PILEATED WOODPECKER. *Ceophlæus pileatus* (Linnæus).

There was much evidence of this species throughout the area. In the high country east of Vaseaux Lake the working of this large woodpecker scarred many dead trees. We saw no birds, but A. Braun reported them most abundant in the fall.

LEWIS WOODPECKER. *Asyndesmus lewis* (Gray).

These showy birds were numerous in the deciduous groves east of Osoyoos Lake. At least three pairs nested in the immediate vicinity of our camp. Nest-holes were high up in dead cottonwoods.

WILLIAMSON SAPSUCKER. *Sphyrapicus thyroideus* (Cassin).

There was much sign of sapsuckers on the bark of various trees on Anarchist Mountain, but only one bird was seen. This bird presented only a fleeting glimpse and may have been of this species.

HAIRY WOODPECKER. *Dryobates villosus* (Linnæus).

We saw only one hairy woodpecker during the entire trip. This bird was seen on the top of Grouse Mountain east of Vaseaux Lake.

EASTERN KINGBIRD. *Tyrannus tyrannus* (Linnæus).

Pairs of these large flycatchers were observed throughout the more open country, where they were sometimes seen side by side on telephone-wires with the more plentiful western kingbird.

WESTERN KINGBIRD. *Tyrannus verticalis* Say.

This species was distributed evenly, in pairs, throughout the valley-bottom and was one of the most plentiful birds in the area.

SAY PHŒBE. *Sayornis saya* (Bonaparte).

One individual seen on three occasions about the camp provided our only record of this species.

HAMMOND FLYCATCHER. *Empidonax hammondii* (Xantus).

This species was heard and seen in numbers along the coniferous-forest edges and in the clearing on top of Anarchist Mountain on May 31st.

WRIGHT FLYCATCHER. *Empidonax wrightii* Baird.

A small green flycatcher frequented a deciduous grove on the east shore of Osoyoos Lake. It was collected on June 1st and identified as of this species.

VIOLET-GREEN SWALLOW. *Tachycineta thalassina* (Swainson).

Swallows were very abundant throughout the valley, particularly around small fresh-water ponds where concentrations of flying insects occurred.

BANK SWALLOW. *Riparia riparia* (Linnæus).

Two nesting colonies of this species were found in low sand-banks along the east side of Osoyoos Lake. The birds were abundant elsewhere as well. We found them throughout the valley-bottom and in Richter Pass.

BARN SWALLOW. *Hirundo rustica* Linnæus.

We saw only four birds of this species in the Osoyoos area, but around the sloughs north of Kelowna they were most abundant.

CLIFF SWALLOW. *Petrochelidon pyrrhonota* (Vieillot).

These birds were very abundant around a small slough in Richter Pass. Here a concentration of three kinds of swallows (cliff, bank, and violet-green) were working flying insects, while others appeared to be feeding on the ground.

Apart from this concentration, only two other cliff swallows were observed—these at Osoyoos Lake, where swallows were also concentrating on the receding water-line.

JAYS. *Perisoreus* sp. and *Cyanocitta* sp.

We recorded no jays whatsoever in the areas visited.

BLACK-BILLED MAGPIE. *Pica pica* (Linnæus).

These birds were abundant in the deciduous-filled gullies east of Osoyoos Lake. There were six occupied nests in the immediate vicinity of our camp, and several others along the bluffs at the base of the mountain east of the lake. On the western side of the range, magpies were more widely dispersed, but almost every suitable gully was occupied by a breeding pair. Some nests examined on May 23rd contained well-set eggs, some contained newly hatched young, while others contained fledglings in juvenal plumage.

RAVEN. *Corvus corax* Linnæus.

Two ravens were observed in flight over the slopes of Grouse Mountain, east of Vaseaux Lake.

AMERICAN CROW. *Corvus brachyrhynchos* Brehm.

Crows were observed regularly at the north end of Osoyoos Lake, but were not abundant in any of the areas visited.

BLACK-CAPPED CHICKADEE. *Parus atricapillus* Linnæus.

Chickadees were paired off and obviously nesting in the Anarchist Mountain area. We observed several pairs on the summit, some of which may have been the mountain chickadee, *Parus gambeli* Ridgway.

We observed no chickadees in the valley-bottom at Osoyoos.

WHITE-BREASTED NUTHATCH. *Sitta carolinensis* Latham.

We found these birds abundant on the Anarchist Mountain summit. They were frequenting the deciduous growth about clearings in the coniferous forest.

RED-BREASTED NUTHATCH. *Sitta canadensis* Linnæus.

This species was heard and seen throughout the higher elevations east of Vaseaux and Osoyoos Lakes.

PYGMY NUTHATCH. *Sitta pygmæ* Vigors.

Although we watched carefully in order to secure specimens of this species, we saw none.

HOUSE WREN. *Troglodytes ædon* Vieillot.

Our only record of this species was a nesting pair in a garden near Penticton.

LONG-BILLED MARSH WREN. *Telmatodytes palustris* (Wilson).

This bird, commonly called the tule wren, was present in the marsh lands at the north end of Osoyoos Lake, and one was seen in the reeds at a large slough near Kelowna.

CANYON WREN. *Catherpes mexicanus* (Swainson).

We found no trace of these along the bluffs east of Osoyoos Lake, where specimens have previously been taken.

ROCK WREN. *Salpinctes obsoletus* (Say).

No rock wrens were seen during our stay in the area.

CATBIRD. *Dumetella carolinensis* (Linnæus).

We heard and saw one individual near our camp on May 28th; otherwise they were not observed.

SAGE THRASHER. *Oreoscoptes montanus* (Townsend).

We saw none, although a day was spent in the White Lake area, where this species had previously been taken.

AMERICAN ROBIN. *Turdus migratorius* Linnæus.

This was one of the most plentiful birds in all the areas visited. We found them in the high country, down the slopes, and in the orchard lands.

WESTERN BLUEBIRD. *Sialia mexicana* Swainson.

This species was not as well represented as the mountain bluebird at the time of our visit. A nest containing six young was found in a short fir stump situated near the middle of a clearing east of Vaseaux Lake. Adults busy feeding young were photographed.

MOUNTAIN BLUEBIRD. *Sialia currucoides* (Bechstein).

Mountain bluebirds were most abundant around settlements, where they were nesting in niches afforded by buildings.

TOWNSEND SOLITAIRE. *Myadestes townsendi* (Audubon).

We saw these birds on only one occasion. Three were observed in a stretch of open pine forest north-west of Osoyoos on May 30th.

RUBY-CROWNED KINGLET. *Regulus calendula* (Linnæus).

These little songsters were plentiful in the high country, where we heard them singing throughout the day. None was seen in the valley-bottoms.

RED-EYED VIREO. *Vireo olivaceus* (Linnæus).

Our only record of this species was on May 25th, when a single bird perched in camp near the skinning-table.

WARBLING VIREO. *Vireo gilvus* (Vieillot).

This was the common vireo on Anarchist Mountain, where numerous birds were singing from the deciduous growth around openings in the forest.

ORANGE-CROWNED WARBLER. *Vermivora celata* (Say).

We observed this bird only twice, both times in our camp.

YELLOW WARBLER. *Dendroica petechia* (Linnæus).

On May 25th a number of these birds appeared in the deciduous grove in which we were camped. They remained the day and were gone. Subsequently none was seen.

MYRTLE WARBLER. *Dendroica coronata* (Linnæus).

Myrtle warblers arrived in numbers around our camp on May 27th and departed the same day. No others were subsequently seen in the valley-bottoms. On Anarchist Mountain, however, they were present in numbers on May 31st, where they frequented the deciduous border of the forest.

AUDUBON WARBLER. *Dendroica audubon* (Townsend).

We saw this bird only once, a beautiful male, in the high country east of Vaseaux Lake.

MACGILLIVRAY WARBLER. *Oporornis tolmiei* (Townsend).

This species appeared to be nesting on Anarchist Mountain. Several pairs were observed in deciduous shrubbery, where they appeared to be "on territory."

CHAT. *Icteria virens* (Linnæus).

We observed no chats until May 29th, when one was heard calling near the camp. On May 30th two singing males were recorded in a deciduous ravine east of camp and a female was taken in a mouse-trap. These, as did many other passerines, appeared to have just arrived in the area.

BLACK-CAPPED WARBLER. *Wilsonia pusilla* (Wilson).

We saw only one of these birds in our camp on May 23rd, but their numbers increased daily during our stay, and upon departure they were most abundant throughout the deciduous-filled ravines east of the lake.

AMERICAN REDSTART. *Setophaga ruticilla* (Linnæus).

A pair of these beautiful birds was observed on May 30th, when they arrived in our camp. None other was seen.

ENGLISH SPARROW. *Passer domesticus* (Linnæus).

"Sparrows" were most abundant in the Village of Osoyoos and surrounding settled areas.

BOBOLINK. *Dolichonyx oryzivorus* (Linnæus).

Despite a constant lookout, we recorded none of this species in the area.

WESTERN MEADOWLARK. *Sturnella neglecta* Audubon.

These birds were very common throughout the sage flats and grass lands in the entire valley, White Lake area, and in the grass lands north-east of Kelowna.

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

These gaudy birds were present in every slough where sufficient reed and bulrush grew to afford nesting-sites. We found them in small sloughs at Richter Pass, at the north end of Osoyoos Lake, and in the sloughs north-east of Kelowna. On one occasion we observed a flock of eleven feeding over the ploughed soil of an orchard near Osoyoos Village.

RED-WINGED BLACKBIRD. *Agelaius phœniceus* (Linnæus).

Breeding red-wings were common throughout the marsh lands and sloughs visited. They occurred in larger numbers than the yellow-heads, and both species were often found together.

BULLOCK ORIOLE. *Icterus bullockii bullockii* (Swainson).

At least six pairs of bullock orioles were nesting in the high cottonwoods about our camp at Osoyoos. They utilized the string which we hung out on shrubs around the skinning-table. Much amusement was afforded members of the party by the antics of these birds when long pieces were tied down. Upon several occasions they attempted to steal string from the main supply, a grocer's hang-up roll. This invariably occurred when all members were away, and the yards and yards of string hopelessly entangled throughout the nearby *Cratægus* bushes indicated that a very busy and undoubtedly frustrated oriole had visited the camp in our absence.

BREWER BLACKBIRD. *Euphagus cyanocephalus* (Wagler).

This species was present in numbers throughout agricultural lands. At the time of our visit, birds were still feeding in flocks over freshly tilled fields.

COWBIRD. *Molothrus ater artemisiæ* Grinnell.

Three pairs of these birds were observed in the fields west of Osoyoos on one occasion, and a breeding pair was collected near Oliver on May 26th.

WESTERN TANAGER. *Piranga ludoviciana* (Wilson).

We saw only one of these birds in the valley-bottom, but in the dry forest of Anarchist Mountain they were seen regularly at the edges of the forest.

LAZULI BUNTING. *Passerina amæna* (Say).

These beautiful sparrows were observed in a variety of habitats. They were paired off at the time of our visit and obviously breeding, although we located no nests. We saw them on the sage flats, on wires about the orchard lands, and throughout the cultivated fields near the International Boundary.

Though not numerous, they were evenly distributed throughout the low-lying sections visited.

CASSIN PURPLE FINCH. *Carpodacus cassini* Baird.

Purple finches were not frequenting the valley-bottom, but appeared to be on breeding territory in the high country. We saw several singing males at timber-line east of Vaseaux Lake on May 27th.

PINE SISKIN. *Spinus pinus* (Wilson).

These birds were very numerous in the dry forest on Anarchist Mountain. We observed them in large flocks and in pairs. On several occasions the males were observed chattering in their display flight, indicating that some at least were preparing to nest in the area.

AMERICAN GOLDFINCH. *Spinus tristis* (Linnæus).

Pairs and small flocks of goldfinch frequented the margin of lake-shore and sage flats on the east side of Osoyoos Lake. They were present throughout our stay.

SPOTTED TOWHEE. *Pipilo maculatus* Swainson.

We saw none of these birds until June 1st, when we were leaving the valley. On this date three adult birds were observed in shrubbery above the pipe-line west of Osoyoos Lake while we were climbing the hillside to photograph an osprey nest.

VESPER SPARROW. *Poæcetes gramineus* (Gmelin).

We recorded only one pair of these birds. They were seen in a pine forest north-east of Osoyoos.

LARK SPARROW. *Chondestes grammacus* (Say).

This was the most abundant sparrow in the area. Pairs were spotted throughout the sage flats and open country around Osoyoos and Vaseaux Lake. They were also plentiful at Richter Pass and in the White Lake area.

CHIPPING SPARROW. *Spizella passerina* (Bechstein).

Chipping sparrows were evenly distributed throughout the area. We observed pairs throughout the orchard lands to the high country on Anarchist Mountain and east of Vaseaux Lake. The birds were paired off and males were singing on territory.

SONG SPARROW. *Melospiza melodia* (Wilson).

This species frequented roadside bushes in small numbers. We saw only three or four pairs during our stay in the valley, and these were observed from the car as we travelled from one area to another.

BOTANIZING ALONG THE BIG BEND HIGHWAY, BRITISH COLUMBIA

BY J. W. EASTHAM

The highway which follows the Big Bend of the Columbia River from Golden to Revelstoke has a rather unfavourable reputation with motorists, especially those from south of the border. It has, however, many interesting historical associations, fine and varied scenery, and an interesting flora within easy reach of the highway. It is, also, only fair to the highway to say that the writer has made four trips over it—one near the end of May, before the road was officially opened for the season, without discomfort or mishap. Of course, this may be due to the peculiar travelling habits of botanists. Even with someone else driving the car, it is not possible to botanize effectively at more than 30 miles per hour, not allowing for the frequent stops, and the difference between this and the 50 miles or more so many tourists seem to want to travel may also make the difference between comfort and safety, and the reverse.

Surveys are now in progress with a view to constructing a dam on the Columbia between Revelstoke and Boat Encampment, probably near Mica Creek. If such a dam is made, it will cause the flooding of an extensive area above it and necessitate the abandonment of the present location of the highway for an undetermined distance. It might be worth while, therefore, to put on record the rarer plants the writer has discovered along the route. In any case, it will be some years before the above project can be completed, and meanwhile it may be of interest to travellers with botanical tastes to have such information. What is perhaps still more important, someone with the necessary time at his disposal may be induced to make a rather more intensive examination of the flora, especially in the Kinbasket region, than has been possible to the writer, while this is still feasible.

As three of the writer's trips were made from east to west, and as he found the flora of the eastern or Rocky Mountain limb of the Bend by far the more interesting, our present journey will be made in this direction, which is also that in which the river flows. Unless otherwise stated, all observations were made in late July.

In Golden itself the most striking plant observed was *Hedysarum Mackenzii* Richards. At low water the shingle-beds of the Kicking Horse River, which flows through the town are gay with its purple-crimson flowers. Occasional plants were found at various points in the Rockies, but nowhere else in such profusion. *Gentiana Macounii* Holm has been reported from Golden but was not seen by us.

Rather over a mile after leaving Golden is an extensive swampy meadow. Here *Juncus longistylis* Torr. and *Carex Crawei* Dewey are quite abundant. The latter we shall meet again at Kinbasket, and a few plants were previously found along the old canal at Canal Flats, these being the only stations for it so far recorded in British Columbia. By the roadside here was a colony of tall sunflowers, identified somewhat doubtfully as *Helianthus giganteus* L. In the woods a little farther on, the delicate, trailing creeping snowberry (*Chiogenes hispidula* (L.) T. & G.) was found, along with *Melampyrum lineare* Lam. and the spurred gentian (*Halenia deflexa* (J. E. Smith) Griseb.).

About 10 miles out there is a patch of black-eyed susan (*Rudbeckia hirta* L.) and another a little farther on. This is a species of Eastern North America reported occasionally as a casual introduction, but apparently well established here, being observed in 1941, 1947, and 1948.

At about 14 miles and not far from the C.P.R. Station at Donald, the road crosses Wait-a-bit Creek, a fair-sized river, and skirts the hillside. Below, on the left, is an extensive silt flood-plain, built up at the junction of this creek and the Columbia River, which would probably repay a full examination. *Carex scirpoidea* Michx. and the grass



Fig. 1. Looking north-west on the Big Bend Highway near Donald. Engelmann spruce and thimble-berry border the road.



Fig. 2. Kinbasket Mountain (8,100 feet), showing detritus fan at its base. Kinbasket River in the foreground.

Danthonia intermedia Vasey were found here, though the latter is usually an alpine or sub-alpine plant. The most interesting find, however, was the grass formerly known as *Muhlenbergia racemosa* (Michx.) B.S.P. with remarkably stout, gnarled, scaly rhizomes. In recent years the name *M. glomerata* Trin., long relegated to synonymy, has been revived for the species entity to which the plants here belong, as do, probably, most British Columbia records of *M. racemosa*, this species in its now restricted sense apparently being rare.

About 4 miles farther on three conspicuous species were found growing intermingled for some distance along the roadside. One, *Astragalus frigidus* var. *americanus* S. Wats., is frequent in the Rocky Mountain region and also occurs in the Cariboo; the second, *Agastache anethiodora* (Nutt.) Britt., a labiate with an interrupted spike of small blue flowers, is listed in Henry's "Flora" without locality and may have been included only as a possibility, the phrase "May occur in the South-east" following the mention of the two species of the genus. The only other collection made by the writer was along a logging-road up Canyon Creek, south of Golden, but he has also had it sent in from Prince George. As Rydberg gives the range as Alberta eastwards, it may have been introduced here. The third, *Thalictrum dasycarpum* Fisch. & Lall., is also mainly an eastern species, although it is abundant on the Creston flats.

Some miles farther on the road skirts Blackwater Lake, and at the western end is a fringing bed of marsh plants, including *Carex sitchensis* Prescott, a widely ranging Coast species rarely occurring in the Interior. The writer has also seen a specimen of the uncommon *Carex livida* (Wahl.) Willd. from this locality, though he has not found it himself.

Nothing much of interest was found for the next 30 miles or so, when the Sullivan River is crossed. On the first visit, in 1941, water from a flooding-in of the river higher up formed a natural irrigation system for a large area, making a congenial habitat for moisture-loving plants. One of these, *Eleocharis compressa* Sull., the writer has never collected elsewhere. However, spring floods threatening to carry away the bridge led to the dyking and dredging of the river, with the result that in 1947 the water-gardens had been replaced by a dusty stony waste with the only vegetation vast mats of *Dryas Drummondii* Richards covered at this date with feathery seed-heads—an astonishing transformation. Fortunately, all the plants of interest, except the *Eleocharis*, were found again at Kinbasket, 2 miles farther on.

The Kinbasket auto camp, with comfortable, screened cabins and a restaurant, is well situated for investigating the plant-life of the varied exposures of the area. It lies in the angle between the Kinbasket (or Middle) River and Kinbasket Lake, an expansion of the Columbia River, and at the north-west corner of the bridge over the river is Kinbasket Mountain, over 8,000 feet high and with a remarkable "gulch" and detritus fan within easy reach. The camp is a few hundred yards from the lake at low water, but much of the ground is swampy with pools and ditches. Along these the dainty little *Primula McCalliana* Wieg. occurs literally in thousands. It is an early bloomer, its pink, lilac, or magenta flowers turning blue in pressing, being found in profusion on May 25th, 1951. In July nothing but the basal rosette of leaves and the dried scapes, 3 to 4 inches high, were left. Mats of the yellow saxifrage (*S. aizoides* L.) occur both here and on the river-banks. *Triglochin palustris* L., *Muhlenbergia glomerata* Trin., *Carex flava* L., *C. Garberi* var. *bifaria* Fern., *Allium Schænoprasum* var. *sibiricum* (L.) Hartm., and the dwarf bushes of *Salix brachycarpa* Nutt. were amongst the plants collected around the camp or along the river-banks. One clump of *Parnassia fimbriata* König was found. This is the common species at the Coast, but is rare in the Rocky Mountain region, where *P. palustris* L. and *P. parviflora* D.C. are common in wet ground. In drier ground *Lilium umbellatum* Pursh, with large, erect, vase-shaped, orange-red flowers, was found, this being the most westerly station where it was seen. It is the common species of the Rocky



Fig. 3. Mount Trident (10,141 feet), looking south-west from the bridge over Kinbasket River. Junction of river and Kinbasket Lake in foreground.

Mountain Trench. In the pools along the river left over from flood-time, *Sparganium minimum* Fries and *Potamogeton alpinus* var. *tenuifolius* (Raf.) Fern. were found.

The "gulch" on Kinbasket Mountain and the detritus fan, brought down by snow-slides through it, yielded some unusual plants. This spot is reached by a trail through the woods at the west end of the bridge, and care should be taken, coming and going, not to get too far below the fan, otherwise one finds oneself in an almost impenetrable jungle, swampy at the lowest levels, and interspersed with great boulders, invisible amongst the ground vegetation until one falls over them. These and swarms of mosquitoes gave the writer a bad half-hour before he worked his way back to higher ground.

In the woods, in moist low-lying spots, were found *Selaginella selaginoides* (L.) Link and the uncommon *Carex Buxbaumii* Wahl., with the Virginia grape fern (*Botrychium virginianum* (L.) Sw.) in higher ground. On the almost vertical walls of the "gulch" were collected the cliff-brake (*Pellaea Suksdorfiana* Butters) and two crucifers *Braya humilis* Robins. and *Physaria didymocarpa* Gray, the latter remarkable for its greatly inflated pods with papery walls. On the fan the most interesting find was a thistle, *Cirsium Hookerianum* Nutt.

We were informed by the camp management that Kinbasket Mountain has a plateau at the top with "wonderful" flower meadows. However, since ascent has to be made from the farther side or north slope and it is a two days' trip, we did not undertake it. No doubt it is a virgin site, botanically, and might prove very rewarding for someone with the necessary time, energy, and equipment who could spend a few days on the expedition.

On leaving Kinbasket, after crossing the river, the road cuts through a close succession of small streams which come down the hillside and are carried under the road by culverts. In 1941, on following one of these streams back into the woods for a little distance, one of the rarest Canadian ferns was found, the mountain bladder-fern (*Cystopteris montana* (Lam.) Bernh.). It grew in a large bed, mixed with the common oak-fern (*Phegopteris Dryopteris* (L.) Fee), at the foot of a small waterfall. Unfortunately, no precise record was made to identify the particular stream where it was found, and on the next trip in 1947 the undergrowth had increased until penetration was difficult, and the site could not be relocated in the time at our disposal. Although this plant has a very wide distribution, being found in Europe and Asia and from Newfoundland to Alaska in North America, it appears to be rare throughout its range, and in Canada its stations are few and wide apart.

From now on the forest becomes denser, with larger trees and more undershrubs, in many places resembling that of the Coast, the chief difference being that hemlock and not Douglas fir is the dominant tree. We are, in fact, getting into a moister zone. (The annual precipitation at Golden averages 18.08 inches, that of Revelstoke 39.72 inches.) The peculiar plants of the Rocky Mountain region are for the most part left behind at Kinbasket and replaced by others more familiar to dwellers at the Coast. A few notes, therefore, will suffice for the remainder of the route.

Carex Mertensii Prescott is one of the most handsome of a not too distinguished genus so far as decorative qualities go, and is found chiefly at the Coast, usually as isolated plants or small colonies. West of Boat Encampment, however, it lines both sides of the road in a vigour and profusion the writer has never seen elsewhere.

At a point where the road comes out on the Columbia River there is a cliff on the landward side with water continually running down the face, and here *Adiantum pedatum* var. *aleuticum* Rupr. is growing in abundance. This is the common maidenhair fern and would not ordinarily be worthy of note. However, in several weeks of collecting from the Montana border to this point, including a side-trip through the Crowsnest Pass, this was the first time it was observed. Apparently it is not common in this section of the Rockies.

The uncommon beech-fern (*Phegopteris polypodioides* (L.) Fee) was found growing vigorously on a cliff-face of almost raw clay where the road had been cut through.

Although uncommon, it seems very adaptable, being found on limestone cliffs at Wigwam on Burrard Inlet, and plants from that site have been flourishing for years in the writer's garden.

In making the trip from Revelstoke eastwards on May 25th, 1951, we came upon snow-patches in increasing numbers and size as we approached the northern turn of the Bend. For a distance of probably several miles here the spaces between the snow-patches were filled with solid masses of *Erythronium grandiflorum* Pursh, some in full bloom, but more just opening. From a cursory examination the yellow-anthered form (ssp. *chrysandrum* Applg.) was dominant, with only an occasional plant of the red-anthered "typical" form. No doubt a similar profusion of this species may be found in some mountain meadows, but there are probably very few highways which run right through such a display.

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