PROVINCE OF BRITISH COLUMBIA
DEPARTMENT OF EDUCATION

PROVINCIAL MUSEUM

of NATURAL HISTORY and ANTHROPOLOGY

Report for the Year 1957

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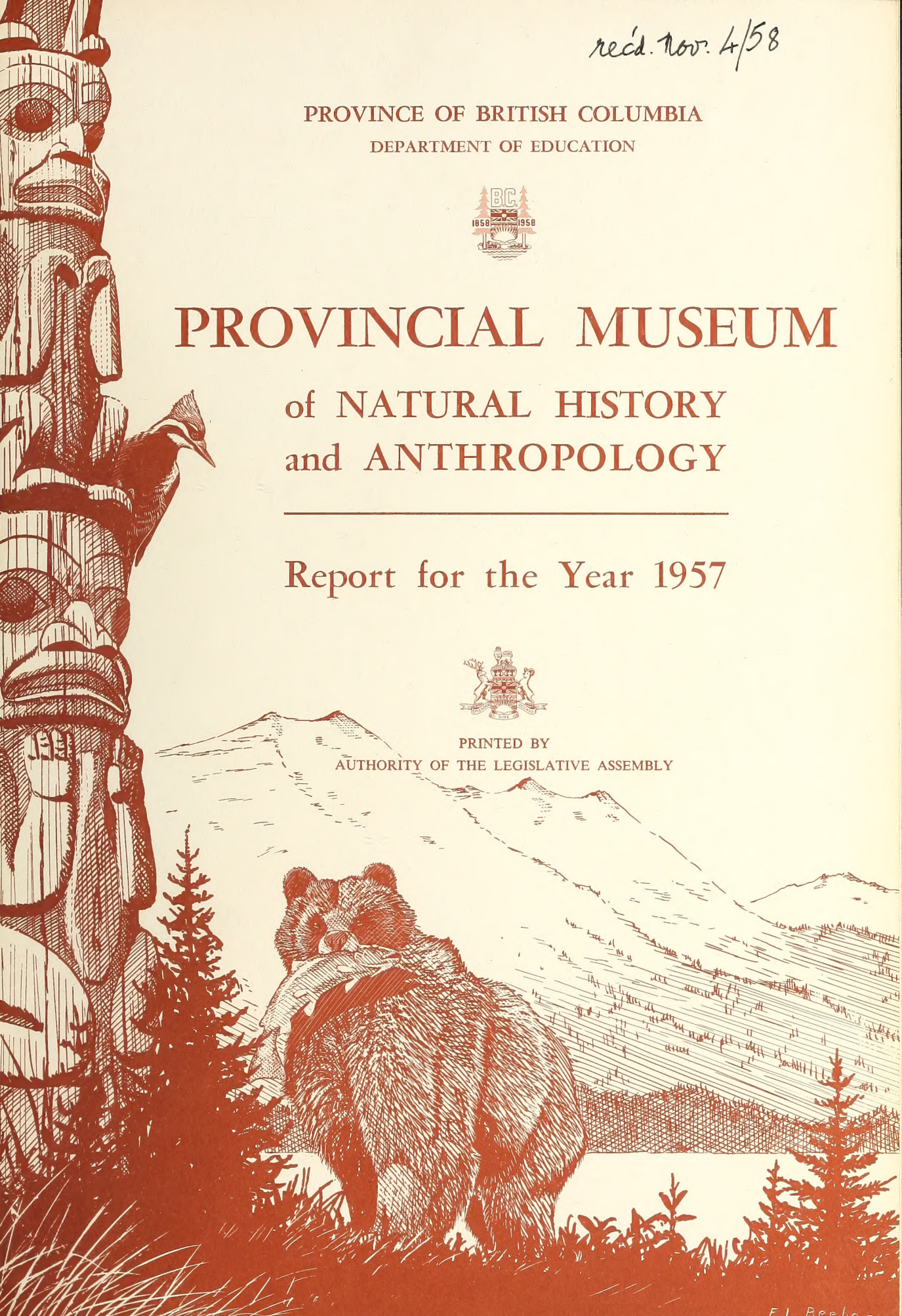

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REPORT FOR THE YEAR 1957

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1958

To His Honour FRANK MACKENZIE ROSS, C.M.G., M.C., LL.D.,
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 1957.

L. R. PETERSON,
Minister of Education.

Office of the Minister of Education,
June, 1958.

PROVINCIAL MUSEUM OF NATURAL HISTORY AND ANTHROPOLOGY,
VICTORIA, B.C., June, 1958.

The Honourable L. R. Peterson,
Minister of Education, Victoria, B.C.

SIR,—The undersigned respectfully submits herewith a report covering the activities of the Provincial Museum of Natural History and Anthropology for the calendar year 1957.

I have the honour to be,
Sir,
Your obedient servant,
G. CLIFFORD CARL,
Director.

DEPARTMENT OF EDUCATION

The Honourable Leslie Raymond Peterson, LL.B., *Minister.*
H. L. Campbell, B.A., M.Ed., LL.D., *Deputy Minister and Superintendent.*

PROVINCIAL MUSEUM OF NATURAL HISTORY AND ANTHROPOLOGY

Staff

G. Clifford Carl, Ph.D., *Director.*
Charles J. Guiguet, M.A., *Curator of Birds and Mammals.*
Wilson Duff, M.A., *Curator of Anthropology.*
Adam F. Szczawinski, Ph.D., *Curator of Botany.*
J. E. Michael Kew, B.A., *Assistant in Anthropology.*
Frank L. Beebe, *Illustrator and Museum Technician.*
Margaret Crummy, B.A., *Senior Stenographer.*
Betty C. Newton, *Museum Technician.*
Sheila Y. Newnham, *Assistant in Museum Technique.*
Eleanore McGavin, *Clerk.*
George A. Hardy, *Curator of Entomology* (part time).
E. J. Maxwell, *Attendant* (to August 31st).
Claude G. Briggs, *Attendant* (from September 20th).

Totem-pole Restoration Programme

Mungo Martin, *Chief Carver*
Henry Hunt, *Assistant Carver.*
David Martin, *Assistant Carver* (part time).
Godfrey Hunt, *Assistant Carver* (part time).

PROVINCIAL MUSEUM OF NATURAL HISTORY AND ANTHROPOLOGY

Objects

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

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

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

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

Admission

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

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REPORT OF THE PROVINCIAL MUSEUM

FOR THE YEAR 1957

REPORT OF THE DIRECTOR

NEW DISPLAYS AND SPECIAL EXHIBITS

The matter of new displays has been uppermost in mind for many years. Except for periodic reorganization of the Indian material on display in the public galleries, there have been no major improvements in display since the current exhibits were installed about the year 1900. Indeed, some of the mounted birds and possibly some of the mammals were prepared before 1885!

Of course, the preparation of new specimens and the installation of large habitat groups and other modern teaching exhibits are very costly undertakings. We have not been able to commence such a programme as yet for lack of funds and lack of trained personnel. Moreover, inadequate space and the unsuitable nature of the present building made it unfeasible to embark on any such plan at present.

In the meantime we are attempting to improve the present displays by using colour and more attractive arrangements in the case of Indian materials and by replacing some of the old exhibits with news displays in the case of natural-history material. The changes are relatively minor in scope and definitely temporary in character.

The programme of adding new cases featuring small mammals, which was started in 1953, was continued by the installation of two new exhibits—one showing the golden-mantled groundsquirrel and pika or rock rabbit, and the other showing the mink. Taxidermy in the first case is by Mr. C. J. Guiguet; that of the mink by Mr. A. J. Braun, of Oliver, B.C. The accessories and backgrounds for both are the work of Frank L. Beebe, of the Museum staff.

In the botanical section a new display-board was installed along the entire east wall and across one alcove, giving a great deal more space for both permanent and temporary exhibits. On this new background, Dr. Szczawinski and Mrs. Newnham have installed a display called " Plants in Action," featuring photosynthesis, seed development, and root structure. The models are the work of Miss Betty Newton, of the Museum staff.

A second exhibit prepared by this team features the flowering dogwood, the recently designated floral emblem of the Province. The exhibit was temporarily displayed by the Victoria Public Library in its Yates Street display-window.

The staircase exhibit, " Tree of Life," was redecorated and rearranged. The exhibition hive of living bees was installed in mid-May by Mr. G. V. Wilkinson, of the Victoria Beekeepers' Association and was maintained successfully throughout the remainder of the year.

The living wild-flower display was continued mainly through the efforts of Mr. John Nutt, who undertook this task early in the season.

A seasonal display of evergreens was presented during the winter months.

Following the repainting of the basement rooms, many of the exhibition-cases containing Indian material have been rearranged or newly set up, a task that will not be completed until 1958. The rearrangement of displays in this section is largely the work of Mr. Kew, assisted by Miss Newton.

FIELD WORK AND OUT-OF-PROVINCE TRAVEL

A number of field-trips to various parts of the Province were made in 1957, as follows:—

(*a*) C. J. Guiguet to Graham Island, Q.C.I. (March 15th to 22nd, 1957), in company with B.C. Game Biologist Don Robinson, to investigate reports of Queen Charlotte Islands caribou.
(*b*) W. Duff to Skidegate, Q.C.I. (April 16th to 19th, 1957), to make preliminary arrangements for salvaging totem-poles from Anthony Island.
(*c*) A. F. Szczawinski to Ucluelet-Tofino district (west coast of Vancouver Island) (June 6th to 14th) to collect plants.
(*d*) W. Duff and J. E. M. Kew to Anthony Island, Q.C.I. (June 17th to July 1st) to take part in salvaging totem-poles and in making an archæological survey of the island.
(*e*) A. F. Szczawinski to the East Kootenay District (June 17th to 28th), in company with Dr. T. M. C. Taylor, of the Department of Biology and Botany, University of British Columbia, to collect plants and to organize a further collecting plan.
(*f*) W. Duff and J. E. M. Kew to Pender Island (July 22nd to 26th) to excavate a test-pit in a midden adjacent to the canal.
(*g*) C. J. Guiguet to Fanny Bay (June 22nd to 23rd) to investigate report of marbled murrelet nesting.
(*h*) C. J. Guiguet to Kyuquot area (July 9th to 26th) to carry on island survey and small-mammal trapping programme.
(*i*) W. Duff on tour through the Okanagan Valley, the Cariboo District, the Skeena Valley to Prince Rupert (October 15th to November 3rd) to visit museums, anthropological collections, and native villages.

Further details of these trips are given in the following sections.

In April the Director made a lecture tour under the auspices of the National Audubon Society, during which he visited the following institutions: Chicago Museum of Science, Chicago Museum of Natural History, Cincinnati Museum of Natural History, Dayton Museum of Natural History, Smithsonian Institution (Washington, D.C.), American Museum of Natural History (New York), University of Puerto Rico (San Juan), College of Agriculture and Mechanical Arts (Mayaguez), and the Institute of Jamaica (Kingston). The courtesies extended by the officials at these various institutions are gratefully acknowledged here.

During the last week of May the Director and the Curator of Anthropology attended the annual meeting of the Canadian Museums Association held in Calgary, Alta., and late in December the Director flew to Ottawa on association business, returning by way of Toronto, where he visited the Royal Ontario Museum.

MUSEUM FILM PROGRAMMES

The annual Saturday morning series of programmes started in 1942 for schoolchildren of the Greater Victoria area was continued this year, as follows:—

Date	Topic	Attendance
March 16th	" Bear Country "	559
March 23rd	" Fur Seals of the Pribilofs "	493
March 30th	" Miracle of the Bee "	506
April 6th	" Prior Claim "	470
April 13th	" Eager Minds "	470

As on many occasions in the past years, we are indebted to the Audio-Visual Education Branch of the Greater Victoria School Board for distributing the free tickets to the various schools, and to the British Columbia Electric Company for granting special travel privileges to school-children attending the lectures.

A similar series of films was presented to the general public on Sunday afternoons during the same period. The attendance was about 1,275 persons. We are again indebted to the Public Information Department of the British Columbia Electric Company for loan of certain films used on these programmes.

OTHER LECTURES AND DEMONSTRATIONS

In 1957 the Director gave lectures and film shows to over seventy organizations and continued to give short instructional talks to Cubs and Scouts.

A course of fifteen lectures and field-trips was given on the "Natural History of British Columbia" during the summer session of Victoria College, July 8th to 26th.

Many other lectures and class demonstrations were given by other staff members, as noted in other sections of the Report.

The Junior Natural History group, sponsored by the Victoria Natural History Society and directed for some years by Miss Newton, of the Museum staff, has been taken over by Mr. Freeman King, an active and enthusiastic member of the society.

MODELS AND ILLUSTRATIONS

In addition to the models of dogwood mentioned in a previous section, Miss Newton has prepared models of lupin, of root structure, of seed development, and of the lamprey. She has also made a series of coloured studies of caterpillars, prepared numerous illustrations for newly installed displays in the Indian section, made numerous posters and other labels, as well as carrying on the preparation of Indian dioramas for distribution through the Visual Education Branch.

During the year Mr. Beebe has completed a large series of illustrations for publications including bivalve molluscs, native orchids, and alien animals. In addition, he has installed two small-mammal cases and started on a third. A latex-rubber model of a green turtle and rubber replicas of various mushrooms and wild flowers were also produced.

RADIO AND TELEVISION

In the fields of radio and television, various members of the staff have continued regular programmes and have contributed to several others. Mr. Guiguet has produced a series of five-minute talks, "Sport Outdoors," three times a week (CKDA), and Dr. Carl has appeared regularly with Inspector George Stevenson, formerly of the British Columbia Game Commission, in a weekly broadcast, "Outdoors with the Experts" (CJVI), sponsored by the British Columbia Cement Company.

In February Dr. Carl was a guest on two short television programmes from CBUT, and on several other occasions other staff members appeared on programmes sponsored by the local station, CHEK. Various Museum activities, including the salvaging of totem-poles on Anthony Island, totem carving in Thunderbird Park, and mushroom collecting have been featured on the C.B.C. television network.

PUBLICATIONS

The major publication of the year was "Anthropology in British Columbia," No. 5, containing an important paper on prehistoric stone sculpture by Wilson Duff, Curator of Anthropology. No. 13 in the Handbook Series, "The Birds of British Columbia: (5) Gulls, Terns, Jaegers, and Skua," by C. J. Guiguet, was also produced, and the manuscript was completed for No. 14, "Alien Animals in British Columbia." Material on orchids, bivalves, fishes, and birds was also gathered for publications planned for 1958.

The following publications by Museum staff members have appeared during the year:—

By Frank L. Beebe—

"A Study of Character (the Story of a Raven)." Victoria Naturalist, Vol. 14, No. 5, pp. 54–61.

By Wilson Duff—

"Prehistoric Stone Sculpture of the Fraser River and Gulf of Georgia." Anthropology in British Columbia, No. 5, 1956, pp. 15–151.

"Totem Poles Recall Vanished Seafarers." The Crowsnest, Vol. 9, No. 3, pp. 22–23.

By C. J. Guiguet—

"The Birds of British Columbia: (5) Gulls, Terns, Jaegers, and Skua." Provincial Museum Handbook No. 13, pp. 1–42.

"Enigma of the Pacific." Reprinted from Audubon Magazine in John Kieran's "Treasury of Great Nature Writings." Doubleday and Co., Inc., Garden City, New York.

"The Kermode Bear." British Columbia Game Commission, News Letter, February.

"British Columbia's Wildlife." British Columbia Government News, Vol. 5, No. 6.

By George A. Hardy—

"Notes on the Flora and Fauna of the Blenkinsop Lake Area on Southern Vancouver Island, British Columbia." Report of the Provincial Museum for 1956, pp. 25–66.

"Gorse (*Ulex europæus* L.)." Victoria Naturalist, Vol. 13, No. 8, p. 89.

"Devil's Club (*Oplopanox horridus*)." Victoria Naturalist, Vol. 14, No. 9, p. 101.

"Forest and Field." Victoria Naturalist, Vol. 13, No. 9, pp. 106–108; Vol. 14, No. 2, pp. 13–16.

"The Life History of *Euthyatira semicircularis* Grt. (Lepidoptera: Thyatiridæ)." Proceedings of the Entomological Society of B.C., Vol. 53, pp. 23–24.

"The Life History of *Zenophleps lignicolorata Victoria* Tayl. (Lepidoptera: Geometridæ)." Proceedings of the Entomological Society of B.C., Vol. 53, pp. 24–25.

"Notes on the Life Histories of Five Species of Lepidoptera from Southern Vancouver Island." Proceedings of the Entomological Society of B.C., Vol. 54, pp. 40–43.

By Betty C. Newton—

"Selection of B.C. Indian Designs." Women's Institute, Department of Agriculture, 18 sheets, mimeograph.

By A. F. Szczawinski—

"Survey of Airborne Pollen and Fungus Spores of Victoria, British Columbia (A Preliminary Report)." American Academy of Allergy Report for 1957.

The sale of publications has increased markedly during the past few years, possibly as a result of publicity gained through radio, television, and the circulation of popular handbooks. Income in 1957 has amounted to approximately $2,680, which has been turned over to Consolidated Revenue. The task of taking care of sales has been performed by Miss Crummy, with the help of Mrs. McGavin.

ATTENDANCE

The number of visitors to the Museum in 1957 is summarized as follows:—

	Registered	Estimated
January	737	1,075
February	1,650	2,240
March	1,748	2,320
April	1,548	1,896
May	3,705	4,687
June	6,352	8,139
July	13,278	17,083
August	10,761	15,246
September	4,931	6,436
October	1,234	1,590
November	718	1,115
December	547	770
Totals	47,209	62,597

To the estimated total should be added 3,771 persons attending the spring film programmes and 1,236 persons attending as school classes or organized groups, making a grand estimated total of 67,604.

As an interesting record for purposes of comparison, the attendance for the month of July has been analysed each year for a number of years. Accordingly, the attendance record for July, 1957, has been broken down by Mr. Briggs as follows:—

Residence	Registration	Residence	Registration
British Columbia	3,480	Washington	1,761
Alberta	563	Oregon	980
Saskatchewan	320	California	2,670
Manitoba	203	Other States	2,348
Ontario	508	Alaska	9
Quebec	125	Great Britain	129
New Brunswick	19	Other countries	120
Nova Scotia	14		
Prince Edward Island	9	Total	8,017
Newfoundland	13	Grand total	13,278
Yukon Territory	7		
Total	5,261		

It will be noted that visitors from California still outnumber those from other individual States and Provinces excepting British Columbia. British Columbia visitors show an increase of almost 40 per cent over the July attendance of the previous year.

The sum of $360.72 collected by the Solarium donation-box during the year was turned over to the Queen Alexandra Fund for Crippled Children.

BUILDING MAINTENANCE AND NEW EQUIPMENT

Early in the year both public washrooms were renovated. This included the installation of new supply and waste lines, additional wash-basins, tiling, and decoration. The basement display-rooms, the stairway and hallway were also repainted as part of a larger plan to modernize the exhibit of Indian material in this part of the building.

In June a new half-ton G.M.C. panel truck was acquired to replace a similar vehicle that had been in use since January, 1949. A dissecting microscope and a slide projector were also purchased.

STAFF CHANGES

After ten years' service as Museum attendant, Mr. E. J. Maxwell left the staff to move to Alberta. To take on the duties of this position, we welcome Mr. Claude G. Briggs, formerly of the Department of Public Works.

As student assistants in the botanical office, we were pleased to have the help of Miss Martha Anne Todd and Miss Ann Hassen, both of Victoria.

OBITUARY

We regretfully record the death here of Archdeacon Robert Connell on November 13th, 1957, in his eighty-seventh year. During his many years of residence in British Columbia, Mr. Connell became an authority in several fields of natural science, particularly in geology, palæontology, and botany. His fossil-hunting activities in the Sooke district added much to the scientific knowledge of that area, and his popular writings delighted thousands for many years. He was also active in the old Natural History Society of British Columbia and was the first president of the Victoria Natural History Society.

REPORT OF THE CURATOR OF BOTANY

HERBARIUM

The principal effort of the botanical section is the maintenance of its growing herbarium despite the time-consuming nature of the duties in connection with it.

Recorded accessions for the year 1957 amounted to 3,200 sheets of phanerogams, bringing the total to 30,408 phanerogams. The accession of cryptogams amounted to 820, consisting mainly of material collected in Northern British Columbia, the Yukon, and Alaska by the Provincial Museum and University of British Columbia survey party in 1956.

A great deal of time was spent in mounting, labelling, and identifying material collected in previous years. It was considered a job of primary importance as it consisted of the collections of our earliest botanists, hitherto uncatalogued and therefore not available for others to study. This work, started in 1956 and carried on throughout 1957, incorporated the remaining extensive collection of J. R. Anderson, W. B. Anderson, J. Fletcher, C. F. Newcombe, C. Tice, J. W. Eastham, G. A. Hardy, and many others.

In 1956 the herbarium started to operate a supervising-collection scheme, offering volunteers detailed instructions and material needed for field work. As a result of this scheme, two extensive and valuable collections and a few smaller ones were received. We are pleased to acknowledge 850 sheets in duplicate, collected on Forbidden Plateau (Moat Lake) and in a few other relatively inaccessible localities in British Columbia by Mr. J. E. Underhill and his workers, and 450 sheets in duplicate collected by Mr. A. P. McLaughlin in Northern British Columbia (Fort St. John area). Space does not permit us to list all the other collectors and localities, but we wish to acknowledge their work with thanks.

A start was made in organizing a new division of British Columbia cryptogams in our herbarium. We were encouraged by the Smithsonian Institution, the University of Washington, and the Michigan State University as the above institutions urgently require British Columbia collections for study. The Smithsonian Institution offered to identify all our collections and to exchange with us British Columbia material in their possession. There is, therefore, an urgent need to build up the herbarium and to collect our cryptogams in future.

In 1956 we started to exchange cryptogams and are hoping to increase this service next year. So far 185 lichens and mosses were exchanged and distributed among herbaria in the United States.

The Forest Research Branch of the Forest Service transferred its herbarium from Cowichan Lake Research Station to our herbarium. They considered it advisable to have one single herbarium serving all branches. A collection of 820 mounted sheets is a valuable addition to our herbarium and has increased it considerably. We acknowledge with thanks this generous donation.

Plants collected by the Provincial Museum and University of British Columbia survey party of 1956 in Northern British Columbia were incorporated into the herbarium, and a complete list was prepared by Dr. T. M. C. Taylor (phanerogams) and Dr. A. F. Szczawinski (lichens). It amounted to 1,575. Duplicates were distributed to Science Service (Ottawa), National Museum (Ottawa), and the University of Washington (Seattle). Most of the phanerogams were identified by Mr. J. W. Eastham, and some of the lichens were identified and checked by Dr. Mason E. Hale (Smithsonian Institution). We acknowledge their help with thanks.

PLANT EXCHANGE

Exchange of duplicates was carried out and increased considerably. Two thousand one hundred British Columbia plants were exchanged with various universities and government botanical institutions. Most of the material was exchanged with Science Service, Ottawa (1,300), University of British Columbia (450), and University of Washington (120).

HERBARIUM HELP

The herbarium was able to obtain the help of two student assistants, Miss Martha Anne Todd and Miss Ann Hassen, for a short period during the summer. They were a great help in mounting, labelling, and shelving plants, and in preparing a new set of generic and specific covers for the plants. Supervision of technical and routine work in the herbarium was very efficiently and carefully carried out by Mrs. S. Newnham.

EXTENSION WORK

A series of lectures (thirty-seven) was given to popularize a botanical knowledge of our Province. The lecture topics were " Flora of Northern British Columbia," "Along Alaska Highway," " 5,000 Miles in British Columbia with a Camera," and " British Columbia Natural Rock Garden." All the above were illustrated by a series of coloured slides. This service was at the disposal of agricultural and horticultural associations, garden clubs, Parent-Teacher associations, church groups, and other professional and social clubs.

A lecture and laboratory demonstration on morphology, taxonomy, and ecology of lichens was given to botany students at Victoria College.

Other extension work of the botanical section is covered in the Director's report.

OTHER ACTIVITIES

The exhibit of native plants was maintained all year round very successfully by Mr. John Nutt. As usual, this exhibit was very educational and popular with tourists.

Other curatorial duties were the identification of plant collections, providing service for the general public and also for various Government departments, mainly Forest Pathology Laboratory and Experimental Station at Saanichton for the Federal Government and Agriculture, Horticulture, Forestry, and Recreation and Conservation Departments for the Provincial Government.

CHANGING EXHIBITS

As in the previous year, an effort was made to continue changing exhibits of educational and conservational value.

The " Plants in Action " exhibit, started in 1956, was rearranged with the addition of more sections to present the anatomy of seeds and the process of germination in gymnosperms and angiosperms, and large models of seeds and their germination stages were done accurately and successfully by Miss B. Newton.

" Nitrogen-fixing Bacteria " was a new changing exhibit illustrating this process in the lupin and showing a series of microscopic cross-sections and greatly enlarged models, prepared with the assistance of Miss B. Newton and Mrs. S. Newnham.

A permanent exhibit illustrating western flowering dogwood (the floral emblem of the Province) was installed. Models representing the flowers, anatomy of the flowers, fruit, and anatomy of the fruit were very truly and artistically reproduced by Miss B. Newton. The case was arranged by Mrs. S. Newnham and Miss Martha Anne Todd.

The work on new modelling technique was started by Mr. F. L. Beebe, who successfully reproduced *Amanita* spp. and *Trillium* for a new series of ecological exhibits.

FIELD WORK

Field work in 1957 included botanical surveys and collecting parties as follows: Long Beach, west coast of Vancouver Island (Ucluelet-Tofino district), June 6th to 14th, jointly with Dr. Stuart Holland, Provincial geologist, and Dr. W. Ziller, Federal mycologist. One hundred and seventy-five plants were collected in triplicate, identified and distributed. A series of coloured slides were taken to illustrate the rain forest of the West Coast. Flathead Valley (East Kootenay District), July 17th to 28th, jointly with Dr. T. M. C. Taylor, of the Department of Biology and Botany, University of British Columbia, to survey the Flathead Valley and to arrange plant collecting by University graduates M. Bell and J. Davidson. The Provincial Museum participated in this botanical research and received a full collection of plants from this area.

RESEARCH

The manuscript on " British Columbia Orchids " for the Handbook series was brought to the final stage of preparation. A great amount of time was spent on studying and checking orchid material in the herbaria at the University of British Columbia, the University of Washington, and in our own herbarium. Material on loan was obtained from the herbarium of Science Service, Ottawa. Grateful thanks is offered to all who co-operated and helped in this regard.

In 1957, research on allergy was started in co-operation with Dr. S. Avren at St. Joseph's Hospital. Daily readings and pollen counting were taken. Tabulated results and conclusions were presented and published by the American Academy of Allergy.

ACKNOWLEDGMENTS

We wish to acknowledge the voluntary co-operation and help of those who contribute to botanical collections and knowledge. Space does not permit us to list everyone who helped, as we have done in previous years, but we intend to include all of them in a grateful vote of thanks.

The botanical section continues its cordial relationship with the Department of Biology and Botany at the University of British Columbia; Science Service, Department of Agriculture, Ottawa; University of Washington, Seattle; Smithsonian Institution, Washington, D.C., and is indebted to them for their interest and help in the field of botanical research.

REPORT OF THE CURATOR OF BIRDS AND MAMMALS

Field work in 1957 saw a continuation of the Museum's programme of West Coast insular explorations. From July 9th to 24th, islands in the Kyuquot Sound area were worked for mammals, birds, and other vertebrates. Seven of the fourteen vegetated islands in the area were investigated. A report on the results of this expedition will be incorporated with those from the remaining islands to be worked next year. Short field-trips were also carried out to the Queen Charlotte Islands and the Fanny Bay area on Vancouver Island (*see* Director's report).

In January, collecting, initiated in December, was completed on four islands in the Oak Bay area, where populations of white-footed mice had been previously established by the Provincial Museum. It is planned to take additional series from each of the islands at four-year intervals for future study of speciation in this plastic species. Field-trips on Vancouver Island were again curtailed this year due to the pressure of other commitments.

This year an additional 150 five-minute radio programmes were produced from a local station. These programmes dealt with natural history of birds, mammals, and fishes, and included information for sportsmen interested in hunting and fishing. Regional Game Biologist Don Robinson, of the British Columbia Game Commission, was heard regularly in this series, giving talks dealing with the management of Vancouver Island's population of deer, elk, and blue grouse. Due to lack of time, these broadcasts will be discontinued at the end of the year.

Routine curatorial activities dealing with 16,500 scientific-study skins of birds and mammals, specimen preparation and identification, preparation and rearrangement of exhibits, cataloguing and indexing of material, lecturing, conducting tours, research, writing (*see* Director's report), and a host of minor activities associated with museum work completely utilized the curator's time during the year 1957.

Reorganization of the bird and mammal scientific-study collections, begun last year, is progressing satisfactorily with the able assistance of Mrs. E. McGavin.

We wish to acknowledge the co-operation of the many citizens of this Province who contribute annually to our biological collections and knowledge, especially members of the Canada Department of Fisheries—Mr. A. J. Whitmore, Mr. H. E. Palmer, and Inspector J. Embelton; Commissioner Frank R. Butler, of the British Columbia Game Commission, and his staff of biologists, inspectors, and game wardens throughout the Province; Mr. R. H. McKay, of the Canada Wildlife Service; the Royal Canadian Navy; and the many private citizens too numerous to list here.

REPORT OF THE CURATOR OF ENTOMOLOGY

The work of the Curator of Entomology, while varied, as could be expected in dealing with such a large assortment of animal life, can conveniently be reported on under the following headings:—

ROUTINE

Routine duties include dealing with correspondence, identifying specimens specifically sent in for that purpose, and dispersing general knowledge concerning insects.

There has been a steady demand by the general public for information, either by letter or personal interview, in relation to insects in the household, garden, or field, usually of common species affecting the economy of everyday life. These include clothes-moths, carpet-beetles, fleas, mites, and similar creatures, which force their attention upon us. Requests of this kind usually require some advice as to control.

Spiders, although not strictly insects, are prominent in these inquiries, occasionally resulting in valuable acquisitions to our collections.

As regards preventive measures, Mr. W. Downes, of Victoria, has shown considerable interest in investigating the habits of carpet-beetles and other species that feed on animal products. Some of his experiments have been carried on in the Museum; the results will be available when completed.

ACTIVITIES

In this category comes the care of the collections, a task that involves minute examination of every insect periodically and possibly followed by fumigation or other preventive steps. To reduce risk of damage, two new storage-cases have been installed which will accommodate all boxes not formerly protected. There are now five of these large cases, each holding between fifty and sixty store-boxes. In addition, there are five cabinets of twelve drawers each which require regular inspection.

Under this heading also comes the preparation of a series of drawings and paintings of caterpillars, about a dozen in all, executed by Miss Betty Newton. These will be used as part of an exhibit to illustrate the more conspicuous features in the life of a butterfly and moth.

The work of systematically gathering the lepidoptera into one reference collection is steadily progressing.

RESEARCH

Under this heading come special studies over and above routine activities. A major one is the gathering of material for a handbook on the butterflies, which is carried out whenever time permits.

As an extra-curricular project, the entomologist is actively interested in working up the life-history of our butterflies and moths, many of which have never been studied. The results are usually published in the Proceedings of the Entomological Society of British Columbia.

The publication of Notes on the Lost Lake Area comes within this sphere of action and was completed during 1957.

ACKNOWLEDGMENTS

I am indebted to Professor G. J. Spencer, Department of Zoology at the University of British Columbia, for information regarding the distribution of certain species of moths in the University collections, and to Dr. T. N. Freeman and Dr. E. G. Munroe, at Science Service of the Department of Agriculture at Ottawa, for the determination of various species of moths.

REPORT OF THE CURATOR OF ANTHROPOLOGY

ACTIVITIES

Field Work and Travel

Several trips were made during the course of the year on anthropological field work and other Museum business. As in past years, most of the field work has been concerned with totem-pole salvage projects, but a small amount of archæological work was also done. This year, more than in the past, we have taken an active interest in the development of local museums within the Province.

The major totem-pole salvage project of the year was the removal of parts of eleven poles from the deserted Haida Indian village of Ninstints on Anthony Island. In April the curator flew to the Queen Charlotte Islands to meet the Skidegate band council and obtain their permission to remove the poles. The council not only approved the project, but also offered to consider the claims of ownership of the poles and administer the funds given as token payments for them. We wish to thank the council and also Mr. P. P. Henson, Indian Superintendent, for their friendly assistance. On April 25th and May 3rd trips were made to Vancouver to obtain financial support for the project from private sources. Through the kindness of an anonymous donor the required funds were made available.

The project itself was carried out between June 17th and July 1st. A complete account of the operation is included in the article on Anthony Island later in this Report; however, a few details and some acknowledgments are included here. The project was organized as a joint Museum-University undertaking under the auspices of the B.C. Totem Pole Preservation Committee. Through the interest of Rear-Admiral Hugh F. Pullen, Flag Officer, Pacific Coast, the services of the Canadian Naval Auxiliary Vessel "Laymore" were obtained to transport the poles from Anthony Island to Victoria and Vancouver. Two of the poles have been placed on display in the Museum entrance hall. The others are now in storage, half at the University of British Columbia and half at the Provincial Museum.

A complete photographic record of the salvage operation was made by Mr. Bernard H. Atkins, Assistant Chief Photographer, Department of Recreation and Conservation, and a 25-minute colour movie is being completed by that Department. In addition, a considerable amount of movie film was taken by a C.B.C. television crew that accompanied the salvage party to Anthony Island.

The curator spent the period May 27th to 31st in Calgary attending the annual meeting of the Canadian Museums Association, in the company of the Director.

As part of a continuing survey of the archæology of the Gulf Islands, the curator and Mr. Kew spent the week of July 22nd to 26th on North Pender Island conducting a small excavation at the Canal site. A 5- by 5-foot test pit was dug through almost 8 feet of deposits to sterile subsoil. The deposits fall roughly into two divisions: the upper 4 feet comprised mostly of loose, uncompacted layers of clam and mussel shell, and the bottom 4 feet comprised of darker, highly compacted earth and disintegrated shell, mostly mussel. The lower levels give the impression of relatively great age. Twenty-seven artifacts were recovered, several of which are of considerable interest. For example, they include three well-made soapstone objects of types described in last year's Report, all from the lower levels. In general, the artifacts from the lower levels suggest a relationship to the Early Maritime culture of the Fraser Delta area, best known from the Locarno Beach site excavated by Dr. C. E. Borden.

We wish to take this opportunity of thanking Lady R. Lake and Mrs. Constance Kelly for their kindness in allowing us to dig on their property and to stay in their summer cottage at the site.

Additional archæological specimens from the Gulf Islands, including two trephined human skulls and a number of very interesting artifacts, were donated during the year, as shown in the list of accessions. We are much indebted to the donors for furthering our work in this way.

The curator spent the week of September 3rd to 7th in Vancouver as the representative of the Provincial Museum at the short course on museum management given at the University of British Columbia. This course, conducted by several members of the University staff, and financed by a grant from the Leon and Theo Koerner Foundation, was designed to assist people from communities all over the Province in the operation of local museums. Representatives attended from Chilliwack, Kamloops, Prince Rupert, Rossland, Saanich, Vancouver, Yale, and Windermere. It was the general opinion that

the contacts made and the information gained were of much value to all who attended. The hope was expressed that a similar course could be given next year. It seems evident that 1958 and following years will see much growth in local museums throughout the Province, and in this development the Provincial Museum will be expected to play an important role.

From October 15th to November 3rd the curator, travelling in the Museum panel truck, made a tour through the Okanagan, Cariboo, and Skeena River areas. This trip had two main purposes. The first was to visit as many local museums as possible, discuss their problems with the staff, and offer advice and assistance where possible. Time was spent in museums at Penticton, Kamloops, Clinton, and Prince Rupert. Two days were spent in Kamloops assisting with the cataloguing of Indian materials and participating in the opening ceremonies of the new museum-library building. In Prince Rupert, three days were spent working in the museum and in discussions with a number of persons concerned with the museum.

The second main purpose of the trip was to visit the villages of the Gitksan Indians of the Upper Skeena River and investigate the possibility of acquiring a small number of totem-poles in their beautiful and distinctive style. Three days were spent in the village of Kitwancool, and tentative negotiations were opened for three poles. Colour movies and a large number of colour slides of the poles were also made. It is saddening to observe that six more of the oldest and finest poles in the village have fallen and shattered since our last visit in 1952. The totem-poles at Hazelton, Kispiox, Kitwanga, Kitsegukla, and Kitselas were also examined, and some movies and slides were made, although poor weather greatly restricted photography. At Kitwanga a mask and a rattle were purchased for the Museum collection.

Also on this trip, private collectors were visited at Huntingdon, Salmon Arm, Cache Creek, Williams Lake, Vanderhoof, Lillooet, and Lytton. At Fort Fraser some birch-bark and moose-hide work was purchased for use in Museum displays.

Education

As in past years, numbers of school classes and other organized groups visited the Indian exhibits and Thunderbird Park and were given talks and demonstrations. The number of primary-school visits declined this year because of a change in the programme of studies and because the Indian rooms were closed for a period for redecoration and reinstallation of exhibits. However, a larger-than-usual number of senior classes and adult groups made visits. The figures are given in the Director's report.

Talks or film shows were given to the following groups: Vancouver Art, Historical, and Scientific Association annual meeting; St. Joseph's Alumni Association; Fairfield United Men's Club; Victoria Electric Club; Kamloops Museum opening banquet; and a public meeting in Prince Rupert. The curator took part in two television shows during the year.

Exhibits

In March the anthropological display-rooms were closed for redecoration, and a start was made on a complete reorganization of the exhibits. The new division of space is as follows: The two west rooms are given over to the topic "Indians of the Coast," the east room to "Indians of the Interior," and the central room to "Introduction and Prehistory" and "The Coast Salish." In the new displays, emphasis is being placed on better use of light and colour and more effective display techniques. Display work has been carried on throughout the year, though frequently interrupted by field work and other demands on our time. In June the west and central rooms were opened to the public, and work was begun on the displays in the east room. The latter was still closed

at the end of the year. The greater part of the display work is being done by Mr. Kew. Miss Newton is assisting in the capacity of artist.

Loans

Five short-term loans of anthropological material were made during the year. For six weeks in the summer the Hudson's Bay Company borrowed several masks, costumes, and totem figures to fill out a large historical exhibit in the Douglas Room of its Victoria store. Also in the summer two Grizzly Bear houseposts were loaned to the Boy Scouts' Association for use in England at its jamboree. Other loans were made to the Victoria Public Library, the Folk Festival Society, and the British Columbia Building at the Pacific National Exhibition.

Publications

Anthropology in British Columbia, No. 5, containing the curator's study of the prehistoric stone sculpture of the Fraser River and Gulf of Georgia, was printed and distributed early in the year. No other publications were completed, but work was started on writing revised editions of the Indian booklets of the Our Heritage series, which we will prepare as the older editions go out of print. Work was also started on a handbook of the Indian tribes of British Columbia for the Museum's Handbook series.

Miscellaneous

Correspondence, reception of visitors, and the routine accessioning and care of the anthropological collections and photographic files are important everyday duties which take much time. The curator is also a member of the committee concerned with the marking of historical sites for the Centennial Year, which has made some demands on time.

An attempt has been made to extend our knowledge of the archæological resources of the Province. We wish to thank the following for completing site-survey forms for our files: Gerhard Eichel, Willow River; Joseph Chambers, Merritt; O. J. Weiler, Whaletown.

TOTEM-POLE RESTORATION PROGRAMME

The Centennial Totem-poles

The planning and day-to-day direction of the carving programme in Thunderbird Park continued to be one of the major responsibilities of the curator. By far the most important project of the year was undertaken in co-operation with the British Columbia Centennial Committee. This was the carving of the 100-foot totem-pole which is to be sent to London as a Centennial gift to Her Majesty the Queen from the people of the Province, and of the exact replica of the Royal pole which is to be erected in Vancouver. The Royal pole is being produced as a joint project of the British Columbia Centennial Committee and this department. The Vancouver pole is being financed jointly by the Vancouver and Provincial Centennial Committees.

The official start was made on the Royal pole on March 23rd, at a formal ceremony in Thunderbird Park during which His Honour Lieutenant-Governor Frank M. Ross accepted the pole on behalf of Her Majesty and removed the first chip with Mungo Martin's adze. By September 21st the carving of the Royal pole was complete (except for the large hat which fits on the top figure). The second log was moved into the workshop and carving was started on the Vancouver pole. The Royal totem will be painted early in the spring of 1958 and shipped from Victoria on April 20th. The Vancouver totem will not be completed until May or June.

(British Columbia Government photograph.)

Skedans Grizzly Bear pole (a replica by Mungo Martin) at Peace Arch Park, White Rock, B.C.

The idea of a Centennial totem-pole originated with members of the Vancouver Centennial Committee. It was conceived as an authentic Coast Indian totem-pole, bearing a foot of carving for each year of British Columbia's centenary, to stand in London as a gift to Her Majesty from the people of the Province and as an outstanding example of our native art. The idea was adopted as a Provincial Centennial project, and it was decided to make use of the existing totem-carving facilities in Thunderbird Park and to

assign the responsibility of designing and carving the pole to this office. Some time later the idea of an exact replica of the Centennial pole, to stand in Vancouver, was proposed as a project of the Vancouver committee, and we were given the task of carving that pole as well.

The first main decision we had to make was in the choice of the design. In the interest of authenticity, it was decided that the pole should be an original creation rather than a copy of one or more other poles, and that it should be carved in a single tribal art style rather than in some combination or mixture of the several good styles found along the coast. The availability of chief carver Mungo Martin and the regrettable fact that no wood sculptors of his stature remain among the other tribes were determining factors in the choice of tribal style. It was decided that the pole would be carved in Mungo Martin's Kwakiutl style, and that he should design and be chief carver of the pole. This would be the crowning achievement of his life-long career in native art, and would further confirm his place as the greatest carver of his generation.

Mungo Martin designed the pole to stand as a memorial to all of his people, the more than twenty local tribes on Northern Vancouver Island and the adjacent Mainland who are known as the southern Kwakiutl. Each of these tribes consists of a number of large family groups or lineages, and each lineage has one or more dominant crests. These crests are animal or human figures representing the original ancestors of the lineages or some other beings who were prominent in their traditions. It was, of course, impossible to put crests of all the lineages on the pole. The maximum number which could be used without distorting the figures out of proper proportions was ten. The ten were chosen to give as wide a representation as possible, although the importance of each crest in Kwakiutl traditions and its suitability for the composition of the pole were also considered. Their order on the pole was a matter of adapting the figures in a pleasing arrangement and in proper proportions to the dimensions of the log and does not represent their relative importance.

The ten crests, from the top down, are as follows:—

(1) *Man with Hat.* — The man with the huge hat surmounting the pole is Tatensid (" Providing Shelter "). He was created as a Raven, but changed to human form and became the founder of the " Won by Argument " lineage of the Goasila tribe of Smith Inlet.

(2) *Beaver.*—The Beaver (Tsawi) changed into a man at the head of Smith Inlet and took the name Nemukwis ("Alone at the Head of the Inlet "). He is the founder of a lineage of the Nakwakto tribe of Blunden Harbour.

(3) *Old Man.*—Numas (" Old Man ") is carved on the pole looking over his left shoulder and holding a staff. He is the ancestor of the Tlauitsis lineage (" Those Descended from Him Who Was Created an Old Man ").

(4) *Thunderbird.*—In his bird form, Tsoona the Thunderbird flew down from the sky and landed at Knight Inlet. Here he stayed, changed to human form, and founded the " Descended from Thunderbird " lineage of the Awaitlala tribe.

(5) *Sea Otter.*—The Sea Otter is one of four crests of a lineage of the Gwawaenuk tribe of Watson Island. It commemorates a supernatural experience of Seweet, the son of the chief, who received power from the Loon, and assumed the form of the Sea Otter during part of his adventures.

(6) *Raven.*—Gwawina the Raven, created on Kingcome River, took human form and called himself Lawagila (" Rescuer "). His lineage, " Descended from Lawagila," is the first to be served at feasts of the Tsawatenuk tribe, as befits their voracious Raven ancestor.

(7) *Whale.*—The founder of this lineage of the Mamalilikula tribe of Village Island was created as a Whale, but changed to human form and took the name Walas (" Great One ").

(8) *Double-headed Serpent.*—One of the lineages of the now-extinct Tlitlekit tribe of Johnstone Strait was a man who was changed from the supernatural Sisiutl, or double-headed snake. As carved on the pole, this crest shows both his human and animal forms.

(9) *Halibut.*—The foremost lineage of the Nimpkish tribe of Alert Bay has as its crest the supernatural Halibut. According to their tradition, the Halibut swam slowly ashore at the mouth of Nimpkish River. From it a man stepped ashore and became the founder of the lineage.

(10) *Cedar Man.* — An important crest of the Kwikwsutinuk tribe was the ancestor, Tseakami, who emerged from the red cedar tree, in which form he had been created. On the pole he is shown emerging from the tree and wearing ornaments woven of cedar-bark.

The two totem-poles are carved from cedar logs of exceptional size and quality donated by the Powell River Company. Both 106 feet long, with diameters of 4½ feet at the base and tapering to 2 feet at the top when carved, the logs were the finest obtainable on that company's logging areas on the Queen Charlotte Islands. Their large diameter has allowed the carvers full scope in creating bold, fully sculptured figures. Island Tug and Barge Company transported the logs from Vancouver, and Heaney Cartage and Storage Limited has moved the logs and carved poles in and out of the workshop as required. The Royal totem-pole will be transported to England by Furness Withy & Company.

The Centennial totem-poles have brought the carving programme much additional publicity, and the necessary public relations work has required some time and effort. This has included the writing of descriptive material and assistance to journalists and photographers. A movie showing the carving of the Royal totem is being made by the Photographic Branch, Department of Recreation and Conservation, and we have assisted in its planning.

Other Work

Before a start was made on the Centennial poles in March, two other carving projects were completed. Two 18-foot totem-poles carved under a special arrangement for the City of Courtenay were finished and shipped off in February. They were erected with appropriate Indian ceremonies in Riley Park, and have brought much favourable comment. The other project was the making of a 21-foot dugout of the Nootka type as a companion to the Northern-type canoe made the previous year. It was our intention to put these canoes on display in a shelter in Thunderbird Park, but because of circumstances beyond our control we were not able to do so.

There were minor changes in the staff of Indian carvers during the year. Chief carver Mungo Martin and Henry Hunt worked steadily the whole year. David Martin worked from January 1st to July 31st, when he returned to his former occupation of commercial fishing. Another apprentice carver from the Kwakiutl tribe, Godfrey Hunt, was employed from May 31st to September 30th.

ACCESSIONS

ZOOLOGICAL ACCESSIONS

Mammals

By gift—

British Columbia Game Office, Victoria, three cougars.
Miss Barbara M. Clowes, Milnes Landing, one little brown bat.
Miles Dichton, Victoria, skull of deer with abnormal antlers.
Herbert Hughan, Aiyansh, two voles, one dusky shrew, one jumping mouse.

Lieutenant-Colonel McCooey, Victoria, one narwhal tusk.
Mrs. O. T. Smythe, Duncan, one mounted deer.
Bert Welfare, per Mrs. Don Heron, Vanderhoof, one box of coyote bones.

By the staff, 101.

Birds

By gift—

Peter Axhorn, Victoria, one glaucous-winged gull.
James A. Berry, Victoria, one Cooper hawk.
Ted Brown, Ganges, one golden-crowned kinglet.
W. R. Crystal, Victoria, one hummingbird.
David Donnett and Terry Sutherland, one murre.
G. H. L. Fairchild, Victoria, one sapsucker.
Dr. A. O. Hayes, Victoria, one golden-crowned kinglet.
Victoria City Parks Department, per Alex. Johnston, one bufflehead, one swan.
Jack Lenfesty, Victoria, one Canada goose, one sharp-shinned hawk.
M. C. M. Matheson, Victoria, one warbler.
P. Monckton, Victoria, one American redstart's nest.
A. Monks, Penticton, one bald eagle.
A. F. Oeming, Edmonton, Alta., one hawk owl.
Dr. D. H. Pimlott, St. John's, Newfoundland, bones of one great auk.
Ralph Wherry, Victoria, one shoveller, one red-tailed hawk.
P. E. Wilkinson, Victoria, one robin.
Ivor Williams, Victoria, one guillemot.
R. Wilson, Victoria, one gadwall.

By the staff, four.

Amphibians and Reptiles

By gift—

Garry Brander, Victoria, one alligator lizard.
James Jack, Victoria, one toad.
Cheryl Leask and Janet Pettersen, Victoria, one snake.
Dorothy Mills, Victoria, one turtle.
G. M. Samson, Milnes Landing, one salamander.

By the staff, fourteen.

Fish

By gift—

Herbert Hughan, Aiyansh, one stickleback, one squawfish, one Rocky Mountain whitefish.

Invertebrates

By gift—

Raymond G. Alcock, Victoria, one pecten.
Ron Barillaro, per John Zarelli, Oliver, one scorpion.
W. E. Barraclough, Nanaimo, one cave insect.
Daniel Cairnie, Victoria, one banded borer.
Joan and Geoff Davis, Kimberley, one giant slug.
D. J. DeRochie, Victoria, one orb weaver.
Mrs. W. Dron, Victoria, one black widow spider.
Ralph Fasmann, Victoria, one crab.
Herbert Hughan, Aiyansh, fresh-water snails.
W. Z. Jones, Sherman Oaks, Calif., one fresh-water clam.
Martin Nicels, Victoria, one black widow spider.
Derreck Webb, Lake Cowichan, one ribbon worm.

Miscellaneous

By gift—

D. F. de Tremauden, Royal Oak, one photograph.

ANTHROPOLOGICAL ACCESSIONS

The Ormond T. Smythe Collection.—(Gift.) A collection of Coast Indian and other objects assembled over many years by the late O. T. Smythe, of Duncan, and donated by Mrs. Cecelia Smythe.

The F. J. Barrow Collection.—(Gift.) A small collection of Coast Indian basketry and other objects, to be added to the extensive collections donated in previous years by Mr. and Mrs. F. J. Barrow.

The Edward B. Reid Collection.—(Gift.) An interesting archæological collection from the Gulf Islands, donated by E. B. Reid, of Saturna.

The Peter Georgeson Collection.—(Gift.) Another valuable collection of archæological specimens from the Gulf Islands, donated by Mrs. P. Georgeson, Langford.

Haida

Carved argillite candle-holders, two. Estate of D. Morkill, Victoria. (Purchase.)
Painted cedar box. W. F. Cameron, Victoria.
Painted cedar box. A. Sumner, Victoria.
Human skull. C. J. Guiguet, Victoria.
Miscellaneous archæological material. Staff.

Tsimshian

Carved wooden rattle. Mrs. M. V. Harris, Kitwanga. (Purchase.)
Carved wooden mask. Mrs. M. V. Harris, Kitwanga. (Purchase.)

Kwakiutl

Model totem-pole. In Smythe collection.
Cedar-root hat. In Barrow collection.
Wooden ladle. In Barrow collection.
Wooden cradle. In Barrow collection.
Model canoe. In Barrow collection.
Wooden feast dishes, three. In Barrow collection.
Sketches of Kwakiutl designs. R. H. Hiscocks, Victoria.

Nootka

Bird mask. Estate of Mrs. Rose Helen Henderson, Victoria.
Stone objects, two. P. E. Malon, Tofino.
Twined basketry cup. In Smythe collection.
Carved grave figure. In Smythe collection.
Twined baskets, three. In Barrow collection.
Prow of canoe. Frank Murphy, Victoria.
Twined basket. W. F. Cameron, Victoria.
Human skulls, two. Royal Canadian Mounted Police.

Coast Salish

Perforated stone object. Mrs. J. L. Hinton, Victoria.
Mountain-goat wool blanket. G. Maxwell, Farmington, New Mexico. (Purchase.)
Abrasive stone. A. Reynard, Nanaimo.

Stone hammer. A. Holmes, Victoria.
Stone celt. Master R. Peters, Ruby Creek.
Stone celt. B. Richmond, Victoria.
Basketry covered cane. In Smythe collection.
Model canoe. In Smythe collection.
Mat needles, four. In Smythe collection.
New dancer's staff. In Smythe collection.
Painted paddle. In Smythe collection.
Beaded cane. In Smythe collection.
Drum. In Smythe collection.
Cedar-root hat. In Smythe collection.
Coiled basket. In Smythe collection.
Abrasive stone. T. W. S. Parsons, Victoria.
Metal spoon. T. W. S. Parsons, Victoria.
Bone barb. T. W. S. Parsons, Victoria.
Barbed bone point. T. W. S. Parsons, Victoria.
Antler wedges, two. T. W. S. Parsons, Victoria.
Ground slate object. T. W. S. Parsons, Victoria.
Chipped stone objects, two. T. W. S. Parsons, Victoria.
Wooden knitting-needles, two sets. R. Nicholls, Victoria. (Purchase.)
Mountain-goat wool blankets, two. R. Nicholls, Victoria. (Purchase.)
Carved wooden wands, two. R. Nicholls, Victoria. (Purchase.)
Dance head-dress. R. Nicholls, Victoria. (Purchase.)
Copper dance rattles, four. R. Nicholls, Victoria. (Purchase.)
Sculptured stone bowl. R. Nicholls, Victoria. (Purchase.)
Dance rattle. R. Nicholls, Victoria. (Purchase.)
Chipped stone point. Master B. Richmond, Victoria.
Basketry covered jar. O. C. Bremner, Chemainus.
Stone hammer. O. C. Bremner, Chemainus.
Coiled baskets, six. In Barrow collection.
Coiled basketry tray. In Barrow collection.
Ground slate point. Master D. Gardner, Victoria.
Stone disk beads. Dana Strugnell, Victoria.
Chipped stone point. P. N. Pedersen, Victoria.
Stone anchor. A. Ritchie, Victoria.
Trephined skull. Dr. B. J. Hallowes, Saturna Island.
Trephined skull. In Reid collection.
Chipped stone points, thirty-four. In Reid collection.
Stone hammers, two. In Reid collection.
Ground slate points, six. In Reid collection.
Stone sinker. In Reid collection.
Stone beads, two. In Reid collection.
Stone celts, six. In Reid collection.
Bone celt. In Reid collection.
Abrasive stone. In Reid collection.
Bone object. In Reid collection.
Chipped stone points, fifteen. In Georgeson collection.
Ground slate points, eight. In Georgeson collection.
Nephrite celts, seven. In Georgeson collection.
Bone barbs, four. In Georgeson collection.
Quartz lamellar blade cores, four. In Georgeson collection.
Stone sinker. In Georgeson collection.
Stone hammer. In Georgeson collection.

Ground slate rod. In Georgeson collection.
Stone labret. In Georgeson collection.
Soapstone object. In Georgeson collection.
Clam-shell and stone beads. In Georgeson collection.
Stone hammer fragments, three. Rev. T. H. Laundy, Victoria.
Stone atlatl weight. John Sendy, Victoria.
Stone anchor. R. V. James, Victoria.
Human skull. R. V. James, Victoria.
Human skulls, four. Royal Canadian Mounted Police.
Human skulls and skeletal fragments, two. J. Stubbs, Comox.
Human skull. W. C. Stone, Denman Island.
Human skull and skeletal fragments. Staff.
Miscellaneous archæological material. Staff.

Interior Salish

Incised bone awls, two. Dr. S. Holland, Victoria.
Chipped stone blade. Dr. S. Holland, Victoria.
Human skull. Royal Canadian Mounted Police.
Human skull. R. H. Todd, Cache Creek.

Athapaskan

Buckskin moccasins in stages of manufacture. Mrs. M. George, Fraser Lake. (Purchase.)
Birch-bark baskets in stages of manufacture. Mrs. M. George, Fraser Lake. (Purchase.)
Basket materials. Mrs. M. George, Fraser Lake. (Purchase.)
Birch-bark basket. Mrs. M. George, Fraser Lake. (Purchase.)
Chipped stone points, seven. A. J. Blackwell, Vanderhoof.
Chipped stone scrapers, seven. A. J. Blackwell, Vanderhoof.
Stone celts, three. A. J. Blackwell, Vanderhoof.
Stone hammer. A. J. Blackwell, Vanderhoof.
Bone awl. A. J. Blackwell, Vanderhoof.
Chipped stone blade. L. J. Rogers, Port Hammond.

Plains Area

Beaded buckskin saddle. Mrs. M. J. K. Snape, Victoria.
Buckskin coat. Mrs. M. J. K. Snape, Victoria.
Buckskin gloves, one pair. Mrs. M. J. K. Snape, Victoria.
Beaded necklace. Mrs. M. J. K. Snape, Victoria.
Beaded bags, two. Mrs. M. J. K. Snape, Victoria.
Beaded belt. Mrs. M. J. K. Snape, Victoria.
Buckskin-covered club. Mrs. M. J. K. Snape, Victoria.
Model canoe. Mrs. M. J. K. Snape, Victoria.
Grooved stone maul. O. C. Bremner, Chemainus.

Miscellaneous

Wooden ladle. Eskimo. In Smythe collection.
Catlinite pipe. In Smythe collection.
Chipped stone points, forty-four. In Smythe collection.
Ground slate objects, seven. In Smythe collection.

Chipped stone objects, four. In Smythe collection.
Bone awl. In Smythe collection.
Antler wedges, two. In Smythe collection.
D-adze. In Smythe collection.
Pottery dish. In Smythe collection.
Stone hammers, seven. In Smythe collection.
Glass trade beads, twenty. In Smythe collection.
Abrasive stone. In Smythe collection.
Stone clubs, two. In Smythe collection.
Stone bowl. In Smythe collection.
Model totem-poles, five. In Smythe collection.
Canoe paddle. W. Cozens, Victoria.
Snowshoes, two pairs. Mrs. A. J. Saunders, Victoria.
Copper arrow point. F. Russell, Victoria.
Bark canoe-bailer. In Barrow collection.
Twined baskets, four. In Barrow collection.
Small wooden bows, two. In Barrow collection.
Large basket. Miss Olive Heritage, Victoria.
Carved bone club. Ivan S. Day, Victoria.
Sealing-harpoon point. Ivan S. Day, Victoria.
Glass trade beads. Ivan S. Day, Victoria.
Stone axe. Ivan S. Day, Victoria.
Adze blade. Ivan S. Day, Victoria.
Grooved maul. Ivan S. Day, Victoria.
Colour slides of pictographs. A. Shipton, Penticton.

NOTES ON THE LIFE-HISTORIES OF FIVE SPECIES OF LEPIDOPTERA OCCURRING ON VANCOUVER ISLAND

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

The following five species of Lepidoptera are common on Southern Vancouver Island, yet apparently the life-histories have never been fully worked out. The present observations are incomplete, but they are given here in the hope that they will stimulate our younger naturalists to fill in the missing details.

The food plants are additional or supplementary to those given in "An Annotated Check List of the Macrolepidoptera of British Columbia," by J. R. J. Lewellyn Jones (1951).

I am indebted to F. L. Beebe for the drawings of the adult stages.

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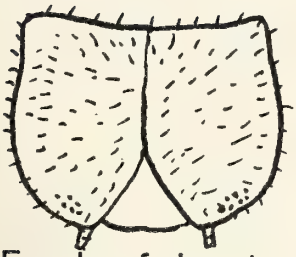
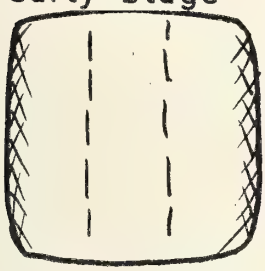
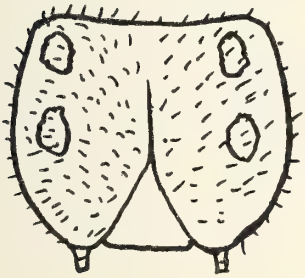


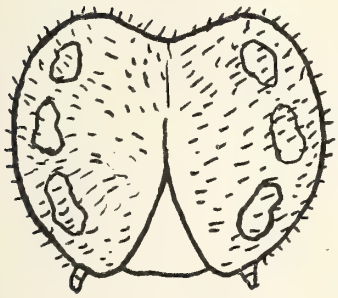
Front of head
early stage



Back of segment



Front of head
middle stage



Front of head
later stage

LARGE DUSKY-WING
(*Erynnis propertius* Scud & Burg.)

Wing expanse averages 1¾ inches. The fore-wings of the male are blackish-brown with marblings of a lighter shade. Near the tip of the wings there are four small elongate silvered dots placed very close together in an oblique row. The hind-wings are lighter in colour and more of a brownish shade.

The fore-wings of the female have the marblings almost white in colour, while the hind-wings have an ochreous tinge and a series of ochre spots on the outer third.

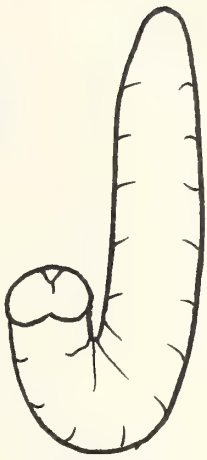
The common name, dusky-wing, is descriptive of the general colour.

Its distribution in British Columbia appears to be restricted to Southern Vancouver Island oniy where the Garry oak occurs.

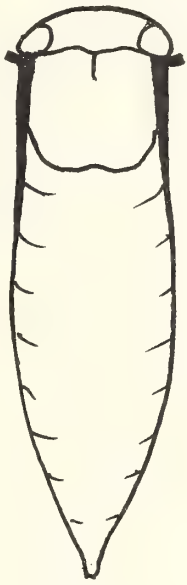
Larva—Beaten from Garry oak (*Quercus garryana* Dougl.) in Saanich, June 29th, 1956. Possibly after first moult. Length, 8 mm. Head large in proportion to body, semi-quadrate, the upper edge sharply angled, dull, due to a close minute pubescence, black in colour. Body, tapering from the head; greenish-grey, thickly and finely dotted with minute yellow spots; two thin, interrupted parallel dorsal lines.

When not feeding it lies partly curled up on a leaf.

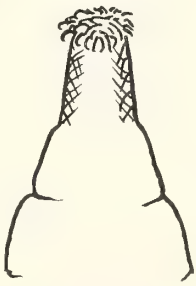
Second (?) moult, July 12th. Length, 10 mm. Head, coloured as before but with the addition of two small orange spots on each side of the vertex. Body biege, closely dotted with lighter spots and with faint yellow subdorsal lines.



Full grown
caterpillar



Pupa



Cremaster

Third (?) moult, July 22nd. Length, 12 mm. Head, light reddish, with two lighter patches on each side. Body, pale glaucous green, subdorsals white; covered with short downy hairs interspersed with minute white mushroom-like bodies. Larva rests with head turned along the side of body between leaves lightly held together by silken threads.

Fourth (?) moult, August 4th. Length, 15 mm. Colour and marking as before. It is restless and wanders about, not feeding very much. Grows very slowly.

August 22nd; length, 17 mm. Head notched on top, flesh colour with orange spots on each side and covered with fine hair. Body, sage-green, sub-dorsals pale yellow, intersegmental rings pale lemon; four or five transverse wrinkles on each segment; covered with fine hairs and with fungoid pustules as before; spiracles and spiracular folds white.

September 19th; length, 20 mm. Resting, apparently dormant between the leaves, where it remained throughout the winter months.

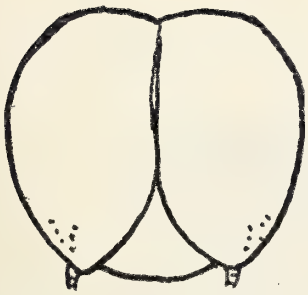
February 27th, 1957. The larva emerged from the leaves and began to spin a light silken mat on the sides of jar, where it remained quiescent. Head, pinkish-brown. Body, flesh colour. Markings and pubescence as before.

March 27th. The caterpillar has now spun a light cocoon at the top of the jar, where it finally pupated on April 29th.

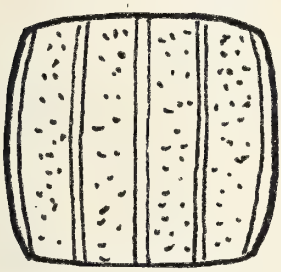
Pupa.—May 3rd, 1957. Size, 15 by 4 mm. Shiny, fuscous, except the intersegmental rings, which are a light brown; thorax and first four abdominal segments have an orange-brown tinge. They are covered with a short, sparse pubescence; the anterior margin of the thorax has a short dull black protruberance, 1 mm. in length. Cremaster, a coronet of small hooks on the summit of a rugose conical base at tip of last segment.

Imago.—Emerged May 28th, 1957.

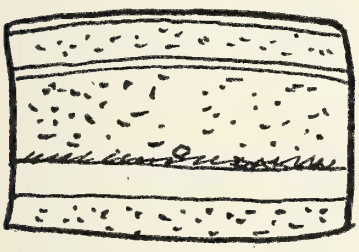
Remarks.—The period of hibernation among the leaves of the food plant, where it was by no means fully concealed, is of interest, also the long period of quiescence in the cocoon before the final change to a pupa. Contrasted with this is the short time spent as a pupa—only four days.



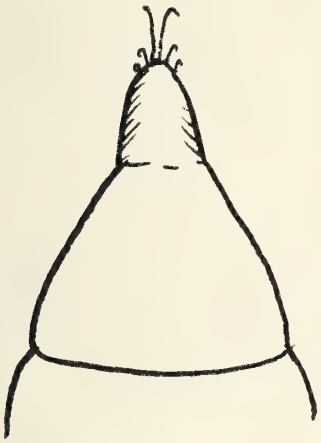
Front of head



Back of segment



Side of segment



Cremaster

RED-SPOT QUAKER (*Aseptis binotata curvata* Grt.)

Wing expanse, 1⅔ inches. The general colour of the fore-wings is a dark blackish-brown with a light reddish-brown spot near the tip. The hind-wings are of a pale smoky colour.

The red-spot quaker is most often met with around artificial light. It is a Western American species, originally described by Walker (1865) from Vancouver Island specimens as *binotata*. The form *curvata* Grt., which also occurs on Vancouver Island but described by Grote (1882) from Californian material, differs in the shape of the spot, which is smaller and more lunate than round as in the species (Dyar, 1904).

The egg is described by Dyar as 0.8 mm. in diameter, nearly spherical, smooth, and dark yellow in colour. He also gives a description of the caterpillar, which fed on the flowering currant *Ribes sanguineam*.

The adult is on the wing from June to August.

Larva.—Taken on ocean spray (*Holodiscus discolor* (Pursh)) in Saanich, May 15th, 1955. Length, 20 mm.

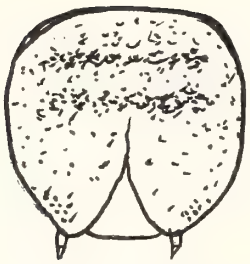
May 26th. Head, smooth, pale green. Body, smooth, green, with whitish-yellow dorsal, subdorsal, and spiracular lines; whole body overspread with small, white dots.

June 4th. Length, 25 mm. Full fed. Head as before. Body as before, but spiracular line edged with purple dorsally; spiracles pale yellow, ringed with red. Larva rests with head and thorax elevated, sphinx-like. Pupated in a lightly spun cocoon among debris at bottom of jar.

Pupa.—Size, 15 by 6 mm. Smooth, dark brown, with a slight "bloom." Cremaster, two long, curved spines, partly twisted together; at base several small, hook-tipped hairs set upon a rugose tubercle.

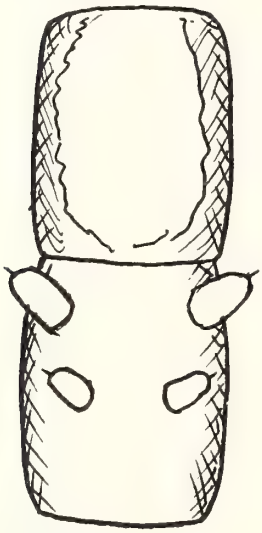
Imago.—Emerged August, 1955.

NOTE.—May 26th, 1957. Two full-grown caterpillars were taken on thimbleberry (*Rubus parviflorus*). One was apple green in colour; the other glaucous green. June 1st, both pupated. June 28th, adults emerged.



Front of head

Underside of segment



First and second abdominal segments

Cremaster

POWDERED CARPET (*Ultralcis latipennis* Hulst)

Wing expanse, 1½ inches. General colour, dark smoky grey, an effect produced by a thick sprinkling of dark scales on a lighter background, hence the common name "powdered carpet." The specific name has reference to the comparativly broad wings.

By day the moth rests on tree-trunks and palings with wings spread and closely applied to the surface, which makes it difficult to detect. More often it is seen about our porch lights.

The powdered carpet was originally described by Hulst (1896) from specimens taken in "Easton, Washington."

In British Columbia it is recorded from Southern Vancouver Island and Lillooet.

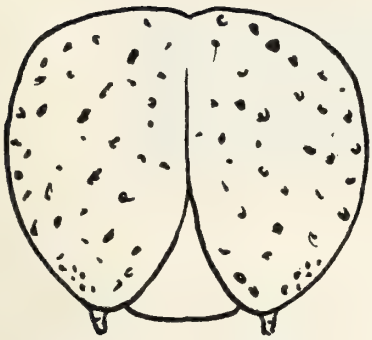
It is on the wing from June to August.

Larva.—Beaten from ocean spray (*Holodiscus discolor* (Pursh)) in Saanich, May 15th, 1955. Length, 30 mm. Head, round, light grey with variegated pattern of fuscous, including two horizontal bars on front. Body, dark purplish-brown, very twig-like in shape and colour. Two large and two small tubercles on second abdominal segment; thoracic segments paler on dorsum, with a dark central line; first abdominal segment with a buff-coloured patch on dorsum; underside with a broad, central white band; a central dark stripe on each segment.

Pupated May 29th under some moss without forming a cocoon.

Pupa.—Size, 14 by 4 mm. Shiny, abdominal segments coarsely punctate; wing-cases finely wrinkled; colour, dark brown, shading to nearly black on last segments. Cremaster, two short, stout, slightly divergent spines on a coarsely rugose base.

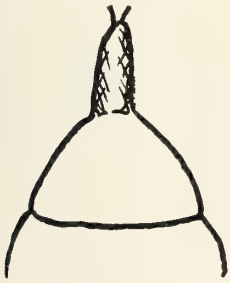
Imago.—Emerged July 1st to 4th, 1955.



Front of head

Back of segment

Underside of segment



Cremaster

RED-TINGED CARPET
(*Anacamptodes emasculata* Dyar.)

Wing expanse, 1½ inches. General colour, light ashy grey crossed by several fine black lines and with suffused patches and bands. There is a distinct reddish tinge, particularly near the tips of the fore-wings, hence the common name. The specific designation has reference to the fact that the secondary sexual characters are not so well developed as in a closely allied eastern species.

The red-tinged carpet may be found on tree-trunks by day or at a light by night. It was described by Dyar (1904) as a variety of *A. humaria* Gn., an Eastern American species, but since raised to specific rank.

It is of general occurrence in Southern British Columbia.

Other food plants include willows, alders, and Douglas fir.

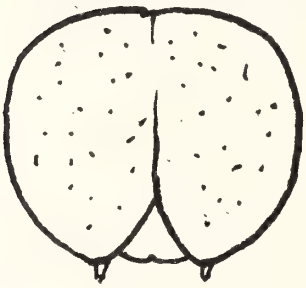
Adults are on the wing from May to July.

Larva.—Taken on ocean spray (*Holodiscus discolor* (Pursh)) in Saanich, October 4th, 1955. Length, 30 mm. Head, biege, dotted and mottled with fuscous. Body yellowish-brown, heavily sprinkled with fuscous; dorsum of abdominal segments with fuscous, diamond-shaped lines, each enclosing an elongate dark stripe; second abdominal segment with two lateral humps; eighth abdominal with two dorsal tubercles. Underside ashy with faint, fuscous central line interrupted with white on the intersegmental parts. Pupated October 9th, in a cocoon in the soil.

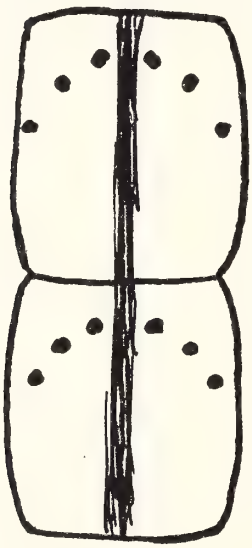
Pupa.—Size, 15 by 4 mm. Smooth, shiny; abdominal segments finely punctate; wing-cases finely wrinkled, light brown. Cremaster, two short, stout, slightly divergent spines set on a stout conical base.

Imago.—Emerged, July 15th, 1956.

At rest



Front of head



Back of segments

Cremaster

MALTESE CROSS (*Callizia amorata* Packard)

Wing expanse, seven-eighths of an inch. General colour, an ashy base on which are superimposed several fine, curved lines together with dark-brown patches and suffusions as indicated in the sketch. The name " maltese cross " is derived from a fancied resemblance to that object when the moth is at rest; the fore-wings widely spread, the hind-wings brought together over the body leaving a wide gap between them and the fore-wings. When at rest on a tree-trunk in this position, this moth is very hard to see, so well does it blend with the bark. It comes readily to artificial light.

The maltese cross, originally described by Packard (1876), is of wide North American distribution. In British Columbia it is recorded as " generally distributed " (Jones 1951).

It is in flight from June to August.

The larvæ first came to my attention when I examined skeletonized leaves of orange honeysuckle (*Lonicera ciliosa* Poir) in Saanich. The caterpillars were placed under observation and the following notes were made.

Larva.—August 21st, 1955. Length, 9 mm. Head, pale, translucent brown, lightly speckled with darker brown. Body, translucent white, ingested food showed through as a suffused green line along the dorsum; six conspicuous black dots on each segment.

Moulted August 26th. Colour and markings as before.

September 2nd. Length, 14 mm. Colour varied in individuals from whitish-green to glaucous green with suffused dorsal and subdorsal lines; a broad white spiracular; underside, light glaucous green; black dots as before. Larvæ fully fed.

September 7th to 25th. All larvæ pupated among debris, without an obvious cocoon.

Pupa.—Size, 7 by 3.5 mm. Smooth, light brown. Cremaster, two divergent, hooked spines, with two to four shorter hook-tipped hairs at the base, all on a blunt, rugose, conical projection.

Imago.—Emerged June and July, 1956.

ANTHONY ISLAND, A HOME OF THE HAIDAS

By Wilson Duff and Michael Kew,
Provincial Museum, Victoria, B.C.

CONTENTS

INTRODUCTION

Severe as the impact of European civilization was on the Indians of British Columbia, it did not in most cases destroy tribes completely. While it is true that no native society has passed through the period of contact without profound change, it is also true that only a small proportion has suffered utter annihilation. In most tribes the rising tide of European discovery and settlement has produced much the same sequence of effects. The earliest contacts were stimulating and helped to produce the greatest developments in the native cultures. More intensive contacts proved unsettling, then oppressive, then destructive. The native systems of living crumbled away. The populations fell to half or a quarter of their former numbers. Then in most cases the decline was checked. The populations have risen again, more rapidly in recent years, and the Indians have fitted themselves into the new patterns of life imposed upon them.

The tribe of Haida Indians that lived on Anthony Island was one of the groups which failed to survive. In former times numerous, vigorous, and proud, they, too, shared in the stimulation of the first contacts with Europeans, and developed their culture to the final climax that produced the forest of totem-poles whose remnants may still be found on the site of their village. But the gathering forces of destruction and decline focused on them too sharply. Gun-powder, disease, and demoralization decimated them beyond hope of recovery. Their community dwindled away and finally ceased to exist.

A visitor to Anthony Island to-day may still find abundant evidence of its former occupation, especially on the village-site itself. Most impressive of all is the straggling line of bleached and weathered totem-poles around the rim of the bay, a sight which can no longer be duplicated anywhere else on the coast. Exploring further, one may find the posts and beams of the old houses lying in moss-covered heaps on the ground, half hidden by the invading forest growth. And beneath the turf, below the remains of the houses of the last inhabitants, lies the midden, layer upon layer of shells and other refuse to a depth of several feet, the accumulation of many centuries of human habitation.

It was the possibility of salvaging some of the totem-poles before they rotted away completely that attracted us to the island in 1956 and again in 1957. Other deserted Haida villages, Tanoo and Skedans, had yielded the last of their salvable poles in 1954, but the Anthony Island village, the last and richest source of all, had remained inaccessible. In October, 1956, thanks to the co-operation of the Royal Canadian Navy and the crew of H.M.C.S. "Brockville," a party from the Museum was able to make a brief visit to the island. Its primary purpose was to examine the totem-poles and obtain the information necessary for the planning of a salvage expedition. The opportunity of examining the remote island also appealed to the Museum biologists, who hoped thereby to fill some of the gaps in their knowledge of the natural history of the Province. Accordingly, the Museum party consisted of Dr. G. C. Carl and C. J. Guiguet as well as the writers. In addition, a C.B.C. television crew consisting of William Reid (who is also an authority on Haida art), Kelly Duncan, and Bill Cunningham accompanied the party.

Having obtained precise information on the number and condition of the totem-poles, we were able to plan and organize a salvage expedition for the summer of 1957. This second visit was a joint undertaking of the Provincial Museum and the University of British Columbia, under the auspices of the British Columbia Totem Pole Preservation Committee. The necessary funds were provided by an anonymous private donor, the assistance of the Royal Canadian Navy was once again obtained, and the co-operation of the Skidegate Indian band was secured. The salvage party consisted of six volunteers and the three-man crew of the chartered vessel "Seiner II" of Skidegate Mission. The members of the party were Wilson Duff and Michael Kew, of the Museum; Drs. Harry B. Hawthorn and Wayne P. Suttles, of the University; John Smyly, of Victoria; and Bernard Atkins, photographer, Department of Recreation and Conservation, Victoria. William Reid and Kelly Duncan again covered the expedition for C.B.C. television. The native crew consisted of Roy Jones (skipper), Clarence Jones (mate), and Frank Jones (cook).

The party left Vancouver by air on June 19th, met the "Seiner II" at Sandspit, and, after brief visits to Skedans and Tanoo, reached Anthony Island on June 21st. A camp was established ashore on the village-site, and the work of lowering and crating the poles was begun. Sixteen sections of eleven poles were salvaged. Despite periods of unfavourable weather, these were all crated and afloat in the bay by June 29th, and early the next morning, at a rendezvous in Louscoone Inlet, they were loaded aboard the Canadian Naval Auxiliary Vessel "Laymore" for transportation to Victoria and Vancouver, where they are now in storage.

In addition to accomplishing the main task of removing the totem-poles, the members of the party were able to investigate other features of the village and the island. Measurements were made of the houses and their arrangement in the village. The archæological deposits on the village-site were tested. The island was explored for additional archæological sites and other features of scientific or gastronomic interest. A number of caves were examined, and a test excavation was made in one of these. A detailed photographic record of the expedition, both in still pictures and movies, was obtained by Mr. Atkins.

The purpose of this article is to present all the information on the island and its former inhabitants which we were able to obtain in the course of the two visits and by means of library research. It is no easy task to write the history, or even the epitaph, of a people who left no written records and whose traditions have been forgotten. Our information is admittedly fragmentary. It does not add up to a well-rounded study of the life and history of the tribe. However, we consider that it is well worth recording now as a contribution to the literature on the Haida, especially since we cannot promise more detailed studies in the near future. And we have one further reason for presenting this account of the island and its historical and archæological significance. The Anthony Island village, unlike other Haida totem-pole villages, was never made an Indian reserve. In order to provide equivalent legal protection against alienation and trespass, we requested that it be placed under the protection of the "Land Act," and in January,

1957, the island was reserved as a Class A Provincial park. We hope that our description will provide full justification for this action. We also wish to place on record our opinion that the Skidegate band have a strong moral claim to ownership of the island, and that their wishes should be considered in any matter that may affect its future use and status.

THE ISLAND AND ITS RESOURCES

Anthony Island lies exposed to the open Pacific, near the southern end of the Queen Charlotte Islands. Approximately 1½ miles long by one-half mile wide, it is low, irregular in outline, and almost surrounded by rocky islets and reefs. It is directly west of the Houston Stewart Channel, which separates Moresby and Kunghit Islands, and is separated from the former by about 1½ miles of reef-dotted water.

The climate of this region is not radically different from that usually associated with the wet coastal zone of British Columbia, but it is noteworthy in several respects. Meteorological data from the Cape St. James Lighthouse Station (some 15 miles south of Anthony Island) indicate a temperate climate. The highest maximum temperature ever recorded was 74° F., and the lowest, 1° F. (Climate of British Columbia, 1957, p. 48). This range of 73° is one of the smallest found in the Province. Cape St. James also has the smallest snowfall in the Province, averaging 5.9 inches; and the average total precipitation of 59 inches is not excessive for the coastal area. These favourable facts are somewhat overshadowed, however, when we consider wind speeds, by far the harshest element of the climate. Sustained winds of 90 miles per hour have been recorded in December, February, and March, and sustained winds from 50 to 80 miles per hour in every other month. The mean monthly wind speeds vary from 14.7 to 24.4 miles per hour. Because of this, the sea is often rough, even in the summer; in the winter, frequent gales produce some formidable weather.

Despite the fact that it is low, the island is quite rugged in its topography. The shores consist of bare rocky points, cliffs broken by deep gorges, and a few small pebble beaches. Inland the terrain is characterized by alternate ridges and canyons lying in a north-south axis. Some of the canyons are vertically walled and several hundred yards long. Although occasional flat places occur, the land is not favourable to foot travel.

The floral cover is not unusual for this area, although all of the timber is small and of poor quality. Hemlock, spruce, red cedar, and a few scattered pines make up most of the forest. We did not encounter, on the island, any red cedar of the size used by the former Haida occupants for their totem-poles and heavy house-beams. We must assume that they brought the heavy cedar logs from the adjacent larger islands.

The most predominant shrubs are salal and salmonberry. In places the former shrub was dense and created a heavy tangle from 6 to 8 feet high. However, recent overbrowsing by deer has destroyed much of the shrubbery on the island; there are large areas devoid of living shrubs, and the salal bushes are completely bare of leaves below a height of 4 to 5 feet. Deer were not native to the Queen Charlotte Islands, but a few were introduced on Graham Island in 1913 and others on Moresby in 1925 (Carl and Guiguet, 1958, p. 87). By 1946 Kunghit Island was well populated, but photographs of Anthony Island in 1948 do not reveal overgrazing. These and all early photographs show extremely dense shrubbery down to the tide mark. Apparently the deer have reached Anthony Island within recent time. Besides the overbrowsing, population pressure among the deer was indicated by several skeletons and the fact that the animals were present on small, sparsely covered islets several hundred yards distant from the larger islands. The flora to-day is undoubtedly in a very different condition from that known to the Haida in bygone days. It is probable that the island produced various berries and roots of use for foods, but it should also be noted that the Haida people dispersed to widely separated locations for the harvest of most resources. It is likely that the main vegetable and fruit crops exploited by the Anthony Island people were located on the more fertile flats and valleys found up the various inlets of the larger islands.

The list of faunal remains recovered from the middens will give the reader a good idea of the animal resources used by the former inhabitants (*see* pp. 51, 53). Large terrestrial mammals were absent in earlier days, although it is possible that black bears, abundant on Moresby and Kunghit Islands, occasionally crossed to Anthony. The larger mammals used were exclusively marine.

Of small mammals, absent from food remains, there are river otter and white-footed mice. The former were observed on the island in 1957, and Mr. Guiguet obtained twenty-two specimens of the mice in 1956. These are of special interest to biologists because their nearest relatives are not found, as would be expected, on the other Queen Charlotte Islands, but on islands from the Bella Bella area near the Mainland. A tentative explanation for this anomaly is that the mice were inadvertently introduced by the Indians.

The bird fauna is typical of the outer coastal part of British Columbia; large numbers of the following birds were observed: Gulls, pigeon guillemots, auklets, tufted puffins, oyster catchers, and murrelets. Most of these species nest on surrounding islets and cliffs, and were probably important in all stages—from egg to adult—in the diet of the Haidas.

The list of faunal remains (*see* pp. 51, 53) includes various molluscs, etc., but the fish remains were unidentified. However, this part of the coast is particularly productive of such species as halibut, black cod, rock fish, and salmon. Probably all of these were important resources to the former inhabitants. The drying and smoking techniques, which all Coast Indians used for preserving foods, were applied particularly to fish and shell-fish, which, in combination with their abundance, made them staple foods throughout the year.

On first inspection, Anthony Island creates an impression of being inhospitable, and no doubt the heavy seas and frequent gales occasionally caused the Haida considerable discomfort. However, equipped as they were with seaworthy canoes and large sturdy houses, the Anthony Island People were enabled to exploit an immensely rich food-producing environment which must have counterbalanced any of the natural disadvantages with which the area is endowed.

FORMER INHABITANTS, THE KUNGHIT HAIDA

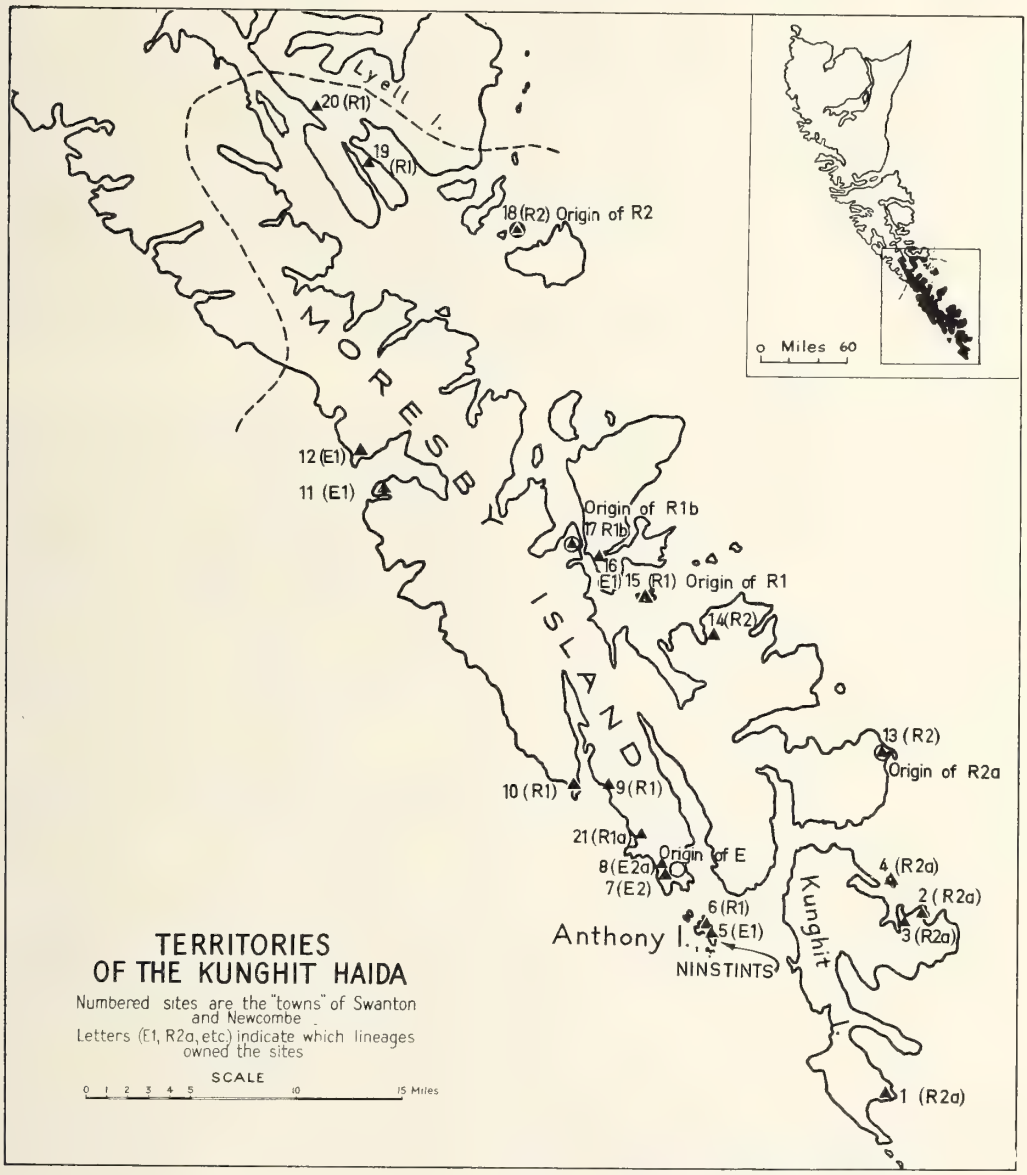
Since the people of Anthony Island were Haida, and shared the main patterns of their way of life with the rest of the Haida, we could construct a generalized account of their whole culture based on the published works on Northwest Coast ethnography. However, that is not our purpose. We prefer to confine ourselves to what is known specifically about the Anthony Island tribe. The amount known about them is quite small. Present-day informants, notably Dr. Peter Kelly, have given us some information. Somewhat more, including the best available information on social structure and territories, is contained in Swanton's "Ethnology of the Haida" (Swanton, 1905). Our own main contribution consists of descriptions of their house type and village layout based on our observations on the island.

The Haida themselves called Anthony Island "Skunggwai" (sδu′γg^{w}ay) ("red cod island"), and they used the same name for the village (sδu′γg^{w}ay lnaδay) ("red cod island village"). European traders, on the other hand, followed the practice of naming each village after its chief. In recent years the main chief of the village was Ninstints (nə′η stins) ("person equal to two"), and his name is the one which has most commonly been used for the village. Ninstints was a permanent village, occupied during the winter by several distinct kinship groups (lineages). During the remainder of the year these lineages would scatter out to territories they owned along the shores of the southern 60 miles of the Queen Charlottes. There they would fish, hunt, and gather other foods and materials that gave them their subsistence and their wealth. The group of people who owned these territories and had their winter headquarters at Ninstints may properly be called a tribe. They were known collectively as the Kunghit Haida (gɑγx̣i′t χay d δay); that is, Kunghit People.

These southernmost Haidas were somewhat remote and independent from the others. They spoke a noticeably different dialect from their northern neighbours. Swanton states that they had " considerable racial individuality. They were great fighters, and sent expeditions in all directions. Their greatest enemies were the people of Kloo (Tanoo); but they warred with those of Kaisun and Tcaal on the west coast, with the people of Skidegate and Masset, with the Tlingit, Tsimshian, Bella Bella, and Kwakiutl tribes, as far at least as Alert Bay." (Swanton, 1905, p. 105.)

Social Structure and Territories

The only information available on the social structure of the tribe is that contained in Swanton's lists of " families " (pp. 268, 272), " towns " (pp. 277–278), and " houses "



(Prepared by Geographic Division, Department of Lands and Forests.)

Map 1.

(p. 282). Before analysing these lists, it is necessary to clarify Swanton's terms. Swanton's "families," for example, seem to be the kinship units known in current usage as lineages (e.g., Drucker, 1955, p. 110). As now used for the northern Northwest Coast tribes, the term "lineage" refers to a matrilineal kinship group that owns one or more houses in a winter village, that owns resource areas, that has its own stock of names, traditions, crests, and other prerogatives, and that acts as a unit for social and ceremonial purposes. Lineages may consider themselves related to lineages in other villages, by virtue of similarities in their traditions and crests, but in the case of the Haida these larger groupings (sometimes known as "sibs") are seldom clear cut enough to be regarded as significant social groups. All Haida lineages, however, fall into one or the other of two major exogamous divisions known as "moieties." The moieties are commonly called "Ravens" and "Eagles."

Swanton's choice of the term "town" was an unfortunate one, and has resulted in a confusion which still exists in the literature.* His "towns" are not all all what the word would seem to imply, but appear simply to be all the occupation sites owned by the lineages. He did not distinguish between winter villages and seasonal camps, or between traditional former homes of the lineages, no longer visited, and sites in constant use. We assume that all of these types of site are included in the list. We also make the assumption, which is perhaps unwarranted, that the list is fairly complete, and that by plotting each lineage's "towns" on a map we may obtain information about its former locations and its recent resource areas.

On Map 1 we have attempted to show the territories of the different lineages, using the information in Swanton's lists and on the C. F. Newcombe map used by Swanton. The numbered sites on the map are Swanton's "towns"; the letters indicate the "families" which owned them.

Swanton's lists show that, like almost all Haida winter villages, Ninstints was inhabited by lineages of both Raven and Eagle moieties. The Ravens of the village belonged to two main lineages known as "Striped-Town People" (Swanton's R1) and "Sand-Town people" (R2). Both of these had further subdivisions which may be called sublineages (Rla, Rlb, R2a). The Eagles were also represented by two main lineages—"those born up the inlet" (E1) and "those born at Kunghit" (E2), and the second of these was also divided into sub-lineages (E2a, E2b). The village-site itself was owned by the leading Eagle lineage (E1), of which Ninstints was the chief.

The Striped-Town People (R1) owned five houses in the village and eight sites ("towns"). Their traditional place of origin, which they claimed as one of their towns, was a tiny island in Skincuttle Inlet, east coast of Moresby Island. One of their sub-lineages, the Strait People (R1b) came into being at a site on Burnaby Narrows, quite close by. The territories of this lineage appear to have been along the east coast of Moresby Island around Juan Perez Sound and Skincuttle Inlet, but they also owned sites on the west coast of Moresby Island just north of Anthony Island, and one site on the north end of Anthony Island itself.

The second Raven lineage owned four houses and seven sites. Its traditional place of origin, Atana or Sand Town, was on House Island, even farther north along the east coast of Moresby Island, near Lyell Island. Its sites were dotted down the east coast of Moresby and Kunghit Islands. The sub-lineage (R2a) took its origin at Songs-of-Victory Town on the south-east tip of Moresby Island, and owned four sites along the east coast of Kunghit Island. The chief of one of these sites was xo'ya (Raven).

* The question is whether each lineage "occupied a separate village" (Drucker, 1955, p. 110; Driver & Massey, 1957, p. 413; Wike, 1957), and much of the confusion exists because Swanton and the others do not state whether they mean winter village or seasonal village. Both are included in Swanton's term "town." Certainly each lineage owned, was most intimately associated with, and exclusively occupied, its seasonal sites. And although nominally each winter village site was "owned" by one lineage, it was actually occupied in almost every case by several lineages of both moieties. The social and ceremonial activities of the winter required that "opposite" lineages be present. There is little real evidence to suggest that the situation was different in earlier times. In Murdock's terms, the Haida winter village group was usually a "clan barrio," the seasonal village group was a "clan."

The two Eagle lineages must have been fully as populous as the Ravens, as they owned four and six houses in the village, respectively, while the Ravens owned a total of nine. But the Eagles owned far fewer sites, only six compared to the Ravens' fifteen. Both Eagle lineages localized their earlier homes on the west coast of Moresby Island just north of Anthony Island. The first, Ninstints' lineage (E1), owned the village-site itself, and also two sites farther north on the west coast, in Gowgaia Bay. It also claimed a single site on the east coast, in Burnaby Narrows. The other Eagle lineage (E2) owned only two sites, both close to Anthony Island on Moresby Island.

In general the Ravens apparently owned much more territory than the Eagles. All of the east coast of Moresby and Kunghit Islands (with the exception of one site on Burnaby Narrows) was solidly Raven territory. Eagle territories were confined to the west coast, and even here (except for Gowgaia Bay) they had to share them with a Raven lineage (R1). The traditional places of origin of the two Raven lineages, in Juan Perez Sound and Skincuttle Inlet, seem to have been main centres of origin and dispersal of the Haida Ravens. Several lineages in other villages also believed that they originated there. The traditions of the Eagle lineages are not so well integrated with those of other Eagles on the islands. One gains the impression that despite the dominance of Ninstints and his Eagles in recent times, the Ravens must earlier have been predominant among the Kunghit People, and the Eagles must have been a relatively small group confined to the south-west coast of the islands. Historical information to be given below also suggests that the Ravens were dominant in earlier times.

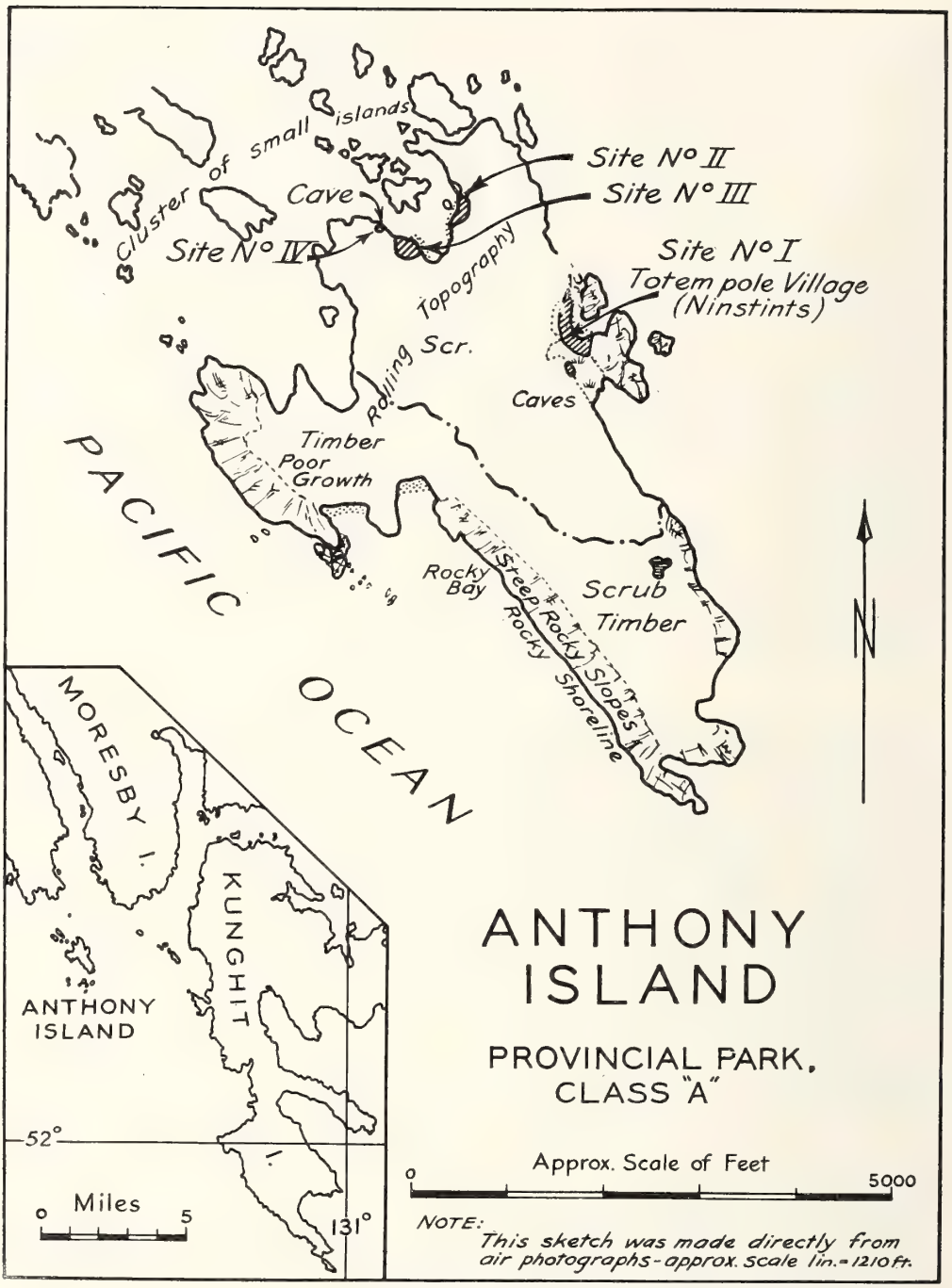
Layout of the Village

(*See* Maps 2 and 3.)

The site of Ninstints village is remarkably well sheltered, considering its location on such a small and exposed island. Tucked in a tiny bay half-way along the eastern (or lee) shore-line, it is protected from the winds and waves of the open Pacific by the whole breadth of the island, and from easterly winds and swells by a small rocky islet which sits just off the bay, sheltering it almost completely. At low tide the bay goes completely dry. At high tide, no matter what the weather, it is a smooth pond several feet deep, entered through a narrow passage around the south end of the islet. The rocky northern channel is not navigable. The beach and floor of the bay consist mostly of smooth pebbles, although near the entrance, beds of boulders and low rock outcroppings jut from the bottom. In at least one place, directly opposite the entrance, boulders have been moved aside to form a canoe runway.

Landward from the beach, the ground rises gradually, then is broken by a vertical north-south wall of rock faces, which in some places form cliffs scores of feet high, and which is indented at intervals by fissures and caves. Extending south from the bay for a few hundred yards is a meadow-like flat, which is bordered on the west by the rock cliffs, on the east by a high wooded knoll (which helps to shelter the village from south-easters), and on the south by another rocky beach.

The houses stood around the rim of the bay, facing the entrance. Following the curve of the southern half of the bay is a terrace about 20 feet high, and most of the houses were located in a single line close to the front crest of this terrace. Along the northern half of the bay the land is low and flat. In places it is swampy, where a small stream (the main water-supply on the site) finds its erratic way to the beach. The houses in this section of the village stood in a straight line which partly overlapped the arc of houses on the terrace, forming in effect two rows. Likewise, at the very south end of the village one or more houses were located on lower ground in front of the terrace, forming two rows. From the relative depths of the archæological deposits on the different sections of the site, it is evident that the terrace was the most desirable section and was occupied

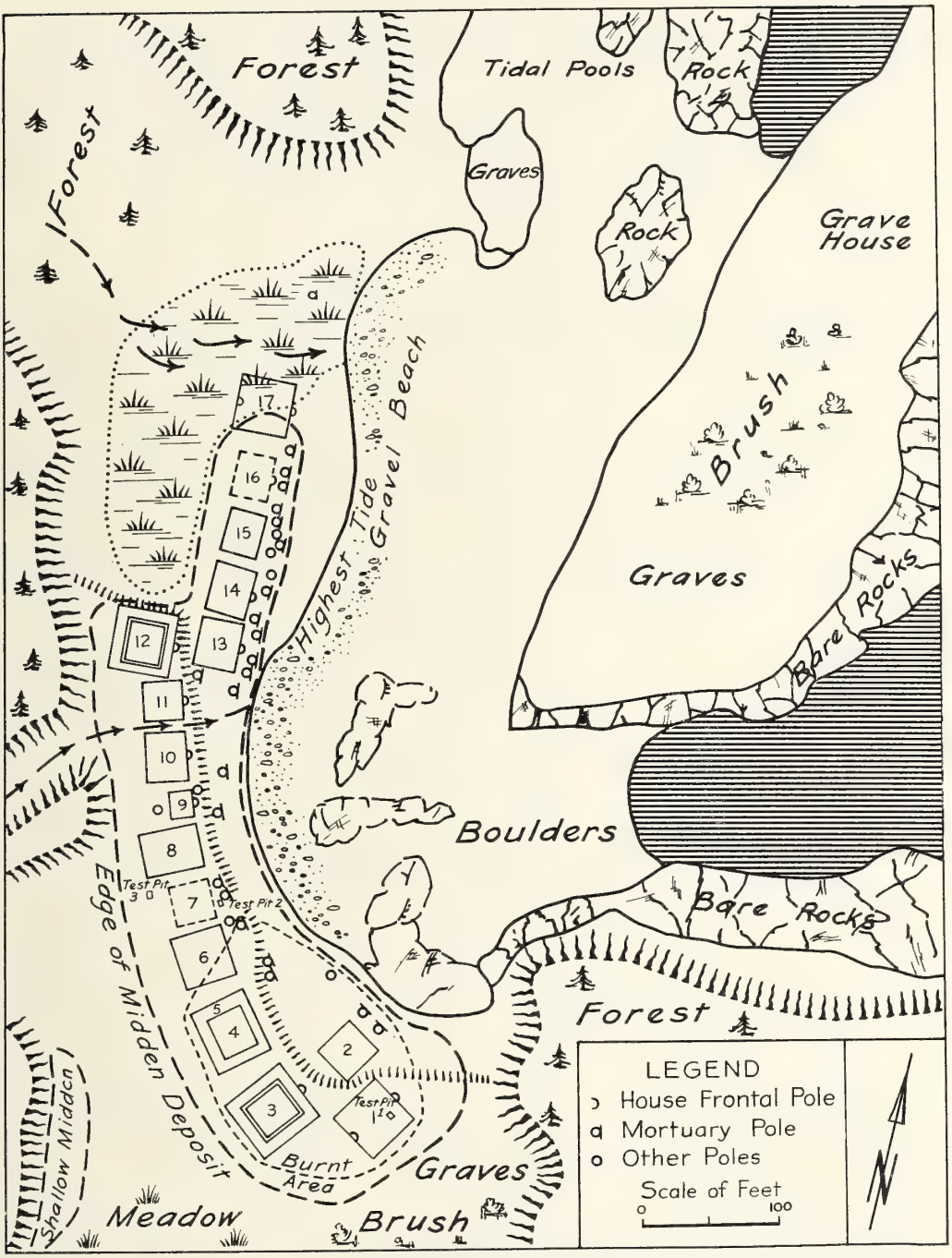


(Prepared by Geographic Division, Department of Lands and Forests.)

Map 2.

first, and the low land to the north was used only when the other space was full, and probably only in relatively recent times.

Because of the fragmentary character of the house remains, it was not possible in every case to determine the exact size or type of construction of the houses. It was not even possible to determine the exact number of former houses on the site. No complete



(Prepared by Geographic Division, Department of Lands and Forests.)

Map 3. Ninstints village.

frameworks remained standing, but in most cases the corner posts and other vertical supports, or stubs of them, could be found, and the over-all dimensions could be obtained. Remains of other house timbers, beams, and planks usually revealed the main details of house construction. Measurements were taken by Duff and Smyly of the houses and their spacing, and the resultant plan of the village is shown on Map 3.

Map 3 does not show the village and its totem-poles as we found them in 1957, but attempts to reconstruct its original condition. We have shown totem-poles which have been removed or destroyed whenever there was any evidence of their previous existence. We have shown all of the houses of which we could find any trace. In cases where we were unable to determine exact dimensions, we have outlined them in broken lines. The following list of the houses, from south to north, gives all the information we were able to obtain on their dimensions, construction, and associated totem-poles. This information is summarized in a table at the end.

The Houses of Ninstints

1. On the terrace at the south-east end of the bay, this house was 39 feet wide by 39 feet 6 inches long (centre to centre of corner posts). The house frontal pole was badly burned, but the bottom figure (Beaver) still stood, and on the fallen upper section one of the human figures of "watchmen" at the top was sound. Both of these sections were salvaged. This was one of the two houses in the village having a back housepost, and although badly burned, a small section was salvaged.

   A test pit (Test Pit 1) in the floor of this house reached sterile subsoil at a depth of 4 feet.
2. On lower ground 6 feet away and somewhat in front of No. 1, this house was 30 feet wide by 32 feet long. Little remained of the house framework. Two burned mortuary poles stand in front. Possibly another house had stood beside this one, but no trace of it could be found.
3. On the terrace 5 feet from No. 1, and behind it, is the largest house in the village—47 feet wide by 49 feet 6 inches long. It is one of only two houses in the village that had excavated floors. The excavation descends in two steps, each 30 inches high, with a 3-foot shelf between them. The ground-level platform across the back of the house, presumably the chief's quarters, is 11 feet wide; those along the front and sides are 7 feet wide.

   The structure of this house is somewhat of a puzzle. Two round beams about 18 inches in diameter lay on the ground. But these had extended only the length of the excavation, not the full length of the house. They had been supported by four half-round posts set upright with their flat sides against the rise of the top step of the excavation. We neglected to measure the height of these posts, but have the impression that they were not tall enough to have been the main supports for the roof.

   The house frontal pole had been badly burned, but enough of its base remained to show that it had been 4 feet 3 inches wide, and that the oval entrance hole was 4 feet above ground-level.
4. Five feet from No. 3 and in line with it was another large house, 49 feet wide by 41 feet long, of which little remained. Inside it is a smaller more recent house, No. 5.
5. This smaller house, 31 feet wide by 28 feet long, was built inside the area formerly covered by the older and larger House No. 4.
6. In line with No. 4 and 4 feet away from it is a house 39 feet wide by 38 feet long. Three or more badly burned poles on the lower ground in front of these houses may have belonged to No. 4, 5, or 6. Two additional poles in front of the left corner of this house probably belonged to it. They are a burned mortuary pole with a Beaver at the bottom and a tall memorial pole with a Grizzly at the base. Both still stand.
7. This house was apparently smaller and was one of two in the village with an unusual structure, perhaps an older style. The only remains were two round beams about 20 inches in diameter and 30 feet long, and the stubs of four upright posts set in a rectangle 30 by 11 feet. The posts were half-round logs hollowed in the back so that they formed a shallow C-shape, with the convex sides facing into the house. We guessed that the house was about 30 feet square.

   A pair of mortuary poles stand in front of this house, one bearing a Whale with two dorsal fins and the other a Beaver holding a frog and with a row of small human heads around the base. Both were left untouched.

   A test pit (Test Pit 2) just in front of this house passed through 4 feet of shell and other cultural deposits before reaching subsoil of sand and gravel still mixed with shell and pieces of bone. Another test pit (Test Pit 3) several feet behind the house reached a depth of 7 feet without reaching sterile subsoil.
8. This house is only a few feet from No. 7 and is 32 feet wide by 43 feet 6 inches long. A Grizzly mortuary pole at the foot of the slope is probably associated with this house.
9. Four feet from the latter, and in line with it, is a very small house, 21 feet wide by 18 feet long, of the regular six-beam construction. Three poles were associated with this house. Of the small house frontal pole, only the bottom figure (Grizzly) remained, and this was salvaged. Close to its left front corner stands a tall memorial pole, with the Grizzly as the bottom figure. This

was left. Twelve feet behind the house lies a small memorial pole which bore two figures—Grizzly and Whale. These three poles, like the house itself, are of much reduced scale. Peter Kelly mentioned once that Chief Ninstints' mortuary house was small, with small totem-poles; probably this is the mortuary house.

10. Eight feet along the terrace is another house, 37 feet wide by 31 feet long. The stub of a house frontal pole which has been cut down and removed may still be seen. At the foot of the slope in front is a leaning mortuary pole whose main figure is the Beaver.
11. Seven feet from the last is House No. 11, 29 feet wide and 30 feet 6 inches long. Timbers and wall boards lie jumbled on the ground, more than any of the other houses. Here, too, the stub may be found of the house frontal pole, which has been cut and removed. A mortuary pole some distance in front may be associated with this house.
12. This is the last house on the terrace, and is 2 feet from No. 11 and set back from it about 6 feet. It is one of the largest houses in the village, 44 feet 6 inches wide by 45 feet long, and is the other excavated house. As in House No. 3, the excavation falls in two 30-inch steps with a 36-inch shelf between them. The back platform at the ground-level is 8 feet wide, that along the sides and front is somewhat narrower, leaving the lowest floor level 27 feet long and 25 feet 6 inches wide.

    The structure of this house, as reconstructed by John Smyly, is shown in Fig. 1.

    The large and beautiful house frontal pole of this house was salvaged, as also was a mortuary pole, with the Grizzly as its main crest, which stood in front of the house.
13. On flat ground 14 feet in front of No. 12, this house was 36 feet wide by 29 feet long. Four mortuary poles stand close to the front of this house, although it is probable that at least one of these was associated with House No. 11. The house frontal pole had been dug out and removed before our visit.
14. Standing only 3 feet from No. 13 and at a slight angle to it, this house was 36 feet wide by 30 feet long. Its house frontal pole was salvaged, but three mortuary poles standing from 5 to 8 feet in front of the house were left untouched.
15. This was a house of the older type of construction, and the only remains of its structure were three of the four half-round vertical posts. These formed a rectangle measuring 26 by 12 feet, leading us to believe it had been a relatively small house. Three mortuary poles stood in front of this house, one of which we removed, and two small poles carved as human figures with large hats which also stood in the line were also removed.
16. Of this house, no trace could be found except the stub of the house frontal pole, which had been removed. Three mortuary poles also remain in front of the house.
17. This was the last house in the village of which any trace could be found, and it stood mostly on what is now a grassy swamp. It was a fairly large house, 39 feet 6 inches wide by 40 feet long, and had an inside back housepost and a tall house frontal pole, both of which we removed.

    Sixty feet north, on swampy ground, stands another single mortuary pole. It is possible that this area was also occupied by houses, of which no trace now remains.

Summary

Table 1 summarizes the dimensions and type of construction of the houses in the village and indicates the number of totem-poles associated with each house. Map 3 illustrates additional features of the layout of the village. In general, the houses were crowded close together, only 2 to 7 feet apart. To the extent that the terrain permitted, their front walls were in line. The " front row " of houses at the north end of the village probably represents an expansion to the next best sites after all the space on the terrace had been occupied. Probably several generations of houses had succeeded one another on the terrace. Some which we measured were obviously old, some obviously more recent, and in at least one instance a new house had been built within the still-standing framework of an older one.

We have not been able to correlate this village layout exactly with Swanton's list of Ninstints houses (Swanton, 1905, p. 282).

At either end of the village and on the small island in front of it, we found graves. These are now in thick brush, and all that remains are fragments of the wooden boxes and scattered bone in the turf. Also on the small island was the remains of a small grave house, with at least one of the corner posts carved in the form of a human figure. We did not disturb any graves.

Table 1.—Summary of Houses and Totem-poles

House No.	Dimensions		Excavated	Construction		Associated Poles			
	Width	Length		Six-beam	Two-beam	Frontal	Inside H.P.	Memorial	Mortuary
1	39′ 0″	39′ 7″	---	×	---	1	1	---	---
2	30′ 0″	32′ 0″	---	×	---	---	---	---	2
3	47′ 0″	49′ 6″	×	?	×	1	---	---	---
4	49′ 0″	41′ 0″	---	×	---	---	---	---	---
5	31′ 0″	28′ 0″	---	×	---	---	---	1	2
6	39′ 0″	38′ 0″	---	×	---	---	---	1	1
7	30′ 0″	30′ 0″	---	---	×	---	---	---	2
8	32′ 0″	43′ 6″	---	×	---	---	---	---	1
9	21′ 0″	18′ 0″	---	×	---	1	---	2	---
10	37′ 0″	31′ 0″	---	×	---	1	---	---	1
11	29′ 0″	30′ 6″	---	×	---	1	---	---	1
12	44′ 6″	45′ 0″	×	×	---	1	---	---	1
13	36′ 0″	29′ 0″	---	×	---	1	---	---	3
14	36′ 0″	30′ 0″	---	×	---	1	---	---	3
15	26′ (?)	(?)	---	---	×	---	---	2	3
16	(?)	(?)	---	---	---	1	---	---	2
17	39′ 6″	40′ 0″	---	×	---	1	1	---	1(?)
Totals (17)	--- ---	--- ---	2	13	3	10	2	6	23

House Structure

Figure 1 is a reconstruction by John Smyly of the structure of house No. 12, shown without the roof and wall boards. Except that it was one of the largest houses in the village and one of only two having excavated floors, this house was typical in structure. In only three cases was there evidence of a different and perhaps older style of construction. This will be described below.

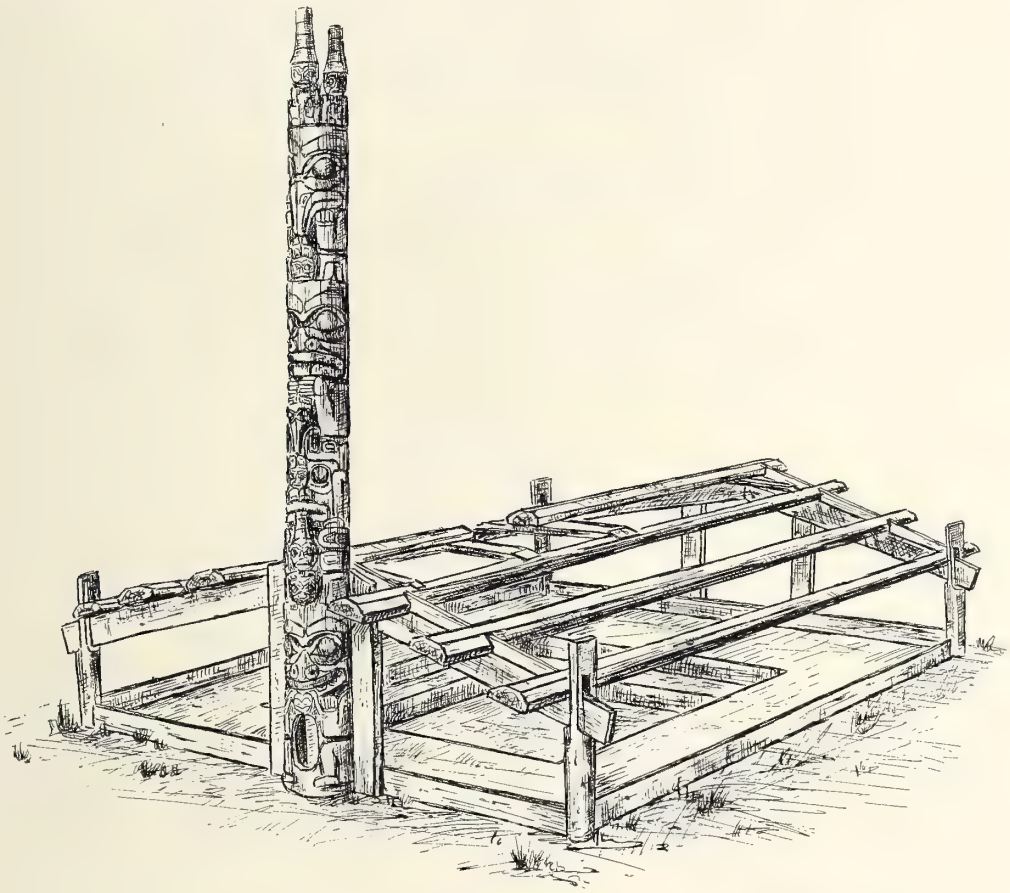
The houses of this structural type ranged in size from 45 feet square down to the small mortuary house which was 21 by 18 feet. The four corner posts were usually round, 15 to 20 inches in diameter, with a rectangular section at the top slotted to hold the heavy front and rear plates. Sometimes the corner posts were rectangular for their full length. They were usually notched at ground-level to receive the lower front and side plates which hold the wall boards in place. Two central front supports were set upright from 3 to 4 feet apart, and the house frontal pole abutted on the front of these. The front supports were six-sided, appearing rectangular from the front but octagonal from the back, and a sloping shelf was cut in the backs near the top, in which the upper front plates rested. They were from 18 to 24 inches wide by 9 to 12 inches deep.

The upper front plates, which were channelled along the bottom edge to receive the front wall boards, and which supported the six beams of the roof, were massive in size, ranging up to 30 by 6 inches. Their upper ends abutted on each other and were held together with large iron staples. Their lower ends extended a foot or more through the slots in the corner posts. The lower front plates were the same thickness as the upper ones, though not as wide, and were channelled along the upper edge to receive the vertical wall boards. Similar plates extended along the sides at ground-level.

The construction of the back frame was the same as the front, except that the upright supports were placed farther apart.

The main supports for the roof consisted of six large equally spaced longitudinal beams which rested on the front and back plates. These beams projected 3 feet or more beyond the front and back walls, and were hewn in a distinctive six-sided shape for part or all of their length. The larger end always faced the front, and measured as much as 24 by 15 inches. The outer beam on each side rested against the corner post, and was channelled underneath to receive the upper ends of the side wall boards. Fitted spacers were placed along the tops of the plates to fill the spaces between the beams. Cross-pieces resting on the two uppermost beams supported a ridge beam of similar size and

shape to the other beams. The ridge beam, however, did not project out over the house-front, and was broken to form the rectangular smoke hole in the roof, which was set a few feet forward of the centre of the house. The ceiling heights of the houses, measured from ground-level to the bottoms of the roofs, varied, but in one average-sized house (at Tanoo) were 9 feet at the side walls and 12 feet 6 inches at the centre line. The inside housepost found at the centre of the back wall of two houses must have largely been for decoration, but may also have supported the ridge beam.



(Prepared by John Smyly.)

Fig. 1. Structure of a Haida house.

The front, back, and side walls consisted of vertical planks fitting at the tops and bottoms into the channels in the plates and beams described above. Roofs were of planks or sheets of cedar bark resting on a framework of rafters and stringers, and probably held in place by weighting with stones and poles. There was probably some sort of structure over the smoke-hole, but, of course, nothing of this sort survived in 1957.

Three houses bore evidence of a different type of structure, but not enough remained to determine in detail what the structure was like. Mainly, however, it was different in that it had two round longitudinal beams about 12 feet apart supported by four upright posts which were half-round with their curved faces inward. How these were related to the rest of the house structure is uncertain. Perhaps they represent an earlier form in which the main strength of the building was provided by the two beams, and this became obsolete as the six-beam form developed. At Tanoo four houses had a structure which used two round beams, and these were also the only excavated houses in the village.

At Skedans two houses had this structure and were two of the three excavated houses in the village. Perhaps this structure persisted in a few of the larger and better-made houses. Perhaps even it was used as a privilege only by certain families.

TRACES OF THE PREHISTORIC PAST

Archæological investigations of Anthony Island were carried out, primarily by Dr. Suttles and Mr. Kew, in whatever time could be spared from the task of removing the totem-poles, and under difficulties of weather. Consequently, this report is incomplete and in many respects deficient. However, a certain amount of information was obtained that is worth recording, especially in view of the fact that the archæology of the Queen Charlotte Islands is almost completely unknown. This report may serve as a guide and stimulus to future investigation.

Four separate archæological sites were discovered on the island. The largest is the village of Ninstints itself, where the remains of the houses and about thirty-five totem-poles were still in evidence (Site No. I, Map 2). In a protected bay on the north end of the island is a second fairly large site, which in all probability is the "town" of Qādadjans (Site No. II) listed by Swanton (Swanton, 1905, p. 277). A short distance west on the same bay is a shallow midden on a small flat (Site No. III), and farther west is a large cave containing midden deposits and the remains of recent burials (Site No. IV).

Site No. I

(*See* Map 2.)

The midden deposits on the village-site are deep and fairly extensive (*see* Map 3). Three test pits were dug in this site, and the greatest depth was encountered at Test Pit No. 3, which we were forced to abandon at a depth of 7 feet, still in cultural deposits. The midden on the northern part of the site is very shallow, consisting of a mere scattering of shell. This area, however, had been occupied by several houses and contained several totem-poles. Probably the village had expanded northward in quite recent times, shortly before the population began to decline. South of the main village area is a flat meadow, which appears to have been cultivated at one time. The Haida obtained potatoes early in the contact period, and it seems probable that the meadow was a former potato-patch. On the inland side of the meadow, rock cliffs rise abruptly and are broken by deep canyons and fissures. Scattered midden deposits were found along the base of the cliffs, and in some of the deep fissures or caves, evidence was found that they had been used as burial-places.

A search of the exposed parts of the midden yielded very few artifacts, a disappointing result which proved common to all the sites. On the surface of Site No. I, pieces of crockery, iron pots, and bits of glass were found, chiefly around the collapsed house frames. A blue glass bead and a musket-ball were found near the beach. In one test pit two glass beads were recovered at a depth of less than 6 inches. The only other artifacts from the test pits were one rectangular bone plaque, one bird bone awl, one fragment of ground stone, and several pieces of whalebone bearing evidence of cutting.

The burial-caves behind this site contained less material than we expected; very few human bones and no skulls remained. It is probable that the caves have been vandalized in the past. However, several fragments of cedar-bark matting and rope were found, as well as a barbed harpoon-point and the remnants of a wooden mask. The harpoon-point is bone with unilateral barbs and a drilled line-hole. The mask evidently represented a bear and consists of two carved pieces of wood, one being the lower jaw. There are wooden teeth fitted in both the upper and lower parts, and some animal-skin (probably bear) had been stretched and fastened with wooden pins to the upper part.

During the digging of the test pits, samples of bone and shell were saved, and a list of the identifiable faunal remains is given below. One feature of interest was a large amount of whalebone (ribs, vertebræ, etc.) seen on the surface and protruding from below the surface of the midden, as well as being found in the test pits.

Associated Faunal Remains—Test Pits in Site No. I

Mammals:

Phoca vitulina (hair-seal).
Eumetopias jubata (northern sea-lion).
Callorhinus ursinus (fur-seal).
Enhydra lutris (sea-otter).
Cetacea (whales and porpoises (undetermined)).

Birds:

Cerorhinca monocerata (rhinoceros auklet).
Ptychoramphus aleuticus (Cassin auklet).
Lunda cirrhata (tufted puffin).

Fish: Numerous but unidentified.

Molluscs, etc.:

Mytilus californianus (California mussel).
Schizothaerus nuttalli (horse-clam).
Saxidomus giganteus (butter-clam).
Protothaca staminea (little-neck clam).
Clinocardium nuttalli (basket cockle).
Hinnites multirugosus (purple hinged scallop).
Sea-urchins.
Barnacles.

Site No. II

(*See* Map 2.)

This site (Qādadjans) is smaller than No. I, being approximately 95 yards long and 35 to 40 yards wide. The depth of the deposit is considerable, probably between 8 and 10 feet in places. On the top of the mound there are two rectangular depressions which appear to have been house-sites. There are also several moss-covered timbers, which may be the last remnants of a house frame. Much of this site is free of underbrush, but it supports some large conifers.

The cove on which this site and Nos. III and IV face constitutes the most protected water around the island. During a heavy southerly blow, this is the only water free from swells. It is shallow, but even at a zero tide would afford entrance for canoes. The main village (Site No. I), on the other hand, would be very difficult to approach in a canoe during a storm at low tide.

No excavation was made at this site, and several examinations of exposed portions of the midden yielded no artifacts.

Site No. III

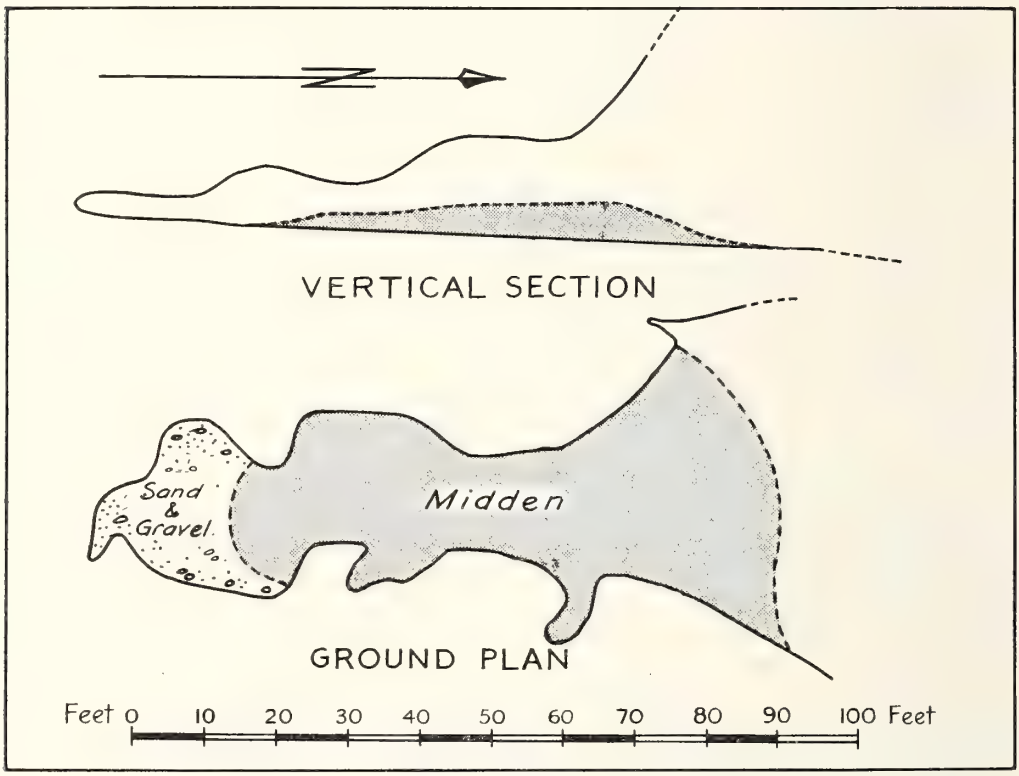
(*See* Map 2.)

This is the smallest site, being approximately 50 by 20 yards in extent and nowhere exceeding 2 or 3 feet in depth. There is no visible evidence of house remains, and no artifacts were found here.

Site No. IV

(*See* Map 2.)

The discovery of this site was one of the highlights of our explorations because it is certainly the most unusual one encountered. It consists of midden deposits inside a water-worn rock cave situated at the end of a short wooded canyon, approximately 80 yards from a steep rocky shore. The cave is about 30 feet above sea-level and must have been formed by wave action at a time before the island had risen to its present level. The roof is solid and worn smooth, and at the extreme end, 90 feet from the entrance, the floor consists of clean sand and gravel. The midden debris begins at a point 21 feet from the back, and the surface-level raises as the entrance is approached; there it slopes abruptly to the moss-covered ground outside the shelter of the overhanging cliffs. We were able to make a rough survey of the floor levels and dimensions of the cave, and from these have estimated that the approximate maximum depth of the cultural deposits is 5 feet (*see* Fig. 2).



(Prepared by Geographic Division, Department of Lands and Forests.)

Fig. 2. Diagram of Site IV, the cave-site.

The cave had been used in recent times for deposition of the dead, but, like the other caves, had been vandalized. We found only a few human bones. However, a close search of the floor with the aid of gasoline lanterns enabled us to recover a few fragile artifacts—three wooden skewers, one wooden blanket-pin, one toy bow (?), one wooden whistle, one yew-wood wedge, and numerous fragments of cedar boxes, cedar-bark rope, and cedar-bark matting.

We began a test pit near the entrance of the cave, but, unfortunately, were not able to finish it. Our datum point consists of a 4-inch nail driven into a crack in the east wall 5 feet above the cave floor. The pit was 5 feet square, the north-east corner being

directly below the datum point; i.e., E.W. 0′–N.S. 0′, and the other corners being E.W. 0′–S. 5′, W. 5′–S. 5′, W. 5′–N.S. 0′ (true bearings throughout). The pit was refilled before we left the island.

We excavated to a depth of 30 inches below the surface, but recovered only one artifact—a bone harpoon-point with unilateral barbs and drilled line-hole. This was at a depth below the surface of 18 inches. The deposit consists mainly of mussel-shell (*Mytilus californianus*) intermixed with some ash. The shell is very coarse, whole valves frequently being intact. Other faunal remains were found as well, and sample specimens were kept for identification. A list of these is included below.

Associated Faunal Remains—Test Pit in Site IV (Cave)

Mammals; *Phoca vitulina* (hair-seal).
Birds:
Cerorhinca monocerata (rhinoceros auklet).
Ptychoramphus aleuticus (Cassin auklet).
Lunda cirrhata (tufted puffin).
Colymbus grisegena (red-necked grebe).
Fish: Numerous but unidentified.
Molluscs, etc.:
Mytilus californianus (California mussel).
Mytilus edulis (edible mussel).
Protothaca staminea (little-neck clam).
Saxidomus giganteus (butter-clam).
Clinocardium nuttalli (basket cockle).
Cryptochiton (large chiton).
Small black chiton.
Acmæa (limpet).
Sea-urchins.
Cancer (crab).
Balanus (barnacles).

The discovery of this site precipitated considerable discussion among expedition members because it is the only known case of a cave habitation-site on the coast of British Columbia. Several possible explanations, accounting for the existence of the site, were advanced: (*a*) The cave was used for smoke-drying mussels; (*b*) it was a secret society " training " retreat; (*c*) it was a refuge in time of hostilities; (*d*) it was a temporary seasonal camping-place, presumably for people who did not have a house on the island.

The remnants of burial boxes on the surface indicate a recent usage of the cave for deposition of the dead. It seems likely that this practice and habitation of the site would not be coexistent, and there may be a considerable time interval since the cave was lived in. If explanation (*d*) were correct, it might mean that the cave was used before any houses had been built on the island, in which case some of the oldest archæological remains would be in the cave deposits. In any event, the site presents an intriguing archæological problem.

Conclusion

One of the striking features about these sites is the paucity of artifacts. The test pit in the cave, for example, yielded one artifact for slightly more than 2 cubic yards of midden. Similar conditions were noted by Drucker in his 1938 survey of the Northern Mainland (Drucker, 1943, p. 111). He discerned a tendency for few artifacts in temporary camp-sites with a higher yield from winter village-sites. We have the impression, from personal experience, that the sites in the Fraser Delta region and on the Gulf Islands

contain a greater proportion of artifacts. The reasons for this difference, if it should prove to be true, remain to be defined. As to artifact assemblage, that, too, we must leave a blank. It is probable that recent Haida tool assemblages will conform closely to Drucker's "Northern aspect."

The faunal remains are what is to be expected from an exposed coastal site such as Anthony Island. Terrestrial-mammal remains are absent, food resources being exclusively sea-mammals, fish, shell-fish, and sea-birds. The material from Site No. I contained a large number of sea-otter and fur-seal bones, a fact which conforms with the historical evidence of involvement in the maritime fur trade by the Anthony Island people.

We have then, in these sites, cultural remains with a well-defined historical horizon and probably a time dimension extending back a considerable period before the contact date. This, combined with the fact that the sites have remained undisturbed and are now protected under Provincial park regulations, make them a logical place in which intensive studies of the prehistory of the area could be initiated.

GLIMPSES OF HISTORY—THE CONTACT PERIOD

Early logs, journals, and other historical records give us some of our most interesting information on the tribe, especially for the earliest years of European contact. Between 1785 and 1825 Ninstints was one of the main centres of the maritime fur trade on the coast. Indeed, it is probable that more Europeans visited the village during those years than in the whole period since then. The records for the period from 1789 to 1795 are surprisingly full, and provide a vivid picture of the relations between the traders and the leading chief at the time. For later periods, during the decline of the fur trade and the decimation of the tribe and eventual abandonment of the village, the records are much more sparse, and one has to search for even the most casual mention of the tribe. The following account falls far short of being a complete history of the tribe during the contact period, but tells as much of the story as we have been able to learn.

First Contacts

The people of Anthony Island did not see the first European explorers who sailed along this coast. The ships of Perez in 1774, Quadra in 1775, and Cook in 1778 passed beyond sight of the island. But with the beginning of the maritime fur trade it was not long before the Kunghit People learned of the new ships which came laden with valued goods, and sought them out for trade. It is quite possible, although we have no record of it, that the English captains Hanna, Lawrie, and Guise visited the village in 1785 and 1786, bargained for sea-otter skins, and thereby introduced the Indians to the new era in their lives. At any rate, by the 24th of July, 1787, when they saw George Dixon's vessel the "Queen Charlotte" off the west coast, the villagers knew enough to paddle out to meet it (180 people in eleven canoes) without fear and with skins to trade. A day or two later, sailing south, Dixon met his countrymen Colnett and Duncan in the "Prince of Wales" and the "Princess Royal" and directed them back to the fur-rich Queen Charlotte Islands. Both must have found the Anthony Island people eager traders, because when the American captain Robert Gray arrived on the scene in the "Lady Washington" two years later, the Indians spoke distinctly of these English predecessors, and traded with an assurance which was not that of beginners.

With this as a start, the maritime fur trade quickly boomed. European and American vessels crowded to the coast each year in ever-increasing numbers. By 1825 more than 230 vessels were to visit the coast for purposes of trade, many of them returning year after year (Howay, 1930). European politics and the dwindling supply of sea-otters were to cause the trade to change in character and then decline, but for forty years competition was brisk and tempers were short all along the Northwest Coast.

And in the very thick of the trading and fighting were the Kunghit People of Anthony Island.

The traders knew the village as Koyah's village, following the usual practice of naming the place after its chief, who conducted the trade. " Koyahs " (there are many different spellings) became one of the main stopping-places for vessels working the Queen Charlottes. Sometimes they anchored directly off the village or in the channel near by, but often, too, they stopped on the east coast of Moresby Island near the other end of Houston Stewart Channel, where they found some of the villagers dispersed to their summer camps. Wherever the trader stopped, the word soon spread and canoes converged on the ship.

Robert Haswell's log of the " Lady Washington's " first voyage gives us our earliest account of the village itself. On Thursday, June 11th, 1789, with Captain Gray in command, the vessel was sailing southward along the west coast looking for Indians with whom to trade. They stood in to examine an " inlet " (now Houston Stewart Channel) and were surprised to see a canoe approaching. " This was an agreeable surprise," wrote Haswell, " as we had apprehended this part of the Island was not inhabited. We soon saw several others on the move. We stood into the sound and saw the village on the south-east part of a bay a little behind a small island, and nigh it appeared a good cove for our vessel to lay. . . . We bore up and anchored in 14 fathoms water with a hard bottom of sand " (Haswell in Howay, 1941, p. 97)* Howay, who edited the log for publication, assumes the " small island " to be Anthony Island itself. In actual fact, it must be the tiny islet in front of the village, which partly hides it from view, and the " cove " (which in at least one later log is called Gray's Cove) is probably the small indentation a couple of hundred yards to the south. This was the scene for numerous later incidents of trading and violence.

The log continues: "A brisk trade was soon set on foot by Coya the chief, who bartered for all his subjects." The villagers, already skilled in the art of bargaining, demanded clothing instead of the usual iron. " These people have been visited by several navigators. They spoke distinctly of Colinnet and Dunkin, and they brought a piece of paper that informed us the N.W. American, Schooner, had been here May the 24th last " (loc. cit.).

Haswell went ashore and examined an interesting native fort. " I landed to take an excursion in the woods when I met with a fortified rock which I suppose in case of invasion is their place of refuge. It was perpendicular, about forty feet high. The top was flat, about twenty yards wide. It was inaccessible on all sides except by an old rotten ladder that was erected by its side. This fort they called Touts,† and when their northern neighbours come to molest them they put their women and children up there while they fight the battle " (loc. cit.). Almost exactly 168 years later we also explored Anthony Island, but did not discover the fort.

Haswell makes a point of saying that the traders' relations with the Indians were " on the strictest friendship." Unfortunately, not all of the later trading visits were to be conducted in such a congenial atmosphere. The next time the " Lady Washington " anchored off the village she was under the command of Gray's moody and erratic superior, John Kendrick. Gray had been given command of the larger vessel the " Columbia," and was trading elsewhere on the coast. Kendrick made two stops at the village, the second of them on June 13th, 1791, and events that took place during the two visits resulted in one of the bloodiest Indian massacres in the history of the coast.

The story of this slaughter is told in at least six contemporary logs and journals.‡ Four of these give Kendrick's version of what happened; the other two were written by

* In quotations from early journals used in this article, slight changes have been made in punctuation and spelling in the interests of readability. No words or meanings have been changed.

† Swanton's t!a'odjis.

‡ Judge Howay has brought together all the contemporary accounts in "The Ballad of the Bold Northwestman, an Incident in the Life of Captain John Kendrick." B. A. McKelvie has also retold the story in *Tales of Conflict*.

members of the crew. There are only hints of what the Indian version would be. The following account is based on all of these sources. It is presented here not just because it is a well-documented incident in the little-known history of the village, but also because it was the first of the harsh disasters that were eventually to destroy the proud and populous community.

Captain Kendrick became increasingly annoyed, during his first visit, with the petty pilfering that the Indians indulged in when they crowded aboard the vessel to trade. And one day, when he found that his personal laundry had disappeared from the makeshift clothes-line where it had been hung out to dry, he lost his temper completely and decided to teach the savages a lesson.

" Seize the chiefs," he shouted, and Koyah and Skulkinanse were quickly overpowered.

" Dismount that cannon," he ordered, and when the gun had been removed from its mountings, he forced one leg of each of the chiefs into the mount and fastened down the clamps.

" Now," he threatened the pinioned chiefs, " either you order your people to bring back everything they have stolen or you die."

One by one the stolen articles reappeared, until only a few were not accounted for. Kendrick took their value in furs. Then, while the chiefs were still in his power, he forced them to send for all the skins they had left, and paid for them what he considered a fair price. Releasing the chiefs, he lost no time in leaving the scene.

What Kendrick regarded as a simple " lesson " must to Koyah have been a monstrous and shattering indignity. No Coast Indian chief could endure even the slightest insult without taking steps immediately to restore his damaged prestige. To be taken captive, even by a white man, was like being made a slave, and that stigma could be removed only by the greatest feats of revenge or distributions of wealth. This humiliating violation of Koyah's person must have been shattering to his prestige in the tribe. The Indian account of the incident told to Captain Gray a year later (but before Gray had heard Kendrick's version) states this very clearly. " On Coyah the chief's being asked for, we were informed by several of the natives . . . that Captain Kendrick was here some time ago . . . that he took Coyah, tied a rope around his neck, whipped him, painted his face, cut off his hair, took away from him a great many skins, and then turned him ashore. Coyah was now no longer a chief, but an 'Ahliko,' or one of the lower class. They have now no head chief, but many inferior chiefs. . . . " (Hoskins, in Howay, 1941, p. 200).* Kendrick had hurt Koyah more than he knew.

On Koyah's part, if we understand the motivations of a Haida chief correctly, only bloody revenge or a great distribution of wealth would restore his lost prestige. To capture and destroy Kendrick's ship, for example, and then distribute the loot, would fill the bill nicely. Koyah watched for his chance, and John Kendrick's carelessness soon gave it to him.

June 16th, 1791 found the " Washington " once more anchored off the village. Trade was unusually brisk, the Indians seemed friendly, and rather incredibly—perhaps because he was " in liquor " that day—Kendrick found nothing alarming in having fifty Indians aboard his ship and more than twice that number alongside in canoes. But a ship's gunner was worried, and went up on the quarter-deck to warn the captain and to remove the keys from the arms chest, where shortly before he had been overhauling the guns. Kendrick, annoyed, struck out at the gunner and pushed him off the quarter-deck, then turned back to his trading.

A shocking realization struck him. Indians had crowded to the arms chest and had taken the keys from the locks. Alone on the quarter-deck and unarmed except for the piece of bar iron he had been bartering, he found himself facing twelve Indians.

* According to Swanton (1905, p. 69), " Some families, called ā'lGA, were so poor that they formed a class of servants only slightly higher in the social order than the slaves."

Daggers appeared from their sheaths. Pulling his eyes from Koyah's triumphant grin, he glanced at the forward decks. Indians far outnumbered the crew, and more were pouring aboard. A war song started up and grew to a frightful din. Kendrick's ship had passed out of his command and into Koyah's.

It is uncertain whether Koyah really intended to shed blood, as no blows were struck. At any rate he felt that he was in full control of the situation and wanted to savour his triumph. Pointing to his legs, he taunted Kendrick, " Now put me in your gun carriage." The Indians plucked hats, kerchiefs, and other booty from the crewmen, then drove them below and began to divide up the copper and other trade goods on the deck. Some hailed the village, calling for the women to come aboard, " for it seems that the women are more courageous than the men." But Koyah's delay was his undoing. One by one, the officers slipped down the companion-way to the cabin. Kendrick also edged toward the companion-way, though threatening clubs and daggers prevented him from going below. He stalled for time, entreating with Koyah, offering to buy back the keys. At the same time he called out instructions to the men and officers below decks. In the cabin the officers hurriedly loaded what personal arms they could find, one or two muskets and a few pistols. They waited. If they charged on deck now, the captain would be killed. " Wait until I shout ' Follow me,' " Kendrick told them, edging closer.

Suddenly the tense situation exploded into action. Koyah, uneasy about the officers in the cabin, leaped down the companion-way for a look. Kendrick threw himself down on top of him. Koyah slashed out with his dagger, slitting through the front of Kendrick's jacket, then, seeing the firearms, made for the deck. " Follow me," roared Kendrick, seizing a musket, and the officers charged out, firing. The Indians retreated.

" The arms chest, it's still unlocked. Arm the men," the captain shouted, as the crew rushed up from the hold. The Indians were now in full retreat, tumbling into their canoes, despite the cries of a woman standing in the bow, urging them to fight. Soon after, one arm severed by a cutlass blow, and bleeding from gunshot wounds, she, too, tumbled overboard. Another shot stopped her attempts to swim away. The deck was now a scene of slaughter. When it was cleared of living Indians, a steady fire of muskets and cannons was trained on the retreating canoes. Armed boats were launched to seek out and kill any survivors.

The next morning Kendrick brought his ship up alongside the village, trained his guns shoreward, and forced the people to return everything they had stolen.

The estimates of the number of dead range from forty to sixty. The following July, at Cumshewa, Ingraham was told that forty had died, including a number of women and children. " Koyah they said was wounded in the back, and lost in the battle a wife and two children. Two of his brothers were likewise badly wounded. Skulkinants was wounded in the left cheek and the ball lodged under his ear which they could not extract till lately " (Ingraham, p. 217). None of the ship's crew were killed or wounded.

The effect on Koyah's prestige of this second defeat can only be surmised. Like the hero in a Greek tragedy, he was pitted against forces stronger than his own, but he had to continue the struggle. If he didn't, he would lose the most important thing in his life, his prestige. And struggle he did. For one thing, he went immediately to war against Chief Skidegate's tribe. Then, during the next four years, he attacked three more ships. Twice he was successful, overpowering and killing the crews. The third time, however, his attack was repulsed with much slaughter, and he himself was killed. This record of four attacks—two successful and two disastrous—establishes Koyah as the most warlike chief on the whole coast at the time. Of the ten known attacks on maritime traders between 1785 and 1805 which resulted in loss of life, his four make up a very significant part (Howay, 1925). No other chief succeeded in capturing more than one ship, and his successes probably encouraged others to make similar attempts. His failures fanned the hatreds on both sides. Every attack contributed to the atmos-

phere of mutual fear and hostility in which the trade was conducted in the years that followed. The series of events that started with the affair of Kendrick's laundry made Koyah of Anthony Island an outstanding figure in the history of the era. And in his struggles and eventual defeat we dimly perceive a powerful story which contains the elements of true tragedy.

We have some records of Koyah's actions shortly after his defeat at the hands of Kendrick, and they are somewhat puzzling. Just three weeks after the massacre, on July 8th, 1791, Gray anchored in the channel a few miles from the village. He knew nothing of what had happened. It was here that he was told of Koyah's loss of status because of Kendrick's earlier treatment (quoted above), but strangely enough no one told him about the massacre. Koyah himself came aboard after sundown. " He appeared glad to see us. He said Captain Kendrick was good, had been here lately, showing some blue nankin cloth that he gave him. . . . He appeared to be much frightened, being in a constant tremor the whole time " (Hoskins, op. cit., p. 200). Captain Ingraham also met Koyah soon after the battle (August 2nd), and although " he said he had seen Captain Kendrick," he made no mention of the incident, and Ingraham did not learn of it until he got back to Nootka (Ingraham, p. 127). We can only guess at Koyah's motives for keeping his defeat a secret.

The next we learn of Koyah he is leading a war party against one of his traditional enemies, Chief Skidegate. On August 27th, less than two and one-half months after the massacre, Ingraham was at anchor in Cumshewa Inlet, and saw the war party heading north in twelve large canoes. The natives told him it was Koyah and Skulkinants going to make war on Skidegate (Ingraham, p. 150). The timing of this attack, and the well-known custom on the Northwest Coast of shedding blood almost indiscriminately to avenge a defeat, allows us to guess that Koyah once again was out to regain lost prestige. Having failed in his attack upon Kendrick, he would salvage some honour by taking a few heads from Skidegate's tribe. Unfortunately, we do not learn the outcome of the raid.

The following year, 1792, Ingraham saw Koyah again, but he was surly and suspicious, with a guilty look, and could not be persuaded to venture aboard (Ingraham, p. 215).

It was two years later that Koyah succeeded in capturing two vessels. We learn of these attacks from Captain Bishop's log of the " Ruby," and from Boit's log of the " Union " (quoted in part in Howay, 1925). Both accounts are second or third hand, and accordingly lack detail. It was some time in 1794 that an American brig commanded by Captain Simon Metcalfe, probably the " Eleanora," was captured. According to Boit's account, Koyah and his men traded peaceably at first, crowding aboard the vessel until they far outnumbered the crew, and suddenly attacked with drawn daggers. One man of the crew survived the slaughter by going aloft into the rigging. He was taken captive and held as a slave for a year (Boit, in Howay, 1925, p. 298).

In the winter of 1794 a large English ship was forced to put into Koyah's sound to replace broken masts. According to the account that Bishop heard, Koyah and his people had traded with them for several days, until seeing their chance when some of the men were ashore obtaining the new masts, they seized control of the vessel and killed the entire crew (Bishop, p. 131). Bishop also noted in his log that he himself had been warned that Koyah planned to attack the " Ruby " along with Cumshewa's tribe, and he had made up his mind to " punish this bloody villain if he should dare offer us the least insult " (loc. cit.). Fortunately for Koyah, Bishop did not return to the Queen Charlottes.

It was on June 21st, 1795, that Koyah made his next attack on a trading-vessel, and almost certainly it was his last. The ship was the " Union," under Captain Boit, an 80-ton sloop manned by seventeen men, including six Sandwich Islanders. Bishop's

brief account in the log of the " Ruby " definitely identifies Koyah as the leader of the attack: " The natives, Koyer or Kower the chief, attacked Captain Boyd's [Boit's] vessel, but were defeated with some slaughter without losing a man from the sloop " (Bishop, p. 126). Boit's account, naturally enough, is much more detailed, and is quoted below. It is somewhat unfortunate that Boit refers to Koyah as " Scorch Eye," but his identification of Scorch Eye as the head chief, coupled with Bishop's account just quoted, leaves little doubt that it was Koyah who met his death in the attack. Boit's account is as follows (Boit in Howay, 1925, p. 301):

> Above 40 canoes came into the cove, full of Indians, at least 300 men. I immediately suspected by their maneuvers that they meant to attack the " Union." Called all hands to quarters. Eight chiefs were on board at this time, who began to be very saucy, and the war canoes kept pressing alongside, and the Indians getting upon the nettings. Scorch Eye the head chief began the attack by seizing Mr. Hudson, the second officer. At the same time the Indians alongside attempted to board, with the most hideous yells. However we soon paid them for their temerity. I killed their first chief, Scorch Eye, in the second mate's arms, while they were struggling together. The rest of the chiefs on board were knocked down and wounded, and we killed from the nettings and in the canoes alongside above 40 more when they retreated, at which time I could have killed 100 more with my grape shot, but I let humanity prevail and ceased firing. At 6 p.m. a small canoe came off from the village with two Indians in her holding green boughs (emblems of peace). I allowed the chiefs on board, who were thoroughly ironed, to hold converse with them. At dark they left us. Kept a strong watch, all hands to quarters, through the night.
>
> At daylight, took up the anchors and came to sail, stretching toward the village on the west part of the sound. At 9 a.m. several large canoes put off full of Indians waving green boughs. They came alongside with fear and trembling, bringing plenty of furs to ransom their chiefs with. Ordered the irons off them, and called the poor devils up, and notwithstanding the treatment I had received I paid full price for the skins. Believe I got every piece of fur they had in the village. Took notice that the village was deserted. Suppose they thought it was our intention to destroy it. At 11 a.m. the canoes left, the Indians crying and praying for our success. Indeed the treatment they received from me was quite different from what they expected. Suppose in this fracas we killed and wounded about 50 but the Indians said we killed 70. None of us was hurt, but their attack was very impolitic, for had they instead of being so intent to board stood off and fired their arrows, no doubt they would have killed and wounded several of us. However, I was too well guarded against surprise for them to have been victorious.

Koyah's final defeat was the second of the disasters that decimated the Kunghit People. We do not know exactly how large the population was at that time, although Boit's estimate of 300 men seems too large for one village alone. If correct, it may indicate that reinforcements from Cumshewa or elsewhere were on hand, in which case not all of the casualties would have been from Koyah's village. The fact remains that about 100 people died under Boit's and Kendrick's guns. Few other coastal villages, if any, suffered so heavily from clashes with white men.

The successors to Koyah's name failed to maintain his position as head chief of the village. Possibly the taint of Kendrick's insult and the discredit of two defeats had undermined his status, and his successors were not strong-willed enough to continue the struggle to regain its lost prestige. At any rate, by a generation or two later, the holder of the name was only a minor chief in one of the lineages of the tribe. In 1900 one of Swanton's informants reached back in memory to list the Ninstints " towns " and their chiefs, and included Xō'ya (Raven) as chief of one place on the east side of Kunghit Island (Swanton, op. cit., p. 277). Unlike his other great Haida contemporaries, Chiefs Skidegate, Cumshewa, Skedans, and Kloo, whose names are still held and are perpetuated as place-names, Koyah has been forgotten. In ten stormy years after the arrival of the first trading-ships, he fought his way through the acts of his personal tragedy and met his defeat. The downfall of the rest of his tribe was to take longer to act out, but in the end was to be just as complete.

Decline and Abandonment

For many decades there is almost no mention of the village. The maritime fur trade continued, but changed in character and declined in volume. The Hudson's Bay Company arrived on the coast and established forts. Remote from these posts, the people of Anthony Island received almost no mention in the journals of the times. They are included, however, in a Hudson's Bay Company census of the Haida, attributed to John Work, for the period between 1835 and 1841. Their name appears as Quee-ah (showing that the early traders' name Koyah still persisted), and they are credited with a population of 308, living in twenty houses, and including eighty-seven men, seventy-nine women, sixty-eight boys, and seventy-four girls. The significant remark is included that although most of the Haida tribes frequented Fort Simpson for trade, " several of them towards the south end of the Island scarcely ever visit any establishments or see whites " (James Douglas diary, 1852, pp. 28–29).

Houston Stewart Channel was charted and Anthony Island was named in 1853 by H.M.S. " Virago." The name was given in honour of Venerable Anthony Denny of Ireland, whose son was a midshipman aboard the vessel (Walbran, 1909, p. 22).

This period must have seen the rise to ascendancy of Ninstints' Eagle lineage over the Raven lineage of Koyah. Robert Brown, a geologist who visited the Queen Charlottes in 1866, in listing the Haida tribes, includes the " Kung-at-adi [Kunghit Haida] on St. Anthony's Island," adding " Ninstens is their chief " (Brown, 1867, p. 390). Before the village was deserted in the 1880's, a bearer of the name Ninstints was to become one of the two greatest Haida chiefs, sharing with Edenshaw of Masset the unique distinction of having given ten potlatches (P. R. Kelly, personal communication).

Disaster struck again, in a form more deadly than gunfire, with the smallpox epidemic of 1862. This epidemic was the greatest single blow suffered by the Indian tribes of the Province, and although its effect on the Kunghit People was apparently somewhat delayed, their remoteness did not protect them from its destructive effects, and undoubtedly more of them fell to the disease than had fallen under Kendrick's and Boit's guns. Brought to Victoria from San Francisco by a white man in the spring of 1862, the dreaded disease spread to the camps of Haida and other northern coastal Indians clustered about the harbour. In alarm the authorities burned down the Indian lodges and drove their occupants away. Fleets of canoes started homeward up the coast, carrying the infection with them. Everywhere they touched they kindled " brush fires " of the disease, which spread from village to village until they burned themselves out. In 1862 there were fully 60,000 Indians in the Province. Two years later at least a third of these were dead, and scattered outbreaks of smallpox continued to take their toll of the stunned and dispirited survivors.

From the files of the Victoria Colonist we learn something of the fate of two groups of Haidas who were in Victoria that spring and caught the disease. We do not know if any of them were Ninstints people, and we do not know whether any of them reached home. On June 5th, 1862, the Colonist reported that of the group of 100 Haidas who had been driven out and had encamped at Ogden Point four weeks before, only fifteen remained alive. The next day it was reported that the last ten or twelve had left for the north. On June 12th another group of Haidas started north in twenty-five canoes, accompanied by a gunboat for protection as far as Nanaimo, but it was not long before stories of their losses filtered back to Victoria. A report on June 21st said that forty of the Haidas had died. Another on July 1st said that four or five Haidas had been captured and murdered by the Yucultas of Cape Mudge, who thereby caught the disease themselves.

From another source we learn of even more losses before the Haidas reached home. Robert Brown, the mining engineer who visited Skidegate in 1866, wrote:—

Small-pox has also destroyed numbers, but not to the same extent as in other tribes—their insular position protecting them. In 1862, when this disease broke out among the southern tribes, the Hydahs, who were wintering in Victoria, fled north with the seeds of infection. While waiting, as is their custom, on an island off the mainland for a favourable chance to cross over, the disease broke out in all its virulence. Not one survived. A trader described to me, coming upon their bodies in the ensuing spring, that a more terrible sight no man ever looked on than these ghastly skeletons, surrounded with their rotting canoes and treasures (Brown, 1867, p. 391).

(British Columbia Government photograph.)

Ninstints mortuary poles. The group of four poles to the left stand in front of the remnants of house No. 13.

Not even the remote Ninstints people were to be " protected by their insular position " for very long. We learn this from the reminiscences of Francis Poole, a self-styled " English gentleman " and " mining engineer " who spent the years 1862 to 1864 in Skincuttle Inlet in an abortive attempt to mine copper ore. In 1862 a party under Poole's leadership had been responsible for introducing smallpox among the Bella Coola Indians, and in December, 1863, he lamented that " a similar fatality seemed to be pursuing him " on the Queen Charlottes. The vessel that supplied his camp put ashore a white man who was suffering from the disease. " Scarce had the sick man landed when the Indians again caught it." (He had made a brief mention earlier of an outbreak some time in 1863.) " In a very short space of time some of our best friends of the Ninstence or Cape St. James tribe . . . had disappeared forever from the scene. It was long before health could be restored to the surroundings of our little colony " (Poole, p. 195). The next March, however, he counted 122 Cape St. James Indians around his settlement, which shows that the tribe had not been completely decimated.

The population of Ninstints continued to fall. Smallpox and other introduced diseases against which the natives had little immunity undoubtedly continued to take their toll, as they did among all the tribes. The loss of women who travelled to Victoria and elsewhere and got married or became prostitutes, and returned (if at all) diseased and infertile, also contributed to the decline.

The exact date of the abandonment of the village by its pitiful remnant of survivors is not known.* When George M. Dawson made his studies of the islands in 1878, he did not land at the village, but did note that there were still " a good many " Indians living there (Dawson, p. 170). In 1884 Newton H. Chittenden made an exploration of the Queen Charlottes for the Provincial Government. He did visit the village, and found " 30 inhabitants, 20 houses, 25 carved poles, and 20 burial columns " (Chittenden, p. 24). On the day of his arrival the Indians had just returned with a large number of halibut caught on banks off the west coast of Kunghit Island. He may well have been the last guest to be entertained by the villagers. Soon after, or at least some time in the early 1880's, their former enemies from Skidegate came down, helped them to load their belongings in canoes, and voyaged with them back to Skidegate Mission. There they settled, returning occasionally during the next few years only on visits, to fish or trap.

Their chief at that time was the ageing Elijah Ninstints, successor of the great Ninstints who had given ten potlatches. Dr. Peter Kelly remembers a visit he made to Anthony Island as a child, with Elijah Ninstints, during which the old man showed him his wife's remains in the small burial house. The old chief's name passed to a nephew, Thomas Price (Peter Kelly's stepfather). Later it passed to Timothy Tait, although some people say he never did properly assume the name. On Tait's death nobody claimed the name, and to-day only a very few people in Skidegate or elsewhere can trace any connection, however remote, with the former inhabitants of Anthony Island.†

The deserted village has been visited only occasionally over the years, as southern Moresby Island has seen little in the way of permanent settlement or industry. In 1909 a whaling-station was established at near-by Rose Harbour, and operated intermittently until 1941. The whalers habitually anchored in the lee of Anthony Island to weather storms, and undoubtedly they often went ashore and examined the totems and old houses. At some time during this period a fire destroyed several poles at the south end of the village. Shortly after the turn of the century the communities of Ikeda, Jedway, and Lockeport grew up to exploit the lumber, mineral, and fish resources of Moresby Island, but these, like the whaling-station, have since been abandoned. To-day the permanent population of the area consists solely of the lighthouse staff at Cape St. James. Transient fishermen, timber cruisers, and others have occasionally visited the village, and a few anthropologists have journeyed to the lonely site to examine and photograph the decaying totems and houses. The photographs, beginning with the excellent sets obtained by Dr. C. F. Newcombe in 1911 and 1913, show the steady decay as the forest moved in and reclaimed the site.

Other deserted Haida villages have, over the years, been designated as Indian reserves, either because they were still in use when the first Reserve Commissioners visited the Haida in the 1800's or because they were claimed by the Indians during meetings of the final Commission in 1913. But Ninstints was never made a reserve. In the 1880's the Commissioner must have heard that it was already deserted, or considered it too remote. In 1913 the Skidegate band was afraid to make claims for additional reserves, thinking that such claims would prejudice their demand for recognition of their aboriginal title to all the land, which was then still under consideration. Mr. Thomas

* Marius Barbeau (*Totem Poles*, Vol. II, p. 526) implies that James Deans visited Ninstints in 1883 and found it deserted. In actual fact Deans (1899, p. 64) was referring to another village in the statement quoted, and nowhere mentions having visited Ninstints.

† This is illustrated by the fact that in 1957 no one could show a close enough relationship to be awarded payment as owners of the totem-poles removed from the island, and the band council decided to give the money to the church.

Deasy, their agent at the time, made claims on their behalf, but for some reason failed to mention Anthony Island. In 1957, in order to give the site some similar measure of legal protection, Anthony Island was designated a Provincial park.

About 1939 five of the house frontal poles were removed from the village and taken to Prince Rupert. These, to our knowledge, are the only poles that left the village up to the time of our arrival. Now they, too, are badly decayed and on the verge of disintegration.

Little remains of the thriving community known to Colnett and Duncan and Gray. The territories of the Kunghit People are more deserted now than they have been for many centuries past. A few fragments of memory, a few bright glimpses in the writings of the past, some old and weathered totem-poles in a storage shed, and the mouldering remnants of once-magnificent carved posts and houses on the site of the old village—these are all that survive of the tribe and village of chiefs Koyah and Ninstints. What was destroyed here was not just a few hundred individual human lives. Human beings must die anyway. It was something even more complex and even more human—a vigorous and functioning society, the product of just as long an evolution as our own, well suited to its environment and vital enough to participate in human cultural achievements not duplicated anywhere else. What was destroyed was one more bright tile in the complicated and wonderful mosaic of man's achievement on earth. Mankind is the loser. We are the losers.

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THE BIRDS AND MAMMALS OF THE CRESTON REGION, BRITISH COLUMBIA: A SUPPLEMENT

By J. A. Munro

INTRODUCTION

In an earlier publication (The Birds and Mammals of the Creston Region, British Columbia: Occasional Papers of the B.C. Prov. Mus., No. 8, 1950, J. A. Munro) it was observed that profound environmental modifications had taken place in the Creston region during the previous twenty years, more particularly in that part known as the Kootenay Flats, and that modifications undoubtedly would continue. Since that was written, additional physical changes in the landscape have been followed by further changes in the biota which are described in succeeding pages. Another purpose of this supplement is to record the occurrence of some bird and mammal species not hitherto reported from the region, to add records of species noted earlier as of rare occurrence or observed in autumn but not in spring, and to amplify earlier observations of these species. These data, which add something to our knowledge of an important inter-mountain flyway, were obtained in the following periods: July 19th to August 16th, 1951; September 1st to 12th, 1952; and May 6th to July 27th, 1956. Unless otherwise stated, all dates are for the year 1956. New records are marked with an asterisk (*).

MODIFICATION OF HABITAT

In 1950 the British Columbia Government ceded 3,200 acres of public land on the Kootenay Flats, including Duck Lake 1 and Duck Lake 2, to a reclamation company, and shortly afterwards these lakes, marshes, brush thickets, and hay lands were converted to agricultural use. As part of this enterprise, a dyke was constructed along the west side of Duck Creek Channel, the south end of Sirdar Lake, the east side of the east channel of the Kootenay River, and the north end of Sirdar Lake. The dykes, together with the precipitous east shore, completely enclosed Sirdar Lake, thus protecting it from the annual spring flood of the Kootenay River that formerly raised the lake-level 12 feet or more. Since this dyking operation was completed, a smaller spring rise in water-level resulting from the inflow of streams tributary to the lake has been more or less controlled by means of a pumping unit at the north end of the lake.

These operations were responsible for a modification of habitat which in turn influenced the local distribution of birds. Thus on the west side of Sirdar Lake, where felled cottonwoods and other debris from dyke construction were piled along the littoral, a luxuriant growth of dogwood, rose, nettle, thistle, and other vegetation quickly became established on this fertile soil, thereby creating a potentially valuable nesting-ground for certain duck species and for small land birds as well. However, this potential has not so far been realized. The practice of spring burning, in the belief it would provide additional grazing for cattle pastured on the lake-shore, would seem to be the most obvious restrictive factor. Also to be considered, in respect of the potential duck population, is the time element. Even had the destruction of nesting cover through burning and through grazing not taken place, insufficient time has passed for a nesting tradition to become established.

The removal of old river-side cottonwoods and the destruction of all thickets and lesser tree growth on the reclaimed lands greatly reduced the amount of nesting habitat available for land birds. So also the cultivation of some 200 acres of sedge meadow, part of a wide peninsula bulging out from the west side of Sirdar Lake and referred to in this paper as West Point, represents reduction in irreplaceable wildlife values.

More favourable for waterfowl is the expansion of marshes along Duck Creek Channel and elsewhere, which has provided waterfowl nesting habitat that formerly did not exist. Although Sirdar Lake is protected from the high spring floods of the Kootenay River that curtailed the growth of emergent vegetation, it is still subject to minor flooding from tributary streams. This does not retard the development of emergent vegetation nor prevent waterfowl occuping it as nesting cover, but it does reduce nesting success through the flooding of nests. The following account of the changing scene on the Duck Creek Channel marshes as the summer advanced confirms the foregoing statement.

On May 15th, when the water was still clear, a few leaves of the pondweed *Potomogeton natans* that had not yet reached the surface was the only evidence of new growth in submerged flora. On that date, cat-tails (*Typha* sp.) measured 2 to 3 feet, round-stem bulrush (*Scirpus acutus*) 18 inches, and sedges (*Carex* sps.) 12 inches. From May 17th, when the tributary streams, swollen and darkened by the first flood, poured into the channel, the water became too turbid to permit observation of submerged aquatics. On May 26th all that could be seen on the surface were a few of the new floating leaves of manna grass (*Glyceria* sp.) and masses of old waterweed (*Anacharis canadensis*) which had become detached from the bottom. Emergent vegetation had made vigorous growth. On May 31st round-stem bulrush and several species of sedges were in flower, while the new spears of cat-tail hid last year's growth. The water in the channel itself was opaque from the silt it carried, yet the water in the marshes, although connected with the channel, continued clear so that submerged vegetation was visible. In many places, surface leaves of *Potomogeton natans,* young plants of duck-potato (*Sagittaria* sp.), water plantain (*Alisma* sp.), and smartweed (*Polygonum amphibium*) were conspicuous. Water buttercup (*Ranunculus* sps.) and bladderwort (*Utricularia* sp.) were in flower; large patches of duckweed (*Lemna minor*) covered much of the surface.

On June 18th cat-tails had attained full growth and some were in flower; the old growth had disintegrated and largely disappeared. Bur-reed (*Sparganium* sp.) had reached a height of 2 or 3 feet above the surface.

All the plants mentioned are elements in the economy of a good waterfowl marsh, and it is clear that the area is in process of becoming such a marsh. More water-birds were attracted to it than to any other part of Sirdar Lake. Red-necked grebe, pied-billed grebe, and American coot arrived in the latter part of May and soon after commenced to nest, as did red-wing blackbird and yellow-headed blackbird. None of these species had nested at Sirdar Lake before dyking operations were completed.

The duck population fluctuated both in numbers and in the species represented. This was due in part to the erratic presence of non-breeding birds and to other factors, the most important being the difference in time of the reproductive cycle climax as between different species of ducks. For example, mallard and Barrow golden-eye broods are usually on the water before blue-winged teal, baldpate, and redhead commence to nest. Thus the last named may or may not be in the marsh at any given time during early summer. Another factor is the natural limits to human powers of observation, which make it improbable that any one census can be wholly accurate. With these limiting factors in mind, it has seemed valuable to include here a series of representative counts, as follows:—

May 31st: Canada goose, 12; mallard, female with brood, 10 post-breeding males; baldpate, 1 pair; blue-winged teal, 1 pair; redhead, 1 pair; ring-necked duck, 1 pair; Barrow golden-eye, 1 female; American merganser, 5; coot, 20; Wilson snipe, 1 pair.

June 4th: Mallard, female with brood, 2 pair, 3 males; blue-winged teal, 1 pair; shoveller, 1 pair; redhead, 2 males, 1 female; Barrow golden-eye, females with broods of 16, 8, 7; American coot, 10 pair; Wilson snipe, 2 pair.

June 7th: Mallard, flock of 28, 2 post-breeding males, 3 females with broods; baldpate, 2 pair; blue-winged teal, 1 male; redhead, 6 males, 4 females; ring-necked duck, 1 pair; American coot, 10 pair; Wilson snipe, 2 pair; sora, 2 pair.

June 18th: Mallard, 51 males, 3 broods; redhead, 1 pair; lesser scaup duck, 1 male; Barrow golden-eye, 3 broods; ruddy duck, 3 males.

June 23rd: Mallard, 6 adult males, 3 females with broods; baldpate, 1 pair, 1 female probably with brood; wood duck, 2 females with broods; blue-winged teal, 1 pair; redhead, 1 pair; lesser scaup duck, 1 male; Barrow golden-eye, female with brood; ruddy duck, 1 pair.

July 7th: Mallard, 20 adult males, 2 in complete eclipse and flightless, 2 females with broods, one of them at flying stage; blue-winged teal, 3 males, 1 female; ruddy duck, 4 males; Barrow golden-eye, female with brood of 8.

By July 1st open ponds were screened by the increased height of horsetail, and visibility in cat-tail marshes was limited to a few feet so that some ducks probably escaped observation. On July 10th it became evident that most of the ducks which earlier were thought to comprise a nesting population—namely, blue-winged teal, baldpate, shoveller, redhead, ring-necked duck, and ruddy duck—had left the marsh. It is believed that the early summer rise in the water-level, and the constant high level maintained, was responsible for this exodus.

The Duck Lake Channel marsh is in process of development and subject to modification from year to year. The height of the early summer rise will determine whether such modification is suitable or unsuitable to the needs of nesting waterfowl, and this will be so unless the depth of water can be artificially manipulated. The marsh contains all the physical elements necessary for a successful nesting-ground, provided the water can be maintained at a favourable level. It has been a matter of observation elsewhere that any marsh subject to a considerable rise and fall of water-level during May and June is not used to any extent by nesting ducks. One outstanding example is the North Arm of Okanagan Lake. This shallow arm, which is subject to a rise and fall of perhaps 5 feet, contains several stretches of bulrush marsh which, in respect of food, shelter, and nesting cover, seems to fulfil all requirements; nevertheless, very few ducks nest there. In contrast is the highly productive Swan Lake, situated about 2 miles to the east and separated from Okanagan Lake by a ridge of hills, in which the early summer rise is negligible. In each the fundamentals are identical, yet one lake is relatively sterile and the other highly productive.

DEVELOPMENT OF AQUATIC VEGETATION IN SIRDAR LAKE

The silt-filled waters from Duck Creek Channel fanned out in a wide belt along the east shore of Sirdar Lake. The west side of the lake remained clear, except for an area in the south-west corner. Turbid water in that section, the result of dyke erosion and seepage, was first observed on June 2nd and continued through the summer, thus precluding a study of the aquatic vegetation. It was noted with interest that, in respect of waterfowl, this section of the lake was the most barren.

It was observed, May 17th, that on various parts of Duck Lake were masses of detached aquatic vegetation composed chiefly of water milfoil, hornwort, and waterweed more or less enveloped by filamentous algæ and debris from horsetail marshes. These masses drifted here and there with the wind, joined together in larger units, some measuring roughly 100 by 40 yards, and again broke up into smaller sections.

While most of the material represented the past year's growth, many individual plants were producing new foliage at the terminal branches. To this food was attracted a flock of some 300 American coots accompanied by a few baldpate. On May 20th a strong northerly wind swept the lake clear of this material, piling it along the south

shore and sinking it in adjacent shallows. Under these improved conditions of visibility it was observed on the following day that approximately 10 acres of lake-bottom, where the water measured 4 to 5 feet in depth, was blanketed by the new growth of waterweed. Other areas carried heavy growths of water milfoil, water buttercup, and hornwort. Masses of these plants continued to drift ashore, piling in windrows against the base of the dyke, should no emergent aquatics have obstructed the drift, and elsewhere forming deep compact masses. Some of these masses were so deep and so firmly anchored by emergent growth that Holboell grebe built their nests on them.

By mid-June the streams tributary to Duck Creek Channel were much reduced in volume and comparatively clear, as was the water of Sirdar Lake, which had been made turbid by this inflow and was now much less so. The water-level, however, continued high—namely, 1,748.28 in June 27th. Thus the inshore waters along the east side of the lake, examined in detail on June 26th, were 6 to 10 feet in depth. This is too great a depth for most submerged aquatics, and no surface efflorescence was visible on this date. In certain shallower areas close inshore, the floating leaves of pondweed (*Potamogeton natans*) had reached the surface, and there was a considerable amount of this pondweed, much of it enveloped by filamentous algæ. The dominant pondweed here in August, 1951, was *P. zosteriformis*. In other similar areas along the east shore, large beds of water buttercup had not yet reached the surface on June 26th. Farther north, in deeper water which still lacked full visibility, no vegetation could be detected. In contrast to these conditions, it was observed on the same day that in the shallow marshes of Duck Creek Channel submerged aquatics were well advanced, and some—for example, water buttercup and bladderwort (*Utricularia* sp.)—had passed the peak of the flowering stage.

In the relatively warm water of Sirdar Lake various aquatic food plants mature and produce seeds earlier than do the same species on Leach Lake and Six Mile Slough, which are flooded with cold mountain water in late May and remain at a relatively low temperature for a month or so after the flood has subsided. Another factor contributing to the later maturing of seeds in the lakes west of the river is that the waters during and after the flood hold a greater amount of silt in suspension than does Sirdar Lake. Thus the factor of water opacity and consequent retarding of photosynthesis may have a direct influence on the distribution of the July and August duck population as between Sirdar Lake and the lakes west of the river.

The abnormally high water of 1956 and the prolonged turbidity which checked the growth of aquatics in the deeper parts of Sirdar Lake does not invalidate the foregoing conclusion. If the maturing season was late in Sirdar Lake, undoubtedly it was later still at Leach Lake and elsewhere west of the river.

A partial clearing of Sirdar Lake waters noted toward the end of June was only temporary. There followed increased seepage from the river, and by mid-July all of the lake except a narrow margin along parts of the south and east shore became muddied to such an extent that visibility was near zero. No vegetation had reached the surface except on the limited areas mentioned.

On July 16th turbidity over the southern part of Sirdar Lake was much reduced and, except for a slight murkiness caused by an efflorescence of blue-green algæ, the water was sufficiently clear to permit identification of submerged flora. The south end of Sirdar Lake, being one of the most important feeding-grounds for waterfowl, was the subject of detailed examination. The principal elements in the bottom vegetation are water milfoil, the pondweeds *Potamogeton richardsonii, P. zosteriformis, P. pectinatus,* waterweed, and *Charaphytes*. There was no surface foliation, the water still being at the 1948 level, approximately. Waterweed and *Charaphytes* carpeted the lake-bottom, in some places to the exclusion of other aquatics; in other places, waterweed was a constituent in a mixed assemblage of pondweeds and water milfoil. At no place did waterweed form dense mats from the bottom to the surface, as it does locally in some other shallower areas.

Changes in conditions on Sirdar Lake can be abrupt and spectacular. Thus on July 20th what had been noted two days earlier as a slight murkiness caused by an efflorescence of blue-green algæ had become, after two more days of hot, still weather, something quite different. In brief, a great proliferation of algæ had taken place and the water was soupy with it. These algal bodies quickly disintegrate and rise to within a millimetre or so of the surface, where they form sheets of mustard-coloured material. This was the situation along the east shore between Duck Creek Channel and Sirdar; sheets of decomposed blue-green algæ, in which were mixed millions of dead midges from a recent hatch, and cotton from the cottonwood trees, coated the floating masses of waterweed. When this material was pushed aside, healthy beds of pondweeds, including *Potamogeton richardsonii, P. friesii, P. pusillus,* and *P. pectinatus,* could be seen. (On June 26th it was noted that only *P. natans* was visible in this area.) Also on July 20th water milfoil had reached the surface in this section of the lake, and the upright flowering stems served as anchorage for the drifting debris of waterweed; at a distance this combination of flowering water milfoil and waterweed branches had the appearance of brown-tinged floating islands.

The condition described above is a repetition of what took place in 1948, when silt-charged water from the flooded reclamation kept Sirdar Lake at a high level all summer. Possibly the condition is a normal midsummer phenomenon.

There seems no reason to doubt that the feeding-ground on the southern portion of Sirdar Lake will still attract large numbers of pond ducks at the times when food is accessible to them—namely, at levels between 1,744 and 1,745. The apprehension expressed in earlier reports concerning the replacement of pondweeds by waterweed apparently was not well founded, at least not in respect to this particular area of Sirdar Lake. Rather, it seems to me, an equilibrium of species is being re-established. Also there is evidence from other British Columbia lakes that waterweed, after invading new territory that is suitable to it, may increase rapidly to a peak and later decline to reasonable proportions.

In other parts of Sirdar Lake the process of invasion and retreat is at an earlier stage, and waterweed is still alarmingly abundant. On July 16th most of the lake's surface was patterned by detached terminal branches 4 to 6 inches in length that drifted with the wind. Whether or not these detached branches are viable and capable of producing new plants, I do not know.

So far as I am aware, the causes of the spectacular invasions of waterweed are not known, but by analogy an explanation as to what took place at Duck Lake may be suggested. It is this: under primitive conditions an equilibrium between plant species and between plants and waterfowl was maintained; this seemed to be the situation in 1947 and 1948. After Sirdar Lake was dyked and an increased waterfowl population crowded into a feeding area which had been decreased by one-third, the consumption of desirable food plants was in excess of the amount necessary to ensure successful competition with the more adaptable waterweed. Thus a kind of botanical Gresham's law began to operate. Much the same sort of thing happened in our dry-belt cattle ranges when overgrazing extirpated bunch-grass and the undesirable *Bromus tectorum* took over.

Charaphytes (Chara and Nitella)

These important algæ, which at times form the chief constituent in the diet of redhead, canvas-back, scaup, and ruddy duck, are still in good supply, although there is evidence of competition with waterweed.

Water Smartweed

There has been an increase in the amount of two species—*Polygonum amphibium* and *P. muhlenbergii.* The first is abundant in the Duck Creek Channel marsh and in the borrow-pit along the south dyke, while both species have spread over much of the flooded sedges on West Point. These species were in flower on July 20th.

EMERGENT VEGETATION

The growth rate of cat-tail in Sirdar Lake and Duck Creek Channel was checked with the growth rate on Boulder Creek Slough, an area subject to flooding. Briefly the stage of growth reached in Duck Creek Channel by May 20th was not attained in Boulder Creek Slough until about July 13th. So also round-stem bulrush was mature and in flower in Duck Creek Channel by mid-June, while at Mud Lake, so late as July 16th, no new growth had appeared.

In other words, since the Sirdar Lake waters were dyked, the maturing of cat-tail, and other emergent species also, has been advanced approximately six weeks and is available as protective cover during the nesting season, where formerly it was not.

THE BIRDS

RED-NECKED GREBE. *Podiceps grisegena* (Boddaert).

It has been noted that after Sirdar Lake was dyked and the water-level more or less stabilized, the marshes on Duck Creek Channel became attractive to waterfowl; seven pairs of red-necked grebe were conspicuous members of this community. On May 31st a nest containing two eggs was examined, and four others were found later. These were floating nests of the usual type, made of rotted vegetation to which a few green rushes had been added. All were in open stands of round-stem bulrush.

Another colony of eight pairs nested near by along the south shore of Sirdar Lake. Four nests were on floating masses of aquatics which had drifted close to shore and become anchored there. The nest material, consisting chiefly of *Anacharis, Ranunculus, Myriophyllum,* and *Utricularia,* was taken from the mass on which the nests rested. There was no concealing cover of emergent aquatics as in the first colony, but when the eggs were covered, as most often was so, the nests were inconspicuous. Three other nests were inside a fringe of flooded willows; another was in a hollow on a muskrat house made almost entirely of water-moss and submerged to a depth at which only a portion of its upper surface appeared above the water.

On June 18th eight nests contained eggs as follows: 2, 3, 4, 4, 5, 5, 5, 7. Behaviour of the nesting birds varied with the individual. Occasionally one of a pair was seen to slip off the nest and submerge at its edge in one concerted movement; in one instance a pair, in another a single parent, swam back and forth on open water close to the nest. More often neither parent was seen near the nest, and in these the eggs invariably were covered.

By July 14th all but two pairs had left the marsh; the eggs in one nest had been eaten, presumably by crows; two nests, each with five eggs, were deserted; in at least three others the eggs had hatched and the young had been led to the open lake; an instance of this movement was observed on July 21st when a pair swimming side by side and 2 to 3 feet apart moved out from the shore, one carrying two newly hatched young on its back.

WESTERN GREBE. *Æchmophorus occidentalis* (Lawrence).

On May 12th three flocks containing respectively sixty-five, fifty, and thirty-five individuals were counted on Sirdar Lake; on May 15th a flock of fifteen and on May 18th a flock of twenty were observed. None was seen subsequently.

PIED-BILLED GREBE. *Podilymbus podiceps* (Linnæus).

In early May, 1956, pied-billed grebe were heard calling in the Duck Creek Channel marshes, and later two nests, each with seven eggs, were examined—one on June 4th, the other on June 18th.

WHISTLING SWAN. *Olor columbianus* (Ord).

The 1956 spring migration of whistling swan was unusually heavy, so much so as to cause local comment. It was said that for a week large numbers of swans frequented fields on the Kootenay Flats in company with Canada geese and pond ducks. Mr. Glen Smith made the following counts: March 23rd, 390; April 14th, 2,005. Some may have remained later than this, for on May 6th I saw four on the Kootenay Flats near Bonners Ferry, Idaho.

GREATER CANADA GOOSE. *Branta canadensis* (Linnæus).

It was reported that two pairs of Canada geese nested on top of muskrat houses in the Boulder Creek Slough, a short distance south of Kootenay Lake. The eggs were hatched and the broods led elsewhere before I reached Creston on May 6th. Mr. Ron MacKay told me of finding two nests with eggs at the same place on April 27th, 1955.

A pair with a brood of six was seen daily on Duck Creek Channel May 14th to May 18th, 1956; this was the only brood recorded.

Non-breeding yearlings appear to be using Sirdar Lake more commonly than formerly. On May 21st a flock of twenty-five, accompanied by two lesser snow geese, grazed and rested on the outer margin of West Point. The Canada geese were relatively fearless and flew only a short distance, then alighted on the water, each time I approached them in a canoe. The snow geese were more wary and flew out of sight when disturbed. Another flock of Canada geese, numbering twelve, was flushed from Duck Creek Channel on May 31st and on earlier dates flocks were heard or seen in flight over Sirdar Lake. None was recorded during June and July.

LESSER SNOW GOOSE. *Chen hyperborea* (Pallas).

On May 16th one was flushed from the river just north of the cross-dyke; a second observation of two birds with a flock of Canada geese has been noted. A spring migration of some numbers may have passed through earlier, as on May 6th a flock of fifty was observed on the Kootenay Flats a mile or so south of Bonners Ferry, Idaho.

MALLARD. *Anas platyrhynchos* Linnæus.

The nesting population of Sirdar Lake and adjacent territory was estimated to be thirty-five pairs. Of these, twelve pairs were on Duck Creek Channel, ten pairs along the river between Sirdar Lake and Kootenay Lake, and eleven pairs on Duck Creek proper. These figures were arrived at by counting mated pairs, males on territories, and early units of post-breeding males.

Although there are now suitable nesting areas along the Sirdar Lake littoral, mallards still seem to prefer sites some distance back from the water. This may be due in part to the degeneration of the littoral, because of fire and grazing referred to earlier, which counteracted the benefits expected from dyking and partial water-level stability.

Judging by the date the first brood appeared—namely, May 17th—egg-laying commenced about the first week of April and continued until May 15th or later; a nest with eleven eggs was found on May 31st. The long spread of the nesting period was indicated, so late as June 11th, by the continued appearance on suitable nesting areas of females with broods, paired birds, single males on territories, and small units of post-breeding males. The latest record of a male exhibiting territorial behaviour was June 11th.

The behaviour of females with broods varied considerably, as the following four examples illustrate. In one instance a brood rushed out from under shore cover to swim far out on the lake while the female remained hidden. This behaviour was enacted on two successive days by the same female. In marked contrast, a female with brood concealed in a cat-tail patch flapped over the water making a complete circle of the cat-tails, flew ahead of the canoe when I left the cat-tail patch and alighted 100 yards away, there to demonstrate as before. She returned to the cat-tails when I did, and again circled

them in the same manner. Meanwhile the young remained concealed, and the only two seen were in the act of diving. This behaviour was again witnessed at the same place two days later. A female in Duck Creek Channel, with neck outstretched on the water and body half submerged, swam as close to shore as possible under the concealing vegetation on the bank while her brood followed in single file. Another example concerns a female on the same channel that flew ahead of the canoe for 25 yards or so, then dropped to the water to flap across the channel from one side to the other. This action was repeated four times as the canoe advanced.

The first evidence of flocking of post-breeding males was observed on an island in Duck Creek Channel, May 14th, when four males loafed and then took flight as a unit. The number increased to five on the following day. On June 7th a flock of twenty-eight and on June 18th a total of fifty-one in Duck Creek Channel marsh illustrate the rate at which these congregations assembled. By mid-June males had begun to moult contour feathers, including the chestnut feathers of the breast, and these were observed scattered on various loafing-places. The first shed primary and secondary wing feathers were found on June 18th. By this time it could be seen that some were well advanced into eclipse, but none had reached the flightless stage. On July 7th two out of twenty adult males observed were in full eclipse and completely flightless. These two together flounced out of a flooded willow thicket and beat their way across the surface of the open lake. On this day also the first flying young were recorded.

At West Point on June 27th a flock of ninety, mostly post-breeding males, was counted. After this the numbers declined sharply, a condition attributed in part to the protracted high water, which reduced the availability of food and loafing-places, and in part to the fact that as the days passed more and more males reached the flightless stage and remained in hiding. To what region those seeking new feeding-grounds retreated is not known. Certainly it was not to any other waters on the Canadian side of the Kootenay Flats, where conditions were even less suitable than was Sirdar Lake. More likely the flooded farm lands on the Idaho side attracted them, and in this connection it is of interest to recall conditions in the summer of 1948. In that year most of the reclaimed lands on both sides of the International Boundary were flooded, and extensive flood ponds persisted throughout the summer, while Duck Lake remained at a high level throughout August. Then, as now, the depth was too great for mallards to feed, and the entire population concentrated on the flood ponds.

On July 23rd the number of mallards had again increased and the population concentrated in the flooded sedges of West Point. A total of eighty-two were widely scattered over the marsh; adult males usually were solitary, some flightless, others able to fly only short distances. The population was composed of the following: Adult males, 30; post-breeding females, 6; females with broods, 1 with 5 flying young, 1 with 3 small young; flying young in flocks, 36. There is little food in the sedge marsh when it is flooded, except what insects and crustaceans have come in with the high water. The only abundant food plant at that time is water smartweed, which in July was yet only in bloom. Undoubtedly the attraction is the concealing cover provided by the sedges.

GADWALL. *Anas strepera* Linnæus.

Two males were associated with mallard and baldpate in flooded sedges at West Point on June 27th; this was the sole record.

BALDPATE. *Mareca americana* (Gmelin).

Until May 18th small flocks, none numbering more than eighteen, were seen frequently in association with coots at the north and south ends of Sirdar Lake. The largest count was thirty-eight on May 16th. During this time until early June, mated pairs were recorded at the north end of the lake and in Duck Creek Channel. On one occasion two males and a female were seen in display flight, and on June 6th in the Duck Creek

Channel marsh the male of a pair was displaying while the two birds stood close together in an area of flooded sedges. This behaviour—the close companionship between pairs, the display flight, and courtship display on the ground—was accepted as evidence that the birds were about to nest.

On July 9th a total of sixty, mostly adult males assuming eclipse, accompanied a flock of redhead on Sirdar Lake close to West Point. On July 16th a flock of similar size, thought to be the same, was flushed from flooded sedges on West Point.

PINTAIL. *Anas acuta* Linnæus.

A single male in Duck Creek Channel on May 11th, a pair on Sirdar Lake on May 16th, and a single adult male in eclipse flushed from a flood pond inside the south dyke on July 23rd, are the only records in 1956.

GREEN-WINGED TEAL. *Anas carolinensis* Gmelin.

On May 12th eleven were counted at the north end of Duck Lake; two were definitely paired. This pair, or another, was seen at the same place on May 17th.

BLUE-WINGED TEAL. *Anas discors* Linnæus.

On May 9th a single male was observed with other pond ducks at West Point. A few others, single males and pairs, were recorded during the remainder of the month at various places on Duck Lake. On May 31st a pair was first noticed on the Duck Creek Channel marshes, and for the week following, the pair, and later only the male, frequently were seen there. During June and the first half of July vagrant males visited the marsh, the largest numbers recorded in one day being a flock of six on July 12th. This flock, or another of the same size, was again seen on July 23rd. On June 27th a female with brood of eight young about 1 week old was seen at West Point.

CINNAMON TEAL. *Anas cyanoptera* Vieillot.

A single male flying across Duck Creek marsh on July 14th is the only record.

SHOVELLER. *Spatula clypeata* (Linnæus).

Recorded as follows: May 9th, a flock numbering nineteen, of which fifteen were males; May 12th, a flock of eight; May 21st, a single male with flock of diving ducks; June 1st, a mated pair in Duck Creek Channel.

WOOD DUCK. *Aix sponsa* (Linnæus).

Considered less common than in the period 1947–49. One reason for this may be the present scarcity of nesting-sites. Most of the cottonwoods along the east side of the river, some of which contained cavities suitable for nesting, were felled during dyke construction, as has been stated. There is also the probability that some of the sites still available had been pre-empted by the earlier nesting Barrow golden-eye. Three male and two female wood ducks were seen in the river near the pumping-station on May 16th; an adult male was recorded May 17th on Duck Creek Channel and a pair at the same place the following day. Later observations are of females with small young observed several times in Duck Creek marsh and on the west and north shores of Sirdar Lake between June 23rd and 27th. For the most part, young wood ducks remained concealed in flooded brush while the females flapped over the open water in the conventional pattern of defence behaviour. On only two occasions was it possible to count full broods which numbered eight and eight respectively. The adult population frequenting Sirdar Lake was estimated to be eight pairs.

REDHEAD. *Aythya americana* (Eyton).

On May 21st six redhead associating in pairs accompanied a flock of seven lesser scaup duck and ten ruddy duck on Sirdar Lake. None was seen subsequently until May 31st, when a pair appeared on Duck Creek Channel; on the following day a second male

joined them. From that date until June 18th redhead frequented the marsh, the largest number seen in one day being six males and four females on June 7th. As these ducks engaged in display flights and in other ways acted as though paired, it was believed they were about to nest. That none apparently did so may have been due to a continued rise in the water-level of the marsh.

On July 9th a flock estimated to number eighty, the majority of them males, appeared on the lake off West Point. Both the redheads and a number of baldpates that accompanied them were extremely nervous and took flight while I was yet 150 yards or more from them. Possibly the redheads may have comprised an early migration of post-breeding birds en route to one of the southern marshes which would afford security during the eclipse period. However this may be, the large flock was not seen again, and no redheads were recorded until July 23rd, when ten males accompanied by two baldpate flew south past West Point and two females were flushed from the point itself.

Ring-necked Duck. *Aythya collaris* (Donovan).

A mated pair flushed from the Duck Creek Channel marsh each time the place was visited during the period May 31st to June 10th; shortly afterwards they left the lake and did not return.

Canvas-back. *Aythya valisineria* (Wilson).

The following are counts of canvas-back on Sirdar Lake during the latter part of the spring migration: May 7th, 200; May 8th, 100; May 9th, 50; May 12th, none; May 15th, 1. Probably these represented the last of a much larger number which had passed through earlier.

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

On May 7th the population of migrating lesser scaup duck on Sirdar Lake numbered 320. The following table shows the fluctuation in numbers that took place during the subsequent two weeks and indicates the approximate time of departure:—

May 7th	320	May 15th	300
May 8th	230	May 18th	246
May 9th	495	May 21st	7
May 12th	300		

The population comprised two age-groups—namely, adults and yearlings, the adult males being distinguished from the yearling males, which were in the majority, by the greater amount of white on the flanks.

A single adult male seen frequently in the same place on Duck Creek Channel between June 19th and 27th evidently was mated, and this male or another accompanied a flock of redhead and baldpate off West Point on July 9th. On July 14th a female, presumably the mate of the male referred to, led her brood of eight newly hatched young down the channel and into the lake. Incidentally this constitutes the most southerly nesting record of the lesser scaup duck in British Columbia.

Common Goldeneye. *Bucephala clangula* (Linnæus).

The spring migration of this species is mostly through April, and so was not witnessed by me, the only record being that of an adult male on May 25th. It was accompanied by a yearling female Barrow goldeneye, and the two ducks swam side by side on the river within about 10 yards of where I stood on the dyke. Under these favourable conditions the characteristic bill shape of the *islandica* female, as well as the dark bill colour of immaturity, was plainly visible.

Barrow Goldeneye. *Bucephala islandica* (Gmelin).

Observations in early May showed that a considerable increase in the nesting population had taken place since 1949, when only one pair was recorded; for example, at the

north end of Sirdar Lake on May 8th, when seven solitary males and two mated pairs were in occupation of nesting territories. It seemed evident that the nesting-trees were in the extensive cottonwood stand just across the river only a short distance from where the males were seen. On May 6th twelve mated pairs, several of them courting, were counted along the west side of the lake. The increase may be due to the more favourable food conditions existing since the lake was protected from flooding.

A few mated pairs were recorded at various places until May 17th; no males were seen during the following week, and it seemed clear that all had left, the egg-laying period being over and females incubating. During this time it was common to see females flying from their nests to alight on Duck Creek Channel and to feed there for half an hour or so.

Females which first appeared with broods on the channel soon afterwards led them to Sirdar Lake, which seems to be the preferred nursery. This was so in every instance, save that of a female with three young and a female with seven young; the first remained on the channel until June 26th, and the second until July 16th. Young Barrow goldeneye require resting-places at the water's edge, such as stranded logs, old fallen trees extending into the water, flat rocks, and other such sites. Sirdar Lake provides many resting-places of this kind, whereas Duck Creek Channel has few, and this may be one reason for the preference.

In making brood counts over an extended period in the same area, the problem of avoiding repetition must be met and, in spite of every precaution, there probably always is a margin of error. In this instance the error is believed to be slight.

Brood counts:—

Duck Creek Channel—
- May 28th: Female with brood of 8.
- June 4th: Females with broods of 16, 7.
- June 6th: Female with brood of 3.
- June 7th: Female with brood of 9.
- June 18th: Females with broods of 2, 9, 11.
- June 28th: Females with broods of 6, 1.

South shore of Sirdar Lake, June 11th: Females with broods of 12, 10, 8, 8, 6, 4, 3.

East shore of Sirdar Lake, June 26th: Females with broods of 12, 6, 36.

West shore of Sirdar Lake—
- June 27th: Females with broods of 1, 2, 5, 5, 6, 6, 7, 4.
- June 16th: Female with brood of 3.

North shore of Sirdar Lake, June 27th: Female with brood of 8.

Leach Lake and Mud Lake, July 16th: Females with broods of 2, 3, 3, 5.

At Sirdar Lake as elsewhere the raiding of broods by other females to secure additional young is a common occurrence. Thus on June 22nd the female with three young that continued to frequent Duck Creek Channel was attacked by another female appearing suddenly in swift flight. She alighted a few yards behind the female that was leading her brood up the channel close to the bank, and, half submerged, rushed over the water and seized her by the feathers on the back of the head. There followed a confused struggle, sometimes on, sometimes below the surface, that was difficult to follow in the smother of spray raised by the contenders. This lasted for several minutes. Meanwhile the young dived, emerged, then dived again, and in this manner moved quickly away from the struggling females. Finally the females disengaged, and one of them, presumably the mother, raced after the young with the second female in pursuit. The young attached themselves to the first female, and the family moved down-stream in the direction from which it had come. The second female flew up-stream several hundred yards and joined two other female Barrow goldeneye. By their dark, unfaded coloration, all three appeared to be adults, possibly representing individuals which had not nested successfully, or which had nested and subsequently lost their broods. That the attempted raiding

described above is often successful is proved by the brood counts that range from a single young to thirty-six.

Three dead downy young were found at different times, the cause of death in each instance being a head wound. Whether or not these casualties were suffered during struggles between females was not determined.

The intense response of female Barrow goldeneye to the presence of young ducks, a trait exhibited by both adults and yearlings, is not confined to the young of their own species. On June 27th a brood of fifteen mallards about a month old was accompanied by a female of this species and a female Barrow goldeneye. When first seen the group was swimming in a thin, marginal growth of cat-tails which partially screened it; when disturbed by my approach, all broke through the cover to the open lake, and there both females performed the various actions of defence behaviour peculiar to each, the Barrow goldeneye exhibiting quite as much concern as did the mallard.

Instances of a yearling female companioning an adult female and brood, frequently noted in the Cariboo Parklands, was not seen here. Indeed, excepting the observation of a single yearling female on May 21st and 25th, no yearlings of either sex were recorded. It might be concluded that, in the spring, members of this age-group proceeded farther north and summered with the bulk of the adult female population. The yearling males, or most of them, are believed to accompany post-breeding males when they leave the nesting-grounds for destinations that are at present unknown.

The trachea and syrinx of a downy about 10 days old, collected on June 11th, contained three small leeches, the largest measuring 35 mm. The presence of leeches in ducks' nostrils is not unusual; to find them located in the windpipe is new in my experience.

BUFFLEHEAD. *Bucephala albeola* (Linnæus).

If there had been a bufflehead migration through the Kootenay Flats in 1956, the bulk of it had passed through before my arrival. Two, probably the same birds, were recorded on each of the following days: May 7th, 8th, and 9th. Subsequently, counts were eight on May 12th, a flock of twenty on May 15th, and one on May 16th.

*WHITE-WINGED SCOTER. *Melanitta deglandi* (Bonaparte).

The sole record is that of a female seen on Sirdar Lake on May 21st accompanied by a yearling Barrow goldeneye. These two ducks swam close together and flew off in company when flushed.

RUDDY DUCK. *Oxyura jamaicensis* (Gmelin).

On May 21st, near West Point, seven male and three female ruddy ducks accompanied a small flock of redhead and lesser scaup duck. Later one or more mated pairs, single males, or associations of three to four males were seen in the Duck Creek Channel marsh. It was suspected that at least one pair attempted to nest and that the nest had been flooded. The last observation was of four males on July 6th.

AMERICAN MERGANSER. *Mergus merganser* Linnæus.

What appeared to be a mated pair was recorded on Sirdar Lake on May 8th. On May 16th a flock of five adult males and two females, or yearling males, flew in a line along the north shore and alighted on the water. What probably was the same flock was seen subsequently near West Point on May 21st, when it contained eight adult males and one female, and on Duck Creek Channel on May 31st, when the flock was reduced to five adult males. The next record was of three adult males in eclipse that flew past my canoe on July 9th. An eclipse and flightless male flapped over almost the full length of Sirdar Lake on July 16th, ahead of, and continually increasing the distance from, a motorboat pursuing it at the rate of 4 miles per hour.

*Red-breasted Merganser. *Mergus serrator* Linnæus.

On July 16th three female red-breasted mergansers, flying south over Sirdar Lake, passed me within 60 yards. Again on July 23rd two females were seen near the same place. These are the first local records of which I have knowledge.

Turkey Vulture. *Cathartes aura* (Linnæus).

Additional records: One in flight, July 24th, 1951, and two seen standing in a dead cottonwood beside Sirdar Lake on May 9th.

Red-tailed Hawk. *Buteo jamaicensis* (Gmelin).

On May 6th I obtained several close views of an immature red-tailed hawk in faded plumage as it flew from tree to tree alongside the roadway that skirts the Kootenay Flats north of Creston. Once while it perched 20 feet above the ground in a cottonwood with its back toward me, the head was swivelled around without any body movement, and in this odd posture the bird stared at me for half a minute or so. This bird, or one like it, was seen subsequently on two occasions during the month of June.

There is some local enthusiasm for killing protected hawks, and it seems likely that a former nesting population has been destroyed, as have bald eagles and ospreys. At any rate, no evidence of nesting was obtained. The only adult seen was soaring over the Duck Creek marsh on June 4th.

Bald Eagle. *Haliæetus leucocephalus* (Linnæus).

An adult standing on the shore of West Point on May 9th was the sole record for 1956. The eyrie in a cottonwood beside the river opposite Sirdar which had been occupied for many years was vacant. The present scarcity may be due to the persecution suffered in spring and early summer; one local hunter boasted of having killed seventeen bald eagles.

Virginia Rail. *Rallus limicola* Vieillot.

One was flushed several times from marshy ground at Duck Creek Channel, September 5th, 1952.

American Coot. *Fulica americana* Gmelin.

A total of 300 coots, assembled in three flocks, each containing approximately 100 birds, was counted on Sirdar Lake, May 8th, and again on May 18th. Usually the flocks kept well out on the lake; when studied through a 20-power telescope, it could be seen that the birds were engaged in feeding and in courtship display. In addition to the flocks, which undoubtedly represented migrants, was a small number, approximately twenty, that associated in pairs and kept close to shore. These were thought to be a potential nesting population.

On May 26th six coots appeared in the marshes of Duck Creek Channel, and two days later the number had increased to eighteen or twenty. Nest-building probably commenced soon afterwards, for on June 4th two unfinished nests and one containing three eggs were found. On June 28th seven nests containing eggs were examined, the two largest clutches numbering eleven and twelve respectively.

The common type of nest was a slightly concave platform of round-stem bulrush usually situated in open stands of this rush and partly concealed by it. There were exceptions to this, one such being deeply cupped and with a firm lining of both green and dry aquatic grass. Another, composed entirely of fresh, green round-stem bulrush, which made it vividly conspicuous, was built on the top of an abandoned Holboell grebe nest floating in a narrow channel of open water. A third, built of the usual dry, round-stem bulrush but well lined with coarse dry grass, was located in an open situation. When first seen, on June 4th, it was conspicuous by reason of an encircling fringe of manna grass, then about 6 inches high. On June 28th the grass had blossomed and

reached a height of 4 feet, thus completely shielding the nest, then containing twelve eggs. Another nest, with six eggs on July 12th, and also made of dry manna grass, was less effectively concealed by the surrounding green leaves of the plant. The nest was deserted when the eggs were about half incubated.

On June 28th it was noted that all but one of the males had left the colony. The previous day a flock of eight was counted at West Point, and it was concluded these were the missing males, as none was seen elsewhere during a complete circuit of the lake. The males remained in the general vicinity of West Point and were still there as late as July 18th.

The first downy young, a single bird in an otherwise empty nest, was recorded on July 6th.

SEMIPALMATED PLOVER. *Charadrius semipalmatus* Bonaparte.

Additional records: West Point, August 2nd, 1951, 2; August 4th, 1951, 1 collected.

GREATER YELLOWLEGS. *Totanus melanoleucus* (Gmelin).

One was seen on West Point on May 16th. This is the only spring record obtained.

DOWITCHER. *Limnodromus griseus* (Gmelin).

Additional observations: Sirdar Lake, July 21st and 23rd, 1951, 11 adults; August 3rd, 1951, 6 adults, 1 young. Specimen records: An adult male and an adult female collected at Sirdar Lake, July 21st, 1951, are identified as *L.g. scolopaceus* (Say). An immature female, collected at Sirdar Lake, August 3rd, 1951, is identified as *L.g. hendersoni* Rowan.

SANDERLING. *Crocethia alba* (Pallas).

On May 21st a flock of sanderlings, estimated to number 150, was watched for several minutes through 7 x 50 binoculars as it flew along the shore of West Point. The flock appeared to be assembled in five or six more or less parallel lines one above the other, each line containing thirty to forty birds. This alignment was maintained as the flock continued along the contour of the shore and finally disappeared in the distance. Evidently these birds were in transit, as none was recorded later.

*RED PHALAROPE. *Phalaropus fulicarius* (Linnæus).

An adult female moulting to winter plumage taken at Sirdar Lake, August 1st, 1951, is the only record.

WILSON PHALAROPE. *Steganopus tricolor* Vieillot.

Additional records: Sirdar Lake, July 31st, 1951, 1; August 3rd, 1951, 4; June 8th, 1956, 1 collected.

HERRING GULL. *Larus argentatus* Pontoppidan.

For most of May and June an abundant supply of food in the form of dead suckers, squawfish, and other fishes, which had passed through the pumping-station and stranded alongside the dyke, was available, but this food attracted few gulls. On May 12th three adults and another in the plumage of the third year were seen on the shore of the river, but these left shortly afterwards and, except for one second-year bird, noted once, and a third-year bird, first seen on June 11th and thereafter numerous times, none was noted until June 27th, when the population was increased by the arrival of twenty-five adults.

This non-breeding summer population was larger than any seen in former years. During July it was usual to see twenty or more, all adults or third-year birds, perched on a line of fence-posts which crossed the flooded sedges on West Point. Here they remained for hours at a time, taking flight only when disturbed. All seemed to be in full moult,

and an increasing number of shed feathers accumulated on the water below the fence-posts and in the adjacent marsh.

*Franklin Gull. *Larus pipixcan* Wagler.

A juvenal female collected at Sirdar Lake, July 31st, 1951, is the only record.

Bonaparte Gull. *Larus philadelphia* Ord.

Not recorded in spring until May 12th, 1956, when three flocks totalling fifty, some in flight, others on the water, were observed on Sirdar Lake.

Mourning Dove. *Zenaidura macroura* (Linnæus).

A notable increase in the number of mourning doves was noted in 1956, and as individuals were met with daily from May to July, it can be assumed these represented a nesting population.

*Black Swift. *Cypseloides niger borealis* (Kennerly).

On June 27th three black swifts in company with a larger number of Vaux swifts were seen circling over Sirdar Lake. As usually is the case when black swifts are recorded, the day was overcast and stormy. Weather conditions on July 7th were similar, and again two black swifts were seen near the same place.

Downy Woodpecker. *Dendrocopos pubescens* (Linnæus).

On June 22nd I watched a male carrying food to young in a nest about 15 feet above the ground near the top of a leaning willow stub 6 inches in diameter. Several times a single young thrust head and neck through the nest opening and cried to be fed. The female parent was not seen.

Lewis Woodpecker. *Asyndesmus lewis* (Gray).

In 1956 Lewis woodpeckers were noted as much more common than formerly; several pairs nested in cottonwoods along the Kootenay River, and others were seen elsewhere in the region. The brood patch on an adult male, killed on the highway by a car July 5th, was thickened and conspicuous, suggesting that the bird had been engaged in constant incubation for some time.

Yellow-bellied Sapsucker. *Sphyrapicus varius* (Linnæus).

An immature male moulting from juvenal plumage, collected on July 19th, is distinct from any other specimen I have examined in having a bronze-coloured rather than a reddish crown patch in which one red feather is conspicuous. Matched with Ridgeway's Colour Standards and Nomenclature, the shade of the crown patch is nearest to medal bronze.

Black-billed Magpie. *Pica pica* (Linnæus).

One was seen in flight near Wynndel on May 12th, this being the first occurrence in the summer to be recorded.

Alpine Pipit. *Anthus spinoletta* (Linnæus).

Not recorded in spring until 1956, when, on May 12th, a flock of fifty, more or less, was watched foraging among drift logs and other debris on the shore of Sirdar Lake.

*European Starling. *Sturnus vulgaris* Linnæus.

According to local reports, the first starlings appeared at Creston in 1955. I saw them frequently in the summer of 1956 within the Creston village limits and on the Kootenay Flats. A nest in a 40-foot cottonwood stub near the shore of Duck Creek Channel contained young on May 28th, and I watched the female parent carrying insects to them, the only food item identified being a medium-sized dragonfly. On June 4th and

again on June 7th a flock of thirty, more or less, was seen flying from place to place in the near-by marsh, and on June 11th a full-grown juvenal male was collected there.

MYRTLE WARBLER. *Dendroica coronata* (Linnæus).

Additional records: Two adults in first-winter plumage were collected and other myrtle warblers identified on September 5th, 1952.

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

Early in May five pairs of yellow-headed blackbirds took possession of a small cat-tail and willow association on Duck Creek Channel which already was in possession of a small colony of redwinged blackbirds. There was dual occupation for a week or so, then the redwings retreated, one pair abandoning a nest with two eggs. As the yellow-headed blackbird had formerly been regarded as a migrant in the Creston region, the history of this nesting, possibly the first, was kept under close observation. On May 28th each of five nests, one of which was firmly attached to a willow and the others built in cat-tails, was empty. When the four nests in process of construction were examined it was observed that all the material used was wet and pliable and thus easily woven around the standing cat-tails of the previous year's growth. When these sodden structures dried out, they became the handsome, compact basket nests characteristic of the species. The material used in weaving the nest in the willow was unusual, as was the site—namely, sedge leaves in the main portion, a fine rush, and pieces of *Equisetum* in the lining.

By June 10th the picture was quite different. During the preceding two weeks additional nests had been built in the cat-tails, while at the same time a rise of 2 feet in the water-level, at an average daily rate of 1 inch, half submerged some nests and came to within an inch or so of the bottom of others. Each of four nests, partly submerged, contained four eggs; one contained two eggs, another three eggs, and two others just above the water were empty. Another two nests were in process of construction. The nest in the willow, still 2 feet above the water, held three eggs; the female was incubating, with the male in close attendance.

The colony still consisted of five pairs, but the four pairs in the cat-tails had built, or were building, a total of ten nests. It was concluded that as the water slowly rose and the nests became wet and cold, additional ones were made even though the original nests held eggs.

Territorial behaviour as noted here is more pronounced in the males than in the females, thus each time the colony was visited in the early part of the season the males always were in evidence, and usually vocal, near the nests, whereas the females might or might not be present. When I approached the cat-tails, such females as might be present left at once, but the males remained, each close to his nest.

By June 18th the water had risen still higher, and the colony was deserted; subsequently, only two unmated males frequented the marshes in the vicinity. The balance of the population moved to a cat-tail marsh at the north end of the lake, some 4 miles distant, and again built nests. Whether or not this attempt succeeded was not determined.

A male collected on June 4th is in the post-juvenal plumage held over from the previous year. The feathers are worn and faded, the only indication of moult being several new feathers on the dorsal surface, conspicuously black in the prevailing brown plumage.

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

An example of territorial competition between this species and the last is referred to above. There is other evidence: five or six pairs of redwing blackbirds occupied a small cat-tail marsh, some 300 yards distant from the one previously described, and two nests constructed there became flooded. At the same time two male yellow-headed blackbirds entered the marsh and pre-empted territories, whereat all the redwing blackbirds,

save one pair, left. This pair built a nest in the new growth of cat-tails, the old growth in which the first nests had been built having disintegrated. On June 18th the nest was 6 inches above the water and held two eggs; both parents were present. In the meantime the two yellow-headed blackbirds had departed, and so, shortly afterwards, as the water continued to rise, did the remaining pair of redwing blackbirds.

On June 11th a flock of twelve adult males was observed foraging in a willow thicket not far from the abandoned nesting colonies; no females accompanied them. Later on approximately the same number of pairs nested in two cat-tail marshes on the west side, and in another marsh at the north end, of Sirdar Lake.

Bullock Oriole. *Icterus bullockii* (Swainson).

On June 7th, in the cottonwoods at the outlet of Drywash Creek, a young male in immature plumage whistled continually, flying from one tree to another, and several days later was seen on the ground gathering nesting material. During July, at the same place, an adult male was observed a number of times; probably the first, and certainly the second, male nested in these cottonwoods.

Black-headed Grosbeak. *Pheucticus malanocephalus* (Swainson).

In 1956 the black-headed grosbeak seemed more common than in former years. Whether this was due to a concentration of population on the reduced amount of nesting habitat still available after 3,200 acres had been reclaimed, or whether it was due to an actual increase, was a matter for speculation. From mid-May to as late as July 4th, males were heard in full song and usually conspicuous at or near the top of one of the tallest trees in their nesting territories. It is a clear liquid song, with suggestions of the songs of robin and western tanager.

A fledgling about one-third grown, collected in an aspen thicket at the outlet of Drywash Creek, July 21st, constitutes the first definite breeding record of *P.m. melanocephalus* for British Columbia.

Evening Grosbeak. *Hesperiphona vespertina* (Cooper).

On May 22nd a flock of six was seen in a Douglas fir on Sutcliffe Point. This is the first spring record.

Lincoln Sparrow. *Melospiza lincolni* (Audubon).

As the only previous record is of a single individual observed August 21st, 1945, it is of interest to report a sight observation of two at Sirdar Lake on May 25th.

THE MAMMALS

*American Badger. *Taxidea taxus* (Schreber).

It is reported by Game Warden B. Rauch, of Creston, that on May 25th he was asked to assist in destroying a badger which had dug several burrows in the dyke at Nicks Island. Later I learned from Mr. H. H. Adam, a farmer on Nicks Island, of several additional local occurrences of badgers, one having been killed on his farm.

Meadow Mouse. *Microtus pennsylvanicus* (Ord).

Following the dyking of Sirdar Lake, much additional meadow mouse habitat became available and soon was occupied. In 1956 runways, burrows, and winter nests were found in all suitable places on the littoral, and many mice were seen. It was concluded that the population had reached, or was nearing, a peak in numbers.

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

This vole was not taken in the Creston region until May 14th, 1956, when I trapped an adult female beside the falls on Wilds Creek, 10 miles north of Creston. The trap was placed at the entrance of a burrow in an almost vertical bank which was constantly

splashed with spray. Here were other burrows and runways, but continued trapping in these places produced no additional specimens of this species.

Specimens in the Canadian National Museum collected at Yahk, 20 miles east of Creston, are identified as *M.l. vellerosus* T. A. Allen.

*Western Jumping Mouse. *Zapus princeps* Allen.

No specimens of jumping mice had been taken in the Creston region prior to 1956, when I trapped a sub-adult female on May 29th and a sub-adult male on June 2nd. Both were taken at the entrance to burrows under old birch-trees in a mixture of coniferous and deciduous woodland. In July four half-grown young were trapped along Drywash Creek under thick cover of thimbleberry.

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