CANADA

DEPARTMENT OF MINES

HON. CHARLES STEWART, MINISTER; CHARLES CAMSELL, DEPUTY MINISTER

NATIONAL MUSEUM OF CANADA

W. H. COLLINS, ACTING DIRECTOR

BULLETIN No. 56

Annual Report for 1927

CONTENTS

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1929

CANADA

DEPARTMENT OF MINES

HON. CHARLES STEWART, MINISTER; CHARLES CAMSELL, DEPUTY MINISTER

NATIONAL MUSEUM OF CANADA

W. H. COLLINS, ACTING DIRECTOR

BULLETIN No. 56

Annual Report for 1927

CONTENTS

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1929

GENERAL ACTIVITIES OF THE MUSEUM

By W. H. Collins

Last year the first of a series of annual reports by the National Museum of Canada was prepared. Considerable space was allotted to a description of the history and activities of the institution. The present volume is restricted to what has transpired during the governmental year between April 1, 1927, and March 31, 1928.

EXHIBITS

Since 1910 the Museum has had to move three times, first from the old Geological Survey quarters on Sussex street to the new Victoria Memorial Museum in 1910, then to various temporary quarters in the city in 1915, when the Parliament buildings were burned, and again back to the Victoria Memorial Museum in 1920, when it was vacated as temporary quarters by Parliament. It was difficult during that period to make much progress with museum exhibits and in consequence this phase of the Museum's activities is now the most backward and requires an abnormally large share of attention.

During the past year, two rooms or booths were built in the sides of the Entrance Hall for the benefit of visitors. That on the east side is used as an information bureau and for the display and distribution of Museum and Survey publications and souvenirs. The other contains a departmental telephone exchange, a public telephone for the convenience of visitors, and a room for the Royal Canadian Mounted Police officers who guard the building. The first of a series of picture post cards of museum features and of interesting natural history features in different parts of Canada have been printed for distribution from the information bureau, and it is proposed to add to these gradually.

The staff of cabinet makers and carpenters have continued to build exhibition cases for the display of minerals. Ten of these table cases were finished by the end of the year. They are mahogany, with a display area 72 by 48 inches, with drawers for other specimens. A contract was let in January, 1928, to the Steel Equipment Company, of Ottawa, to build sixteen upright metal cases and it is expected that these will be in place before the end of 1928. They are being built to a modified "clip" design evolved by the National Museum. Each case is 12 feet long, 7 feet high, and 32 inches wide, with three glass panels on each side. The two outer panels are hinged against the middle one, thus enabling the case to be opened without difficulty by one person, whereas on the ordinary "clip" cases two or more men are required to lift off a panel, at some risk of breakage.

The installation of these new cases will relieve some of the cases now in use for other purposes for which they are better suited, notably for the commencement of exhibits of insects, trees and forest products, and geographical features. As mentioned in last year's report, Mr. Arthur Gibson, head of the Entomological Branch, Department of Agriculture, has accepted

a position of honorary curator of entomology in the Museum. Already he has taken the first steps towards having exhibits prepared of the more important insects found in Canada and their influence upon agriculture and other human industrial activities. Likewise Mr. E. H. Finlayson and Mr. D. R. Cameron, Director and Associate Director of the Forestry Branch, Department of the Interior, have agreed to assist the Museum in preparing exhibits of the trees and forest products of Canada, and Mr. T. A. McElhanney, of the Forestry Branch, already has this work in charge.

A remarkably fine opportunity exists in Canada, a pioneer country of varied topography and climate, to develop museum collections and displays of the geographical features and their influence upon transportation and other human activities. A modest beginning has been made by using the corridor to the offices of the Topographical Division of the Geological Survey, on the fourth floor, for the display of enlarged photographs, relief models, and other exhibition material.

NEED FOR ENLARGED QUARTERS

When the additional furnishings and exhibits above mentioned are installed the available exhibition halls will be full, and yet provision will have then been made for less than half of the branches of natural history to which the Museum gives attention. This lack of space was mentioned in last year's report, and deserves further reference here. It was pointed out that the Victoria Memorial Museum building, originally intended as a home for the Geological Survey and Museum, is occupied also by the Administrative part of the Department of Mines, the Dominion Fuel Board, and the National Art Gallery. In consequence, out of a total of twelve large halls and two smaller ones, only four large halls and the two smaller ones are now available for museum exhibits. Only in the case of anthropology is it possible to develop permanent and comprehensive exhibits, and an excellent display in this division is being made. The Division of Biology, which should have at least five and a half large halls, has one and a half. About one-third of this space is being used for a permanent exhibit of birds, which is already an attractive and instructive feature. In the remaining two-thirds there are crowded mere samples of what should be done to illustrate the fur-bearing and other mammals of Canada, the plants, trees and forest products, insects and their relations to agriculture and other industries, fishes and other aquatic animals, reptiles, and batrachia. In another hall are exhibited together the invertebrate fossils and the vertebrates—dinosaurs and other prehistoric creatures, which are so richly represented in Canada and of which this Museum has an exceptionally fine collection. Two halls are required for the purpose and until they can be obtained only a temporary, huddled display can be made. No hall is available for display of rocks, minerals, ores, and the products of the mineral industry, and these are being crowded into corridors and odd corners.

If the entire building were available for the Survey and Museum the requirements for exhibition purposes would be largely satisfied, but not the requirements for offices, laboratories, and storage of specimens. A museum requires as much room for reserve material and workshops as it does for public display, and the Geological Survey requires chemical,

mineralogical, and petrographical laboratories. The Victoria Memorial Museum building can be made to meet these needs only by increasing the size of the present building about 60 per cent.

Tentative consideration of this matter has indicated that nearly $1,000,000 would be required to enlarge the building sufficiently to meet requirements for the next twenty years or so. This is a formidable sum of money, but against it are to be offset certain considerable annual economies that would result. The Division of Mineralogy, which now occupies separate quarters about a mile away, could be housed in the Victoria Memorial Museum, and there would be a yearly saving of $10,000 to $12,000 for rent, heating, and other services. Much greater benefit would also be derived from the Division of Mineralogy if it were in the same building as the remainder of the Survey and Museum staff. There is also an annual outlay of from $3,000 to $5,000 for temporary construction in the Museum building largely due to cramped conditions and the consequent need for frequent changes. Most of this expenditure would not be needed if the building were enlarged. Averaging the annual saving at $15,000, it represents the interest at 5 per cent on a capital investment of $300,000; in other words, of the $1,000,000 required $300,000 might be regarded as a satisfactory financial investment. It should also be remembered that a very much larger investment has already been made towards a national museum, and that the additional amount wanted to make the difference between a well-equipped, efficient institution and one that is hampered by lack of accommodation would increase the return upon the total amount of money sunk in this enterprise.

Any museum, and particularly a national museum, is an expression of the interest of its country in the cultural aspects of civilization, and can hardly, therefore, be regarded as an object of close economy. Compared with such sister institutions as the United States National Museum, the American Museum of Natural History, the Field Museum, or the Royal Ontario Museum at Toronto, the expenditure upon the National Museum of Canada so far has been small. The building of the American Museum of Natural History has already cost $10,786,306.48 and extensions are planned which will enlarge it to about three times its present size. The Royal Ontario Museum, supported by the province of Ontario, is already larger than the National Museum at Ottawa, although it has been in existence for less than twenty years; and further large additions are being planned.

There is only one thing of importance needed now in order to develop a national museum that Canadians may regard with satisfaction—an addition of about 60 per cent to the present Victoria Memorial Museum building. It is a large requirement, but an essential one. It is quite apparent that the Government intended to support a national museum generously when, twenty years ago, the present building was erected at the foot of Metcalfe street, facing the Parliament buildings, and it is to be hoped and expected that this spacious policy will be continued.

In any scheme for the improvement and beautification of the capital city the Museum is a feature quite as important as those already so generously provided for, and it is to be hoped that it will be accorded, with them, the liberal financial support it deserves.

If an addition to the building is to be provided there should be little delay. Two years or more will be required for planning and constructing it, and it will be badly needed by the end of 1930, at the present rate of growth of the Museum.

DONATIONS

Increasing interest in the Museum is being shown, in substantial fashion, by gifts of valuable material. Lists of these donations are given in the sections of this report supplied by the heads of divisions. Particular mention should be made, however, of a valuable series of specimens of gold, platinum, palladium, and other rare metals obtained from the nickel-copper ore deposits of Sudbury district, which were presented by the Mond Nickel Company. Other fine material was donated by the International Nickel Corporation and by Henry Wiggin and Company, of Birmingham, England. These specimens have been incorporated into an exhibit of the Canadian ores of nickel, their geological occurrence, and their uses and products. The section of the Museum devoted to economic geology has been particularly favoured in recent years by gifts from the National Aniline and Chemical Company, of Buffalo, the Imperial Oil Company, Mining Corporation of Canada, and other companies.

MUSEUM LECTURES

The Museum Lecture Committee (H. I. Smith, M. E. Wilson, and C. L. Patch) report that during the season of 1927-28 the annual course consisted of sixteen lectures given by lecturers from twelve different technical institutions in the Government service. The course lasted from November 12 until March 14. Each lecture was delivered on a Saturday morning to children and on the following Wednesday evening to adults. The total attendance of children was 9,550 and of adults 2,312. Following is a more detailed statement of the course:

November 12 and 16. Unusual Features of the Animal World, by C. L. Patch, National Museum.
November 19 and 23. Enamels, by J. F. McMahon, Mines Branch, Department of Mines.
November 26 and 30. Our Canadian Bird Sanctuaries, by H. F. Lewis, Canadian National Parks Branch, Department of the Interior.
December 3 and 7. Insects and Their Ways, by Mr. De Crice and Dr. J. M. Swaine, Entomological Branch, Department of Agriculture.
December 10 and 14. Glimpses of Gothic Cathedrals, by Major C. N. Marriott, Department of Health.
December 17 and 21. How Fruit is Marketed, by A. Fulton, Department of Agriculture.
January 7 and 11. Flying in Canada, by J. A. Wilson, Department of National Defence.
January 14 and 18. The Age of Mammals, by C. M. Sternberg, Geological Survey.
January 21 and 25. Why People Like Pictures, by Mrs. Maud Brown, National Art Gallery, Department of Public Works.
January 28 and February 1. Indian Songs and Dances, by C. M. Barbeau, National Museum.
February 4 and 8. Across Sub-Polar Regions, by John L. Foreman, Hydrographic Survey, Department of Marine and Fisheries.
February 11 and 15. The Mining Industry of British Columbia, by C. E. Cairnes, Geological Survey.
February 18 and 22. The Fisheries of Canada, by J. A. Rodd, Department of Marine and Fisheries.
February 25 and 29. The Rouyn Mineral Area, by W. F. James, Geological Survey.
March 3 and 7. Interesting Facts about Trees, by J. R. Dickson, Forestry Branch, Department of the Interior.
March 10 and 14. Horticulture in Canada, by L. F. Burrows and Mr. Ritchie, Department of Agriculture.

Each lecture was followed by appropriate motion pictures secured from the Canadian Government Motion Picture Bureau, the Northwest Territories Branch, the Canadian National Parks Branch, the Department of National Defence, the Canadian Pacific Railway Company, the Province of Ontario Moving Picture Bureau, the United States Bureau of Mines, the United States Department of Agriculture, and the American Museum of Natural History, to each of whom thanks are due.

FIELD WORK

Statements of field investigations carried out by, or for, the Museum are given in the following reports by the heads of the various divisions. In the case of geology and geography, readers are referred to the Summary Report of the Geological Survey, where also are included fuller statements of work done in mineralogy and palæontology.

DIVISION OF ANTHROPOLOGY

D. Jenness, Chief of the Division, reports:

The organization and personnel of the Division of Anthropology underwent no change during the past year. The need for an additional ethnologist to take the places of Dr. Sapir and Mr. Waugh, former members of the staff, becomes more evident every year, for it is difficult with the division as now constituted to conduct any ethnological researches among the Indians of eastern or northern Canada. The lack of a physical anthropologist was partly overcome through the temporary employment of Professor J. B. Grant, of the University of Manitoba. It is a pleasure to record that the excellent services of the preparator, Mr. J. D. Leechman, received recognition through his promotion to the position of senior museum assistant.

An outstanding feature in the year's activities was the acquisition of fourteen large, new cases for the east Exhibition Hall. These are now being assembled, and when installed will permit the display of specimens from the Plains and Northern Indians that receive little attention at the present time. Some of the cases will serve also for synoptic exhibits; and Mr. Leechman has already assembled an attractive collection of cradleboards and photographs to illustrate the aboriginal methods of carrying children. He has also prepared for this hall a model of a habitat group showing a Sarcee tipi or tent, fully furnished, with two men painting a record of war exploits on a blanket; and he is gradually gathering material for a full-sized group based on this model. The tent alone will require nearly two dozen buffalo hides; the division possesses at present only four, donated by the National Parks Branch of the Department of the Interior. When completed this east Exhibition Hall should prove as attractive and instructive to the public as the west hall, which remains the same as last year, except for a rearrangement of the five cases devoted to the Kwakiutl Indians of British Columbia.

The collections both in the exhibition halls and in the storage rooms were again inspected monthly throughout the year, with the result that no specimens were lost or injured by insect pests. The printed forms attached to the storage cabinets in 1926 greatly facilitated this work.

The specimens catalogued and treated were as follows:

Ethnology	467
Physical anthropology	3
Archæology	300
	770

This number is smaller than in past years, but fifty boxes of Ontario and Quebec archæological specimens have been piled up in a corner of the Eskimo storage room on the fourth floor, unopened, and uncatalogued, through lack of storage cabinets. Room 17 in the basement, which has been the main archæological storage room of the division for many years, was transferred to the Geological Survey during the winter, and all the specimens it contained were removed to the corridor and alcoves on the top floor. The moulds and casts of petroglyphs on that floor, displaced to make room for the archæological cabinets, will be removed as soon as practicable to the sub-basement. A new room in the basement will shortly be available for fur clothing and other perishable specimens, thus greatly relieving the congestion in the ethnological cabinets; but a considerable portion of the archæological collections are now inaccessible, and will continue to be inaccessible until the division obtains at least one more storage room.

Two exchanges of specimens were arranged during the year. Lt. G. T. Emmons exchanged 33 specimens of Tlingit basket-makers' materials for five of the Museum's Kwakiutl wood carvings; and the National Museum of Denmark, Copenhagen, exchanged 120 Greenland specimens, ethnological and archæological, for 58 Tsimshian specimens. The following specimens were donated to other institutions:

To the Royal Ontario Museum of Archæology:
39 Eskimo specimens;

To Loyola College, Montreal:
34 Sarcee and West Coast specimens;

To Dr. Francis Pospisil, Bruno Museum, Czechoslovakia:
1 Tsimshian specimen.

Three special exhibits were arranged during the year. The first, for the Canadian Folk Song and Handicraft Festival held at Quebec in May, comprised French-Canadian material only. The second, for the International Mining Congress at Ottawa in August, displayed Indian-derived objects suitable for souvenirs, and also the application of West Coast Indian designs to the modern arts. The third exhibit, at the National Gallery of Canada in December, covered the whole field of West Coast Indian art, and proved so successful that it was shown later in Toronto and in Montreal.

Miss MacDonald, of the Northwest Territories Branch of the Department of the Interior, spent a week with the division studying museum methods, prior to taking charge of the small museum attached to that branch. Local artists and teachers from the Normal School have continued to borrow loan collections and miscellaneous specimens for study.

Mr. O. E. Prud'homme, artist of the division, continued to make drawings of specimens to illustrate the reports of the division's officers. Ill-health compelled him to apply for sick leave before Christmas and to go south to a warmer climate for the remainder of the winter. He returned to duty at the end of the fiscal year.

Field Work

The division had five parties in the field during the summer: one in Newfoundland, one in Quebec, one in northeastern Manitoba, and two in British Columbia.

Mr. D. Jenness spent the field season in Newfoundland searching for remains of the extinct Beothuk Indians in order to trace their connexion with the Indians of Canada. A detailed account of his work and its results is appended. He left Ottawa early in June and returned in September.

Mr. C. M. Barbeau continued his Tsimshian investigations in July, August, and September, 1927, both among the Niska tribes of Nass river and the Tsimshian proper of Port Simpson. His study on the Nass covered the social organization, the heraldry and privileges, the hunting grounds, and the oral traditions of part of the Niska tribes. These tribes are now gathered in four modern villages, but formerly belonged to twelve tribes located at various points along the river, from Giteeks to Gitlarhdamks. It was impossible to conclude the work among them in one short season, owing to the size of the undertaking. Niska songs, 137 in all, were also collected both in text form and on the phonograph; they are mostly ancient and belong as exclusive privileges to the various families under observation. A close study of native rhythms and melodies was made on the spot, during a fortnight, with the collaboration of Dr. Ernest McMillan, Director of the Toronto Conservatory, and about fifteen of these songs are now available in transcribed form. Niska carvings and totem-poles were studied with particular care; it became clear as a result that the lower Nass river was in the early nineteenth century the main centre of diffusion of North West Coast art as we now know it—Fishery bay, on the Nass, being a spring gathering place for ulachen fishing of the Tlingit, the Haidas, the Tsimshian, the Gitksan, and the Niska. The origin and recent absorption of two Déné (Tsetsaut) families among the lower Niska—one of which, that of Danjalee, now of Kincolith, lived on Portland canal—was also recorded in detail. The war traditions and migrations of two or three more Tsimshian tribes (in particular the Ginarhangeek, the Gillodzar and the Gidestsy—the last being on the southern frontier of the Tsimshian, next to the Kwakiutl) were studied by William Beynon, Mr. Barbeau's assistant. Several hundred photographs were taken of the activities of the Niska, their totem-poles, dances, costumes, and their country. Moving pictures of ancient life were also made by Dr. J. S. Watson, of Rochester, N.Y., in collaboration with Mr. Barbeau; some of the activities among the Niska were pictorially recorded, for instance: men's and women's songs and dances, the carving of masks, the games of *rhsan* and lahal, the totem-poles, the treatment of patients by medicine-men, the recording of songs, and the life at the canneries. Specimens were collected on the Nass and the Skeena, first for the National Museum, and then, with special permission, for the Royal Ontario Museum, of Toronto. Some private collections of West Coast and Tsimshian art were inspected in Prince Rupert, Vancouver, and Victoria, and the collection of the Provincial Museum at Victoria was rapidly examined.

Mr. Harlan I. Smith left in April for Hazelton, Skeena river, B.C., to continue the direction of the interdepartmental work on the conservation of totem-poles along the line of the Canadian National railways. At

intervals in this work he made motion picture negatives of the Carrier, Gitksan, and Tsimshian Indians in the vicinity, and investigated archæological sites in Bulkley and Skeena River valleys. He visited also a number of sites near Prince Rupert, and directed the partial excavation of a kitchen-midden at Seal cove, the labour for which was kindly furnished by the Seal Cove Lumber Company. This midden was of unusual interest because the stump of a large cedar tree that had grown above it fixed its minimum date at a little more than 360 years. A human skeleton was discovered in the course of the excavations, although the Indians of this neighbourhood practised cremation at the time of their discovery. Two rare specimens of stone mirrors were obtained in the course of field work; one was found at Hazelton in Gitksan area, the other on Digby island, in the territory of the Tsimshian. Before returning to Ottawa Mr. Smith examined a petroglyph on the top of the plateau overlooking Fraser River valley near Alexandria Bridge.

Mr. W. J. Wintemberg investigated some ancient Indian camping-sites in the vicinity of Tadoussac which had been erroneously ascribed to Eskimo occupation. After completing this work he explored the north shore of the gulf of St. Lawrence from Tadoussac to Lanoraie, west of Three Rivers, locating a number of archæological sites and securing a fairly large collection of specimens. A fuller account of his field work appears later.

Dr. J. C. Boileau Grant, Professor of Anatomy in the University of Manitoba, travelled with a Geological Survey field party to Gods and Island lakes, in northeastern Manitoba, where he made an anthropometric study for the Museum of the Cree and Ojibwa Indians living in those districts. Altogether, he measured over four hundred Indians, one hundred and seventy-one of whom were men over twenty-one years of age. During the winter he has been tabulating his figures, working out the means and averages of the various measurements, and preparing a detailed report on the physical characteristics of the two tribes.

Office Work

On returning from the field, Mr. Jenness resumed the administrative duties attached to the division that always occupy a considerable proportion of his office hours. He prepared for the Director numerous memoranda relating to various subjects, exercised a general supervision over the arrangement and exhibition of specimens and the preparation of scientific reports, and handled a considerable volume of correspondence in connexion with the division's activities. During the winter he edited and submitted for publication three manuscripts: one, by Professor T. F. McIlwraith, on the "Bella Coola Indians of British Columbia"; one, by Professor Leonard Bloomfield, on "Cree Language and Folk-lore"; and one, by W. J. Wintemberg, on the "Archæology of the Uren Site in Southeastern Ontario." He completed also one of his own manuscripts, a "Comparative Vocabulary of the Western Eskimo Dialects," which is now in press; and made considerable progress on a comprehensive text-book, covering all the aboriginal tribes in Canada, for which there has long been a constant demand.

Mr. Barbeau devoted much time to the preparation of a voluminous monograph on "The Totem-poles of the Gitksan," which is now near com-

pletion. Various other activities at the office also required time and attention, particularly the preparation of several articles on Canadian Indians, on North West Coast Indian art, and on Folk Songs of Canada; the selection of West Coast Indian specimens from various Canadian museums and the preparation of an exhibition of West Coast and modern art at the National Gallery, and the Art Galleries of Toronto and Montreal; the organization and direction, jointly with Mr. J. M. Gibbon, of the Canadian Pacific Railway Company, of the first Folk Song and Handicrafts Festival, given at Quebec in May, 1927, sponsored by the Canadian Pacific railway, and under the auspices of the National Museum; the preparation of the folk song materials and other accessories for the second festival, which is to take place in May, 1928. A second series of five lectures on the ethnology of British Columbia was given in September, 1927, at the University of British Columbia. Ten lectures and addresses were given elsewhere, either on ethnology or folk-lore; and it was found impossible to accept several other requests for lectures out of town. Assistance was also invited and given in the preparation of three Indian and French folk song recital programs given at the Art Gallery of Toronto, the Little Theatre of Ottawa, and the Association of Canadian Clubs, under the auspices of the National Museum.

Mr. Smith, during the winter months, arranged and titled two motion pictures from negatives he had taken between 1923 and 1927; one illustrates the Bella Coola Indians, the other the Carrier Indians, of British Columbia. He prepared a list of the archæological sites in the general vicinity of Prince Rupert, and continued to secure and incorporate in the files a large body of information concerning archæological remains in other parts of Canada.

Mr. Wintemberg completed before Christmas a manuscript on the "Archæology of the Uren Site in Southeastern Ontario," which has now gone to press. He drew up a list of the archæological sites in eastern Ontario, particularly around Ottawa, for the Dominion Archives, and is now preparing a very extensive report on the "Roebuck Village Site" which he excavated in 1915.

Publications

The following articles and books were published by the staff of the Division during the fiscal year.

By D. Jenness:

Ethnological Problems in Arctic America. Problems of Polar Research, American Geographical Society, Special Publication No. 7, New York, 1928.

The People of the Twilight. The MacMillan Co., New York, 1928.

Notes on the Phonology of the Eskimo Dialect of Cape Prince of Wales. International Journal of American Linguistics, vol. 4, Nos. 2-4, Jan., 1927.

By C. M. Barbeau:

Les Arts décoratifs des tribus indifènes de la Côte Nord-ouest de l'Amérique du Nord. Exposition d'art canadien, Musée du Jeu de Paume, Paris, Avril-mai, 1927.

Twelve French-Canadian Folk Songs (in collaboration with Sir Harold Boulton). Boosey and Co., London, 1927.

Annotated Program, Canadian Folk-Song and Handicraft Festival, Quebec, May, 1927.

The Native Races of Canada. London Times, Jubilee number, July, 1927, and Transactions of the Royal Society of Canada, 1927.

Folk Songs of Canada. Jubilee numbers of several Canadian papers.

West Coast Indian Art. Program for Exhibition of Canadian West Coast Art, National Gallery of Canada, Dec., 1927, and Toronto Art Gallery, the Grange, Toronto, Jan., 1928.

Canadian Folk Songs as a National Asset. The Canadian Nation, Feb., 1928.

By Harlan I. Smith:

A List of Petroglyphs in British Columbia. American Anthropologist, vol. 29, No. 4, 1927.

A Pictograph on the Lower Skeena River, British Columbia. American Anthropologist, vol. 29, No. 4, 1927.

By W. J. Wintemberg:

Foreign Aboriginal Artifacts from Post-European Iroquoian Sites in Ontario. Transactions of the Royal Society of Canada, 1926.

Was Hochelaga Destroyed or Abandoned? American Anthropologist, vol. 29, No. 2, 1927.

The Technique of Certain Aboriginal Cords. Thirty-Fifth Annual Archæological Report (1924-25), Toronto, 1928.

By J. D. Leechman:

Brass Horse-Amulets. Canadian Homes and Gardens, October, 1927.

Lectures

Lectures were delivered by the staff during the fiscal year as follows:

By D. Jenness:

The Vanished Red Indians of Newfoundland. Professional Institute of Canada, Radio, March, 1928.

By C. M. Barbeau:

Indian and French Folk Songs of Canada. Provincial Chapter, Imperial Order Daughters of the Empire, Ottawa, April 19, 1927.

The Folk Song and Handicrafts Festival. Author's Association, Ottawa, May 30, 1927.

The Quebec Festival and the Growth of Canadian Music. The Canadian League, Ottawa, May 31, 1927.

Five lectures on the Ethnology of British Columbia: (1) Feuds and Migrations; (2) An Era of Crucial Changes; (3) The Plastic and Decorative Arts of the Northwest Coast; (4) The Potlatch; (5) Indian Songs. University of British Columbia, Sept. 6 to 12, 1927.

Canadian Folk Songs. Women's University Club, Vancouver, Sept. 13, 1927.

The Plastic and Decorative Arts of the Northwest Coast. Art Gallery of Toronto, Jan. 9, 1928, and Art Gallery of Montreal, Feb. 17, 1928.

Canadian Folk Songs. The Canadian Club, Toronto, Jan. 10, 1928, and Arts and Letters Club, Ottawa, Feb. 28, 1928.

Indian Songs. Women Teacher's Federation, Ottawa, March 10, 1928.

By Harlan I. Smith:

Out-of-doors Museums. Sea Scouts, Prince Rupert, Sept. 13, 1927.

Archæological Research in Canada. Women's Canadian Club, Prince Rupert, Oct. 4, 1927.

Indian Totem Poles and Their Preservation. C.N.R. Radio, Vancouver, Oct. 25, 1927, and Professional Institute of Canada, Radio, March 12, 1928.

The Ethnology, Archæology, and Natural History of the Bella Coola Valley. Ashbury College, Ottawa. Jan. 14, 1928.

The Bella Coola Valley and Its Indians. Erskine Church, Ottawa, Feb. 6, 1928.

By W. J. Wintemberg:

Indians of the Ottawa Valley. Boy Scouts, Ottawa, Feb. 11, 1928.

Accessions to Museum

(a) From Staff:

From D. Jenness:

11 anthropological specimens from Little Diomede island
17 anthropological specimens from cape Prince of Wales
38 archæological specimens from Big Diomede island
143 archæological specimens from Newfoundland
1 skeleton from Newfoundland
1 skull from Newfoundland

From C. M. Barbeau:

1 piece of worked antler (from under nineteenth century native house) from Kitsalas canyon
4 anthropological specimens, Haida
63 anthropological specimens, Tsimshian (Nass River)
1 chief's headdress, Bella Bella
1 halibut hook, Tlingit
2 anthropological specimens, Carrier

From H. I. Smith:

3 anthropological specimens, Carrier
31 archæological specimens from Kitsalas canyon
1 " " Kitwanga
2 " " Hazelton
1 " " Hagwelget
7 " " village site south of Hazelton
2 archæological stone specimens from Dodge island
2 archæological specimens from Emmerson point
43 " " Seal cove, Prince Rupert
Samples of colour from Gitwinlkul and Spences Bridge
Samples of rock from Chapman
1 skeleton from Seal cove, near Prince Rupert

From W. J. Wintemberg:

16 cases of archæological specimens from Tadoussac
1 case from Batiscan and Red Mill, Champlain co., Que.
3 cases from an Iroquoian village site near Lanoraie, Berthier co., Que.
1 cast of shell "pin".
1 complete and 2 incomplete human skeletons from Iroquoian site near Lanoraie, Que.

From J. D. Soper:

16 anthropological specimens from Baffin island

From Mr. Hadley:

19 archæological specimens from Alaska

(b) Donations:

From Oscar Andreson:

1 'grooved adze' from Emmerson point, Digby island

From Dr. F. G. Banting of Toronto:

9 archæological specimens from Port Leopold, Somerset island
6 " " Ponds inlet

From Dr. H. E. Bedingfield:

Wax impression of one side of a stone pipe with incised figure of man, North Dorchester township. (H. Gould coll.)
Cast of small Rabbit Lake amulet of grey slate

From Major L. T. Burwash:

2 caribou-skin coats from Boothia peninsula
205 anthropological specimens (Central Eskimo)
84 archæological specimens from Mansell island
1 skull, Simpson straits, King William island (Eskimo)

From Canadian National Parks:

4 buffalo hides

(b) DONATIONS—*Continued:*

From G. T. Emmons:
1 shaman's hair pin (Tsimshian), Gitwinlkul, B.C.
4 anthropological specimens (Coast Salish)

From Mr. Lockwood:
1 stone hammer from Seal cove, Prince Rupert

From Mr. J. M. Gibbon (Canadian Pacific railway):
1 film of Indian life on the west coast

From W. H. B. Hoare:
1 bone fish-net gauge, Kay point, Mackenzie delta

From Frits Johansen:
Archæological and other specimens from Hudson strait

From Mr. Johnson:
2 pieces of soapstone showing cutting, from Haig, B.C.

From Arthur English:
6 archæological specimens from grave of an Eskimo child

From W. T. Lopp:
1 soapstone lamp (Eskimo)

From P. McCausland
1 stone ax and fragment of walrus ivory from Rustico island

From J. H. McLeod:
2 pieces of totem-poles, B.C.

From G. C. Monture
1 ice-chisel made of micaceous slate
12 chert points from farm of Jos. Monture

From A. E. Moses:
1 grooved stone club head, Cutknife, Sask. (through the courtesy of W. W. Cory, Esq., Deputy Minister of Interior)

From C. G. Rayment
1 frame of jadeite adze from Hope, B.C. (presented by Mr. Thacker)

From T. W. Shackleton
1 stone adze from Usk

From Dr. J. S. Watson:
3 films illustrating Indian life, ancient and modern, on Nass river

From Royal Canadian Mounted Police:
8 specimens from Cumberland gulf

From T. L. Thacker:
1 sandstone ornament from above Yale
4 soapstone specimens from Hope, B.C.

From J. Thurston:
1 chalcedony arrow tip from vicinity of Rumsey, Alberta

From T. Wray:
1 slate mirror, Wireless Station, Digby island

From J. E. F. Wight:
4 anthropological specimens from Baffin island
4 archæological specimens from Baffin island

(c) PURCHASES:

From Harry Nolan:
1 Eskimo kayak (small model)

From Mrs. G. Lanctot:
1 ceinture fléchée

From Mr. Switzer:
1 elk-hide lariat, B.C.

From Mrs. A. F. Sladen:
1 kwakiutl mask

From G. R. L. Potter:
3 pieces of old porcupine quill work (Plains Indians)

Folk-Lore

Mr. Marius Barbeau reports that the folk-lore data collected and donated to the Museum during the past year stand as follows (a summary of the revised totals for the French and English collections is also appended):

French

The Massicotte (E.Z.) Collection:
164 song texts (from Lavallée, Chatel, etc.)

The Barbeau (Marius) Collection:
27 song melodies recorded on the dictaphone (Napierville and Gaspe)
1 melody recorded by ear

The Lambert (A.) Collection:
16 song texts (Drummond, Arthabaska)
1 melody recorded by ear

Miscellanea:
From the Publicity Department, Canadian Pacific railway, 2 specimens of colonial technology; from Charles Marchand, 2 songs with melodies; from P. G. Roy, a document on early colonial sculpture; from M. Brown, 1 photograph; from Photographic Division, Dept. of Mines, 6 photographs; from Miss H. C. Wallace (Waterloo, Que.) 1 folk anecdote.

English

The Webster (Alice) Collection:
25 manuscript pages of folk-lore (sayings, omens, folk beliefs, rhymes, formulæ, folk remedies) from Muskoka and lake Simcoe
3 song texts

Miscellanea:
From the late Wm. McInnes, 6 manuscript pages of folk-lore from New Brunswick; from W. J. Wintemberg, 6 photos; from Frits Johansen, 2 photographs

Totals—(1914-1927)

French

6,476 song texts, excluding those in a few manuscripts
3,793 melodies recorded on the phonograph
498 melodies recorded by ear
319 folk tales
192 anecdotes and narratives
4,306 photographs
105 dance melodies (excluding those in old notebooks)
310 specimens of Colonial technology
Blason populaire of folk nicknames, including folk geographic names in a few counties
A large number of rhymes, sayings, remedies, folk beliefs, etc.
Voluminous data on the ancient architecture and manual arts of Quebec

English

2,200 or over, formulæ, sayings, remedies, etc., recorded in various parts of Canada. (A part of these materials has been published.)
130 folk songs
91 manuscript pages of folk-lore recorded by the late James Teit on Fraser river, B.C.
Miscellaneous data from Ontario, Quebec, New Brunswick, and Nova Scotia

German

A manuscript ready for publication of Canada-German folk-lore, by W. J. Wintemberg

DIVISION OF BIOLOGY

R. M. Anderson, Chief of the Division, reports:

Organization and Personnel

The main subdivisions of the Division of Biology are zoology and botany. The only zoological collections upon which curators are actively engaged in systematic work are mammals, birds, reptiles, and batrachia. There are considerable collections of marine and freshwater invertebrates, and a small collection of fishes, which are being stored and cared for. The national collection of insects, which was formerly a part of the museum, was loaned to the Entomological Branch, Department of Agriculture, some years ago, at the time Parliament was occupying the Museum building, and is still in the possession of that Department, where it has become greatly increased and is in constant use. Co-operation in insect work has been resumed during the year by the appointment of Mr. Arthur Gibson, Dominion Entomologist, as curator of insects in the National Museum of Canada, and preparations are under way to install some new entomological exhibits in the Museum halls. The National Herbarium is the repository of the botanical collections, and is cared for by a Chief Botanist, with one Herbarium Assistant (recently superannuated in April, 1928).

A list of the staff comprising the Biological Division is given in the annual report preceding this one.

Office Work

The ordinary routine work of the division consists of a considerable amount of correspondence and the identification of specimens of birds, mammals, and plants sent in by individuals and institutions, and answering questions in regard to them. Considerable time is also taken up in answering inquiries referred to the officers by other departments of the Government, particularly those of a faunistic character, the Museum branch being the only place in the Federal service where scientific data in regard to certain phases of Canadian wild life are being collected and studied. The National Museum is the natural repository of scientific material for study and comparison and its facilities are made available to the public as fully as possible by the limited staff.

The educational function of the Museum has not been neglected. In addition to the popular lecture courses, in which members of this division have lent aid, numerous specimens have been loaned to schools for natural history study, and selected lantern slides have been loaned for lecture purposes to persons engaged in educational work. Loans of individual specimens and, in some cases special groups of animals and plants, are made from time to time to museums and qualified individuals who are monographing certain groups, and other institutions have reciprocated by loaning specimens for study by officers of this division.

A considerable amount of new data has been secured, through field work by members of the staff, and by correspondence with interested persons throughout the country, on the animal and plant life of Canada. With the immense territory of the Dominion of Canada, and a small scientific staff endeavouring to cover it as thoroughly as possible, the

assistance of interested persons in all parts of the country is solicited. The constant changes in conditions due to development, spread of agriculture, and forest destruction are so rapid that much field work and correspondence are required to keep up to date. The specimens and information thus secured have been invaluable in the work of preparing bulletins and monographs in the past, and other similar works are under way. For such work large series of specimens of the different species are required for study. The general public, in many cases, have the idea that one or two specimens of each species are all that a museum need have: that is, a male and a female mounted for exhibition purposes. For scientific investigations many more specimens are needed, of different ages, sexes, plumages, and pelages, taken in different seasons. In fact, many closely allied species are so superficially similar, that close study and comparison in the laboratory are necessary to determine the differences. In addition to this, series of specimens from different localities and provinces are necessary to delimit the ranges and habitats of the different forms. For such purposes "sight records" are not sufficient, and museum material is essential to substantiate records if they are to be of any real scientific value. To build up a " balanced" collection of both animals and plants of all kinds, and to have the major zoogeographical districts and life zones represented, have been two of our main problems.

Although some districts of the Dominion have been fairly well covered by our field parties in the past, other vast regions are *terræ incognitæ* in respect to their animal and plant life, except by inference and deduction. The Museum is lacking in an adequate representation of many species and races of the important fur-bearers of Canada, and has been unable to purchase many specimens of these on account of the high prices which have prevailed for some time. Some local races have approached close to extinction without any adequate representation being preserved for posterity. Although the mammal collection of the National Museum of Canada at present runs up to 8,855 numbers, including skins, skulls, and skeletons (skin and skull of the same specimen being catalogued under one number), there are, for example, nine geographic races, and at least two distinct species of the pine marten described from Canada and Newfoundland, of which we have only four represented in the National collection, and partly by very indifferent specimens—hunters' skins, or fragmentary skulls, bones, etc. In contrast with this, a European zoologist who recently visited our Museum for the purpose of examining some of our specimens of fur-bearers, informed us that in the U. S. S. R. collection at Leningrad there are over 260 specimens of Russian sable, about the same number of the different races of Russian and Siberian marten, and other species in porportion—sufficient for adequate comparisons. The British Museum also is well supplied with specimens in many animal groups, largely due to the generosity of British travellers in different parts of the world. The National Museum of Canada has, it is true, received a few donations of valuable material, but our sportsmen and travellers have not been sufficiently educated as to the importance and needs of Canadian museums. A fine, attractively exhibited group of some of our noble game animals will form a memorial to the prowess, public spirit, and scientific interest of the donor, long after he has laid up his rifle for ever.

Since January, 1927, little progress has been made in installation of biological exhibits of noteworthy importance in the museum halls, due to

congestion of space preventing addition of new exhibits of any size. The work of the preparatory staff has been mostly confined to remaking and improving old exhibits, and substitution of new material for old inferior material. A considerable number of single specimens of small birds have been added to the systematic exhibit of Canadian birds. Attractive habitat exhibits have been prepared of spotted sandpiper, nest and young, of local material, and of the black-tailed prairie-dog, the latter being collected by J. D. Soper near Val Marie, in southwestern Saskatchewan, in 1927, definitely establishing the occurrence of this species in Canadian territory. The preparation of such groups involves a great deal more time and labour than is generally supposed, for although the natural accessories, including all plants growing in the spot represented, are used, the plants have to be treated, and soft, perishable green leaves and flowers have to be cast and reproduced in wax, in some cases necessitating the manufacture of many hundreds of individual leaves.

Some progress has been made in labelling specimens in large, legible type, with correct names, and as much additional information as space allows. Where possible, appropriate photographs of the animal in its natural habitat are exhibited, as well as coloured maps showing the habitat, summer and winter ranges of migratory species, etc. Where specimens are donated, they are accredited to the donor.

Arrangements have been made with the Forest Products Laboratory, for the installation of some new botanical exhibits, illustrating the growth and life history of four important species of commercial forest trees of Canada, including Douglas fir, western red cedar, hard maple, and white spruce. These will show sections of the trunks, leafy twigs, blossoms, and fruit. Exhibits will also be made of the process of making paper pulp. These exhibits will be in unit sizes, and will be extended further as more room is afforded.

With the assistance of the Honorary Curator of Insects in the National Museum, Mr. Arthur Gibson, Dominion Entomologist, attractive and instructive exhibits of insects are being installed illustrating the life stages of several important species. These will be extended according to the space offered and material available.

Field Work

Important exhibits are made by gift or purchase, but the bulk of the material is obtained through staff activities in the field. Isolated and detached material is valuable as a source of additional information, but scientific reports on animal and plant life are truly valuable only to the extent in which they enable the reader to envisage specimens in their natural surroundings, and the economic value of a report is dependent on the scientist having made his study under actual conditions.

Although it is possible to do a certain amount of winter work, and such is extremely desirable in connexion with some of our big game mammals and fur-bearers, we have heretofore not been able to do much in that line, except in the fortunate instances where members of the staff have been attached to extended expeditions. Biological collecting in Canada is largely a seasonal occupation, and competent field collectors are few in this country. Even if funds were available, the men are not available, as they require years of training to do really effective work. The amount and scope of our field work necessarily leaves much to be desired.

WOOD BUFFALO PARK, N.W.T.

A complete skeleton and skin of the wood buffalo (*Bison bison athabascae*) having long been a desideratum for the museum, it was decided that R. M. Anderson should make an expedition to the Wood Buffalo park in northern Alberta and Northwest Territories, in co-operation with Dr. Seymour Hadwen, head of the department of veterinary science, University of Saskatchewan, Saskatoon, and obtain specimens for both institutions at the same time. Through the kindness of the officials of the Department of the Interior, recommended by the Northwest Territories and Yukon Branch of that Department, permits were granted for the taking of two adult wood buffalo bulls, as well as other mammals and birds for scientific purposes. Mr. Anderson left Ottawa August 26, 1927, and was joined by Professor Hadwen in Saskatoon. They consulted with Mr. Benjamin Lawton, Game Commissioner of the province of Alberta, at Edmonton, and through his offices were granted a permit to collect desirable scientific material in the province of Alberta.

They left Edmonton August 30 for Fort Smith, Northwest Territories, the district headquarters of the Northwest Territories and Yukon Branch, Department of the Interior, and the guardians of the Wood Buffalo park, which comprises about 17,000 square miles on both sides of the Alberta-Northwest Territories boundary line. Through the active efforts of Mr. G. D. Murphy, acting agent of the Northwest Territories and Yukon Branch at Fort Smith, preliminary arrangements had been made for a trip into the park. Though nominally a park, the area is mostly a wilderness in its original state, with the exception of a few short roads to rangers' cabins, and a few pack trails and old Indian trails. Some parts of the park may be reached by canoe at high stages of water, but most of the district is difficult of access in summer, as wagons can go only a comparatively short distance, and the trails in most cases are difficult to traverse of account of old brûlé (burned timber) and windfalls obstructing the way. Camping places have to be selected with care, as good water is difficult to find in a dry season, and much of the water is salty or brackish, on account of the salt springs of the region.

The party left Fort Smith on September 6 with one heavy wagon, one democrat wagon, and five horses, provided with saddles and horse packs. The party consisted of Chief Warden M. J. Dempsey, Warden George Milne, Sousa Marie (Chipewyan Indian guide), G. H. Blanchet, D.L.S. (engaged in survey of the park), S. Hadwen, and R. M. Anderson. Ten wood buffalo were seen by Blanchet at some distance from the road on the 7th. On September 8, we walked about 12 miles looking for buffalo, and in the afternoon and evening rode about 20 miles, visiting Grassy slough on the same quest, but saw no animals, although fairly recent signs were numerous. On the 9th we drove to Pine Lake cabin, the end of the road, and walked down there to Graham ford, Salt river, where we stayed until dark on an elevated platform waiting for buffalo. On the 10th we paddled to the south end of Pine lake, and walked several miles farther along a chain of smaller lakes and sloughs. A herd of eight or ten young buffalo was seeen on the edge of the bush and several others heard in the same vicinity. The tracks showed that they were all small animals, probably Wainwright stock. Much care is necessary in examining the animals, due to the large number of young Wainwright buffalo

that are at large in the southern part of the range. The wood buffalo are said to be in two more or less scattered herds, a northern herd of unmixed stock ranging on the Northwest Territories side of the boundary, running up towards Great Slave lake, a district that is very difficult of access in summer. The southern herd ranges southward towards Slave river in Alberta and it is still a mooted question whether it meets the northern herd at all. Beginning with 1925, nearly 2,000 surplus young buffalo from the Plains stock at Wainwright Buffalo park, Alberta, have been transferred to the Wood Buffalo park, so that now between 5,000 and 6,000 have been established there. There has also been some increase of calves from this stock, and the loss has been comparatively small, attributed mostly to the depredations of wolves upon the young stock. As only young stock was transported, yearlings and two-year-olds, and possibly a few three-year-olds, it is evident that, regardless of any admixture of strains, any buffalo over five years old in 1927 was from the original primitive stock. As the buffalo bulls do not attain the complete development of size and horns until about nine years of age, selection of specimens was largely a question of picking out aged bulls.

On September 11 the party travelled with five saddle horses and partly on foot, visiting Willow lake, but saw no evidence of buffalo except tracks going east. Warden Dempsey made a detour of about 30 miles on horseback next day, but saw no recent signs of buffalo. September 13, went north to jackpine brûlé, thence east and south, and walked several miles along edge of Salt plains, getting back to camp after 12 hours of hard travel on foot. Many deep buffalo trails and old signs, but few signs within two or three days old.

On September 15 the three remaining packhorses were saddled and the party started for the Big Poplar country, which Sousa considered the best buffalo range. Water was scarce everywhere on account of prolonged dry season and extensive bush fires to the northward during the summer and fires in part of the park have evidently sent the buffalo moving southward.

Three species of grouse are found in the park, and a few were seen now and then—the ruffed grouse in poplar and birch woods, spruce partridge in spruce thickets, and sharp-tailed grouse on the open, grassy plains with scattering willow clumps. The ruffed grouse and spruce partridge, which were feeding at this time almost entirely on vegetable matter, leaves, and berries, showed no signs of parasitic infestation or disease, but Dr. Hadwen took a considerable number of small tape-worms from intestines of sharp-tailed grouse which were feeding largely on grasshoppers. The birds in all cases, however, appeared to be healthy.

On September 16 a large buffalo bull was seen to cross the road and followed tracks for about half a mile, 3 or 4 miles from Salt River corduroy bridge. On September 22 we started seven or eight buffalo south of Pine lake. They were very wild and difficult to stalk in the brush, but finally on a jackpine ridge where the trees were more open, picked the largest bull, on the assurance of the guides that it was a large wood buffalo. It turned out to be only of medium size, not more than five years old. The skin, skull, and leg-bones were preserved for specimens and the meat cached. Dr. Hadwen made a thorough examination of all the organs of the animal, including blood-slides. Except for some small internal parasites, the animal appeared to be in a healthy state. It measured: length from nose

to tip of tail vertebræ, 4·3 feet; tail, 1·4 feet; hind foot, from hock to end of hoof, 2 feet; depth of chest, 2·56 feet; height at shoulder, 4·8 feet. After the buffalo had been prepared and packed up, Sousa and the writer made a long detour to west, visiting several small lakes. No recent buffalo signs were observed, but there were several fresh evidences of beaver workings, and young poplars cut down. The beaver are said to be fast increasing in this area and are spreading out to lakes from which they have been absent for several years.

September 24, Warden Milne started back to Fort Smith with the wagon and the remainder of the gear and specimens; the others started for Salt plains, where the buffalo appeared to be heading. At Salt river, above the salt springs, where the water was still fresh, a herd of about a dozen buffalo was seen, on small prairie near the edge of low brush. These were stalked and being assured that one was an undoubted large old bull, he was shot. It was a magnificent specimen, at least nine years old, as shown by the horns, and perhaps older. It measured: length from nose to tip of tail vertebræ, 11·21 feet; tail, 1·45 feet; hind foot, from hock to tip of hoof, 2·23 feet; depth of chest, 3·6 feet; height at shoulder, 5·65 feet; width of fore feet, 4·5 to 5 inches. The animal was so heavy that four men had difficulty in turning him over. Estimated weight, about 2,000 pounds, but the animal was rather lean. Live weights of buffalo are quite variable, and the paunch of this animal was full and weighed about 400 pounds. A party during the next afternoon succeeded in killing a large bull about 5 miles away, so that the quota was complete. This last buffalo measured a trifle larger than the former one, externally, although the long leg bones were identical in length. Length, from nose to tip of tail vertebræ, 12·2 feet; tail, 1·5 feet; hind foot, from hock to tip of hoof, 2·12 feet; depth of chest, 3·88 feet; height at shoulder, 5·7 feet; width of fore foot, 4·2 inches; estimated weight about 2,000 pounds. Nine large buffalo crossed the end of the prairie in the morning and an unsuccessful attempt was made to photograph them.

The party returned to Fitzgerald about noon on the 30th, with pack-train, packed the specimens, and left Fitzgerald on the next boat, October 6. They arrived at Edmonton on October 14. The expedition accomplished the main purpose of the trip, of obtaining wood buffalo, and also secured a number of other specimens, including black bear, beaver, northwestern muskrat, Mackenzie bog-lemming, brown bat, and other small species, as well as a few birds. By co-operation with Dr. Hadwen, an expert parasitologist and animal pathologist, investigations were made which may prove of value, as he was enabled to make critical examinations of internal organs and take blood-slides of specimens captured for museum purposes. There is a great deal to be learned in regard to the inter-relations among the different species of mammals, and the most lowly species of vole or shrew may be host to various internal and external parasites, or bear trypanosomes in its blood that may work havoc on themselves as well as on other species that eat them raw or feed on the same range. Dr. Hadwen later described a new form of tapeworm from cysts found in liver of a muskrat taken near head of Salt river. Further investigations along these lines may solve some of the problems of the periodicity of certain species, or their fluctuations in numbers from year to year, or in cycles. The northern varying hare or snowshoe rabbit in the north is an example.

BRITISH COLUMBIA

In order to add to the mammal collections of the National Museum and begin a biological survey of a region that has not been thoroughly worked heretofore, a field party was sent to the southern part of British Columbia near the International Boundary. A number of species of mammals are found there which were not well represented in our collections, if represented at all. It is also known that a number of species reach the northern limit of their habitat near this line and chances are good that intensive field work would reveal the presence of species heretofore not known to occur in Canada. The southern part of British Columbia being much cut up by alternating mountains and valleys, showing different climatic conditions due to humidity and altitude, it is desirable that information be obtained in regard to the local faunas. As a number of species and subspecies have been described from this part of the country, which are not represented in Canadian collections, it is also desirable that topotypes, or specimens from districts near to type localities, be obtained wherever possible. Mr. Charles H. Young, collector-preparator specialist, with Mr. Hamilton M. Laing, of Comox, British Columbia, as assistant, was detailed to this work. They began at Huntingdon, just north of the state of Washington, about May 13, 1927, and made extensive collections of the fauna, both mammals and birds, of the narrow coastal plain west of the Cascade Mountains range. Trips were also made to Sumas, and Cultus lake. This region is rather thickly settled, but has a rich assortment of small mammalian life, and specimens were taken of most of the forms, including the aplodontia (or so-called "mountain beaver"), three species of moles, several species of shrews, bats, weasels of three different species, two species of skunks, pack-rats, Douglas squirrel, flying squirrels, muskrats, and numerous species of mice or voles.

Mr. Laing moved his base to Lihumption park July 20 and worked in this mountain district until August 21. Mr. Young went into the same district July 28 and remained until August 7, when he moved to Hope, higher up in Cascade mountains. Mr. Laing moved to Hope-Princeton summit pass August 21 and remained until September 19, when he proceeded to Stevenson creek, near Princeton, where he collected until October 8. Mr. Young remained at Hope until September 7, when he was obliged to return to Ottawa. The net results of the season's work were: for Mr. Laing, 490 mammals (Cat. Nos. 7492–7961) and 75 birds (Cat. Nos. 22430–22504), and for Mr. Young 426 mammals (Nos. 7046–7421), 5 birds (Nos. 22303–22306, 22575), and one set of eggs; total 916 mammals and 80 birds. An interesting record was the taking of several specimens of the large black Townsend mole, or Oregon mole, at Huntingdon, the first record of the occurrence of this species in Canada. Two species of large moles were found near here, and Mr. Young states that the larger species, Townsend mole (*Scapanus townsendii*) was found burrowing on comparatively low ground, whereas the Scheffer mole (*Scapanus orarius schefferi*), a slightly smaller species, was found higher up on the terraces. Both of these moles are Pacific coast species, and in Canada are found only in extreme southwestern British Columbia, west of the Cascades and south of Fraser river.

PRAIRIE PROVINCES

The Great Plains area along the International Boundary in southern Alberta, Saskatchewan, and Manitoba promised another fruitful field for intensive collecting. Although the climatic conditions in this area are fairly uniform, except for local variations in aridity, and occasional elevations, as Cypress hills, Wood mountain, and Turtle mountains, there are some local differences due to the wide extent of territory, with eastern influences causing intergradation in the Manitoba sector and Rocky Mountain influences in the Alberta sector. Also, as in British Columbia, there are certain southern species that reach the northern limit of their ranges in the vicinity of the International Boundary. As much of this region is thinly settled and devoted largely to grazing, there are many points of interest that are rather remote from railway service, and moving by rail involves many roundabout and time-consuming detours, so that it was decided to conduct this survey by motor car. Mr. J. D. Soper, who had the previous year completed a two-year expedition to Baffin island, for the museum, was re-engaged. He was allowed the use of a half-ton truck and used it with great success during the season, demonstrating the efficiency and economy of using modern methods of transportation in museum field work. All of our field men in the past have laboured under the inconvenience of passing by many likely-looking spots for biological field work, seen from train windows, where they were unable to stop without a return trip and hampered by the difficulty of arranging for local transportation into the country and return. By using a motor car, all attractive places on the route may be explored, and if conditions do not prove fruitful, the trip may be continued without further delay. This method brings back some of the advantages of the old ox-team and covered-wagon route surveys, in the way of examining the ground thoroughly, with the advantage of greater speed. The method of surveys by rail has some advantages, but the jumps are too long, and the territory along the right-of-way is generally more thickly settled. The advantages of motor car transportation wherever there are passable roads, are very evident in this work.

Mr. Soper started work at Munson about June 1, and was somewhat delayed by unseasonable and unusually heavy rains and compelled to make some detours. He took some specimens at Coleman, Alberta, from June 14 to June 17, and at Burmis June 18 to 21. Moving south and east he camped on Milk river, Alberta, longitude 112° 25′ west, from June 24 to July 2; north of Sweet Grass hills from July 6 to July 12; Deer creek from July 13 to July 19; Pend d'Oreille July 20; Eagle butte from July 22 to July 30; Lodge creek from August 1 to August 8. The early part of this work was in the dry, open plains country just north of the Montana border, and the latter part of July was spent on the partly wooded escarpment of the western edge of Cypress hills. Proceeding east, he began work in Saskatchewan on August 9 at Battle creek, where he remained until August 12, working also at Fort Walsh. He remained at East End, Saskatchewan, east of Cypress hills, from August 20 to August 30; at Val Marie, near Frenchman river, from August 28 to September 3; making a special effort to investigate reported occurrences of the black-tailed prairie-dog (*Cynomys ludovicianus*) in the region around East End and Val Marie, and was successful in obtaining five specimens of this species, with material

for a habitat group for the museum. As far as we know, these are the first authentic specimens taken and recorded in Canada, although there have been various fugitive reports of local colonies. The next stop was at Lonesome butte, Saskatchewan, from September 9 to September 16; at Big Muddy lake from September 20 to September 26; at McDonald lake from September 29 to October 4; at Glen Ewen from October 11 to October 17. He then proceeded into southwestern Manitoba, camping first at the junction of Antler and Souris rivers, from October 19 to October 24; then moving to Max lake, Turtle mountains, where he remained from October 27 to November 3.

Notice having been given that the Government of Saskatchewan had decided, after a close season of several years, to open the season of elk from November 15 to December 15 this year, and as the elk of that region have been considered as a distinct form, the prairie elk (*Cervus canadensis manitobensis*), now restricted to a few small local areas in western Manitoba and Saskatchewan, it was considered very desirable to obtain specimens for the National Museum before this form of elk is extinct. Mr. Soper consulted with the Provincial game officials at Regina and was granted a permit to take a male and female of this species, as well as of other big game and other mammals encountered. He proceeded from thence to Prince Albert, and by team about 60 miles northward to Harper lake, Saskatchewan, where he arrived just previous to the opening of the season. He received much assistance from Mr. Andrew Holmes, the game guardian of that district, who aided him very much in procuring the desired specimens, and a number of others. He collected in the vicinity of Harper lake from November 17 to December 8, and in the vicinity of Birch Bark lake from December 12 to December 14, when he returned to his home in Alberta. The results of the northern Saskatchewan trip included three elk (one being a head obtained from a local resident), two moose, two mule deer, one red fox, and a number of smaller mammals. The total results of Mr. Soper's season's work comprised 639 mammals (Cat. Nos. 7962-8600), 103 birds (Nos. 22328-22429), and one set of eggs (No. 1985), a very creditable season's work, considering the variety of the material obtained and the unfruitfulness of some of the country traversed. It must be borne in mind that the value of biological reconnaissance work can not be judged merely by catalogue numbers, as in arid or barren districts where forms of life are comparatively few the same amount of effort is involved in obtaining one specimen as in collecting eight or ten in other more favourable districts. Also, the time and labour involved in collecting and preparing an elk, moose, or deer is more than that involved in trapping and skinning two or three dozen, or more, squirrels or field mice.

QUEBEC

Mr. Joseph Rochon continued field work in the province of Quebec from August 15 until September 15 at Ste. Veronique, Labelle county, Quebec. The results of his work consisted of 141 mammals, mostly skins and skulls of small species, although some small skeletons were obtained. A good assortment of the small mammals of the region was secured, although, as many species are very local in distribution, and some of them are rare, it is impossible to get a complete collection in any one season. The periodicity of fluctuation in numbers of some species in different years is an

important factor to be considered in estimating a local collection made in any one year. Species which are rare one year may be common two or three years later, or vice versa. The most important specimen collected was an eastern least weasel (*Mustela rixosa allegheniensis*), this being the most eastern point at which the least weasel or mouse weasel species has been taken in North America, according to the records available, and the only record of this eastern subspecies in Canada.

LOCAL FIELD WORK

Clyde L. Patch, Claude E. Johnson, and D. Blakely devoted some time to collection of local species in the Ottawa district to complete habitat groups of birds and specimens to fill out the systematic collection of birds and mammals. They were not able to devote much time to this work, as their time was mostly taken up in the preparation of material for exhibition. Mr. J. E. Perron, although devoting most of his time to tanning mammal skins, spent some time assisting in the preparation of the mammal groups. Mr. Blakely was kept busy most of the time in remaking and cleaning old skins and fresh salted skins that came in from some of the field parties, in which specialized form of work he has developed an excellent technique and has been able to salvage a lot of very valuable material. Mr. Jos. Rochon and D. MacDonald cleaned something over 1,700 skulls of mammals, as well as other bones and skeletons, and bones of a few birds.

Publications

J. D. Soper spent the time from January 1 to May 15 in preparing for publication an account of his work for the Museum in Baffin island during the summer of 1923 and for the period from July, 1924, to September, 1926. It will be issued under the title of "A Faunal Investigation of Southern Baffin Island." Mr. M. O. Malte prepared a paper on "Commercial Bent Grasses of the Genus *Arctogrostis*," P. A. Taverner prepared a paper on "Birds of the Belvedere Region, Northern Alberta," covering the work of himself and H. M. Laing during the field season of 1926. H. M. Laing prepared a report on the "Birds and Mammals of the Mount Logan Expedition of 1925," with critical notes on the birds by P. A. Taverner and on the mammals by R. M. Anderson. The papers by Malte and Taverner were published in the 1926 Annual Report of the Museum, and the paper by Laing appears in the present Annual Report.

In preparing the report on Baffin Island fauna, a lack of definite published information on the animal life of this, the largest Canadian island, was found, there being very little in English outside of the report by Professor Ludwig Kumlien ("Contributions to the Natural History of Arctic America, Made in Connection with the Howgate Polar Expedition, 1877-78," by Ludwig Kumlien, naturalist of the expedition, Department of the Interior, U.S. National Museum, Bulletin No. 15, Washington, 1879, pp. 1-179, 21 pages being devoted to the mammals, and 36 to the birds). Having found some references to the work of a young German naturalist, Bernhard Hantzsch, who spent two years in Baffin island, 1909-1911, dying on the shores of Foxe basin in the spring of 1911, R. M. Anderson prepared a translation of Hantzsch's "Beobachtungen über die Säugetiere von Baffinsland" ("Observations on the Mammals of Baffin Island"), *Sitz-*

ungsberichte der Gesellschaft naturforschender Freunde zu Berlin, 1913, pp. 141-160. With the assistance of Mrs. Anderson there was also prepared for the Museum Library a translation of Dr. Erich Hesse's publication of Hantzsch's ornithological journal and critical studies of the Baffin Island birds brought back, under the title "Bernhard Hantzschs ornithologische Ausbeute in Baffinland" ("Bernhard Hantzsch's Ornithological Results in Baffin Island"), *Journal für Ornithologie*, vol. 63, No. 2, 1915, pp. 137-228; also "Beitrage zur Kenntnis der Vogelwelt des nordöstlichsten Labradors" ("Contribution to the Knowledge of the Avifauna of Northeastern Labrador"), by Bernhard Hantzsch, *ibid.*, vol. 56, pp. 177-202 and 307-393. The publication of the latter paper was begun in *The Canadian Field-Naturalist*, Ottawa, vol. 42, Nos. 1, 2, and 4, and following numbers, as an important contribution to Canadian ornithology. Thanks are due to the Library of the University of Toronto for the loan of the original of the copy of *Sitzungsber. Gesell. naturf. Freunde*, and to the Emma Shearer Wood Library of Ornithology, McGill University Library, Montreal, for loan of volumes of *Journ. für Ornithologie*. Of further assistance in the studies on Baffin island, another very valuable paper was "Bernhard Hantzsch und seine letzte Forschungsreise in Baffinland" ("Bernhard Hantzsch and His Last Scientific Expedition to Baffin Island"), *Mitteilungen des Vereins für Erdkunde zu Dresden* (Communications of the Geographical Society of Dresden), Band II, Heft 7, Abhandlungen 5, 1913, pp. 669-716, by Dr. M. Rosenmüller and Dr. O. Israel. The latter publication appeared to be unavailable in Canada, and the Library of Congress at Washington was kind enough to loan a copy to the Museum library. A translation of the latter paper is being printed by the Northwest Territories and Yukon Branch, Department of the Interior, in connexion with an account of work by others in Baffin island. In making an extended study of the natural history literature of the eastern Arctic region, Mr. Anderson found that much valuable and interesting material had been generally overlooked and was virtually unavailable to most students on account of not being printed in English, and in many cases difficult to obtain in this country. He prepared a paper for the Washington meeting of the American Ornithologists' Union, November 16, 1927, on "The Work of Bernhard Hantzsch in Arctic Ornithology," which was welcomed as a contribution to the literary side of the science, and was solicited for publication in *The Auk* in 1928.

P. A. Taverner contributed an important paper to *The Auk*, vol. 44, No. 2, April, 1927, pp. 217-228, entitled "Some Recent Canadian Records." In this paper he recorded a number of Canadian bird occurrences that have not been formally recorded, as well as a few others that are not generally available for reference, the whole being to some extent supplementary to his "Birds of Eastern Canada" (1922), and "Birds of Western Canada" (1926). Other members of the staff have contributed brief notes and reviews of natural history literature to periodicals, but no formal articles have been listed.

A report on Marine Algæ, being Part B, Report of the Canadian Arctic Expedition, 1913-18, was issued November 4, 1927, by the Department, under the supervision of R. M. Anderson, general editor of reports of this expedition. It comprised sections on "Bering Sea and Arctic Ocean Algæ," by the late Frank Shipley Collins; "Calcareous Algæ," by Mme. Paul Lemoine, of the Museum of Natural History, Paris; and "Hudson

Bay Algæ," by Marshall A. Howe, Assistant Director of the New York Botanical Garden, pages 1-30, Pl. 2. This paper completes the nine parts of volumes IV and V of the Arctic botanical reports, and an index of the whole botanical section has been prepared, and will soon be issued.

Museum Bulletin No. 48, Biological Series No. 13, "A Study of *Buteo Borealis*, the Red-tailed Hawk, and Its Varieties in Canada," by P. A. Taverner, pp. 1-20, 3 coloured plates, was issued November 11, 1927.

R. M. Anderson made considerable progress on a Check-list of Canadian Mammals, of which he has found about 470 forms recorded from the Dominion of Canada, including the Dominion of Newfoundland and its Labrador mainland section, which is similar to Quebec from the zoological standpoint. There has been no complete modern list of the mammals of Canada as a whole, and it should be of some value to students and others to have the English, French, and Latin names of the species found in the different districts, with lists of the type localities, and the ranges and habitats of the different species. Additional data is solicited from persons having records of the rarer species or of spread of any species.

P. A. Taverner has been working during the year on a monograph of the sea-birds of Canada, having extended the scope of this work to include the sea-birds of the Pacific coast as well as the Atlantic, as was originally intended.

Lectures by Staff

By C. L. Patch:

"Birds," Osgood School, Ottawa, March 25, 1927.

"Amphibians and Reptiles of Canada," Preston, Ontario, May 3, 4.00 p.m.

"Some Canadian Birds," Preston, Ontario, May 3, 1927.

"Amphibians and Reptiles," Brodie Club, Toronto, May 10, 1927.

"Amphibians and Reptiles," Creighton School, Ottawa, May 12, 1927, 3.00 p.m.

"The National Museum," Canadian League, Ottawa, May 17, 1927.

"Amphibians and Reptiles," Hamilton West Public School, October 10, 1927, 10.00 a.m.

"Amphibians and Reptiles," Hamilton Bird Protection Society, October 10, 1927, 4.00 p.m.

"The Gannets of Bonaventure," Hamilton Bird Protection Society, October 10, 1927, 8.15 p.m.

"Unusual Features of the Animal Kingdom," National Museum of Canada, November 12 and 16, 1927.

"Amphibians and Reptiles," St. Andrews Troop Boy Scouts, November 25, 1927.

"Amphibians and Reptiles," Ashbury College, Rockcliffe, November 26, 1927.

By M. O. Malte:

"Botanical Work on 1927 Arctic Expedition," before open meeting of Ottawa Field-Naturalist's Club, Museum auditorium; before Editors' division, Professional Institute of Civil Service; and Gastronomic Club.

By R. M. Anderson:

"Natural History Work in Canadian Arctic, Particularly in Baffin Island," Ottawa Field-Naturalists' Club.

"The Work of Bernhard Hantzsch in Arctic Ornithology," 45th annual meeting of the American Ornithologists' Union, Washington, D.C., November 16, 1927.

Preparatory Work

Work of C. L. Patch, Chief Taxidermist and Herpetologist; D. Blakely, Taxidermist; and J. E. Perron, Museum-helper tanner:

Bird and smaller mammal skins prepared for study collections	212
Larger mammal skins tanned (caribou, polar bear, grizzly bear, black bear, fox, seal, beaver, deer, elk, mountain sheep, antelope, cougar)	51
Mammals and birds prepared for exhibition purposes	92
Specimens loaned to schools for educational purposes	279

The specimens in greatest demand were the muskrat, beaver, hare, red squirrel, oriole, bluebird, red-winged blackbird, red-headed woodpecker, robin, frog, and toad.

Work of Claude E. Johnson, Artist of the division:

Retouched or coloured photographs	27
Slides (two special)	2
Colour plates	9
Plaster moulds	36
Wax and celluloid pieces (cast and coloured)	1,630
Lettering (including special enlarged shield for Metallurgical Congress)	3
Map models (coloured on celluloid)	2

Completed for exhibition, habitat groups: Wilson thrush, spotted sandpiper, dowitcher.

Miscellaneous details in mammal habitat groups of: black-tailed prairie-dog, Canadian otter, European hare (introduced and acclimated in Ontario).

Coloured feet and beaks: whistling swan, common cormorant, Kumlien gull, duck hawk and young, green-winged teal, 2 puffins, 1 murre.

12 wall tints prepared for lecture hall and for Dr. Collins, some repairs on exhibition groups, etc.

Accessions

ACCESSIONS TO THE BIOLOGICAL COLLECTIONS:

Mammals received and catalogued	2,096
Birds received and catalogued	346
Reptiles and amphibians received and catalogued	285
Birds' eggs (sets) and nests	2
	2,727

ACCESSIONS OF MAMMALS:

By members of staff:

Hamilton M. Laing (southern British Columbia)	490
Charles H. Young (southern British Columbia)	326
J. Dewey Soper (southern Alberta, Saskatchewan, and Manitoba)	639
R. M. Anderson (northern Alberta)	11
Jos. Rochon (southern Quebec)	141
C. L. Patch (Quebec)	2
	1,609

By gift, outside of collections made by members of staff:

Canadian National Parks Branch, Department of the Interior, 2 marten skins (Jasper park); 1 skeleton and 1 skull of mule deer (Waterton Lakes park); 1 skeleton, incomplete, Rocky Mountain cougar, 1 skeleton black bear, 1 skull black bear (Jasper park); 6 skulls bighorn sheep (Waterton Lakes park); 1 skin and skull of black bear (Waterton Lakes park); 1 skin of Rocky Mountain marten (Jasper park); 1 mounted head of plains buffalo, "Sir Donald," the last of the wild plains buffalo in Canada, died April 6, 1909,

aged 39. Probably one of three calves captured by C. B. Alloway in vicinity of Prince Albert, Saskatchewan, in 1873; later presented by Lord Strathcona to city of Winnipeg. This mounted head was formerly hung in Rideau Hall, Ottawa, then transferred to Canadian National Parks branch, and later to National Museum of Canada.

Northwest Territories and Yukon Branch, Department of the Interior, 9 skins of cub wolves (Arctic wolf) in Great Slave Lake region, killed for bounty; 5 skulls of northwest timber wolf, taken north of Peace river, northern Alberta, in Wood Buffalo park.

Morris M. Green, Ardmore, Pennsylvania, 2 skins with skulls of forest vole, *Microtus pennsylvanicus fontigenus* Bangs, topotypes, from Lac Edouard, Quebec; 2 skins with skulls of bean mouse, *Microtus pennsylvanicus wahema* Bailey, topotypes, from Glendive, Montana.

Hamilton M. Laing, Comox, Vancouver island, British Columbia, 6 skulls of Columbian black-tailed deer, *Odocoileus columbianus columbianus* (Richardson), from Comox, B.C.

W. E. Lake, Turtleford, Saskatchewan, 1 skin and skull of Hayden shrew, *Sorex cinereus haydeni* (Baird).

Richard Finnie, Ottawa, 1 black squirrel, *Sciurus carolinensis leucotis* (Gapper), in the flesh, taken between Ironsides and Kingsmere, Quebec, April 28, 1927.

A. E. Porsild, Northwest Territories and Yukon Branch, Dept. of the Interior, Ottawa, bones of mammoth, horse, and caribou, from Candle Creek gravel deposits, Seward peninsula, Alaska.

H. F. Hudson, Strathroy, Ontario, 1 star-nosed mole, 1 vole, in the flesh.

J. B. Hunter, Deputy Minister, Public Works Department, 1 mounted head of Stone sheep, from northern British Columbia.

C. A. E. Hensley, Winnipeg, 1 skull of Keewatin mink.

Royal Canadian Mounted Police, 2 musk-oxen (skins and skulls complete) taken in December, 1926, at head of Grethasoer fiord, Ellesmere island; 3 Peary Arctic caribou (skins and skulls), from Hyperit point, Axel Heiberg island, April, 1927, collected on patrol by Staff-sergeant (now Inspector) A. H. Joy; through Commissioner Cortlandt Starnes. Also skulls of Arctic fox, polar bear, seals, ermine, and embryos of Arctic hare, walrus, and ringed seal, from Staff-sergeant J. E. F. Wight, Constables T. H. Tredgold, S. H. G. Margetts, and E. E. Tutin, of Pangnirtung detachment, Baffin island.

Dr. Morten P. Porsild, Director, Danish Arctic Station, Godhavn, Greenland, 3 skulls of Greenland caribou (*Rangifer groenlandicus*).

H. S. Arkell, Ottawa, 1 silver fox pup.

By purchase:

J. D. Soper, Edmonton, 287 small mammals, from Ontario, Alberta, British Columbia, etc. Private collection from 1916 to 1926.

Clovias Seguin, Timmins, Ontario, 1 skin and skull of Canadian land otter, near-albino of golden-yellowish colour, taken at Kamiskotia lake, Ontario.

ACCESSIONS OF BIRDS:

By members of staff:

J. D. Soper (southern Alberta, Saskatchewan, and Manitoba)	102
H. M. Laing (southern British Columbia)	75
R. M. Anderson (northern Alberta)	15
P. A. Taverner, Ontario	8
W. K. Bentley, Ontario	6
C. H. Young, southern British Columbia	5
	211

ACCESSIONS OF BIRDS—*Continued*

By gift, outside of collections made by members of staff:

Dudley Dimock, Grand Cascapedia, Quebec, 1 dovekie, in the flesh.
Canadian National Parks Branch, Department of the Interior, 2 ducks (Jasper park).
Dennis Ashby, Croyle, Duncan, Vancouver island, B.C., 1 ring-necked duck, 2 European widgeon, 1 ruddy duck, 1 Clarke nutcracker (old mounted bird).
Talbot Criddle, Treesbank, Manitoba, 1 goshawk in the flesh.
Ed. White, Ottawa, 4 wings of greater snow goose.
Stuart Criddle, Aweme, Manitoba, 1 screech owl, in the flesh.
H. A. C. Jackson, Montreal West, Que., 1 pellet of snowy owl.
Manley Miner, Kingsville, Ontario, 1 blue goose in the flesh, found dead at Jack Miner's bird sanctuary.
Wm. Macoun, Central Experimental Farm, Ottawa, 1 great horned owl, in the flesh.
Canadian National Parks Branch, 2 whistling swans, in the flesh, from Kingsville, Ontario.
Carnegie Museum, Pittsburgh, Pa., 1 flicker, from cape Wolstenholme, Hudson strait, collected July, 1925.
Alice M. Smith, Owen Sound, Ontario, 1 Wilson thrush, in the flesh.
Frank L. Farley, Camrose, Alberta, 1 bean goose, the first record of the species in Canada (*Anser fabalis*).
H. Mousley, Montreal, 1 nest of rose-breasted grosbeak, from Verdun, Que.
Ralph E. DeLury, Ottawa, 1 chickadee, in the flesh.
Dr. L. H. Livingstone, Northwest Territories and Yukon Branch, 4 snow geese, from Baffin island.
Royal Canadian Mounted Police, Pangnirtung detachment, Baffin island, 2 sets birds' eggs; 5 birds; sent by Corporal H. P. Friel.
Canadian National parks, 1 golden eagle, in the flesh.
Arthur English, St. Johns, Newfoundland, 1 short-eared owl, 2 ptarmigan.
Jack Miner, Kingsville, Ontario, 1 red screech owl, in the flesh.
Frederic H. Kennard, Newton Centre, Mass., 2 blue geese, from Clyde river; 1 blue goose and 2 snow goose heads, from Eclipse sound, Baffin island.
Garnet Wiggans, Bristol, Que., 1 great horned owl, in the flesh.

By purchase:

Allan Moses, Grand Manan, New Brunswick, 1 Kumlien gull, in the flesh.
Allan Moses, Grand Manan, 1 male adult common cormorant.
Arthur English, 27 Newfoundland ptarmigan skins, fresh salted.

By exchange:

From Arthur C. Bent, Taunton, Massachusetts, skins of downy young of dowitcher, Pribilof sandpiper, pectoral sandpiper, golden plover, Steller eider, spectacled eider, king eider, Pacific eider.

ACCESSIONS OF REPTILES AND AMPHIBIANS:

By members of staff:

Clyde L. Patch (Pottageville and Hamilton, Ontario; Meach lake, Pink lake, and Burbidge, Quebec)	131
E. M. Kindle, Tenaga, Quebec	2
J. D. Leechman, Pink lake, Quebec	2
Hamilton M. Laing, Huntingdon, British Columbia	1
Harlan I. Smith, Usk and New Hazelton, B.C.	11
J. D. Soper, Val Marie, Saskatchewan	2
W. J. Wintemberg, Tadoussac and Point aux Basques, Que.	2
Charles H. Young, Huntingdon, Smith falls, and Lihumption park, British Columbia	7
	158

ACCESSIONS OF REPTILES AND AMPHIBIANS—*Continued*

By gift:

M. Y. Williams, Coulée, Saskatchewan	1
W. Annand, Ottawa, Ontario	1
J. Roland Brown, Hamilton and Port Maitland, Ontario	26
Mr. Brayshaw, Coldstream, British Columbia	1
J. V. Butterworth, Southwest Mabou, Nova Scotia	5
D. M. Campbell, Armstrong, British Columbia	4
Norman Criddle, Treesbank, Manitoba	3
Mrs. Cummings, Charleston, South Carolina	2
Murray W. Curtis, Athens, Ontario	1
Doreen Dodd, Telegraph Creek, British Columbia	2
L. M. Klauber, San Diego, California	4
W. J. LeRay, Oak Lake, Manitoba	1
Edgar Lester, Arnprior, Ontario	20
Hoyes Lloyd, Kingsmere, Quebec	1
Robert Lockwood, Pink lake, Quebec	1
Leon Marcotte, Sherbrooke, Quebec	19
Lloyd W. Patch, Edgewater, Maryland	2
H. G. Pittman, Wauchope, Saskatchewan	1
W. E. Saunders, Fishers Glen, Ontario	1
H. L. Seamans, Dunmore, Alberta	1
T. L. Thacker, Laidlaw, British Columbia	2
John Woolsey, near Quyon, Quebec	28
	127

ACCESSIONS TO BOTANICAL COLLECTIONS:

By staff:

From 1927 Arctic Expedition (eastern Arctic), sheets, about	4,000
From New Brunswick, about 550 species, sheets, about	3,000

By gift and exchange:

H. Groh, Ottawa, Ontario	53
Gray Herbarium, Cambridge, Massachusetts	229
National Museum, Stockholm, Sweden	10
Dr. Morten P. Porsild, Danish Arctic Station, Godhavn, Greenland	132
Dr. B. Lynge, Oslo, Norway	87
E. A. Moxley, Owen Sound, Ontario	47
E. M. Kindle, Ottawa, Ontario	69
Fr. Marie-Victorin, Montreal, Quebec	191
Mrs. George Black, Dawson, Yukon	31
Dr. E. H. Moss, Edmonton, Alberta	60
Miss E. S. Dowding, Edmonton, Alberta	2
Wm. Herriott, Galt, Ontario	5
Henry Mousley, Montreal, Quebec	8
	924

Plants distributed:

Gray Herbarium, Cambridge, Massachusetts	283
National Museum, Stockholm, Sweden	36
Fr. Marie-Victorin, Montreal, Quebec	104
Dr. B. Lynge, Oslo, Norway	63
Scholasticate of the Oblates of Mary, Ottawa	224
Dr. Selim Berger, Stockholm, Sweden	100
	812

MISCELLANEOUS COLLECTIONS:

Birds' eggs in sets, and nests	6
Birds' stomachs (in formalin), for investigation of contents, received and catalogued	25
Insects collected, mostly Microlepidoptera	500
1 young alligator, about 8 inches long, from Mrs. John Coolidge, Ottawa (from Florida).	

SPECIMENS DISPOSED OF:

75 mounted birds, old collection, duplicates, presented by the National Museum of Canada, to the Museum of Fort Anne, one of the historic sites, under the Canadian National Parks Branch, at Annapolis Royal, Nova Scotia, June 9, 1927.

1 skin of Arctic loon, *Gavia arctica pacifica*, to Royal Ontario Museum of Zoology, Ontario, to complete their exhibition series.

5 downy young of shore birds, red-backed sandpiper, stilt sandpiper, white-rumped sandpiper, Baird sandpiper, and Wilson phalarope, to Arthur C. Bent, Taunton, Mass., in exchange for desiderata of the same kind.

DONATION:

150 framed pictures and 11 large diagrams, constituting the Italian Government educational exhibit at the World's International Poultry Congress, held at Ottawa, August 1927. The pictures are mostly photographs of originals and water colour copies of fowls made by Ulysses Aldiovardi Bonaniensis (1592-1605), to which are added Middle Ages examples of fowls in art. The diagrams are mostly illustrating genetic descent by Professor Alessandro Ghigi, Department of Zoology, University of Bologna.

As a result of field work by members of the staff, considerable additions have been made to the reserve study collections of mammals, birds, reptiles, and batrachians, and many specimens suitable for future mounting have been acquired. A few particularly desirable specimens have been purchased. Many valuable specimens have been obtained by gift or transfer from other departments, notably from the Canadian National Parks Branch, and the Northwest Territories Branch, of the Department of the Interior, and from the Royal Canadian Mounted Police.

The Canadian National Parks Branch, through the Commissioner of Parks, Mr. J. B. Harkin, has kindly sent in many specimens of large game, predatory, and fur-bearing mammals that have died from natural causes, or have been killed by park wardens, as well as confiscated for illegal trapping in the various national parks, Waterton Lakes, Yoho, and Jasper. The Northwest Territories and Yukon Branch has sent in several skulls of timber wolves and Arctic wolves from the northern districts, principally from the Wood Buffalo park. The Commissioner of the Royal Canadian Mounted Police, Colonel Cortlandt Starnes, has showed continued interest in the work of the Museum and has encouraged the police detachments in the north to send in material to the Museum, obtained on their long patrols in remote districts. The most notable accession secured during the year was a series of three skins and skulls of the small white Peary Arctic caribou, taken by Staff-sergeant (now Inspector) A. H. Joy, on Axel Heiberg island in the spring of 1927. The same detachment also sent in two complete skins and skulls of the white-faced musk-oxen taken on western side of Ellesmere island. We are also greatly indebted to Dr. Morten P. Porsild, director of the Danish Arctic station, at Godhavn, Greenland, for the gift of three fine heads of the Greenland caribou, brought down by the Canadian Arctic Expedition of 1927. Both of these species of caribou mentioned have long been desiderata in our mammal collections.

Considerable progress has been made in identifying and arranging the systematic collections, particularly in botany, mammalogy, and herpetology, and a large amount of data has been assembled along these lines for use in reports and memoirs now in preparation, or necessary as a foundation for future publications. The determination of the large amounts of new material coming in from new districts has involved considerable study on

the part of the technical officers of the Biological Division. As time goes on, and the collections are increased annually, identified and labelled properly, and arranged systematically, they become gradually more valuable and convenient for purposes of study and reference, and extremely useful for consultation. In return for the kindness and scientific interest of correspondents and contributors to the National Museum, it is the aim of the officials to make it a repository and clearing-house for all manner of data in regard to the animal and plant life of the Dominion of Canada and related regions.

Botanical Field Work

M. O. Malte, Chief Botanist, National Herbarium, early in the spring visited the New York Botanic Garden and the American Museum of Natural History, New York; the United States National Herbarium, Washington, D.C.; and the Gray Herbarium, Harvard University, Cambridge, Mass., for studies of critical plant genera and methods of arranging botanical museum exhibits. On June 21 he left, with W. R. Watson, student assistant, for northwestern New Brunswick, making his headquarters at St. Leonard. On July 12 he left for North Sydney, N.S., to join the Canadian Arctic Expedition of 1927, under direction of Mr. George P. Mackenzie, Northwest Territories and Yukon Branch, Department of the Interior, which sailed on July 16 on S.S. *Beothic* for Greenland and the principal islands in the eastern part of the Canadian Arctic archipelago. After a brief visit to Godhavn, Greenland, the *Beothic* proceeded to Eclipse sound, Baffin island, with the object of touching Pond inlet, some distance up the sound. Solid ice in the sound, however, prevented the ship from reaching the objective, and the course was, therefore, set for Dundas harbour, North Devon island, where a landing was successfully effected. From Dundas harbour the *Beothic* sailed for Craig harbour, Ellesmere island, where a stop of a few hours was made. From there the ship proceeded to Etah, Greenland, and thence to Bache peninsula, Ellesmere island, the most northerly port of call on the schedule. On account of rather threatening ice conditions, the stay at Bache peninsula had to be cut as short as possible and, as soon as the necessary supplies for the Mounted Police post had been landed, the *Beothic* was headed southward. After having visited Craig harbour and Dundas harbour again, an effort was made to reach Melville island, but unfavourable ice conditions in Barrow strait thwarted the attempt. After a few days forced stay at Beechey island, the *Beothic* steamed for Port Leopold, Somerset island, and from there for Arctic bay, Admiralty inlet, Baffin island. From Arctic bay the expedition sailed for Ponds inlet, which was reached after some delay caused by the ice conditions. From Ponds inlet the *Beothic* proceeded to river Clyde, then to Pangnirtung, Cumberland gulf, and from there to Lake harbour, on the south coast of Baffin island. After brief visits to Wakeham bay and Port Burwell, on the south shore of Hudson strait, the *Beothic* finally returned home, reaching North Sydney, Nova Scotia, September 5.

Botanical collections were made at all points mentioned above, the total number of herbarium sheets secured and prepared being about four thousand. This number was gathered in seventy-seven hours of actual collecting. The proper preparation of such a comparatively large number

of specimens was made possible through a combined use of double corrugated boards and heat. No felt driers were used in exsiccating the specimens. The plants were placed directly on the corrugated boards and, when a press of suitable size had been made up, it was placed on the fiddley ladder. The heat from the boilers dried the plants perfectly in forty-eight hours or less, the specimens so prepared keeping their colours, both in respect to foliage and flowers, much better than plants pressed in felt driers.

From a scientific point of view the expedition was a decided success. Ellesmere island, having been thoroughly explored by the Sverdrup expedition, yielded one species and one variety not previously reported from there. At Dundas harbour, North Devon island, twenty-nine species not so far recorded from the island were collected within a radius of about a mile from the Mounted Police post, and at Port Leopold, Somerset island, probably one of the most barren places in the Archipelago, one additional species and two varieties were found. Baffin island, however, gave the real surprise. There not less than about forty species and four varieties not previously recorded from the island, were collected. Of these, almost a score have so far not been known to occur north of Hudson strait. The most interesting thing, however, in this connexion, is that some of the additions are species that hitherto have not been found east of Hudson bay or that are closely related to species characteristic of the arctic mainland west thereof.

During the absence of the Chief Botanist in the Arctic, Mr. Watson continued botanical explorations in northwestern New Brunswick until the last week of August. The collections from New Brunswick totalled about 3,000 herbarium specimens, containing about 550 species.

DIVISION OF MINERALOGY (GEOLOGICAL SURVEY)

Eugene Poitevin, Chief of the Division, reports:

Field Work

A. T. McKinnon spent two months in Ontario and Quebec collecting minerals. No other field work was done.

Laboratory, Office, and Museum Work

The laboratory and office work of the various members of the division is described in the annual report of the Geological Survey.

In line with the policy established about two years ago more than twenty table cases of economic and other minerals were transported from the divisional offices at 227 Sparks street and displayed in the Victoria Memorial Museum, making a total of thirty-four upright and table cases of mineralogical exhibits there. This entailed much additional work to the small staff of the division, in addition to which there has been an increase in the amount of laboratory work.

On January 3, Dr. W. F. Ferrier was appointed for six months, and carried on some work on the mineralogical collections. During that time a very large number of specimens were gone over and more than one thousand additional specimens were incorporated in the systematic collections

in the cabinets at 227 Sparks street. About eight hundred of these were obtained from the stored specimens; two hundred and two specimens were acquired by exchange material, comprising about one hundred and fifty species new to the collection. The placing of these in their systematic positions involved a large amount of work and searching of the literature. Dr. Ferrier has also gone over the entire systematic collection and indicated by tags the specimens to be assigned to the display, reserve, and duplicate series, and the collection is now ready for numbering, labelling, and cataloguing. Of the eight hundred and twenty-seven numbered specimens in Dana's Mineralogy five hundred and twenty-two are represented in the collection and two hundred and seven unnumbered species.

Publications

The mineralogists of the division completed various pieces of research work, and they have contributed the following studies to Canadian mineralogy:

"Contributions to Canadian Mineralogy," by Eugene Poitevin.

"Ellsworthite Crystals from Haliburton County, Ont.," by H. V. Ellsworth; American Mineralogist, February, 1927.

"Lyndochite, a New Mineral of the Euxenite-polycrase Group from Lyndoch Township, Renfrew County, Ontario," by H. V. Ellsworth; American Mineralogist, May, 1927.

"Uranothorite from the Macdonald Mine, Hybla, Ontario," by H. V. Ellsworth; American Mineralogist, October, 1927.

"Alpha and Beta Hyblite—New Sulfatic Alteration Products of the Hybla Thorite," by H. V. Ellsworth; American Mineralogist, October, 1927.

"A New Analysis of the Maberly, Ontario, Euxenite," by H. V. Ellsworth; American Mineralogist, 1927.

"A New Mineral Related to Samarskite from Woodcox Mine, Hybla, Ontario," by H. V. Ellsworth; February, 1928.

"A Mineral Related to Samarskite from Parry Sound, Ontario," by H. V. Ellsworth; American Mineralogist, February, 1928.

"A Simple and Accurate Constant Volume Pyknometer for Specific Gravity Determinations," by H. V. Ellsworth; Mineralogical Magazine, March, 1928.

Educational Collections

The demand for educational collections grades 1, 2, and 3, and others, has been very heavy this year as shown by the following table:

Province	Standard	Grade 2	Grade 3	Grade 4	Miscellaneous	Prospectors	Mineral chips	Kegs
British Columbia	2	0	0	0	2	18	1	0
Alberta	0	0	1	0	7	5	1	1
Saskatchewan	0	1	1	0	1	3	0	0
Manitoba	1	0	0	0	1	4	0	0
Ontario	4	1	35	0	17	80	1	0
Quebec	10	0	2	50	9	49	2	0
New Brunswick	1	1	0	0	6	1	1	0
Nova Scotia	2	0	1	0	1	1	0	0
Foreign	3	0	1	0	11	2	0	0
	23	3	41	50	55	163	6	1

Total collections distributed=342.

During the fiscal year the following specimens were obtained:

Accessions

DONATIONS

Special acknowledgment is made to the International Nickel Company, the Mond Nickel Company, and Messrs. Henry Wiggin and Company of Birmingham, England, for valuable donations of specimens of metallurgical products from the nickel ores of Sudbury district. These specimens have been added to the nickel exhibit.

Two specimens of cryolite from Greenland, from W. S. McCann.
Two quartz crystals, 1 specimen of zinc blende, 1 quartz ball, 1 quartz pagoda, 1 flower vase, from Ani mine, Ugo province, Japan, from Mr. Shimmatsu Ichikawa, Japan.
Series of nickel products from International Nickel Company.
Series of nickel products from Mond Nickel Company.
Specimens of lead-zinc ore from Worthington mine, Sudbury, Ont., from J. T. O'Connor, Sudbury, Ont.
Specimens of apophyllite, pyrite, and calcite enclosing byssolite from Falls of French Creek Iron mine, Pa., U.S.A., and prehnite from Paterson, N.J., U.S.A., from Mr. Biernbaum, Philadelphia, Pa., U.S.A.
Graphite from south end of lac Vert (or Castor), Joly township, Labelle county, Que., on the portage route from lac Tremblay and lac Caribou, from Mr. W. O. Anderson, care American Bank Note Company, Bronx, New York city, N.Y.
Four specimens of calcite, 2 specimens messolite, 1 specimen scolecite, 1 specimen volcanic glass, 1 specimen lignite, from Iceland; 1 specimen volcanic ash from Reykjanes, S.W. Iceland; aragonite, Girgenti, Sicily; fluorite, Wolsendorf; from H. Eiriksson, Idnskolinnm, Reykjavik, Iceland (through R. A. A. Johnston).
Coal nodules taken from Victoria colliery, Raneguij coal field, Bengal, India. (New Beerhhoom Coal Company, Limited.) Donated by Mr. G. S. Caldwell.
Sphalerite from Lucky Jim mine, Slocan mining division, B.C., from C. E. Cairnes.

PURCHASES

Thirteen specimens of native silver and argentite from Frontier mine, Cobalt, Ontario. Purchased from Mining Corporation of Canada, Cobalt, Ont.
One boulder of native silver from Verner, Ont., 2 fragments and one small bag of silver. Purchased from Mr. Mederic Beauparlaut.

DIVISION OF PALÆONTOLOGY (GEOLOGICAL SURVEY)

E. M. Kindle, Chief of the Division, reports:

Field Work and Collections

Field work by three members of the division and other members of the Geological Survey has resulted in several interesting and valuable collections of fossils. E. M. Kindle collected in Jasper park a fauna of Ozarkian or Canadian age comparable with the Ozarkian fauna previously known farther south in the Rocky mountains; Devonian and Carboniferous faunas were collected in the same region. Collections of a Blairmore flora were made on the east and west sides of the Front range of the Rocky mountains near the eastern entrance to Jasper park, by B. R. MacKay and E. M. Kindle. In Stikine River district, British Columbia, F. A. Kerr obtained a Permian fauna allied to the Permian of Alaska and Ural mountains. The collection of Mr. C. S. Evans from British Columbia includes late Cambrian, Ordovician, and Silurian fossils. Collections of vertebrate fossils of fragmentary character were made by F. H. McLearn from the

White Mud and Cypress Hills conglomerate formations of Alberta and a collection of fossil plants from the Ravenscrag of Cypress hills. G. S. Hume has sent in a collection of Cretaceous fossils from southern Alberta. A small collection of Palæozoic fossils was secured from the metamorphosed sediments of Slocan district in British Columbia by J. F. Walker. Mr. H. S. Bostock secured from White Lake district, British Columbia, a collection of Tertiary plants.

Collections donated include a small collection of Pleistocene fossils from Hudson strait made by F. Johansen, a few Ordovician fossils from Baffin island transmitted by T. H. Tredgold, and type specimens of sections of British corals from Prof. Stanley Smith.

The Marland-Hudson Bay Oil Company has presented a considerable collection of Mesozoic fossils from western Alberta.

Office Work on Collections

Considerable progress has been made by Miss A. E. Wilson during the year on the catalogue of type fossils belonging to Museum collections. The work of F. H. McLearn on Jurassic ammonities has added several ammonite types to the collections. Several of the types of Billings' cephalopods in the Museum, which were described many years ago without figures, have been figured and described with supplementary description in a manuscript by Dr. A. F. Foerste. W. A. Bell has during the year nearly completed his report on the Windsor fauna of Nova Scotia. A new genus of Cretaceous fish has been described from the Museum collections by Dr. D. S. Jordan. Two new armoured dinosaurs from Red Deer River valley, one with small teeth, the other a toothless form, have been described by Mr. C. M. Sternberg. These curious dinosaurs, a fossil horse and other material now ready for display, cannot be exhibited until more space is available.

Mr. Sternberg prepared and mounted two skulls of armoured dinosaurs and began work on a third. Mr. Skillen finished the preparation and mounted a skull of horned dinosaur (*Styracosaurus albertensis* Lambe), prepared and mounted the skull of another (*Anchiceratops* sp.), and commenced work on a horned dinosaur skeleton from the Edmonton formation. Part of a skull, dermal scutes, and other bones of an armoured dinosaur have been prepared by Mr. Proulx and Mr. Skillen.

Educational Collections

A considerable number of collections of fossils were sent out for the use of high schools. Two colleges were also supplied with study collections.

Museum Exhibits

Lack of exhibition space will postpone the display of most of the interesting material prepared during the year until more room is available.

Accessions

The following members of the Survey staff sent in collections of fossils: F. A. Kerr, H. S. Bostock, F. J. Alcock, E. M. Kindle, C. S. Evans, J. F. Walker, G. S. Hume, F. H. McLearn, W. A. Bell.

Collections were presented to the division by the Hudson Bay-Marland Oil Company, Edmonton; Professor Stanley Smith, Bristol University, England; Fritz Persch, Saalfeld, Germany; and T. H. Tredgold.

A collection of fossil fishes from Maguasha, Que., was purchased.

NOTES ON THE BEOTHUK INDIANS OF NEWFOUNDLAND

By D. Jenness

The field trip to Newfoundland in 1927 had in view two objects: (1) to locate any existing remains of the extinct Beothuk Indians; (2) to discover what contacts there had been between the Beothuk Indians and the Eskimos to the northward.

The writer reached Newfoundland early in June, and after a short stay in St. Johns, examining the specimens in the local museum, went inland to Badger brook and Red Indian lake. A Beothuk Indian camp-site that he examined at Badger brook proved to have been excavated by an earlier investigator; and the old camping-places of the Indians on Red Indian lake were either submerged when the Anglo-Newfoundland Development Company raised the level of the lake a few years ago to secure power for its pulp and paper mill, or are concealed beneath the forests that have sprung up since the extermination of the Beothuk one hundred years ago. From Red Indian lake he moved to bay of Exploits, and searched the eastern coast-line as far north as Canada harbour. By utilizing both the local steamship line and the small motor boats of the fishermen, it was possible to visit all the places in this area where Beothuk remains had been found previously, and many bays and islands that had heretofore yielded nothing.

When the Beothuk moved out to the coast during the summer months they preferred to camp in small, sheltered bays that had freshwater streams at their heads and gravel beaches where the birch-bark canoes could ground in safety; in the interior their camp-sites seemed most numerous at river and lake crossings formerly frequented by the caribou, or on promontories that afforded a wide view up and down the lakes. Removal of the turf from three camp-sites revealed nothing except a few flint flakes, one or two hammerstones, a piece of pyrites for striking fire, and some fragments of iron stolen from the early settlers. Inland were no signs of graves, but a number were examined on the coast, where the Indians seem to have employed two methods of burial. Usually they deposited their dead in caves, or under overhanging cliffs in the woods, wrapping them in birch-bark and placing some of their property beside them; but in bay of Exploits they appear to have buried them also in stone cairns on the seashore. It is true that the dozen or more cairns investigated had been overturned by the local fishermen, and yielded nothing except a little birch-bark; but one of the boatmen, who had lived 57 years in this bay, stated that he himself had ransacked a number of them in his boyhood, and had occasionally found human skulls and other bones which he had thrown to one side. If his evidence is reliable, a few of these cairns must have been graves such as are known from Labrador peninsula; the great majority, however, were probably caches that had been emptied of their contents by the original owners.

In caves, and under cliffs, were several undoubted graves, two of which yielded a number of small skeletal bones and a few carved bone ornaments. All except one, however, had been rifled many years ago. The unrifled grave lay under a high cliff in the woods on the

west side of Long island, bay of Exploits, about 100 yards back from the shore. Many rocks had caved in on top of it, and foxes or other animals had apparently carried off some of the remains, although they may possibly have been crushed under a large rock that three men were unable to displace. They recovered the cranium of an adult (female?), the cranium of a child, a lower jaw too large for either of these skulls, some long and many small bones, two metal spoons, two fragments of copper basins, part of an arrow, some red ochre, a piece of iron pyrites, more than a dozen carved bone ornaments, and many pieces of sewn birch-bark, including part of a small birch-bark dish. All these objects, except the adult cranium and one of the metal spoons, which were about 2 feet away in a crevice between two rocks, lay under masses of birch-bark mingled with small rocks, in complete disorder; and among this debris were several stout sticks 4 feet long and 2 inches thick, cut with a metal ax, and two semicircular hoops of birch 4½ feet long, that presumably formed the frame of a small, birch-covered wigwam. Burial inside a wigwam has never been recorded from Newfoundland, and one is tempted to conjecture that this was not a real grave, but rather the last resting-place of a family that had perished from disease or starvation. The smallness of the wigwam, however, seems to make this conjecture untenable.

An interesting collection of stone arrow points, knives, hammerstones, celts, etc., was secured at various places along the coast, mainly from fishermen who had dug them up when planting and harvesting their potatoes; for the places that the Beothuk Indians chose for their camp-sites have often proved the most favourable for modern settlement. The fishermen have recovered large numbers of specimens during the last hundred years, but unfortunately they have thrown most of them away, or given them to stray tourists.

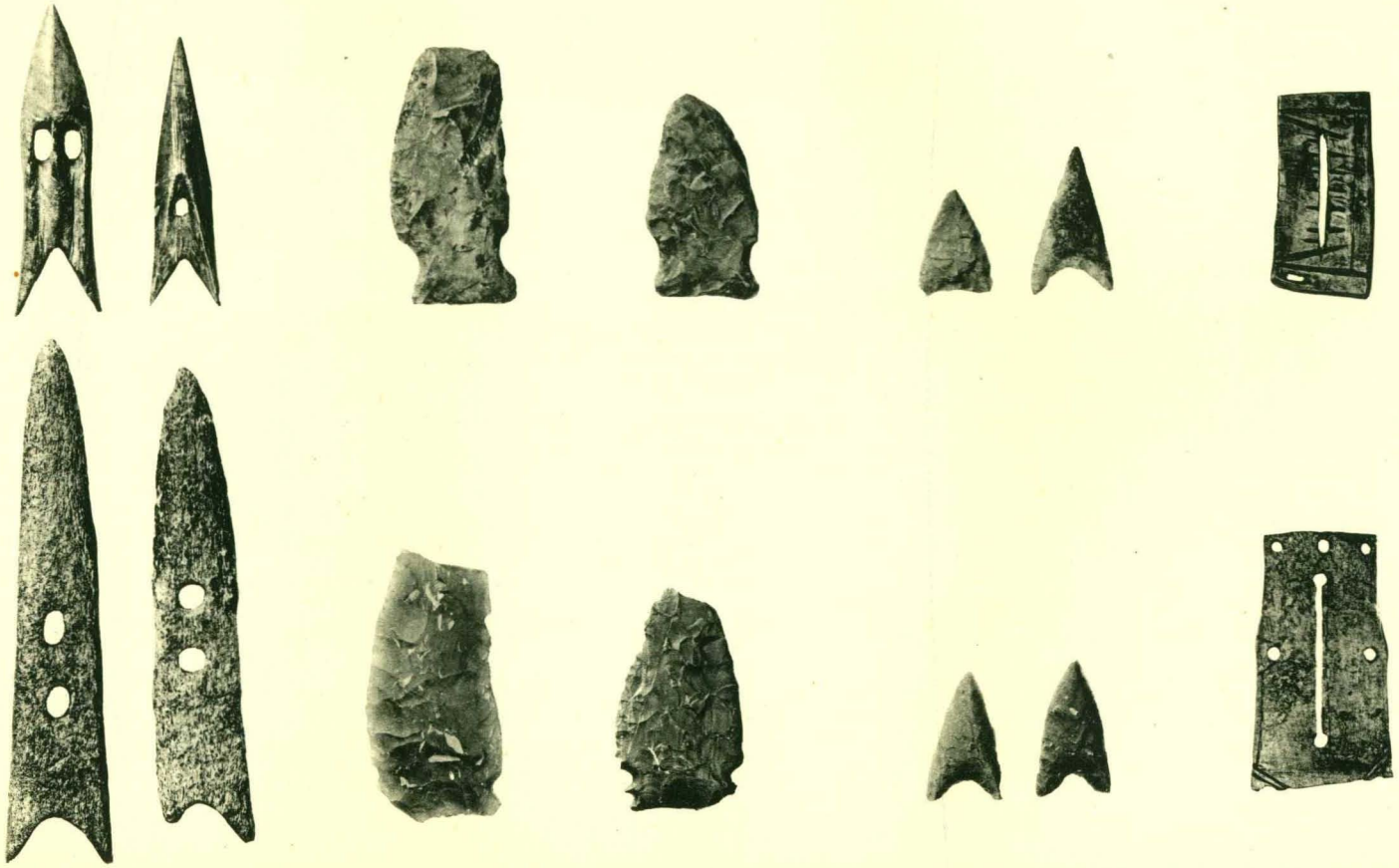
Some of the implements brought back to the National Museum throw an interesting light on the early history of the Beothuk. The majority closely resemble specimens from Algonkian sites in eastern Canada and the United States; for example, there are birch-bark vessels, triangular arrow-points, long adze-blades, tanged points of rubbed slate, discoidal hammerstones pitted on each face for thumb and finger, and soapstone plummets. Considered in the light of other elements of Beothuk culture, such as the birch-bark houses and canoes and the methods of drying fish, they strongly support the theory that the "Red Indians" of Newfoundland were merely a divergent branch of the Algonkian stock. A few specimens, however, distinctly suggest contact with the Eskimo to the north. Old writers tell us that the Beothuk hunted seals in the open sea with retrieving harpoons, an art they possessed in common with the Eskimo, from whom it was probably borrowed. The Beothuk harpoon heads, however, were not modelled on those used by any Eskimo of the present day, but on another type that has recently been discovered in old stone houses around Hudson strait, Hudson bay, Baffin island, and other places in the eastern Arctic. The writer described the peculiar Eskimo culture found in some of these ruins, as far as it was then known, two years ago, in the Geographical Review (vol. XV, No. 3, July, 1925, pp. 428-437),

when he gave it the tentative name Dorset culture. Some of its peculiarities as there listed were:

(1) Harpoon heads with rectilinear sockets;
(2) Triangular arrow points of flint, quartz, or basalt (this is a common Indian type, whereas the typical Eskimo stone arrow point is tanged);
(3) Knives (or arrow points?) notched on each side of the base for hafting;
(4) Curved-edge knives of flint and quartz;
(5) A curious style of engraving on bone, antler, and ivory.

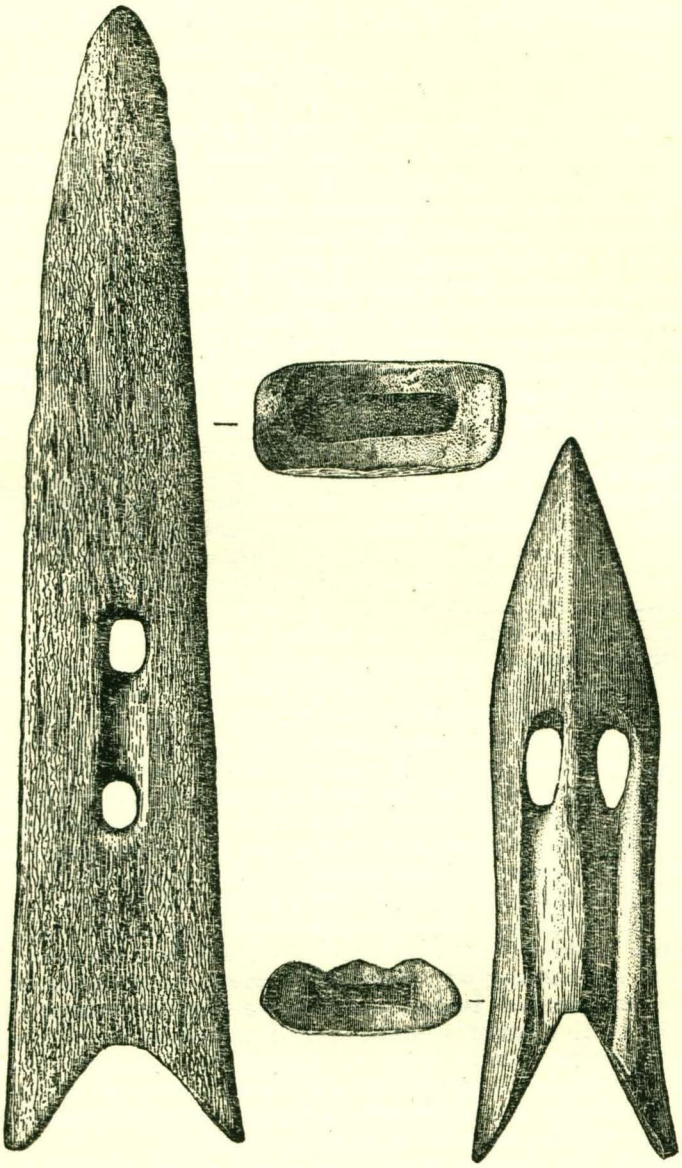
Now the first four of these features reappear in Beothuk specimens, although the harpoon heads with rectilinear sockets were not known in any other part of America, and curved-edge knives seem exceedingly rare.[1] Furthermore, the style of engraving on some of the Eskimo specimens distinctly resembles the engraving on some of the Beothuk bone ornaments. It seems fairly clear, therefore, that the Beothuk and Eskimo were in contact at some early date, and borrowed a few elements of each other's culture. The Beothuk were established in Newfoundland in the fifteenth century and apparently seldom came into contact with the Eskimo after that date. The Labrador Eskimo of the sixteenth century, and almost certainly the fifteenth century also, were not using a harpoon head with a rectilinear socket, but the modern type with round socket; nor is there any evidence at the present time to indicate that the older Eskimo who used the former type of harpoon head ever reached as far south as the strait of Belle Isle. On the other hand, Beothuk remains were discovered by Lloyd some fifty years ago in Labrador, on the north shore of the gulf of Belle Isle. It appears fairly probable, therefore, that several centuries ago (prior to 1500) the Beothuk were living in Labrador peninsula in contact with Eskimo tribes now extinct or absorbed by later comers, and that for some reason yet unknown (perhaps pressure from Montagnais and Naskapi tribes advancing from the west, perhaps even from Eskimo hostility) they crossed over into Newfoundland. If this theory is correct it should be possible to discover Beothuk remains somewhere along the north shore of the gulf of St. Lawrence, or else on the southeast shore of Labrador beyond the strait of Belle Isle. It explains, at all events: (1) some Eskimo features in Beothuk culture; (2) the apparent absence of very ancient Beothuk remains in Newfoundland; and (3) some of the peculiarities of the Dorset-Eskimo culture.

[1] The Museum possesses a soapstone plummet, identical with the Beothuk plummets, that was obtained from Eskimos somewhere on the east coast of Labrador. There is no proof, however, that it was associated with Dorset culture remains.



Upper Row—Eskimo specimens of the Dorset culture. *Lower Row*—Beothuk specimens.

From left to right in each row—Two harpoon heads with rectilinear sockets; curved-edge knife. Knife or arrow-point notched at the base for hafting, two triangular arrow-points; a bone ornament.



Harpoon heads with rectilinear sockets, Beothuk on the left and Eskimo of the Dorset culture on the right.

PRELIMINARY REPORT ON FIELD WORK IN 1927

By W. J. Wintemberg

Commencing at Tadoussac, the writer collected many stone artifacts from the exposed surface of workshop sites on windswept, sandy terraces to the north of the village and east as far as Moulin à Baude river. The deposit in which artifacts and workshop debris occurred in situ was located by trenching what seemed to be the least disturbed portions of two of the terraces north of Tadoussac. The artifacts found in excavating were of the same types as those from the surface. The only evidences of habitation discovered consisted of a few scattered patches of ashes, a few small fragments of charcoal, and some whitened, brittle animal bones. Artifacts found on the surface and in trenching consist of: lozenge-shaped and leaf-shaped points for arrows, spears, and knives chipped from chert, quartz, and quartzite; a few semi-lunar knives or scrapers chipped from quartz; a fragment of a slate spear or knife blade, diamond shaped in cross-section; several fragments of long, pointed slate objects; a large, heavy, unfinished, pear-shaped stone plummet; many unfinished, one whole, and a few broken, stone adzes; one whole and a few fragments of long, thin, chisel-like objects of slate; a fragment of a stone gouge, apparently of the flaring type and similar to two found by Moorehead in "Red Paint" graves in Maine; several stones used as anvils; many hammerstones, a few of which are pitted; a few disk hammers or pounders; a whetstone; a few rectangular scraper blades chipped from stone; and a rubbed piece of what appears to be hematite, which was probably used as paint. No pottery was discovered. Chips of quartz, quartzite, quartz crystals, sandstone, slate, porphyry, and other rocks were abundant. All but one of the adze blades were of an unusual type. So far as can be determined from their broken condition, they were highly finished, long and slender, flat-backed blades, most of them half-round and a few others somewhat triangular in cross-section. The front of most of them appears to have been convex from end to end, in which respect they resemble what Moorhead calls "hump backed" adzes, found by him in "Red Paint" graves. They seem to have been widest at the middle and the poll was narrower than the cutting end. The poll of a few blades is curved outward. All of them have a convex cutting edge. It is hard to say why these adzes were broken, some of them into three and four pieces. It does not seem to have been from use, because none of the cutting edges is broken. The unbroken adze is a short, thick blade of a type frequently found on Algonkian sites elsewhere in eastern Canada. Other artifacts, which are characteristic of these workshop sites, consist of what seem to have been long, slender, and mostly cylindrical lance points of slate, some of them highly polished.

Although the absence of pottery, small, finely chipped, and notched points for arrows, notched points for spears, perforated stone objects, drill points, and grooved axes, suggest that the culture of these sites is archaic Algonkian, it may be merely a local phase of a later stage of Algonkian culture. The people here were probably not "Red Paint" people, although a few artifacts are like some that are characteristic of that culture.

After completing the work at Tadoussac, the writer explored the country in the vicinity of Ste. Catherine bay, Basque point, and Little Bergeronne bay, in Saguenay county; Bic, in Rimouski county; Rivière du Loup, in Temiscouata county; St. Siméon, Murray Bay, St. Iréné, and Baie St. Paul, in Charlevoix county; St. Petronille, isle of Orleans; Quebec, Sillery, Loretteville, and Les Saules, in Quebec county; lake St. Joseph, St. Raymond, Neuville, Les Ecureuils, Donnacona, Cap Santé, Portneuf, and St. Casimir, in Portneuf county; La Perade, Batiscan, Ste. Geneviève, Champlain, Red Mill, and Cap-de-la-Madeleine, in Champlain county; Three Rivers, Pointe-du-Lac, and Yamachiche, in St. Maurice county; St. Angèle-de-Laval, in Nicolet county; Louiseville and Ste. Ursule, in Maskinonge county; and Berthier and Lanoraie, in Berthier county. Two very small, shallow shell-heaps were found on the point at the west side of Little Bergeronne river. A test hole dug into the floor of the cave at Bic, where human skeletons are said to have been found many years ago, did not yield any evidence of human habitation. A fragment of an unfinished stone adze and a few quartz chips, indicating the presence of another workshop site of the same people as those at Tadoussac, were found at St. Siméon, about 28 miles west of Tadoussac. Algonkian sites were discovered near Batiscan, Red Mill, and Pointe-du-Lac. Notched arrow and spear points, plano-convex scrapers, and a drill point, all chipped from chert, from the site near Batiscan, resemble those found at Algonkian sites in Ontario. One of the three pieces of pottery found here is from a pot which had been made by the coiling process. It and another piece bear stamped or roulette designs similar to those on Algonkian ware from Ontario. One piece bears a pattern composed of rows of incised diagonal lines. Two small objects of unknown use and a hollow cylindrical bead are made of native copper. Stone celts and gouges have also been found at this site. The site near Red Mill yielded thirteen stone plummets (two of which are of the same type as the one found at Tadoussac), a crude, leaf-shaped form chipped from stone, a shouldered but not barbed arrow point, and a fragment of a notched point chipped from chert, a fragment of a slate chisel, hammerstone, and many chippings of chert and other rocks. This site appears to be of an earlier period than the one at Batiscan. Notched arrow and spear points and plano-convex scrapers chipped from chert, and a notched sinker-like stone object, were found at the site near Pointe-du-Lac. A small site near Lanoraie, the only Iroquoian site discovered, is of the same culture as the Roebuck Village site, in Grenville county, Ontario, and the site of Hochelaga. Here the writer collected points for arrows and spears chipped fron stone, mullers, mortars, stone adzes, whetstones, fragments of pottery and ea thenware pipes, one human skeleton almost complete, and parts of two others.

Notes were made of artifacts in small private collections at Rivière du Loup, Batiscan, and Louiseville, and in the museums of Laval University, Quebec, and the Seminary at Three Rivers.

KITCHEN-MIDDENS OF THE PACIFIC COAST OF CANADA

By Harlan I. Smith

The kitchen-middens of the Pacific coast of Canada are in general very much alike. Typical heaps measure several hundred yards long by 5 or 6 feet high; a few extend for miles, and several attain a height of more than 9 feet; however, some are very small. They were built up of the refuse from the aboriginal villages, refuse which consists almost entirely of clam, mussel, and other shells, with here and there a human skeleton, but very few artifacts. In the middens of Fraser River delta, back from the seashore, artifacts and human remains are comparatively common; however, conditions in the delta are unusual, and in most places one might find only a single artifact in a whole day's digging. Inland there are no shell-heaps, or at least no typical ones; and on the coast they generally lie at the mouths of freshwater streams near ocean beaches where shell-fish are abundant.

Kitchen-middens are found all along the Pacific coast, not only of Canada, but also of Alaska, the United States, and Mexico. Four lie within as many miles of Prince Rupert on the northern part of the Canadian coast-line, and on the southern part others are found even within the city limits of Vancouver and Victoria. They appear in every linguistic area along this coast. In the Haida, or Skittagetan area, there is a notable heap near Yakan point on Graham island, Queen Charlotte group; its length is at least 1,000 feet, its width 200 feet, and its average thickness, estimated from a few test pits, about 5 feet. In the Tsimshian area large middens are found near Port Simpson, Prince Rupert, and on the adjacent islands, but village sites up Nass and Skeena rivers contain almost no shells, and consequently their middens are less conspicuous and generally shallower. In the Bella Coola section of the Salishan area, on the northern side of the eastern arm of Kwatna inlet, there is a midden containing much shell; but since most of the Bella Coola villages lie on rivers or on river deltas where the fresh water emptying into deep fiords offers conditions unfavourable to shell-fish beds, the middens of this area contain very little shell. In the Wakashan linguistic area shell-heaps appear on the islands near Rivers inlet; in the region of less than 100 miles square, on the north end of Vancouver island and the opposite mainland, over one hundred and fifty are known, which is equivalent to more than one site for every 10-mile strip of land 1 mile wide; there are large heaps also along the west coast of Vancouver island. Shell-heaps are numerous, too, in the part of Salishan area along the southeastern end of Vancouver island and on the adjacent mainland of southern British Columbia.

The writer conducted archæological explorations on a rather extensive scale in the shell-heaps of the southern part of the coast of British Columbia in 1897-1899, for the Jesup North Pacific Expedition of the American Museum of Natural History, New York. The results of these explorations were published in the memoirs of the expedition, a special series of Museum memoirs, edited by Professor Franz Boas, who directed the whole work of the expedition. The specimens collected, and many photographs, were deposited in the American Museum. Later, when the writer

continued the work for the National Museum of Canada, he made a reconnaissance near the mouth of Skeena river in 1915, and some intensive excavations in 1919 on the northeastern part of Graham island, Queen Charlotte group—the most western large island of Canada. It is worth mentioning here that during his first visit to British Columbia he saw large quantities of clam and cockle shells thrown out of the houses of some Kwakiutl Indians on the north end of Vancouver island. Again, in 1919, he saw a small kitchen-midden and shell-deposit on the eastern side of Massett inlet, Graham island, so recent that the grass upon which it was built had not yet decayed. Thus certain middens in their entirety, and at least the upper layers of others, have been formed under the observation of Europeans within the past fifty years. Nevertheless investigations leave little doubt that the majority of middens along this coast date back many centuries.

What methods are available for determining their antiquity? Elsewhere certain writers have attempted to calculate the age of middens by estimating the population at a given site, and the number of shells an Indian would throw out each day. Such a method seems impossible in British Columbia, where there is no information concerning the population, the duration of their occupation of the various sites, or the proportion of shell-fish to other foods in their diet. An abundance or scarcity of other food would decrease or increase the number of shell-fish consumed, and the number of shells thrown away. A large population, other things being constant, would discard more shells than a smaller population, but would probably scatter them over a larger area; and even a small population might build up a very deep heap if it occupied a site for a long period. Again, a site might be inhabited continuously, or only intermittently at certain periods of the year. Even if everything except population is discounted, the antiquity of a site, calculated from the number of shells contained in the kitchen-midden, would increase or decrease in inverse ratio to the number of people assumed to have inhabited it.

The presence in a shell-heap of European or Asiatic objects of known antiquity might give some clue as to its date; but such objects have seldom been found in British Columbia middens. It would appear, therefore, that many of the heaps were abandoned before or soon after European contact. The absence of perishable materials, such as wood, horn, and feathers, confirms this conclusion.

We may consider now the culture revealed by the shell-heaps, and inquire: (1) whether it differs from the culture of the present-day natives; (2) whether there are differences in the cultures of different shell-heaps; and (3) whether there are differences in culture in different layers of any one heap. Considering the last point first, the writer has been unable to find any differences between the upper and lower layers in any shell-heap that he has investigated. There remain then only two points to be considered, the relation of the shell-heap culture to that of the modern Indians, and the possible variations of culture in the shell-heaps themselves.

In both ancient and modern times the material culture of the natives must have been greatly influenced by the physical environment. Living is easy here. The climate is moist, the weather neither very warm nor very cold, and the vegetation luxuriant. Trees of red cedar abound; the wood is easily split for boards or hollowed for canoes, and the bark lends itself to weaving. Berries and roots are abundant. The numerous shell-

fish of the shores afford an easy supply of food. Then there are fish of many species, such as the salmon that ascend the rivers in unbelievable numbers, seals, whales, deer, and other mammals, and various land and water birds. All these resources must have been available to the Indians of the old shell-heap days just as they are today.

It is hardly surprising, therefore, that the culture represented in the ancient middens should seem to be similar, on the whole, to that of the Indians found in this region at the time of its discovery. In both ancient and modern times goats, deer, and elk were hunted with bows and arrows, large sea-mammals were caught with retrieving harpoons, fish with the spear and probably with hook and line, and huge quantities of shell-fish were taken by hand. Pottery was unknown in both periods, meat and fish being cooked with the aid of hot stones. The depressions in the soil left by the ancient houses indicate that they were huge, rectangular structures built of planks like the few native dwellings that still remain. The social organization and religious beliefs of the earlier period we do not know, but the animal carvings on bone and stone discovered in the shell-heaps prove that the art of sculpture had attained the same degree of excellence as in modern times. Totem-poles, it is true, are absent, and totem-poles are peculiarly typical of this coast-line today. However, everything made of wood has decayed in the middens; and even if totem-poles are a comparatively recent invention, as the traditions of the natives sometimes seem to indicate, yet we can hardly doubt that there were other wood-carvings in those early days little, if at all, inferior to the modern.

There are, it is true, certain differences. Of the two types of Indians apparently co-existing in shell-heap days only one has been observed among the existing tribes. Trephining, unknown in recent times, was not uncommon among the ancient people of both types. The modern Indians buried objects with their dead, but objects associated with human remains are rare in the shell-heaps, or in the cairns that seem to belong to the same period. The circle and dot design so common now was apparently unknown; and labrets, which were never used in historic times along the southern part of the coast, are found there in the shell-heaps. These differences, however, are small, and cannot outweigh the overwhelming resemblances. Even the strange type of Indian might be found today if we made a closer study of the surviving natives.

Turning now to the shell-heap culture alone, some differences between the northern and southern parts of the British Columbia coast may not be without significance. Archæological sites in Fraser River delta and vicinity (i.e., part of the Salishan linguistic area) contain a few tubular pipes and chipped stone points similar to those found in the ruins in the hinterland, a little copper, plain celts, celt hafts, carvings representing a seated human figure with a bowl in its lap, clubs made of bones of whales, and cairn burials. All these appear to be absent in Queen Charlo tte islands to the north. On the other hand, the grooved hammer heads and grooved adzes found in Queen Charlotte islands seem to be absent from Fraser River delta and neighbouring regions. One other feature is worth noticing. The frequency of human remains in the rear portions of the shell-heaps in Fraser River delta suggests a peculiar method of burial, for in shell-heaps elsewhere human remains are very scarce. More excavations will be necessary to confirm and amplify these differences before

their full significance becomes apparent. At present we can fairly claim that they may indicate no more than local variations of a single culture that extended all along the coast.

Our comparison of the shell-heap and modern cultures along this coast, and of the shell-heap culture in its northern and southern portions, has yielded so far no very definite results, and thrown no light on our present problem, the antiquity of the shell-heaps themselves. Let us now compare the shell-heaps on the coast with the archæological remains from the Salish country on Fraser and Thompson rivers, in the southern interior of British Columbia. Immediately some striking differences are noticed. Common or present in the interior, but rare or absent on the coast, are drills, knives, and skin scrapers chipped from stone, tubular pipes, semi-cylindrical arrow-shaft smoothers, dice made of beaver incisor teeth, and crossbar handles for digging sticks. In contrast with this we find on the coast, what are rare or absent in the interior, points made of bone, and celts mounted in antler heads. Rubbed stone points, too, are as common as chipped points, whereas the latter greatly predominate in the interior. Art is much more strongly developed in the coast remains, stone pestles differ in shape from those of the interior, and graves contain few or no objects. Even the dentalia shells which were derived from the adjacent waters are rare in the coast remains, but common in the graves of the interior. But the ancient culture in the interior seems to be the same as that of the Indians still living there, who have a different culture from the Indians of the coast. We seem justified, therefore, in considering the old coast and the old interior cultures to be quite distinct. Both are pre-European; but whether they are contemporaneous, or whether one is of later date than the other, cannot at present be determined.

Our study of the objects found in the shell-heaps shows that, at some time preceding European discovery, there was a difference in the culture of the coast and of the interior Indians, as there is today; there were slight variations in the coast culture that also parallel present conditions, and apparently merge with them; and there was a tribe or tribes of peculiar physical appearance inhabiting a portion of the coast in the old shell-heap days that has not been recognized in the modern population. But it has not told us the real age of any of the shell-heaps, whether they go back 300 years, or 3,000. Can we learn more if we call other sciences to our aid?

Palæontology offers no help. The shells and animal remains found in the heaps all belong to existing species, with no indication that sufficient time has elapsed for noticeable development since they were discarded. Sea-otter bones were numerous in the heaps near Yakan point, in Queen Charlotte islands, but that animal was still plentiful at the time of European discovery.

Let us turn then to geology. The majority of the shell-heaps parallel the water-front so closely that they are often eroded by the surf. Some lie on raised beaches, but the beaches may well have been raised long before any houses were erected upon them. Two sites lie so far from the present coast-line that they merit special consideration. One, a little south of Vancouver, is a long, deep shell-heap built along the top of an old sandspit projecting northeast from the high land of point Roberts. The spit now lies half a mile from the sea, and runs at an angle to the shoreline. Apparently it represents the older shoreline before the bay was silted up. If the shell-heap were contemporaneous with this older shoreline (and we know

that the heap is at least 400 years old from the stump of a tree that grew on top), then its position would be quite natural. Yet the silting up of this bay may not have taken more than 400 to 500 years, so that geology can tell us no more than we know already. The second site is at Port Hammond in Fraser River delta, where there is another large heap 20 miles by water, and 10 by land, from the present shoreline. It is impossible for the old shoreline to have extended so far inland, even several thousand years ago before the building up of the present delta; and we may be sure that the shells were not packed over-land. Almost certainly, therefore, they were carried up by canoe on the flood tide, which could still be done in the winter months. So in this case again geological considerations give no help. They may, however, yield more definite results with other shell-heaps along this coast that still await examination.

The most definite information concerning the antiquity of some of the shell-heaps comes from another source—from the forest trees that have grown on their surfaces. Four Sitka spruce trees growing from a heap 5 feet deep, 700 yards back from the sea at Yakan point, Queen Charlotte islands, attained a circumference of 125, 129, 136, and 148 inches respectively before they fell. As they lay on the ground smaller trees—a spruce 18 inches in diameter, and hemlocks 6 to 8 inches—grew on them. The fallen trees had decayed so much that it was impossible to count their annual rings; but clearly a minimum date for the abandonment of this shell-heap must run into several centuries.

Other heaps near Vancouver give information that is still more precise. In 1897 there stood on one heap that was 8 feet high the stump of a Douglas fir that showed over four hundred annual rings. This heap must have been abandoned before 1497; before an earlier date still, in fact, because there was a second stump on it larger and presumably older, although its rings could not be counted because the centre was hollow. A Douglas fir cut down on another and higher shell-heap many years ago showed four hundred and twenty annual rings, so that this heap was abandoned before 1500. We know neither how many years had elapsed between the abandonment of these shell-heaps and the growth of the trees, nor the rate at which the shell-heaps themselves had accumulated; but if the upper layers are at least 400 years old, the lower ones must be considerably more ancient.

There seems no reason to believe that the two shell-heaps just described are the oldest along this coast. Others may be centuries older, preceding perhaps the Christian era. We may derive from tree-growths minimum dates for a few, but unless we can obtain some geological indications, there seems little hope of discovering the true age of any heaps except the most modern.

MATERIA MEDICA OF THE BELLA COOLA AND NEIGHBOURING TRIBES OF BRITISH COLUMBIA

By Harlan I. Smith

INTRODUCTION

This paper describes the materia medica of four tribes of British Columbia, the Bella Coola of Bella Coola valley, the Gitksan of Skeena river, the Carrier who live in the territory behind both of these tribes, and the Sikani of the headwaters of Peace river. Among the Bella Coola the medicines are largely family possessions known to a few individuals only, so that two families may have different remedies for the same specific complaint; but this is not the case among the other tribes. Everywhere magical practices enter largely into the treatment of disease, but are not touched upon in this report. It was impossible for the Indians to diagnose many of their maladies, so that the identifications given here are in many cases problematical.

Most of the information relating to the Bella Coola was given the writer in 1920-22, by Joshua Moody, apparently a full-blood Bella Coola Indian, born about 1868. As he did not speak English he gave the data in Chinook jargon, which has been interpreted and arranged in logical order. Joshua is an Indian scientist with great knowledge of the local plants and animals. He remembers when Mr. John Clayton was the only white man living in Bella Coola valley, and when the inhabitants saw only one other white man every year or two. Consequently he can recall the old Bella Coola material culture before it was much affected by European ideas.

Some of the information relating to the Bella Coola was given the writer in 1922-23 by the late Captain Schooner, also, apparently, a full-blood, born about 1848, who used the Chinook jargon. Alec Davis, Alexander Cleleman, Louie Hall, and other Bella Coola Indians likewise gave information and corroboration.

Most of the information relating to the Southern Carrier Indians of Ulkatcho was secured during 1920-1922 from Charlie West, alias Pretty Charlie or Handsome Charlie, a native of that place, born about 1874. Charlie used the peculiar form of broken or pidgeon English commonly employed for communication between the whites and the Carrier and Chilcotin Indians of this region.

The information about the Sikani and the Northern Carriers of Hagwelget is from stray field notes kindly supplied by Mr. D. Jenness.

The information relating to the Gitksan was secured in 1925-26 from the late John Fowler and Abraham Fowler of Kitwanga, Luke Fowler and Bob Robinson of Hazelton, with additions and corroboration from a few others, all old Gitksan Indians, apparently full-blood. The information was secured mainly in English, although Abraham Fowler used also the Chinook jargon.

The method the writer employed was to submit specimens of the plants to his informants and question them concerning all their uses. Of the information thus obtained only the medicinal portion has been presented here. The plants were later identified by Mr. M. O. Malte, of the National Museum, Ottawa.

72984—4

POLYPODIACEAE, FERN FAMILY

Polypodium vulgare L., Polypody, Parasitic Sword Fern

Bella Coola: Roots—sometimes mixed with leaves of the red cedar (*Thuja plicata* Donn) or with other medicinal roots which the informant had forgotten—boiled, and the warm decoction taken internally for pains in the stomach, but not for vomiting or diarrhoea. Neither an emetic nor a purgative.

Roots chewed for swollen sore throat.

Southern Carrier: Not used.

Asplenium cyclosorum Rupr., Lady Fern

Bella Coola: Little roots cleaned off, from five to ten centres, mixed at times with roots or branches of the currant (*Ribes laxiflorum* Pursh. var.), boiled strongly, but for a short time only, and the decoction used as a wash for sore eyes.

Southern Carrier: Not used.

Aspidium spinulosum Sw., Shield Fern

Bella Coola: Root eaten raw to neutralize poisoning from eating several kinds of shell-fish in the early part of the summer.

Fern, species uncertain

Northern Carrier: Root boiled and the decoction taken internally for worms.

Gitksan: The large, round, green root-stock, but not the rootlets, mashed with bark of balsam fir (*Abies grandis* Lindl.) and devil's club (*Fatsia horrida* Sm. B. and H.), a little gum of scrub pine (*Pinus contorta* Dougl.) or tideland spruce (*Picea sitchensis* Carr), and root of skunk cabbage (*Lysichiton kamtschatcense* Schott), warmed a little, and applied to a boil or ulcer, which it brought to a head. Also used for rheumatism, and as a plaster on the chest for hemorrhage of the lungs.

LYCOPODIACEAE, CLUB MOSS FAMILY

Lycopodium clavatum L., Common Club Moss

Southern Carrier: Inserted in the nose to cause bleeding and cure headache.

TAXACEAE, YEW FAMILY

Taxus brevifolia Nutt., Yew

Bella Coola: Branches with leaves boiled, and the decoction taken internally for the lungs. Neither a purgative nor an emetic.

CONIFERAE, PINE FAMILY

Juniperus communis L., JUNIPER

Bella Coola: Roots, leaves, branches, and bark boiled, and the decoction taken internally as often as desired for many ailments, including a cough from the lungs, and pain in the stomach. Neither a purgative nor an emetic.

Southern Carrier: Branches boiled, and the vapour inhaled for headache and pain in the chest.

Northern Carrier: Tips boiled, and the decoction taken internally as a purgative, also for a cough.

Juniperus sp.

Gitksan: Entire plant, including roots and berries, boiled for a day, and the decoction, when cool, taken internally for many ailments, including hemorrhage and kidney trouble. A purgative and diuretic.

Thuja plicata Donn, RED CEDAR

Bella Coola: Very soft bark used to bind up wounds, and to cover poultices of false bugbane (*Trautvetteria grandis* Nutt.) and of tall buttercup (*Ranunculus acris* L.).

Leaves, sometimes with the gum-coated cones, boiled, and the hot decoction taken internally for pain in the stomach. Neither an emetic nor a purgative.

Leaves powdered by pounding, mixed with a little cold water and taken internally for pain in the stomach, also externally for coughs and internal pains, as heart trouble, rheumatism, swollen neck, and pain in the stomach. *See also* Polypody, page 48.

Gitksan: Not used.

Chamaecyparis nootkatensis (Lamb) Spach, YELLOW CYPRESS, YELLOW CEDAR

Bella Coola: A little soft bark used to cover poultices of false bugbane (*Trautvetteria grandis* Nutt.) and of tall buttercup (*Ranunculus acris* L.).

Pinus contorta Dougl., SCRUB PINE, JACK PINE

Bella Coola: Gum applied to cuts.

Gum chewed and applied to broken skin.

Gum at the ends of branches, collected in November, December, and January, boiled and the decoction taken internally for "consumption."

Gum—like that of tideland spruce (page 51) and western hemlock (page 51)—mixed with the baked stems and leaves, or the dried and pulverized bulb, of false hellebore (page 53), and applied as a poultice (sometimes spread on red cedar bark) to the chest for heart trouble, and to the arms for rheumatism. Burned the skin within two or three days, but was sometimes left on as long as two weeks.

Southern Carrier: New shoots boiled, and the decoction taken internally for pain in the stomach. Resembled the decoction made from the bark of the aspen (page 54), or from the new shoots and bark of the tideland spruce (page 51), but the last-mentioned considered most efficacious.

Northern Carrier: Needle tips mixed with large needle tips of the "British Columbia pine" (*Pinus* sp.?), the inside bark of the wild gooseberry (*Ribes* sp.?), bark of the red-osier dogwood (*Cornus stoloniflera* Michx.), the inside pulp of raspberry canes (*Rubus* sp.), stems of the "bearberry" (?black twin-berry, *Lonicera involucrata* Banks?), and the inner bark of the wild rose (*Rosa* sp.), placed in a vessel holding four gallons of water, boiled down to a thick decoction, strained, and bottled. About two tablespoonfuls taken, at sunrise and sunset, for constitutional weakness or paralysis, or if the body were covered with sores.

Gum obtained by heating a green piece of pine (sp.?) painted on the eye to remove white scum and to cure snow-blindness.

Sikani: Pitch chewed and the saliva swallowed for a cough.

Gitksan: Inner bark (scraped from the trunk with a bone scraper after the outer bark had been removed) eaten both for food and as a blood purifier. Purged the body in from half an hour to an hour.

Shavings of the yellow resinous timber found after removal of the bark boiled, the decoction placed in oil, and taken internally as a purgative and diuretic for many serious ailments, including gonorrhoea. Said to produce beneficial results in "consumption."

Young needles plucked in June and eaten as a purgative and diuretic.

For use with a fern, *see* page 48.

Abies grandis Lindl., White Fir, Balsam Fir

Bella Coola: Bark of root or of stem boiled, and the decoction taken internally every day for tuberculosis and stomach trouble. Said to have cured many cases of tuberculosis.

Gum from bark blisters found on young trees warmed, mixed with mountain goat tallow, and taken internally for sore throat; also drawn on a hair across sore eyes.

Young, green leaves baked, mixed with fruit of skunk cabbage (*Lysichiton kamtschatcense* Schott.) gathered in October, or the buds gathered in April, split, dried on top of the house, roasted, mixed with a small quantity of slightly roasted roots of the cow parsnip (*Heracleum lanatum* Michx.), one or two cupfuls of the gummy buds of the black cottonwood (*Populus trichocarpa* T. and G.), and four or five cupfuls of fresh eulachon oil, allowed to stand one day, then boiled and kept in a box for a hair perfume. Kitimat Indians said to be more expert in its preparation.

Southern Carrier: Tree used for medicine, but details not obtained.

Chilcotin: Not used.

Abies sp.

Northern Carrier: Bark boiled in water and the decoction taken internally as a purgative.

Gum used as an ointment on wounds, and especially on burns.

Sikani: Gum applied to wounds.

Gitksan: Juicy inner bark, scraped from the trunk of the tree, after removal of the outer bark, taken internally for constipation.

Gum from the bark blisters taken internally as a purgative and diuretic for "consumption," gonorrhoea, and many other serious ailments. Applied externally to cuts and sores, especially the sores of gonorrhoea.

The young cones, obtainable in August, sliced across, mashed, and used for the same purposes as the gum from the bark blisters.

See also fern, page 48.

Pseudotsuga taxifolia Britt., Douglas Fir

Bella Coola: Gum boiled and taken internally, while warm, as a diuretic for gonorrhoea.

Gum, spread on red cedar bark, applied to cuts. (One informant said that although gum of scrub pine (*see* page 49), hemlock (*see* page 51), and tideland spruce (*see* page 51) were good, Douglas fir gum made cuts worse.)

Gum mixed with dogfish (shark) oil or, if that were not available, eulachon oil, taken, two spoonfuls at a time, with warm water, as an emetic and purgative for colds, rheumatism, gonorrhoea, constipation, intestinal pains, and diarrhoea.

Southern Carrier: Not used.

Gitksan: Not used.

Tsuga heterophylla (Raf.) Sarg., Western Hemlock, and **Tsuga Mertensiana** Carr, Mountain Hemlock

Bella Coola: Leaves chewed and applied to burns.

See also scrub pine (page 49).

Gum warmed and applied to cuts. Not boiled for a diuretic for gonorrhoea.

Burning twigs applied to the skin for various internal ailments.

Southern Carrier: Not used.

Gitksan: Not used.

Picea sitchensis Carr., Tideland Spruce

Bella Coola: Tips of small, but not of large, spruces mixed with blue currant (*Ribes brocteosum* Dougl.), young juneberry (*Amelanchier florida* Lindl.), and crushed branches (leaves and stems) of garden snowberry (*Symphoricarpus racemosa* Michx.), boiled and taken internally for gonorrhoea.

Sap from the peeled trunk taken in doses of from half a cup to a cupful as a laxative from May to August.

Ripe cones boiled, and the decoction taken internally for a pain. Neither an emetic nor a laxative. A bed consisting of a sack of ripe cones, placed on top of hot stones, used by rheumatics. Cones also burned to fumigate rheumatics.

A piece of the bark 5 feet long by 2 feet wide used as a mat in a hot bath for rheumatism. Many stones were heated, a little sand strewn over them, the bark spread above with the inside uppermost, and the patient, naked, lay on the bark, covering himself with one or more blankets. A similar bed, but with the bark covered with a few leaves of devil's club (*Fatsia horrida* Sm. B. and H.), used for chronic backache.

Gum applied to small cuts, broken skin, and suppurating sores.

Branches used to whip a burned arm or leg until the blood came.

Gum boiled and taken internally while hot as a diuretic for gonorrhoea.

See also scrub pine (page 49).

For use with fern. *See* page 48.

The buds or new shoots, with the gum sometimes found around the outside when they are about half an inch long, boiled in water, and the decoction taken internally for tuberculosis.

Southern Carrier: New shoots and bark of small branches boiled for about two hours, and the decoction taken internally, one or two cupfuls at a time, for pain in the stomach, but not for vomiting, diarrhoea, or constipation. Said to effect a cure in one day, and preferred to the decoction made of scrub pine (page 49) or aspen (page 54).

Gum from new shoots and small branches, scraped out with a little stick, placed in the eyes for snow-blindness.

Sikani: Inside bark scraped and chewed for a cough.

Needles chewed, and the saliva applied to external sores.

Gum, obtained by splitting the tops, applied with a stick to white spots on the eye.

The "flower" boiled and the decoction taken internally for pain in the chest.

Gitksan: Gum extracted from the wood by boiling in water, added to eulachon oil, salmon oil, bear grease, ground-hog fat, lard, etc., and taken internally before meals for consumption.

Twigs bearing both leaves and bark boiled with entire roots of soapolallie (*Shepherdia canadensis* Nutt.); one cupful of the strong decoction taken internally three times a day for rheumatism.

ARACEAE, ARUM FAMILY

Lysichiton kamtschatcense Schott., Skunk Cabbage, Yellow Arum

Bella Coola: Roots used with oil as a hair tonic.

Roots boiled, and the sweet decoction taken internally for stomach trouble.

See also white fir (page 50).

Gitksan: Root well mashed with water and applied externally for blood poison and boils. Said to bring boils to a head. For use with a fern (*see* page 48).

Smoke from the burning roots inhaled for bad dreams, influenza, and rheumatism (a remedy avoided by medicine men, lest it destroy their magical power). Roots themselves considered poisonous.

Leaves used to sit or lie on when taking a sweat bath for rheumatism; also spread over the afflicted parts.

Calla palustris L., WATER ARUM

Gitksan: Roots well boiled and the decoction taken internally for cleaning the eyes of the blind, for hemorrhage, for short breath, and influenza.

LILIACEAE, LILY FAMILY

Clintonia uniflora Kunth., QUEENS CUP

Bella Coola: Boiled and used to wash the body. One leaf toasted and applied as a poultice to eyes or wounds.

Southern Carrier: Not used.

Gitksan: Not used.

Smilacina racemosa L., FALSE SOLOMON'S SEAL

Bella Coola: Not used.

Southern Carrier: Not used.

Gitksan: Roots boiled and decoction taken internally as a very strong medicine for rheumatism, sore back, and kidney trouble. A purgative. Bark and leaves useless. Roots mashed and bound on cuts.

Veratrum viride Ait., FALSE HELLEBORE

Bella Coola: Small bulbs or scrapings of large bulbs, boiled, and one cupful or less of the decoction, according to the strength of the patient, taken internally for chronic cough, gonorrhoea, constipation, pain in the stomach, and many illnesses. Two or three cupfuls acted as an emetic. Said to be poisonous if eaten raw.

Small pieces of the raw root swallowed with a little cold water as an emetic for pains in the stomach. More water taken if all the pieces not vomited. Overdose considered fatal.

See also scrub pine (page 48).

Southern Carrier: Entire roots dried in the sun, and powdered by rubbing on a stone. About a dessertspoonful of the powder taken in hot water as an emetic for sickness. Too strong a decoction considered fatal. [1]

SALICACEAE, WILLOW FAMILY

Salix lasiandra Benth., WILLOW

Bella Coola: Six sticks about a foot long charred, and pulverized on a stone. A teaspoonful of the powder taken in a cupful of cold water for diarrhoea. Said to effect a cure in two or three hours.

A piece of the inner bark folded once and the folded edge inserted into a knife cut; other edges then separated and flattened down, and the wound covered with eagle down. Thought to make the pus come out. Same process used to heal incisions in the abdomen made by those who tried to cure pain in the stomach.

Southern Carrier: Not used.

Gitksan: Not used.

---

[1] The late Dr. C. F. Newcombe informed the writer that this plant seems to be used by every tribe in whose territory it grows.

Salix Scouleriana Hook., WILLOW

Bella Coola: Folded inner bark used like that of *Salix lasiandra* Benth. for cuts; but charcoal from the stick not used for diarrhoea.

Southern Carrier: Not used.

Gitksan: Not used.

Salix sp., WILLOW

Sikani: Young willow chewed and the saliva applied to external sores.

White powdery tops chewed for a cough.

Populus tremuloides Michx., ASPEN, TREMBLING POPLAR

Bella Coola: A quantity of bark from the roots boiled, and the decoction taken internally from seven to ten times a day for gonorrhoea with hemorrhage from the urethra. A very bitter decoction, said to be a good remedy that stopped the hemorrhage.

Southern Carrier: Bark used instead of tideland spruce bark (page 51) to make a decoction for pain in the stomach. Considered inferior to the spruce bark.

Sikani: Bark pulverized by pounding, moistened with water, and applied as a paste to wounds.

Bark scraped, scrapings steeped in hot water, and the decoction taken internally for worms. Caused a stool immediately.

Gitksan: Bark of roots chewed or mashed and put on cuts.

Bark alone boiled, and the decoction taken internally as a purgative. Not an emetic.

Populus trichocarpa T. and G., BLACK COTTONWOOD

Bella Coola: Leaves, ten to fifteen years old, from the lower layers lying rotting on the ground, boiled, and the decoction used as a bath, the patient sitting in it up to his neck for about two hours to cure pain in the body, not rheumatism. A hot stone added from time to time, and the bath repeated the next day.

The buds with their resin boiled and the decoction used as a hair wash. *See also* white fir (page 50).

Half a cupful of buds, picked some time between December and March, mixed with two roots of cow parsnip (*Heracleum lanatum* Michx.), a half cupful of buds of mountain alder (*Alnus tenuifolia* Nutt.), and a little water, mashed, and applied warm, but uncooked, as a poultice for pains in the lungs or hips like rheumatism. Said to effect a cure in two days, but harmful if left on longer.

See also western dock (page 56).

Southern Carrier: Buds with their resin boiled for one or two hours, and the decoction taken internally for coughs and lung affections.

Resin from the buds applied to the face as a cosmetic, or, with the addition of oil, to repel mosquitoes, black flies, and gadflies.

Roots and bark not used; buds not boiled to make a hair wash.

Northern Carrier: Green roots chewed to a pulp and applied to wounds to stop bleeding.

Inside bark boiled and the decoction used as an eye-wash.

Gitksan: Gummy buds boiled and the resin mixed with bear grease for a hair perfume.

Roots, leaves, and seeds not used.

MYRICACAE

Myrica Gale L., SWEET GALE

Bella Coola: Branches, secured at any time of the year, pounded with their bark, boiled, and the decoction taken internally for gonorrhoea. A diuretic. The decoction, which was kept in a box made of red cedar wood with a little cover to keep out the dust, soured in two or three days and became useless.

Southern Carrier: Not used.

BETULACEAE, BIRCH FAMILY

Alnus sitchensis (Reg.) Sarg., GREEN ALDER

Bella Coola: Cones used as a remedy for some unspecified complaint.

Alnus tenuifolia Nutt., MOUNTAIN ALDER

Bella Coola: Cones used as a remedy for some unspecified complaint.

See also black cottonwood (page 54).

Southern Carrier: Not used.

Gitksan: Pistillate catkins crushed, and the mass eaten raw as a laxative.

Pistillate catkins and shavings eaten raw, or else boiled in water and the decoction taken internally three times a day, as a diuretic for gonorrhoea. Said to effect a cure in one week.[1]

Alnus rubra Bong., RED ALDER

Bella Coola: Bark boiled, and a cupful of the decoction taken internally as a purgative.

Southern Carrier: Sap applied to cuts. Not used for a medicinal decoction.

Northern Carrier: Inside bark ground, steeped in water, and injected with a syringe made from the crop of a bird, for biliousness.

Gitksan: Bark and roots boiled for about six hours and the decoction drunk in the morning for a cough.

Bark from the stem, but not from the roots, scraped, mixed with water, and the infusion taken internally, as an emetic and purgative, for headache and many other maladies.

URTICACEAE, NETTLE FAMILY

Urtica Lyallii Wats., WESTERN NETTLE

Bella Coola: Used for a form of paralysis where the patient had been unable to walk for a long time. Limbs stung daily, causing sores and gradual revival of sensation. In one case said to have effected a cure in ten days.

See also western dock (page 56).

Southern Carrier: Not used.

Gitksan: Entire plant boiled, and the decoction taken internally for many illnesses, including hemorrhage and bladder troubles.

Stinging not used.

---

[1] A Gitksan informant stated that the Tsimshian of the coast made a decoction of this tree which acted as an emetic, purgative, and diuretic, and was used for poisoning caused by eating sea-urchins.

ARISTOLOCIHACEAE, BIRTHWORT FAMILY

Asarum caudatum Lindl., WILD GINGER

Bella Coola: Boiled, and the decoction taken internally for pain in the stomach, but not for diarrhoea or vomiting.

Boiled, and applied externally for headache, intestinal pains, and pain in the knees.

Southern Carrier: Not used.

POLYGONACEAE, BUCKWHEAT FAMILY

Rumex occidentalis Wats., WESTERN DOCK

Bella Coola: Roots roasted for a short time in a hole in the earth among the ashes of a fire, covered with earth, mashed, and applied in quantity as a poultice for boils. Both leaves and roots used, according to another informant, and the poultice applied to wounds as well as boils.

Leaves used for a sweat bath for pains similar to rheumatism all over the body. Stones were heated, a little cold sand spread over them, and leaves spread on the sand; or else the leaves were spread on hot ashes. The patient sat or lay naked directly on the leaves, and was covered with blankets. Western Nettles (*Urtica Lyallii* Wats.), small branches of black cottonwood (*Populus trichocarpa* T. and G.) with the leaves on them, or the small kelp found on rocks were sometimes used when leaves of the western dock could not be obtained.

Southern Carrier: Not used.

LORANTHACEAE, MISTLETOE FAMILY

Arceuthobium americanum Nutt., SMALL MISTLETOE

Bella Coola: Boiled, and decoction taken as a potent medicine for hemorrhage of the lungs.

Southern Carrier: Boiled, and decoction taken freely for hemorrhage from the mouth, tuberculosis of the lungs, and emaciation.

NYMPHACEAE, WATER-LILY FAMILY

Nymphaea polysepala (Engelm.) Greene, YELLOW POND-LILY

Bella Coola, old custom: Used in a magical way for pain in all parts of the body. A root in many cases as large as a man's leg was cut free from the bed of a pool with a hemlock pole sharpened like a shovel. A hollow was made in it, water placed in the receptacle, and hot stones added. The stones were changed four times, after which the patient drank one or two cupfuls of the water. He repeated the dose each day for four days. To be effective the root had to be thrown back into the water, not on the ground.

Present custom: Root boiled twelve hours, and decoction taken internally for pain in any part of the body, such as "consumption", rheumatism, heart disease, and gonorrhoea. Considered good for the blood. Not used as a diuretic, or for diarrhoea, constipation, or vomiting.

Gitksan: Infusion of scrapings of toasted root (or according to another informant, heart of root, boiled) taken internally for hemorrhage of the lungs and as a contraceptive.

RANUNCULACEAE, BUTTERCUP FAMILY

Anemone globosa Nutt. (**A. multifida** Poir.), WIND-FLOWER

Bella Coola: Not used.

Southern Carrier: Plant, except roots, boiled and decoction taken internally for any sickness. Aroma of crushed leaves inhaled for cold in the head or lungs; for this purpose leaves sometimes placed in water and heated.

Gitksan: Handfuls eaten in sweat bath for rheumatism. A decoction of the plant sometimes used for the same purpose.

Trautvetteria grandis Nutt., FALSE BUGBANE

Bella Coola: Roots pounded in a little water, and the resulting mass, covered with a little soft bark of the red or yellow cedar, applied as a poultice to boils and left on for half a day or a day. Said to promote suppuration and opening of the boil, but to cause such intense burning that it could not be applied to children. Considered less strong than the tall buttercup (page 57), but, like it, preferred to the cow parsnip (page 61), which was used in the same way.

Thalictrum occidentale Gray, MEADOW RUE

Gitksan: A small piece of the root chewed, and some of the juice swallowed, for headache, eye trouble, and sore legs. Loosened phlegm and possibly accelerated the circulation of the blood.

Ranunculus arcis L., TALL BUTTERCUP

Bella Coola: Roots used as a poultice for boils in the same way as those of the false bugbane (page 57), but considered stronger and better.

CRUCIFERAE, MUSTARD FAMILY

Sisymbrium incisum Eng., A HEDGE MUSTARD

Gitksan: Mashed and applied to bad cuts.

CRASSULACEAE, ORPINE FAMILY

Sedum spathulifolium Hook., STONECROP

Bella Coola: Leaves of the plant before it blossomed eaten to start the flow of milk. Said to take effect in one day. Leaves warmed and applied externally for the same purpose.

SAXIFRAGACEAE, SAXIFRAGE FAMILY

Ribes bracteosum Dougl., BLUE CURRANT

Bella Coola: *See* tideland spruce, page 51.

Ribes laxiflorum Pursh. var., CURRANT

Bella Coola: Roots boiled in a very small box with hot stones and the weak decoction used each day for washing the eyes when filled with matter.

See also lady fern (page 48).

Southern Carrier: Not used.

Ribes lacustre Poir., SWAMP GOOSEBERRY

Bella Coola: Roots boiled and the decoction taken internally many times a day to cure constipation.

Leaves chewed and cud tied on sores caused by the prickers of the plant; if leaves unobtainable the bark substituted after singeing off the prickers.

Southern Carrier: Not used.

Gitksan: Bark boiled and used as a remedy for some unspecified malady.

Ribes divaricatum Dougl., COMMON GOOSEBERRY

Bella Coola: Bark or roots, sometimes mixed with those of the wild crab apple (*Pyrus diversifolia* Bong.), boiled, and the decoction used as an eye-wash three times a day for soreness and approaching blindness.

Southern Carrier: Not used.

Ribes sp., GOOSEBERRY

Northern Carrier: *See* scrub pine, page 49.

Saxifraga Bongardi Prest., SAXIFRAGE

Bella Coola: Roots and leaves gathered in the autumn, placed in a very small box with a very little water, and boiled. Decoction taken cold, or preferably hot, in quantity to cure strangulation of the bladder. Said to effect a cure in one day.

Southern Carrier: Not used.

ROSACEAE, ROSE FAMILY

Prunus emarginata Dougl., WILD CHERRY

Bella Coola: Roots and inside bark boiled with much water and the decoction taken in quantity daily for heart trouble.

Southern Carrier: Not used.

Gitksan: Not used.

Rubus spectabilis Pursh., SALMON BERRY

Bella Coola: Bark of roots boiled and taken internally for certain stomach troubles, but not for diarrhoea or vomiting.

Southern Carrier: Not used.

Gitksan: Not used.

Rubus sp., RASPBERRY

Northern Carrier: *See* scrub pine, page 49.

Fragaria bracteata Heller., STRAWBERRY

Bella Coola: Not used, but said to be used by Haida of Queen Charlotte islands to cure vomiting.

Southern Carrier: Not used.

Gitksan: Not used.

Rosa sp., WILD ROSE

Bella Coola: Roots and branches boiled, and the decoction taken internally, even ten cupfuls a day if desired, as a purgative for pain in the stomach.

Southern Carrier: Not used.

Northern Carrier: *See* scrub pine, page 49.

Sikani: Roots crushed, steeped in water, and the decoction used as an eye-wash.

Gitksan: Not used.

Physocarpus opulifolius (L.), Maxim., NINE-BARK

Bella Coola: Inner bark boiled for two hours, and two to four cupfuls of the decoction at blood heat taken internally as an emetic for persons dizzy with pain. Four or five cupfuls of lukewarm water then taken as a cleansing emetic and repeated about five times.

Inner bark boiled a long time (when it ceased to have emetic properties), one cupful of the hot decoction taken internally, and thereafter applied externally as a wash twice a day for gonorrhoea and scrofulous glands in the neck. Said to be a laxative that caused the glands to break, discharge fully, and heal. A cupful taken internally daily in advanced cases.

Southern Carrier: Bark (gathered near the coast) boiled for two hours, and two cupfuls of the decoction taken as an emetic, or one cupful as a purgative. Said to act in half an hour, and to be an excellent remedy, but fatal in too large a dose.

Aruncus sylvester Kost., GOAT'S BEARD

Bella Coola: Roots boiled, and one or two cupfuls of the decoction (or as much as desired) taken internally for pain in the stomach and gonorrhoea. A diuretic, but neither a laxative nor an emetic.

Roots boiled in grease of mountain goat (*Oreamnos montanus* Ord.) for a day and the decoction taken internally for smallpox.

Southern Carrier: Not used.

Gitksan: Not used.

Geum macrophyllum Willd., LARGE-LEAVED YELLOW AVENS

Bella Coola: Roots boiled, and decoction taken internally for pain in the stomach, but not for diarrhoea, or vomiting. Leaves, usually chewed but sometimes bruised, applied to boils.

Southern Carrier: Leaves boiled and the decoction taken internally for any sickness.

Leaves boiled and applied to bruises.

Pyrus sitchensis (Roem.) Piper., MOUNTAIN ASH

Bella Coola: Bark of the roots, and sometimes the inner bark of the stem, collected at any time of the year, boiled for an hour, and the hot decoction, weak or strong, preferably the latter, taken internally for the stomach or rheumatism. Said to effect a cure in from one to seven days. Not taken for diarrhoea, or vomiting; and for rheumatism sometimes poured into a large box and used as a bath. Used also as an eye-wash.

Southern Carrier: Bark chewed for colds.

Gitksan: Fresh fruit crushed and eaten raw as a strong purgative.

Pyrus diversifolia Bong., CRAB APPLE

Bella Coola: See common gooseberry (page 58).

Gitksan: Juice, scraped from peeled trunk, used as an eye medicine.

Trunk and branches, or scrapings from inside of bark, boiled until thick, and the decoction taken internally over a period of from four to six months for "consumption" and rheumatism. Said to be a fattening medicine, both laxative and diuretic.

Amelanchier florida Lindl., JUNEBERRY, SASKATOON

Bella Coola: See tideland spruce (page 51).

EMPETRACEAE, CROWBERRY FAMILY

Empetrum nigrum L., CROWBERRY

Bella Coola: Green leaves, with or without berries, boiled, and the decoction taken internally as a purgative.

VIOLACEAE, VIOLET FAMILY

Viola adunca Sm. var. **glabra** Brain., VIOLET

Bella Coola: Not used.

Southern Carrier: Entire plant boiled and one or many cupfuls of the decoction taken internally for pain in the stomach, but not for diarrhoea or vomiting.

Gitksan: Not used.

ELAEAGNACEAE, OLEASTER FAMILY

Shepherdia canadensis Nutt., SOAPOLALLIE

Bella Coola: Not used.

Southern Carrier: Not used.

Northern Carrier: Root boiled in water and the decoction taken internally as a purgative.

Gitksan: Roots, stem, and branches boiled, and the decoction used as a wash for gonorrhoea.

Bark, branches, and leaves without roots boiled, and the decoction taken internally for chronic cough.

See also tideland spruce (page 51).

ONAGRACEAE, EVENING PRIMROSE FAMILY

Epilobium angustifolium L., FIRE WEED

Bella Coola: Root roasted in ashes, mashed between hands or stones, and applied to boils.

Southern Carrier: Not used.

Gitksan: Not used.

UMBELLIFERAE, PARSLEY FAMILY

Osmorrhiza sp., SWEET CICELY

Bella Coola: Ten to fifteen little pieces of root, as large as the end joint of the thumb, ground by rubbing on a stone; two cupfuls placed in water warmed to blood heat, and two cupfuls of the decoction (according to the strength of the patient) taken internally as an emetic. Decoction acted (sometimes as a purgative instead of an emetic) within five or ten minutes, but lost its power if heated too much. Warm water taken afterwards until the patient vomited four or five times and the stomach was entirely cleaned. Used also for pneumonia.

Southern Carrier: Not used.

Heracleum lanatum Michx., COW PARSNIP

Bella Coola: Roots crushed, baked (or boiled in a box with hot stones), and applied as a poultice for boils. If too hot a poultice injured the skin.

Raw, uncrushed root inserted in an opened boil and left from half a day to a day. Pus said to come away with the root.

See also white fir (page 50), balsam fir (page 50), black cottonwood (page 54), and false bugbane (page 57).

Southern Carrier: Blossoms steeped in eulachon or other oil and the mixture rubbed on the body to keep off flies and mosquitoes.

Northern Carrier: Roots applied to swellings and bruises.

Sikani: Roots mashed and applied to swellings of neuralgia or rheumatism.

Gitksan: Roots mashed and applied to boils, rheumatic and other swellings.

Angelica genuflexa Nutt.

Bella Coola: Roots boiled and decoction taken internally as a purgative. Not an emetic. Sometimes used raw, but never roasted.

Gitksan: Roots well boiled with twigs of squashberry (*Viburnum pauciflorum* Raf.) from which the bark had not been removed, and decoction taken internally for headache and weak eyes.

Ligusticum scothicum L., LOVAGE

Bella Coola: Leaves spread over a hot stone or stones and used as a medicinal bed for the sick.

Southern Carrier: Not used.

Cicuta Douglasii (DC.) C. and R., WATER HEMLOCK, POISON PARSNIP

Bella Coola: Roots used as a purgative.

Southern Carrier: Not used.

ARALIACEAE, GINSENG FAMILY

Aralia nudicaulis L., SARSAPARILLA

Bella Coola: Roots boiled in a box with hot stones, and decoction taken internally as often as desired for pain in the stomach, or merely as a beverage. Nowadays sweetened with a little sugar. Stem, or its bark, not used.

Southern Carrier: Not used.

Gitksan: Not used.

Fatsia horrida Sm. (B. and H.), DEVIL'S CLUB

Bella Coola: Bark of roots chewed, and juice swallowed with a little water as a powerful purgative.

Bark of roots and stems boiled, and three or four cupfuls of the decoction taken internally as a purgative; or one cupful, three times a day for a week or two, to cure rheumatism.

Southern Carrier: Bark boiled, and one or two cupfuls of the decoction taken internally before and after childbirth as a purgative.

Northern Carrier: Inside layer of the inner bark rolled into pills and swallowed for cramps in the stomach and bowels, especially after a purgative. Acted also as a purgative, especially if much hot water taken with it.

Gitksan: A decoction used as a purgative in the treatment of gonorrhoea. Believed to assist the knitting of broken bones if taken continually.

Boiled, together with entire plant of squashberry (*Viburnum pauciflorum* Raf.), and the decoction taken internally as a diuretic and purgative, for strangury or any sickness. Used continuously for rupture.

For use with a fern (*See* page 48).

CORNACEAE, DOGWOOD FAMILY

Cornus canadensis L., BUNCHBERRY, DOGWOOD, DWARF CORNEL, PIGEONBERRY

Bella Coola: Not used.

Southern Carrier: Whole plant, without berries, boiled, and the strong decoction used as an eye-wash.

Northern Carrier: Used as a medicine for some unspecified malady.

Gitksan: Not used.

Cornus stolonifora Michx., RED-OSIER DOGWOOD, RED WILLOW

Bella Coola: Not used.

Southern Carrier: Not used.

Northern Carrier: *See* scrub pine, page 49.

Gitksan: Not used.

ERICACEAE, HEATH FAMILY

Pyrola secunda L., WINTERGREEN

Bella Coola: Not used.

Southern Carrier: Roots, gathered at any time of the year, boiled, and the strong decoction used as an eye-wash.

Pyrola bracteata Hook., WINTERGREEN

Bella Coola: Not used.

Southern Carrier: Leaves boiled, and the decoction used as an eye-wash.

Pyrola asarifolia Michx., WINTERGREEN

Bella Coola: Not used.

Southern Carrier: Leaves and roots, gathered at any time of the year, boiled for about two hours, and the warm decoction used as an eye-wash.

Gitksan: Not used.

Ledum groenlandicum Oeder, LABRADOR TEA

Bella Coola: Leaves boiled, and the decoction used as a simple beverage, or for pain in the stomach, but not for diarrhoea or vomiting. Neither an emetic nor a purgative.

Southern Carrier: Not used formerly, now as a beverage only.

Gitksan: Leaves boiled, and the decoction used as a diuretic, or merely as a beverage.

Gaultheria shallon Pursh, SALAL

Bella Coola: Leaves toasted, pulverized by rubbing, and applied to cuts.

Southern Carrier: Not used.

LABIATAE, MINT FAMILY

Prunella vulgaris L., HEAL-ALL

Bella Coola: Roots, leaves, and blossoms washed, boiled, and a cupful of the weak decoction taken internally for the heart. Not used for diarrhoea or vomiting.

Southern Carrier: Not used.

Gitksan: Not used.

Mentha canadensis L., MINT

Bella Coola: Entire plant boiled, and the decoction taken internally, as often as desired, for pain in the stomach. Not used for vomiting, constipation, or diarrhoea.

Southern Carrier: Entire plant boiled, and a cupful of the decoction taken internally for the stomach, colds, lung affections, and various ailments.

Gitksan: Not used.

SCROPHULARIACEAE, FIGWORT FAMILY

Castilleja miniata Dougl., PAINT-BRUSH

Bella Coola: Not used.

Southern Carrier: Not used.

Gitksan: Entire plant boiled, and the decoction taken internally for bleeding, stiff lungs, sore eyes, and lame back, possibly caused by kidney trouble. A purgative and diuretic.

Seeds boiled and the decoction taken internally for coughs.

CAPRIFOLIACEAE, HONEYSUCKLE FAMILY

Lonicera involucrata Banks., BLACK TWIN-BERRY

Bella Coola: Leaves chewed and cud applied for itch.

Leaves chewed and applied to boils, after they were cut open, to draw out the poison.

Leaves crushed and applied to burns and sores of gonorrhoea.

Bark toasted, pulverized, and applied to sores of gonorrhoea.

Bark boiled and decoction taken internally for cough.

Southern Carrier: Bark boiled for five hours, and the decoction used daily as an eye-wash. Roots, leaves, and berries not used.

Northern Carrier: *See* scrub pine (page 49).

Gitksan: Fresh juice of berries used in sore eyes. Inner bark (when berries not available) soaked in water, and the milky solution used in the eyes.

Symphoricarpus racemosa Michx., GARDEN SNOWBERRY

Bella Coola: Branches, large and small, with the bark left on, boiled, and the decoction taken internally daily as the best cure for gonorrhoea. A diuretic. Roots, blossoms, and berries not used for medicine, unless, as one informant stated, the berries were used with the branches.

See also tideland spruce (page 51).

Southern Carrier: Juice of ripe berries used in sore eyes.

Gitksan: Not used.

Sambucus racemosa L., RED-FRUITED ELDER

Bella Coola: Bark of the roots placed in water, a few hot stones added until water reached blood heat, and decoction used as a powerful emetic and purgative for pain in the stomach.

Bark of the roots peeled with the teeth, chewed, preferably with a little cool water, and juice swallowed as an emetic and purgative. Said to act within half an hour.

Southern Carrier: Roots boiled, and two cupfuls of the warm decoction taken internally twice a day as a purgative.

Northern Carrier: Roots brewed, the first water discarded and the second taken internally as a purgative.

Sikani: Bark boiled, and the decoction taken internally as a purgative.

Gitksan: Bark of roots scraped off, water added to the bark, and the infusion taken internally as an emetic and purgative.

Viburnum pauciflorum Raf., SQUASHBERRY

Bella Coola: Bark chewed, and the juice swallowed for whooping cough and cold on the lungs.

Southern Carrier: Not used.

Northern Carrier: Inside bark crushed, steeped in cold water until the water turned green, and one cupful of the infusion taken internally as a purgative and for dysentery.

Gitksan: Bark and twigs boiled, and one cupful of the decoction taken internally in the morning for coughs and "consumption". Said to be always taken in conjunction with devil's club (page 62). *See also Angelica genuflexa* Nutt., page 61.

VALERIANACEAE, VALERIAN FAMILY

Valeriana septentrionalis Rydb., VALERIAN

Bella Coola: Not used.

Southern Carrier: Roots, mixed with grease, used for perfume.

Northern Carrier: Valerian? blossoms crushed, and the oil, often mixed with fat from a black bear hide, applied as a hair tonic. Believed to make the hair smooth and shiny, to help its growth, and to give it a fragrance.

Gitksan: Entire plant steeped in bear grease and the grease applied to hair and face as a perfume.

Valeriana sitchensis Bong., VALERIAN

Southern Carrier: Leaves mixed with grease used as a perfume for the hair.

COMPOSITAE, COMPOSITE FAMILY

Achillea Millefolium L., YARROW

Bella Coola: Leaves chewed and applied to burns.

Southern Carrier: Entire plant, except the roots, boiled, and the decoction taken internally at frequent intervals for colds.

Leaves chewed and applied to sprains and swellings.

Gitksan: The young plant, except the roots, gathered between June 1 and July 15, boiled, and the decoction gargled for sore throat. Roots, marked by the dead stalks, dug out at other seasons and used instead.

Artemisia discolor Dougl., SAGEBRUSH, GREEN WORMWOOD

Bella Coola: Used for medicine.

Southern Carrier: Chewed and applied to sprains and swellings.

Northern Carrier: Sagebrush (sp. ?) steeped in water and the hot decoction taken internally for headache.

Antennaria Howellii Greene, EVERLASTING

Bella Coola: Leaves boiled, and the decoction taken internally for pains in the body, but not for pains in the limbs. Not used for colds.

Southern Carrier: Not used.

Gitksan: Not used.

Taraxacum officinale Weber., COMMON DANDELION introduced

Bella Coola: Roots boiled, and the decoction taken internally for pain in the stomach, but not for diarrhoea or vomiting. Remedy said to have been learned from white men.

Gitksan: Not used.

Lactuca spicata (Lam.) Hitchc., TALL LETTUCE

Bella Coola: Roots boiled, and many cups of the decoction taken internally for heart trouble, hemorrhage, pains in the body (but not in the limbs), for vomiting, or for diarrhoea. Neither an emetic nor a purgative. Milky juice not used.

Gitksan: Not used.

Prenanthes alata (Hook.) Gray, RATTLESNAKE ROOT

Bella Coola: Roots boiled, two or three cupfuls of the decoction taken internally daily for colds. For a baby only a small spoonful given three or four times a day.

Bella Coola: Chewed, and applied to burns or to any painful part of the body.

Boiled, and two or three cupfuls of the decoction taken internally daily.

Mnium affine Bland, Moss

Southern Carrier: Entire plant, except the "roots", boiled, and two or three cupfuls of the decoction used to bathe a swollen face.

72984—5½

Fomes Laricis (Jacq.), more generally known as **Polyporus officinalis** Fries, A SHELF FUNGUS

Bella Coola: This (?) fungus ground, steeped in water, and the decoction taken internally for gonorrhoea.

Southern Carrier: If found on the Douglas fir tree, dried, powdered, a handful steeped in boiling water and the hot decoction taken internally as an emetic and purgative. Said to act within an hour. Not used if found on any other tree.

(According to Dr. John Dearness, this is a medical polypore, perhaps the only fungus used by pharmacists. Park, Davis, and Company make a fluid extract and a triturate which is prescribed for the relief of night sweats in tuberculosis. The fungus is a cathartic in large doses. Its medicinal virtues have long been known in the old world.)

Bovista pila B. and C., PUFF BALL

Bella Coola: Spores dusted on wounds, sores of gonorrhoea, and suppurating sores other than boils.

LICHEN

Bella Coola: A certain long, white lichen, if found on the red alder tree, warmed, and applied to a broken boil or suppurating sore.

Sticta sp., LICHEN

Bella Coola: Entire plant, if from red-osier dogwood (*Cornus stolonifera* Michx.) or crab apple (*Pryus diversifolia* Bong.), but not from willow (*Salix* sp.), boiled, and five cupfuls of the hot decoction taken internally daily for pain in the stomach, but not for diarrhoea, constipation, or vomiting. Neither a purgative nor an astringent.

Entire plant boiled and the decoction used as an eye-wash.

Entire plant pulverized and applied to skin.

Southern Carrier: Not used.

KELP

Bella Coola: A small kelp found on the rocks sometimes used for a sweat bath. *See* western dock, page 56.

WOOD SAP

Bella Coola: The sap that oozes from any kind of wood when burning considered a good remedy for sores.

MOUNTAIN GOAT

Oreamnos Montanus, Ord., MOUNTAIN GOAT

Bella Coola: Mountain goat fat boiled with droppings of geese that had fed on roots, and the mixture given to babies once or twice a day for colds.

Goat meat with droppings of the bushy-tailed woodrat, commonly called packrat *(Neotoma cinerea)*, taken internally with water as a remedy for nursing babies when they had colds.

SKUNK

Spilogale, Spotted Skunk, or **Mephitis,** Striped Skunk

Bella Coola: Oil not used as a remedy.

Southern Carrier: Oil warmed, and a cupful taken as a purgative for worms.

HARE

Lepus americanus columbiensis Rhoads, The British Columbia Varying Hare

Northern Carrier: Hare opened, ruminating stomach containing something like the white of an egg removed, and the liquid applied to a foot blistered by frost-bite. Considered a sure cure.

RED SQUIRREL

Sciurus hudsonicus Erxleben

Bella Coola: Opened along the under side and applied as a remedy to badly broken chancres in the groin.

GIANT SLUG

Bella Coola: Slug made to crawl into a baby's mouth to cure loss of skin on the inside of its mouth.

Slug opened, and bound tightly over large cut.

SEA CUCUMBER

Bella Coola: Decoction of the water in which the sea cucumber was boiled, taken internally as a specific against heartburn. Not a purgative.

SPITTLE INSECT

Cercopidae, Spittle Insect, Frog Hopper

Bella Coola: "Fly spit," *i.e.*, the material surrounding a nymph of a spittle insect, applied to sores.

Southern Carrier: Not used.

WOODWORMS

Gitksan: Pulverized and applied to cuts.

COPPER

Bella Coola: Fine particles scraped from clean copper (but not from a weathered green surface) placed in sore eyes.

Gitksan: Copper ground, poured into a vessel of cold water, first water poured off, and second water taken internally as a harmless contraceptive.

CHARCOAL

Northern Carrier: Charcoal daubed under the eyes to prevent snow-blindness.

FIRE

Bella Coola: Burning twigs of very dry hemlock used to sear the skin for all kinds of internal ailments.

Northern Carrier: Hot coals used as a blister for a bad pain in the leg before applying an ointment.

CAUTERY

Gitksan: Fungus taken from a birch (or sometimes a hemlock), set alight, and used to sear a rheumatic person.

STEAM

Northern Carrier: Red hot stones placed in a dish of cold water, the head covered with a cloth and the throat steamed for a bad cough.

ICE-COLD WATER

Northern Carrier: A hole made in the ice and the feet soaked in the ice-cold water when they were frozen.

SEA WATER

Bella Coola: Sea water used as an emetic.

BIRDS AND MAMMALS OF THE MOUNT LOGAN EXPEDITION, 1925

By Hamilton M. Laing, P. A. Taverner, and R. M. Anderson

INTRODUCTION

By H. M. Laing

During the spring of 1925, by arrangement of the Victoria Memorial Museum (now National Museum of Canada), Ottawa, with the Alpine Club of Canada, the writer was enabled to accompany the Mount Logan Expedition[1] to Alaska as naturalist and cinematographer, and in the present paper a brief account is given of biological work in Chitina River region.

Though a few observations were possible at Cordova and along the route of the Copper River railway, field work really began at McCarthy, 6 miles from the end of steel. After a two-day stay here (May 9 to 11), during which much time was consumed in travel preparation, the party set out for mount Logan and five days later (May 17) reached Trail End on the upper Chitina at the limit of pack-horse travel. The route followed led from McCarthy to the new bridge across the Nizina, thence up Young creek and over the divide to the Chitina, where the gravelly, flat valley afforded fair travelling up as far as the glaciers at Trail End.

For several reasons it was deemed best to make Hubrick's camp the headquarters for biological work, and through the next three months field work was carried on in the vicinity of the foot of the Chitina moraine—roughly a 20-mile strip on the north side of the river, bounded below by the streams of the valley and above by the ice-fields on the summits of the range at from 6,000 feet upward. The camp was about 25 miles west of the Alaska-Yukon line. No crossing of the Chitina was ever effected, and so the south side or cold slope was not visited by the writer.

The return in August (16-21) was over a partly new route, by way of the High trail that leads from Bryson's cabin on the Chitina across the divide, following Calamity creek and the Chittitu to the Nizina. This seems worthy of mention as types of life were found on these summits not encountered on the Chitina slope.

GENERAL NOTES

It was somewhat of a surprise on May 8 to find that although winter at Cordova on the coast still was strongly entrenched, the farther inland we travelled up Copper river the more pronounced was the evidence of spring. In the morning within 50 miles of the coast ptarmigan were pattering over the white snowbanks and flats; by mid-afternoon the snow was gone, bumblebees and butterflies were seen on the wing, and anemones were in bloom on a sunny slope; and by evening at McCarthy, at about 1,400 feet elevation, the spring was represented by juncos, Gambel's sparrows, and nest-hunting northern violet-green swallows.

[1] The Canadian Alpine Journal, The Alpine Club of Canada, vol. XV, 1925.

There was little snow left at McCarthy and much less was found in the valley of the Chitina, the latter being known locally as a region of little precipitation during both winter and summer. This was born out later by the types of vegetation collected.

On account of the proximity of the glaciers there was a newness and crude rawness about Chitina valley that doubtless greatly modified the types of life encountered. The flat valley floor, about 2 miles wide, was almost a desert; it was cut by innumerable rapid streams that braid and interbraid and cut new channels with every period of high water. The valley walls rise very steeply—commonly from 30 degrees to 45 degrees. The north wall is cut at short intervals, usually less than a mile, by tremenddous canyons that allowed few crossings. The camp at river-level was at approximately 2,000 feet elevation. A good stand of white spruce and a little poplar cover the next 2,000 feet and beyond this is the open, bald slopes that rose to meet the ice-fields. Much of the valley wall is faced by high, rocky battlements that could be scaled in very few places.

Various types of habitat calling for study included the desert flat, the jumbled moraine with its scanty beginnings of vegetation and timber, the spruce forest, the burned slopes, the muskegs at low elevation, the wooded lakelets, the canyons, the alpine woods where spruce gave place to stunted poplar and willow and the bald, flower-strewn upper slopes and summits. Although there was considerable sameness about the life of the area studied, there were few uninteresting spots.

Though the Hudsonian life zone seemed mainly represented this north wall of the valley ran from the Arctic Alpine zone at 5,000 feet and over, down through the Hudsonian spruce forests to the Canadian zone at river-level where there was even more than a suggestion of the Transition. The open alpine slopes, where even as late as June 27 snow fell and lay for two or three days, were the home of the Arctic horned larks and pipits, the pika and Osgood ground squirrel. Typical Hudsonian types in the spruce forest were Arctic and Alaskan three-toed woodpeckers, Gambel's sparrow, junco, Hudsonian chickadee, and Canada jay. The common mammals of these woods were the red squirrel and varying hare. In a narrower belt toward river-level, where grew the bulk of the white and black poplar and an abundance of flowers, typical Canadian forms were spruce grouse, red-tailed hawk, olive-backed thrush, the greater numbers of the white-winged crossbills, redpolls, and pine siskins, the hairy woodpecker, and golden-crowned kinglet. The bare, dry slopes toward the river, with their dusty sheep-trails and in their vegetation notable for their buffaloberry (*Shepherdia*), silverberry (*Elaeagnus*), service-berry (*Amelanchier*), wild roses and abundant legumes such as lupine, *Hedysarum*, *Oxytropis*, and various Crucifers, strongly favoured the Transition. There was much overlapping, however. Thus the red squirrel was common from river-level to timber-line, and Gambel's sparrow nested from the scanty cover of portions of the edge of the river flat right to the last clumps of stunted willows beyond the highest timber. Also, in a muskeg draw almost at river-level were found several plants, such as *Dryas octopetala*, *Potentilla fruticosa*, and *Polygonum viviparum* that elsewhere belonged to the slopes considerably above timber.

The absence of water fowl here may be explained by the lack of marshes or suitable lakes or sloughs. It was plain also that the Chitina is not a migratory bird route in spring, and what movement was in evidence was

downward (westerly). There was a pronounced upward movement about mid-July, not only of non-breeding birds, but also of family groups. This was especially noticeable in the case of spotted sandpipers, Hudsonian chickadees, hairy woodpeckers, Bohemian waxwings, and golden-crowned kinglets. There was an autumn migratory movement in evidence beginning August 12, in which birds such as the Grinnell's water-thrush, Lincoln's sparrow, black-poll warbler, and orange-crowned warbler appeared—birds that gave no evidence of being in this section earlier in the summer.

The song season ended very abruptly about the middle of July.

It seemed noteworthy that birds here after nesting formed strange partnerships and all the smaller birds were met in mixed companies. In August, juncos, myrtle warblers, and Hudsonian chickadees formed one never-failing combination; the white-winged crossbills, redpolls, and pine siskins formed another; yet such mixtures as "a dozen juncos, as many myrtle warblers, a family of jays, three olive-sided flycatchers, and two or three chickadees" were often met, and other strangely assorted flocks appeared almost daily.

With the exception of the Dall sheep which were numerous, and a few bears, both black and grizzly, there were no large mammals in the valley. Mice were found only at river-level and above timber-line. Traps set at intermediate points brought no results.

The plant life of the upper Chitina valley was a most interesting feature. From mid-May when the first anemones bloomed (*Anemone parviflora*) until the date of leaving in mid-August there was scarcely a day that did not add its new flower to the collection. For the most part the flowers did not colonize here as seen in some other regions, notably the Cascades, yet a few species: the fireweed (*Epilobium angustifolium*) in the burns, the red-purple Hedysarum (*Hedysarum Mackenzii*) along the river banks and lower slopes, the Dryas (*Dryas Drummondii*) of the gravelly river flats, the sister plant of that of the alpine slopes (*Dryas octopetala*), and some others painted whole landscapes in glowing colours.

The rapidity of growth here was shown by the following measurements on a stalk of fireweed (*Epilobium angustifolium*) that grew in the corner of the tent. From June 3 to 12 it grew $10\frac{1}{4}$ inches. Its average daily growth was about $\frac{7}{8}$ inch; its shortest was $\frac{13}{16}$; its longest was $1\frac{1}{2}$ inches—this last due slightly to the unfolding of the tip. The heat of the tent may have aided this growth a trifle.

The quotations under various headings are from the writer's daily notes.

The critical and systematic work upon the collection of plants, birds, and mammals has been covered by Mr. M. O. Malte, Mr. P. A. Taverner, and Mr. R. M. Anderson respectively, and their findings are followed throughout. Acknowledgment is also due to Mr. A. O. Wheeler of the Alpine Club of Canada for his advice and general helpfulness during preparation for the expedition.

NOTES ON BIRDS COLLECTED AND OBSERVED IN CHITINA RIVER REGION, ALASKA[1]

By H. M. Laing and P. A. Taverner

The critical notes under each species are supplied by P. A. Taverner, who is also responsible for the nomenclature and determination of specimens. The American Ornithologists' Union Check-List of North American Birds, 3rd edition, 1910, and its subsequent supplements, have been followed in the matter of nomenclature. All specimens referred to are in the collection of the National Museum of Canada.

1. **Larus argentatus** Pontoppidan HERRING GULL

On May 8 a few scattered gulls of doubtful species observed along Copper river from Cordova to near McCarthy. On May 16, a rainy day, two or three large gulls, probably this species, seen near Short river descending Chitina valley. Definitely identified July 9 at Hubrick's camp when a female, evidently a wanderer, was secured. This bird was eating carrion in company with a family of ravens.

Specimen: Adult female, July 9. Typical *L. a. argentatus*. Black wing tips with no restriction towards *thayeri* either in depth of colour or in area.

2. **Anas platyrhynchos** Linnaeus MALLARD

Very scarce in Chitina valley. Three or four seen during outward journey to mount Logan. Not observed at Hubrick's camp, but on August 17 at Barnard glacier a single bird noted on the wing.

3. **Mareca americana** (Gmelin) BALDPATE

Two widgeon near coast, seen from Copper River railway, May 8, only ones noted.

4. **Nettion carolinense** (Gmelin) GREEN-WINGED TEAL

Observed near McCarthy May 8, reported next day by one of the packers. On upper Chitina found on only one small lakelet—christened "Teal pond" in consequence—at river-level in the woods. May 25 a pair on this lakelet. On June 21 five males in company here, and one taken.

Specimen: Adult male, June 21.

5. **Glaucionetta islandica** (Gmelin) BARROW'S GOLDEN-EYE

Golden-eyes reported on the Chitina May 15, but not seen by writer. On July 13 a non-breeding female taken at Teal pond—only golden-eye seen during the summer.

Specimens: Adult female, July 13. Adult male in Hoyes Lloyd's collection, McCarthy, Alaska, November, 1922.

6. **Charitonetta albeola** (Linnaeus) BUFFLE-HEAD

On May 8 at Chitina Station on Copper River railway, 129 miles from Cordova, two small ducks diving in middle of little lake were taken to be buffle-heads.

7. **Histrionicus histrionicus** (Linnaeus) HARLEQUIN DUCK

Two specimens in Lloyd collection, male, female, McCarthy, Alaska, November, 1922. In a fairly good series of Atlantic and Pacific Coast birds validity of proposed subspecies, *H. h. pacificus* W. S. Brooks, does not seem substantiated.

[1] Locality unless otherwise specified is Chitina River glacier, Alaska.

8. **Oidemia deglandi** Bonaparte WHITE-WINGED SCOTER

A single adult female taken at Teal pond July 3.

Specimen: Adult female, July 3. Should say a very old female. Head nearly completely black with only faintest suggestion of light facial spots. Bill comparatively long and slender, but not noticeably spatulate as postulated for *O. d. dixoni.*

9. **Cygnus columbianus** (Ord.) WHISTLING SWAN

May 8 near Heney glacier on railway two swans rose near train when it was stopped, and winged silently away. On May 14 while party camped on river gravel, whistling swans heard calling from opposite side of Chitina. Doubtless merely resting here in migration.

10. **Lobipes lobatus** (Linnaeus) NORTHERN PHALAROPE

On May 21 two northern phalaropes, plainly a pair, taken in small pot-hole hidden in willows on lower part of Chitina moraine.

Specimens: Male and female, May 21.

11. **Gallinago delicata** (Ord.) WILSON'S SNIPE

On May 8 two or three routed from marsh at Naval Radio station near Cordova. Later two seen at Chitina Station. June 6 at Hubrick's camp shrivelled body of Wilson's snipe found beside stream in nearby canyon; dead some time.

12. **Pisobia minutilla** (Vieillot) LEAST SANDPIPER

May 10 single tiny sandpiper seen at gravelly stream at McCarthy, almost certainly a least.

13. **Totanus flavipes** (Gmelin) LESSER YELLOW-LEGS

May 8 six seen at Chitina Station. On May 9 and 10 seen and heard at McCarthy. First observed on Chitina July 3; evidently breeding nearby. Juveniles and one or two adults seen at same pond later in month. On August 5 a juvenile taken from a lynx at Teal pond.

Specimens: Adult male, July 3. Juvenile female, July 13.
The adult male an unusually small bird; juvenile female considerably larger.

14. **Tringa solitaria** (Wilson) SOLITARY SANDPIPER

Frequented stream at McCarthy May 9, 10, and 11. First noted on Chitina June 24, and on July 3 a juvenile taken; evidently close to its breeding ground. Common at Teal pond from this date, always frequenting muddy margins, though met once at a pool in woods nearby.

Specimens: 1, male adult, May 11.
2, female, adult, July 3.
3, sex?, juvenile, July 22.
4, male, juvenile, July 22.

In view of question as to validity of subspecies *T. s. cinnamomeus* expressed by Swarth (Birds of Atlin Region, Univ. Calif. Pub. in Zool., vol. 30, pp. 70-72, 1926) advisable to discuss species at some length.

Since Mr. Brewster described *cinnamomeus* in 1890 it has been evident that in extreme west, and for an indefinite distance eastward from mountains, birds of this species occur with characters not commonly shared by those of east. That birds identical with typical eastern ones commonly occur with them confuses decision, but may be due either to inconstancy of distinguishing characters or to intermingling of different racial strains in migration. Little is known of distribution of the two forms and at present we are able to ascribe only vague and hypothetical breeding ranges to them. So far all definitely proved nesting birds have been from more southern parts of breeding range of species and all nesting birds that have been critically examined and reported upon have been of eastern or *solitarius* type. Doubtful if a nest of *cinnamomeus* ever observed or taken.

In view of far-flung geographical position of Mount Logan area, approaching farthest limit of distribution of species, it is assumed that all above specimens can be regarded as belonging to a single race. Here, if anywhere on the continent, we would expect to find *cinnamomeus* pure and unmixed with *solitarius* even at dates when farther south migrant intrusives might be expected amidst the resident population. The writer thinks he is justified in forming tentative presumption that all four specimens here listed belong to a single race.

Principal distinctive characters of *cinnamomeus* are: (1) cinnamon instead of white spots on back; (2) marbled or freckled areas on inner webs of first primaries; (3) large size, best recognized in specimen by length of wing.

Examining these specimens for these criteria it is found: No. 1, slight suggestion of marbling at base of first primary, a long wing (5·4 inches), and white back-spotting. No. 2, well-marbled primaries, very long wing (5·5 inches), and white back-spotting. Nos. 3 and 4: one has marbled primaries, other not. Wings short (3—5·1 inches; 4—5·07 inches) and back-spotting decidedly buffy.

Therefore, all referable on one ground or another to *cinnamomeus*, but none shows all postulated characters and evident that no one character consistently constant. *Cinnamomeus* may or may not have marbled primaries, may or may not have long wings, and may or may not have buffy back-spotting. From the study of a considerable series of other specimens writer convinced that buffy back-spotting is a character restricted to juvenile and in that plumage is the most constant distinction of *cinnamomeus*. He has not seen it exhibited in any striking degree by any eastern specimens and it is present in all juveniles that can be referred satisfactorily on other ground to *cinnamomeus*. Marbled primaries, when they occur, seem to be certain and reliable evidence of *cinnamomeus*, but not present in all of that race. *Cinnamomeus* usually of large size, but not always, and includes some individuals that are as small as many pure *solitarius*.

Evident that in this northwestern extension of continent and extending east and southward for an unknown distance there exists a strain of solitary sandpipers that averages large, is inclined towards marbling on the primaries, and shows buffy back-spotting when juvenile. Probably majority of this strain distinctly characterized, but some or perhaps many indistinguishable from type form by any test known at present. By current standards *cinnamomeus* a distinctly good race.

Probable extent of breeding area of these birds uncertain. In migration through southern British Columbia Allan Brooks (A Distributional List of the Birds of British Columbia, Pacific Coast Avifauna No. 17, 1925, p. 43) refers 30 per cent of migrants to *solitarius*, but has no exact information as to breeding of either particular form in province. It may be that many of these supposed *solitarius* are the unrecognizable *cinnamomeus* above mentioned, or a more southern breeding stock. Along east side of Rocky mountains *solitarius* is only form identified actually breeding (Didsbury and Belvedere, Alberta), but *cinnamomeus* occurs at both places and elsewhere in same general region very early in migration season and even before many locally raised young are independent of parental care. (P. A. Taverner, Ornithologica Investigations near Belvedere, Alberta, 1926; Annual Report for 1926, National Museum of Canada, 1928.) Farthest east *cinnamomeus* definitely recorded by authority is at Maple Creek, Sask., June 30, by Dr. Bishop—probably an early migrant.

15. **Bartramia longicauda** (Bechstein) Bartram's Sandpiper

On August 9, while stalking sheep high on alpine slopes far above timber, one of these sandpipers met. No mistaking identity of bird as it was seen and heard at very close quarters.

16. **Actitis macularia** (Linnaeus) Spotted Sandpiper

First met May 16 near Bryson's cabin where six were noted. Species evidently nested low; was not seen near foot of glacier until July 9 and a week later family groups in evidence. By end of month species quite numerous and had penetrated canyon stream beside moraine even beyond Trail End. Often observed a few yards back from edges of silty streams and several constant attendants at camp where they frequented spot on gravel in which refuse buried, having a busy, delightful time catching blow-flies. In stalking flies employed methods of young turkey or chicken, stealing

cautiously forward and then shooting out beak in a sudden lunge. Largest numbers of these sandpipers seen August 3. When pigeon hawks early in August took to haunting vicinity of camp and of Teal pond, sandpipers disappeared and this may have been more than a coincidence.

Specimen: Female, July 14.

17. SANDPIPER species?

Unidentified sandpipers seen as follows: May 16, at camp of party at point of Barnard glacier, a flock of thirty-five sandpipers whirled overhead, going down stream. Identification impossible. Again, August 9, while writer was skinning a ram up at edge of snowbanks at about 6,000 feet, a lone sandpiper of large size came sweeping about the slope, calling in a manner suggesting Baird's.

18. **Pluvialis dominica** (Müller) GOLDEN PLOVER

August 20, three juveniles encountered on high divide between Calamity creek and Nizina river. This was at an estimated elevation of nearly 6,000 feet on open, bald, soft tundra, the cold habitat of the rock ptarmigan.

19. **Canachites canadensis** (Linnaeus) SPRUCE GROUSE

Found very sparingly in spruce woods at low elevation and not noted above Hubrick's camp. Specimens of both sexes secured between May 13 and July 19. A female taken May 15 was laying. On June 30 in a burn above camp a female with downlings encountered. "The hen made a sudden cackle and mounted a low perch and the young exploded in several directions, one barely missing my face as it whizzed by. The young were about the size of a sparrow." In same locality a male taken July 19. Bird had been feeding on first of ripening alpine bearberry fruit.

Specimens: Two males, May 13 and July 19. One female, May 15.

In this species males appear so constant in character across continent as to be of comparatively slight value in subspecific determination and such identification is largely dependent on study of females that show stronger geographical variation. Above single female distinctly and extraordinarily grey. In fact shows so much ashy grey on back as to resemble a male. We have a small series of females from Teslin lake that by geography should be *osgoodi*, but which differ so slightly in that direction that writer hesitates to call them so. Bird shows the greyness called for in diagnosis of *osgoodi* in ultra-typical degree, but writer hesitates to name it as it seems more like an abnormal, very old bird assuming masculine characters.

20. **Lagopus lagopus** (Linnaeus) WILLOW PTARMIGAN

Ptarmigan, supposedly this form, numerous May 8 along Copper River railway near coast. Many seen running on white drifts. Trainmen in August reported with every show of veracity that they nested there. No ptarmigan of any form found in region of upper Chitina, warm southern exposure of valley wall apparently not being cold enough habitat, though feathers in woods here and there showed that they had been winter residents and prey to hawks and owls.

When on return, August 19, High trail above Bryson's cabin taken to cross divide between the Chitina and Nizina, willow ptarmigan encountered on first summit above timber-line, an elevation estimated at 5,000 feet. A cold, damp locality with alpine willow thickets as shelter for birds. Eight or nine of these birds, apparently all adults, routed from shrubbery by Andrew Taylor's dogs.

This type of habitat not present above timber-line on upper Chitina on any of mountain slopes visited and doubtless explains absence of species. Possible, however, that they could have been found on southern or cold side of valley.

21. **Lagopus rupestris** (Gmelin) ROCK PTARMIGAN

On the return journey, August 20, as a bare, high, alpine ridge was traversed—divide between Calamity creek and the Nizina—elevation estimated at 5,500 feet, two coveys of ptarmigan routed. These birds plainly not willlow ptarmigan and Taylor, who knew them well locally, declared them rock ptarmigan. He further insisted that a smaller, white-tailed species to be found in some high parts of region, but none seen on present journey.

22. **Lagopus leucurus** WHITE-TAILED PTARMIGAN

A specimen in full, white, winter plumage is in collection of Hoyes Lloyd—McCarthy, Alaska, November, 1922.

23. **Circus hudsonicus** (Linnaeus) MARSH HAWK

A hawk seen August 12 at a distance winging high up valley thought to be a migrant of this species.

24. **Accipiter velox** (Wilson) SHARP-SHINNED HAWK

Several times during summer a sharp-shinned hawk noted in flight over a stretch of very broken and rugged country some distance up valley, beyond foot of moraine. Definitely identified June 20, when seen fairly close and its shrill voice heard. Probably nested.

25. **Astur atricapillus** (Wilson) GOSHAWK

First met May 12 in woods along Young creek when an adult seen with a burden in its talons, supposedly a red squirrel. Several times during spring and early summer goshawks seen near Hubrick's camp. On June 12 a brown-coated bird of previous year met in woods. This bird was sweeping through spruces at a tremendous pace, flying low, evidently bent on surprising red squirrel or rabbit or other prey. On May 29 two large hawks studied through field-glasses doing mock battle in air. Smaller of two appeared to be a goshawk and badgering what seemed to be a large, grey falcon. The two clutched talons, swung each other in air, and exercised several thrilling manoeuvres. Cut of birds different, more spreading tail of smaller bird being plainly noticeable. When they separated, larger hawk winged off high, aiming across valley into white slopes above timber. As a guess at identity it might be suggested that a goshawk was worrying a gyrfalcon.

A beautiful male met near timber-line June 23 suggested a nest, but it was not until July 15 this was discovered, when the shrill cries of three young shouting *"Qua!"* or *"Kea!"*—a more unmusical call scarcely can be imagined—led to its discovery. At river-level half a mile from camp. Young at this time had left the nest, but were holding to vicinity, and very noisy. Male and young secured, but no female could be discovered by any artifice—even though one of young was left at nest site for several days. Bird kept in camp some time for study, but proved a most untractable and unrelenting dependent.

Weights of goshawks. Adult male, 2 lbs. Not fat. Juvenile female, 2 lbs. Fat.

Specimens: Adult male, July 15; juvenile male, July 15.

These two birds, parent and offspring, raised locally, are of particular interest in view of discussion carried on over characters of western goshawk, *A. a. striatulus*. A careful comparison of a considerable series of birds across northern part of continent indicates, that, with exception of occasional extreme western specimens, adults show no geographical distinctions. In spite of question raised (Swarth, Birds of Atlin, B.C., Cal. Pub. in Zool., vol. 30, pp. 104-5, 1926) it still seems true that fineness of vermiculation below is an age rather than a racial character. At any rate it occurs with equal frequency anywhere between Atlantic and Pacific. Writer has examined specimen cited by Mr. Swarth as a juvenile going into a finely vermiculated plumage, but disagrees with his conclusions. It is a finely vermiculated blue bird just completing its summer moult, but extraordinarily pale and not a normal bird. Close examination reveals a very few individual, scattered brown feathers, but they cannot be regarded as relicts of a late juvenile plumage, for they are fresh, unworn, and but lately assumed with remainder of the adult plumage. Writer can only conclude that they are sporadic recrudescences of juvenile-like feathers in a very old bird.

Though adults show little or no indication of geographic variation, juveniles show it rather definitely. In British Columbia a series of birds are found in striped plumage of the year, with dark backs, heavily and broadly striped breasts, and often with an overwash of pale brownish-ochre, strongest on breast but suffusing over most of under parts, especially the flags. These characters strongest on coast birds in our collections. Agree closely with juvenile types designated by describer of *striatulus*. Practically nothing known of breeding range of this form and probably these Mount Logan specimens only definitely prove breeding *striatulus* extant. Regrettable that ornithologists so often neglect collecting or preserving these large, bulky species and that oologists too often satisfied with loose, subspecific identifications of their specimens, otherwise many of these questions of breeding distribution might have been settled long ago. Resident birds of interior southern British Columbia seem to be typical *atricapillus* (Brooks and Swarth, "A Distributional List of the Birds of British Columbia," Pacific Coast Avifauna No. 17, 1925). Both *atricapillus* and *striatulus* occur on coast, but it is uncertain which nests there. Early autumn birds of Vancouver and Queen Charlotte islands and Teslin lake (extreme northern British Columbia) *striatulus*, but *atricapillus* occurs with them. It is assumed that former is a northern and coast breeder, but confirmatory evidence very desirable.

Exception mentioned under reference to adult plumage consists of occasional very dark adults; back strongly blackish and a wash of same over breast. Writer has seen only a few of these individuals from localities so widely scattered as to give no suggestion of geographical distribution, but has considered the possibility of their being adult of juvenile *striatulus*. These Mount Logan birds, however, dispose of that conjecture and definitely show that marked juvenile *striatulus* come from parents indistinguishable from typical *atricapillus*. Looks as if dark adults mentioned are examples of a melanotic dichromatism confined to western strains and similar to well-known occurrence of same phenomena in Swainson's, red-tailed, and broad-winged hawks. Matter is further complicated by pale Atlin bird cited by Swarth as before mentioned, which seems a departure from type in other direction and a tendency towards a white phase of species such as occurs in Asia.

26. **Buteo borealis** (Gmelin) Red-tailed Hawk

The first Buteos seen from railway, evening of May 8, near McCarthy. Were perched in dead trees near an open, burned muskeg and though setting correctly for rough-legs, were probably red-tails.

Undoubted red-tails all in dark phase of plumage observed daily up the Chitina, and from Hubrick's camp downward probably a breeding pair every 5 miles. Nests difficult to locate on account of being hidden in spruce woods and birds themselves shy. These hawks hunted in woods, and, contrary to expectations, did not go aloft and prey upon ground squirrels in open, alpine country above timber.

All attempts to secure specimens failed until July 5, when a female, apparently a non-breeder in the juvenal, brown-tailed plumage of the previous year, taken near river-level. Colour notes on soft parts for this

bird given as "Iris rich brown. No yellow in bill; tip blackish, base more bluish, cere and gape greenish. Toes and tarsus pale yellowish grey—not strongly yellow." At time this bird was shot two hunted together over lower slopes, but no evidence of this bird breeding.

On July 14, by using same strategy, an adult nesting female with a whitish tail secured, and two days later plaintive voices of young calling "*Klee-ee*!" often repeated in short spells, revealed whereabouts of nest. Two young taken July 19 and male next day, third being kept in camp for observation until August 11.

Colour notes on adults given as follows: female: "Iris rich brown. Bill blackish at tip, bluish at base, cere yellowish green. Toes and tarsus pale yellowish grey." Male: "Iris brown. Bill slaty at tip, running to blue, and base and cere greenish yellow; gapes mostly yellow. Toes and tarsus yellowish grey."

Colour notes on juveniles. "Male and female: Iris grey-brown. Bill bluish slate, cere and base greenish. Toes and tarsus faint pale greenish."

Weights of above birds: adult male 2¼ pounds; adult female 3 pounds; juvenal male 2¼ pounds; juvenal female 2½ pounds.

Young not fat, though in good condition. Ears of both young taken July 19 crammed with brownish maggots—a dozen or fifteen in each ear.

Young red-tails never before seen by writer to leave nest in such immature state, though this may have been partly due to fact that when they flew from nest (July 19) they had a long, down-hill slope to traverse. All were taken remote from nest.

Red squirrels and rabbits formed main food of these hawks here. Both stomach contents and general habits agreed in this. Youngster kept in camp began with a capacity of about a red squirrel and a half a day, but on July 27 ate two red squirrels, and the skinned bodies of two jays and an olive-sided flycatcher. Disgorged large gobs of hair like an owl. This bird, like most young red-tails, proved quite intelligent and tractable in captivity—utterly unlike young goshawk.

Almost a certainty that no red-tails nested in valley above camp, though they frequently hunted there.

Another pair in which one bird was white-tailed, found a few miles down valley, but could not be secured. Again, August 21, as party returned, near McCarthy, an adult with white tail seen hunting with a brown juvenile. Latter killed with rifle and proved counterpart of other young taken.

Specimens: 1, adult, female, July 14.
2, adult, male, July 20.
3, juvenile, male, July 19.
4, juvenile, female, July 19.
5, juvenile, male, August 11.

Above represent a complete family, parents and offspring. Last juvenile kept in captivity for some time before being made into a specimen.

6, juvenile, male, McCarthy, Alaska, August 21.
7, adult, female, July 5.

An important series. With those collected by Brooks and Swarth near Atlin, British Columbia, and a single adult and young taken by writer on Red Deer river, Alberta, all in same season as above, they constitute only substantiated record for breeding of Harlan's hawk that he knows. As they form basis of a separate paper where they are fully described and illustrated, not necessary to elaborate upon details of their characters here and now. Male of mated pair can be described as a black *B. b. calurus*, female as a well-marked *B. b.*

harlani nearly intermediate between dark and light phases. Young melanotic, but range from a solidly brownish black bird to one having considerable rusty feather edging above and ochreous on the breast. Tails dark, barred with darker, but writer sees no distinction by which they could be certainly distinguished from a black-phased juvenile *calurus*. As we also have good *B. b. krideri* from Teslin lake, Yukon Territory adjoining, and others are recorded in general Alaska-Yukon-British Columbian neighbourhood, it is evident that we have here all forms of species (except perhaps *B. b. borealis*) inextricably mixed together. This occurring at this far-flung extent of species range, and failure to find *harlani* in pure strain anywhere indicates that it should be regarded as a phase of *calurus* instead of a distinct species or even subspecies. As name *harlani* has considerable priority over *calurus* it will be necessary in future to call western red-tail *B. b. harlani* instead of *B. b. calurus*. An unfortunate necessity, but seems unavoidable in circumstances and under rules of nomenclature. (*See* "A Study of *Buteo borealis*, the Red-tailed Hawk, and Its Varieties in Canada," by P. A. Taverner; Geol. Surv., Canada, Mus. Bull. No. 48.)

27. **Buteo swainsoni** Bonaparte SWAINSON'S HAWK

This species not observed on the Chitina; but on evening of August 20 as party came off bare, high divide and reached timber-line on Nizina slope, a dark-phased Buteo, taken to be above, rose and hovered above in breeze for some time, calling shrilly. Only Buteo suspected of being other than red-tailed type. Call, action, size and setting, seemed true of *swainsoni*. Red-tail never a timber-line hawk in this region.

28. **Aquila chrysaëtos** (Linnaeus) GOLDEN EAGLE

Seen daily along the Chitina from Young creek to far up glacier above Trail End. Usually these hunters seen circling about cliffs from timber-line to highest ranges, but when heavy clouds obscured upper reaches of mountains they hunted at lower elevations, even coming to river-level. Following their custom, usually hunted in pairs. In May and early June eagles almost constantly hovering about little flocks of Dall's sheep that at this date were mainly using first pastures above timber-line. Harry Boyden reported seeing an eagle "packing off a lamb" as early as May 4.

Several times eagles seen in juvenal plumage that bears conspicuous white markings on wings and white basal tail-patch. Definitely established that these markings show plainly both from below and above. Many times when writer hidden in some corner of crags far aloft, one of these hunters swept by below.

It seemed that ground squirrel of upper slopes (*Citellus plesius plesius*) was their chief food and these little chaps lived in deadly fear of them. The sight of an eagle always set going a series of shrill warnings as alarm passed about mountain. Several times eagles seen to strike, but not once seen with prey. They spied prey and stooped for it at incredible distances—wind humming through their wings as it hums through frame of an airplane landing with dead motor. One passing overhead at about 5,000 feet one day slanted down straight for a lakelet in timber so far away that even with glasses bird's objective not learned. Again one was seen making a long, slanting strike on set wings and it was followed by a hard-winging little pigeon hawk. But hawk very quickly left behind and gave up chase. Eagles worked much more about crags than upon open slopes. Doubtless in sweeping suddenly around rocky bluffs able to make use of surprise attack against their clever and vigilant game.

Two or three times voice of golden eagle heard here. In all cases a harsh and shrill yelping note oft repeated, and such was its penetrating quality that it could be heard nearly a mile.

No nests discovered, though they must have been nearby. Suitable nesting crags almost without number.

29. **Haliaeetus leucocephalus** (Linnaeus) NORTHERN BALD EAGLE

Quite numerous along Copper River railway, May 8, where many pairs in possession of nest sites—most nests being in black poplars in valley. At Eyak lake, Cordova, a pair on ice with a large fish. Eight seen in first 10 miles; about twenty seen during day, but few in afternoon as birds decreased rapidly inland. All birds noted here adults.

Not observed on the Chitina. However, on June 13, dilapitated remains of an eagle, thought to be a bald, was found in spruce woods near camp. The body—that of a juvenile—hanging 10 feet aloft on a spruce branch and had hung there since the previous season or longer. Determination based mainly on bare tarsus.

30. **Falco rusticolus** Linnaeus GYRFALCON

Doubtful observation. *See* under Goshawk.

31. **Falco peregrinus** Tunstall DUCK HAWK

Seen but once. While resting in a niche in cliffs, 500 feet above timber-line, May 24, a duck hawk sped past on lightning wing heading down valley, taking ravines and slopes at a sweep, evidently bent on a far destination.

As party followed down upper waters of Young creek, August 19, a nest that had been used earlier in the season was noted in face of a cliff rising above stream. Setting exactly that chosen by peregrine.

32. **Falco columbarius** Linnaeus PIGEON HAWK

Observed at Strelna May 8, when train stopped. On the Chitina observed first May 30, giving chase to an eagle on swoop, and met again June 16, but headquarters of these interesting little falcons not found until July 30. On this date, while sheep-hunting above Trail End, a family of noisy young that had left nest some days, found holding to last woods on that slope of range. Young raised a very constant commotion, calling *"Killy-killy-killy!"* in much the manner of young sparrow hawks.

Daily this family worked farther down valley, reaching near camp August 4, when specimens were taken. Next day two seen a mile below at Teal pond and from this until mid-August species could be said to be fairly common.

Specimens: Four juveniles, August 4 to 11.

These birds, though birds of the year, are in complete autumn plumage. Little or no variety in them and all characteristically *F. c. columbarius.* Rather surprising in view of fact that those taken by Swarth and Brooks near Atlin, British Columbia, adjacent, are *F. c. suckleyi,* an identification which, having seen the specimens, writer concurs in. Little known of distribution of *suckleyi* and as far as writer knows its nest has never been recognized unmistakably. In all probability both these Mount Logan birds and those from Atlin raised near their respective localities. Yet if *suckleyi* is a coast breeder how does it occur as far inland as Atlin and if it extends as far inland as Atlin why not as far as mount Logan ? These are questions that cannot be answered at present or until considerably more accurate determination of breeding birds has been made.

33. **Cerchneis sparveria** Linnaeus SPARROW HAWK

In June a lone sparrow hawk noted several times working over open slopes above timber-line in neighbourhood of camp. On June 26 an individual met very high on bald slopes of a neighbouring mountain, perhaps attracted there by numerous insects—for mice at that elevation not found. About the end of July a family appeared along edge of canyon stream near Trail End, showing that they probably nested in much same quarter as pigeon hawks. Species present until time of breaking camp, but even young of year uncommonly shy and not a single specimen could be secured.

34. **Bubo virginianus** (Gmelin) HORNED OWL

On evening of first camp on slope toward the Chitina en route to mount Logan, May 13, a horned owl's mellow hooting filled long evening silence of woods.

Not observed farther up the Chitina, though at Teal pond a few feathers of this bird found where at some time earlier, probably in the winter, he had used a certain stump to tear his prey, victims being ptarmigan. A patch of feathers in woods near camp showing where a hawk owl had been eaten, also suggested horned owl as killer.

35. **Nyctea nyctea** (Linnaeus) SNOWY OWL

One specimen in Lloyd collection, McCarthy, Alaska. November, 1922.

36. **Surnia ulula** (Linnaeus) AMERICAN HAWK OWL

Evidently fairly common throughout region, as several seen on evening of May 8 from coach of railway—usually perched in a dry rampike over a burn or muskeg—and species met at several points on the Chitina where it bred.

On morning of May 15 as writer was engaged in making a movie of pack train on gravel bar below, one of these little daylight hunters sat within a few yards over a burn and twittered and chattered as some redpolls, scanning him with evil eye, scolded in great anxiety. A pair of Gambel's sparrows below him in the windfallen tangle also chirped constantly in alarm. Owl changed his perch three times in about an hour and when camera operations over was shot. Stomach contained a mass of red squirrel fur.

On June 20, about a mile above Hubrick's camp, a hawk owl suddenly swept overhead; coming from across valley where he had been hunting on foot of moraine, and when he was dropped—so swift was his flight that at moment he was taken for a falcon—his clutches released a victim; a fledgling junco.

Specimens: Four, May 15 to August 11.

There is also an additional specimen in Lloyd collection from McCarthy, Alaska, November, 1922.

37. **Dryobates villosus** (Linnaeus) NORTHERN HAIRY WOODPECKER

Fairly common and found in burns of lower hillsides and in stands of stunted black poplar covering almost every rock slide that had reached river-level. Only one breeding pair found, this fairly low in a burn near camp, May 31. Female noted drumming. Other than this pair only straggling wanderers and non-breeders encountered. No juveniles taken or even seen.

Specimens taken July 1 showed tail feathers worn back three-quarters inch or more—this no doubt done by action of burnt wood.

Hairy woodpecker never as numerous as American three-toed, but excellent opportunity here for comparing their call notes and drum roll. Call notes similar yet always distinguishable, that of *Picoides* being more musical, yet difference difficult to set down on paper. In the case of drum roll *Dryobates* rattle always much more rapid than that of *Picoides*. The *Dryobates* "*Br-r-r-r-r-r!*" still heard in the woods as late as June 29 when all hope of nesting must have long been over.

Specimens: Six, May 31 to August 12.

In spite of fact that all but last specimen show considerable abrasion at ends of wing quills the wing measurements fall well into large size of *leucomelas*. Spotting of wing coverts slightly reduced under that of typical *leucomelas* and hence shows a slight departure towards *monticola*.

38. **Picoides arcticus** (Swainson) Arctic Three-toed Woodpecker

On June 11 in a burn half-way up to timber-line, a pair of these woodpeckers found rearing a clamorous brood in a burned spruce. Female shot before nest suspected. Young already well grown and very noisy. Parents also noisy, male keeping up a rapid rattle when perched at very nest door, as though he would drown loud chippering of young. His excitement remindful of racket made by a red squirrel while delivering his worst abuse.

Male raised his brood and took them away so cleverly that not a trace of them later discovered.

On June 25 nest tree felled and nest measured. Located about 25 feet from ground in a tree of 15 inches diameter at butt, heart of tree being somewhat "punky". Whole nest, and especially nest door, seemed small for so large a bird. Entrance not truly round and frame of door wider than throat, there being a slight step or slope on which bird could rest while entering. Door $1\frac{7}{8}$ inches in diameter; length of excavation $12\frac{1}{4}$ inches; greatest width $4\frac{3}{4}$ inches. Nest pocket widest a little above bottom. In it a layer of powdered wood and skin sloughings of young.

Close at hand in another burned spruce, but at only about 5 feet from ground, a similar nest-hole and doubtless same pair had nested here previously.

Specimen: Female, June 11.

39. **Picoides americanus** Brehm. American Three-toed Woodpecker

Commonest woodpecker here and found from river-level to near timber-line, though mainly low. Only one specimen seen really high, this a male, taken June 14 in last clump of stunted black poplars at limit of trees. Though slow rattle of this woodpecker a common sound in lower woods, only one nest located, this close to edge of river flat. On July 3 a continuous far-sounding "*quittering*" in woods led to its detection. These, also, very noisy young and at approach of a visitor parents always joined in noisy clamour. Sometimes, male seen to cling at nest-hole and add his voice to that of clamorous young.

When nest visited July 13 it was vacant. Tree, about 15 inches in diameter at butt, had a dead top and nest in this dead portion, about 40 feet aloft. Dimensions as follows: diameter of door barely 2 inches; depth of nest $9\frac{1}{2}$ inches; greatest diameter 3 inches. Barrel of nest quite cylindrical. Young of this nest not found after leaving.

Drumming season seemed unusually prolonged. On July 26 slow drum roll came from woods beside camp and two birds found and shot, both proving to be males.

Specimens: Eleven, May 19 to July 26.

These birds notable for large amount of white on back. With exception of one female (June 29) they give an effect dorsally of a hairy rather than that of an American three-toed woodpecker. In this respect entirely different from any specimens from the Yukon, British Columbia, Alberta, Mackenzie, or Ontario and eastward. Were species not known to be sporadically variable in this character specimens might well be regarded as of a distinct race. Not being prepared to pass judgment on proposals of Bangs (*Auk*, XVII, 132-135) that have lately received quasi-approval of Brooks and Swarth (A Distributional List of the Birds of B.C., Pacific Coast Avifauna No. 17,66) writer follows the A.O.U. Check-List and refers specimens to *P. a. fasciatus*.

40. **Colantes auratus** (Linnaeus) FLICKER

Not common, but observed several times at different places. Heard giving spring call at Strelna on railroad May 8. Seen or heard daily while en route to mount Logan. A male taken at Teal pond, June 5, probably prevented a nesting here as another male had been taken at same spot May 25. An old nest-hole at spot showed breeding of earlier years. On July 1 a nesting pair with brood of loud-voiced young found in a burn near timber-line. This nest vacant July 17, though exact date of leaving not learned. Species not seen after July 21.

Specimens: Two, May 25 and June 5.

On casual examination these two flickers seem typical *auratus*, but close inspection shows that fawn throat washed with grey and in moustache of latter specimen are a few very small red feathers. They thus both show slight but perceptible infusions of *cafer* blood. Although A.O.U. Check-List ascribes *C. a. luteus* to north and northwest, Ridgway and most other authors, including Brooks and Swarth, refer these birds to *C. a. borealis*. Writer not prepared to pass judgment on these divisions at this moment.

41. **Selasphorus rufus** (Gmelin) RUFOUS HUMMINGBIRD

Hummingbirds reported at McCarthy and Kennicott by four different observers, both in spring and late summer. Three seen by writer in Ketchikan, May 4, and bird reported at Kennicott, 6 miles from McCarthy, by Robert Mooney, about May 10. Not seen on the Chitina, but after return to McCarthy August 21, Capt. and Mrs. Hubrick reported bird in their garden about August 1. F. A. Iverson also noted hummers at his ranch a few miles distant. Andrew Taylor told of seeing hummingbirds in White River country, tributary to Yukon, during other years. All these most probably above species.

Probable that appearance of these sprites in northern valleys corresponds with blooming of red currant (*Ribes triste*), just as it corresponds all up west coast with blooming of red-flowering currant (*Ribes sanguineum*).

42. **Sayornis sayus** (Bonaparte) SAY'S PHOEBE

Observed during spring only once, when on May 27 a bird was working down open valley near Barnard glacier. First specimen secured July 17, above timber-line, this being only one of several species that at the time made a migratory movement along upper country. Seen several times later, and a second specimen taken at river-level August 12. The last two seen by road near McCarthy August 21.

Specimens: Two, July 17 and August 12.

Though these specimens slightly purer grey on back than comparable birds from southern prairies of Canada, bills do not seem at all different nor does the writer see any other points of distinction. He would prefer not to commit himself regarding validity of *S. s. yukonensis*. If there is good distinction for it he has not material to demonstrate.

43. **Nuttalornis borealis** (Swainson) Olive-sided Flycatcher

An early migrant here. First met along the Nizina May 12. Far-carrying *"Quick! Three beers!"* of this strident-voiced bird heard more often than bird seen. In vicinity of camp met June 3, and again heard at Trail End, near end of timber, June 9. Late in July became fairly common. First juvenile taken July 17 and another taken July 27 had skull almost completely granulated. Species last noted August 4 near Barnard glacier.

Specimens: Adult and juvenile, July 17 and 27.

44. **Myiochanes richardsoni** (Swainson) Western Wood Pewee

On morning of August 11 as writer was preparing breakfast there came startlingly clear the once familiar flycatcher call above tent. All that could be seen after a rush outdoors was a flycatcher leaving a spruce top and flying off over woods. A day or two later same suspect fired at without avail. Same call heard early in season down valley toward Barnard glacier. At time phoebe (*Sayornis phoebe*) suspected, but observations next year among northwestern flycatchers convinced writer that bird western wood pewee (*Myiochanes richardsoni*).

45. **Empidonax hammondi** (Xantus) Hammond's Flycatcher

Only one small flycatcher seen during summer, when, August 11, a juvenal female taken from a company of juncos and myrtle warblers at river-level. Another tiny flycatcher seen at McCarthy August 23, probably same form.

Specimen: One, female, August 11.

This specimen fulfils distinctive requirements of wing formula and size of Hammond's flycatcher. Distal primary longer than sixth. Wing measurements reach major extreme for species, 2·72 inches.

46. **Otocoris alpestris** Linnaeus Horned Lark

On May 17 as party trudged up wide, gravelly flat opposite Barnard glacier, tinkling song of a horned lark heard and a bird seen to rise high over valley to deliver his flight song. Required three expeditions back to this quarter to secure a specimen, two males being taken June 5. Four birds seen; probably bred.

On June 14, high above timber on upper slopes at about 5,500 feet, species found again. Two females taken carried almost fully formed eggs. Later, on July 25, several young of species met again on same ranges, but at higher elevation, six or seven young being counted.

Specimens: Six, June 5 to June 14.

All are typical *arcticola*.

47. **Pica pica hudsonia** (Sabine) American Magpie

Sparingly present throughout entire region visited. Noted May 8 at intervals along railway from Cordova to McCarthy, and on the Chitina in May present to end of timber. Much more plentiful in August when family flocks of a dozen abroad. Apparently nests well up towards timber-line. In August young as bold and inquisitive as adults in spring had been shy. First flocks of young met July 28.

Specimens: Male and female, May 31 and August 4.

48. **Perisoreus canadensis** (Linnaeus) CANADA JAY

Fairly common in all woods of region from near timber-line to river-level. A pair frequented camp all summer, but always left their young in woods and carried food to them. First young seen May 28. Latter very dependent on parents for a long time after leaving nest and for several weeks family held together as a unit. Adults in heavy moult July 3.

Specimens: One female, McCarthy, Alaska, May 12. Five adults, June 2 to July 14. Six juveniles, May 28 to July 27.

Adults typical *P. c. canadensis*. Juveniles, however, consistently lighter both above and below than comparable eastern birds. On breast black overwash considerably less, and a purer grey. These characters, however, do not seem to fit *fumifrons* and are rather slight for other taxonomic recognition.

49. **Corvus corax** Linnaeus NORTHERN RAVEN

Common. A pair nested in cliffs of a canyon wall near camp. Female shot June 3 before nest discovered, but male proved a good parent and provider, and when on June 7 and 8 first of the young left nest canyon he brought them to the vicinity of camp, where they were fed all bird and mammal remains. Most tardy of five young arrived at camp June 14.

Raven family an interesting feature of camp. Young dependent for a long time, and refused to pick up food for themselves, waiting always until thrust into their gaping, vociferating mouths by a hard-working parent. More than two weeks before youngsters learned to use their big bills in haggling off their own portions. Their voices very high pitched and "croupy" by comparison with voice of raucose-throated male. In distance combined cries of young greatly resembled calls of a flock of sandhill cranes. Not until about August 14 did young voices change to adult, throaty quality.

Evidently bird is early nester and fact that two pairs (?) seen in nuptial flight high over valley May 13 would go to show that either some pairs nest later, or aerial courtship kept up for some considerable time after mating.

Sagacity of raven shown in many ways while raising young and generally getting a living in a hard land. Certainty with which they found offal from a sheep-kill high on upper slopes, far beyond their ordinary haunts, quite inexplicable. Observed on one occasion badgering two golden eagles at remains of a kill and may have been guided aloft by actions of raptors. Trick of carrying dried sheep meat to water to soften it before giving it to young a display of intelligence seeming near to reason. Ravens commonly came into town of McCarthy where they showed their ingenuity in stealing scraps of food from tethered huskies. Said that a raven knew length of a dog chain to a link. A dozen ravens seen in August on Iverson ranch plundering pigs in pens.

One day a little bit of wild play observed at nesting canyon near camp. A big ram came out and lay down on a ledge at brow of canyon wall and male raven went over and began to "tell him off". Ram stood abuse a while and then rose slowly and made a run at rascal, and *Corvus* quit hurriedly.

Note in diary, June 16. "In the evening I gave the ravens a ground squirrel. With head removed it weighed about a pound as it was 18 ounces entire. I had slit the belly. *Corvus* as always, lit, jumped, and flittered a few times, then pounced upon it and tried to fly with it. But he had not the hawk's trick of carrying a burden in the feet. He was

nose heavy. So he tore out some viscera and I think gulped some of it, then tried again and nearly lost it in the creek. But he was too canny, and dropped it quickly on the near bank. Then he tore it some more, leaving some entrails on the sand, and so went off with it. The youngster attending this performance begged in the pose of all fledglings with wings drooping and flapping and beak extended as he shouted his hungry plaint. The parent refused him a morsel while I watched, but the youngster followed him off and doubtless got his share later."

Specimen: Female, June 3.
Referred to *C. c. principalis* on geographic consideration.

50. **Corvus caurinus** Baird NORTHWESTERN CROW

May 8, a few of these coast crows seen at Cordova.

51. **Nucifraga columbiana** (Wilson) CLARKE'S NUTCRACKER

Specimens: Two, in Lloyd's collection, McCarthy, Alaska, November, 1922.

52. **Loxia leucoptera** Gmelin WHITE-WINGED CROSSBILL

One of the really common birds of spruce woods everywhere visited. Early nesters. A pair taken at McCarthy May 11 judged already to have nested. First young taken at camp May 21. From this date juveniles taken until August 12. Juvenility could be determined by amount of crossing of mandibles as well as by skull condition. Juvenile taken August 12 had skull almost fully granulated.

Evident that males go through somewhat puzzling plumage changes of *Carpodacus* group. A male shot May 23, with sex organs in breeding condition, but faintly red, and another male taken previously, while in high plumage, had a few yellow feathers interspersed in red areas.

Food of these birds seemed to consist almost entirely of seeds of white spruce—cone crop of previous year having been heavy.

Voices of crossbills almost a constant sound in woods, but isolated pairs seldom met. Call note *"Chit-it! Chit-it! Weet-weet-weet!"* almost monotonous at times when a small flock at hand, but at no time was any striking song heard from this bird.

A female taken May 26 had a gob of fecal matter in her throat, indicating a nest of young.

Small flocks seen swirling over woods all summer and several such seen June 7, 8, and 9, all heading down valley. Species still numerous at time of leaving the Chitina.

Specimens: Male and female, McCarthy, Alaska, May 11. Eight adults, May 19 to August 12. Four juveniles, May 22 to July 14.

53. **Acanthis linaria** (Linnaeus) COMMON REDPOLL

Met at Strelna on railroad, also at McCarthy, and later very numerous on the Chitina. Chatter of redpolls and white-winged crossbills most frequent sound heard in spruce woods. Like crossbills frequented cone-clustered tops of spruces and also found very commonly in willow thickets and poplars and even in burns. These birds intensely social and as soon as nesting over, young and old collected in flocks, often associating with pine siskins and crossbills. First young had left nest May 31; juveniles taken June 2.

On June 5 a male redpoll shot at edge of woods on river flat. On picking it up a new nest discovered snugly crotched in a small, rough-barked, black poplar, 5 feet from ground. Nest built against trunk and in colour artfully camouflaged into its setting. Made of weed stems and fibres and lined with feathers and willow cotton—a hawk's, and several ptarmigan feathers being included. Quite possible that this a second nesting. Male not in high red plumage. In fact not many highly plumaged males could be found in numbers seen.

On June 13 a female flushed from a low willow clump in a burn on hillside, and calling *"Swee-a-t!"* anxiously, indicated a nest. Latter found in burned-out heart of a willow in base of clump, cover being mainly supplied by new shoots grown since fire. "It was composed of downy material, mainly willow cotton and rabbit fur and it was placed but 6 inches from the ground. The five eggs were pale bluish, clouded, and spotted faintly with pale brownish and grey tints. One egg was scrawled and two had black spots on them. The clutch was but slightly incubated—doubtless a second hatching."

Species very numerous in late July and August when broods of young abroad.

Specimens: Male, McCarthy, Alaska, May 12. Seven adults, May 21 to June 24. Six juveniles, June 2 to June 29.

An interesting collection of summer and breeding redpolls. Only three of males are in full red-breasted and pink-rumped plumage. Others, though seemingly adult and presumably breeding, in dull plumage like females. Two, May 22 and June 5, have faintest suggestion of rosy on sides of breast and flanks and substantiate the conclusion that red plumage assumed with second winter plumage. Presumed that they breed in juvenile plumage, though said to be shy on their breeding grounds and it is difficult to connect male with any given nest and make certain of proprietorship.

54. **Spinus pinus** (Wilson) Pine Siskin

At time of arrival in camp, pine finches not noted. Though suspected two or three times and identified by ear June 2, it was not until June 14, when a female of a nest-building pair secured, that species put on a certain footing. Siskin never as numerous as redpoll with which it commonly associated, and undoubtedly a later nester. Call notes and chatter of siskin and redpoll so much alike that it is difficult to separate by ear, but here after much practice found that though a good deal of chatter indistinguishable, each had at least one note always diagnostic. Siskin note set down as *"Sque-e-e-e!"* or *"Zree-e-e-e!"* and corresponding redpoll note *"Zrill!"* In mixed flocks of crossbills, pine siskins, and redpolls, exercise of a little patience usually would disclose identities. In July considerable flocks of siskins and redpolls gathered, young of both being intermixed indiscriminately.

Specimens: One adult female with egg nearly ready to lay, June 4. Three juveniles, June 25 to July 14.

55. **Plectrophenax nivalis** (Linnaeus) Snow Bunting

While traversing high divide on August 20 between Calamity creek and the Nizina, at about 5,500 feet, some snow buntings suspected of being in a flock of pipits and horned larks, but distance too great to make observation a certainty.

56. **Calcarius lapponicus** (Linnaeus) Lapland Longspur

On August 20, in same habitat mentioned in foregoing species, some longspurs noted in a mixed flock of pipits and horned larks.

57. **Passerculus sandwichensis** (Gmelin) SAVANNAH SPARROW

On May 4 Savannah sparrows noted at Ketchikan. Two days later one travelled all day on S.S. *Alaska*. A specimen, only one seen, taken at McCarthy May 11. Species next seen near Barnard glacier May 27, when three or four birds holding to scanty cover of edge of river flat, led a merry chase for some time before a specimen could be secured. Disappeared from the Chitina at this date, but appeared again as a migrant in late July movement when one or two seen.

Specimens: Male, McCarthy, Alaska, May 11. Female, May 27.

Writer has long noted a slight difference between Canadian Savannah sparrows east and west of Rocky mountains. Former slightly paler (greyer) on back, latter ruddier, with striping above and below more defined, ample, and stronger, with a yellower eyebrow and yellow suffusion over face. These Mount Logan birds agree with plains birds rather than with those from British Columbia. Difference slight and until a more complete study made of whole species seems better to include these birds under *P. s. alaudinus*, although doubts may be expressed as to application of name to many of specimens generally associated with it.

58. **Zonotrichia leucophrys** (J. R. Forster) WHITE-CROWNED SPARROW

This sparrow one of commonest birds of region and fitted into any habitat from scanty thickets of *Shepherdia* on gravelly river flat, to last willow clumps above timber-line. Common at McCarthy and all way en route to mount Logan; air laden with its cheery song. Though found wherever there was cover, its favourite location burns and more open country. No other bird here occupied such an extensive vertical range, unless perhaps the pileolated warbler which, however, was not numerous.

A female taken May 28 had an egg almost ready for laying. First fledgling out of nest seen June 24—this at river-level. Song ceased abruptly in mid-July—as indeed it did with other singing birds. A few white-crowns seen at timber-line August 6, but at this time bulk of species at river-level. At time of leaving upper Chitina, these sparrows combining with flocks of juncos, myrtle warblers, water-thrushes, and other shrubbery frequenting birds.

Specimens: Male and female, McCarthy, Alaska, May 11. Five adults, May 21 to June 26. Three juveniles, July 4 to 21.

Adults all straight *Z. l. gambeli*. Juveniles inseparable from *Z. coronata* or *Z. l. leucophrys* by characters identified as *gambeli* by their association with adults. Writer does not care to pass upon question as to whether Gambel's sparrow should be accorded full specific value as has been proposed and for which there seems considerable supporting evidence.

59. **Zonotrochia coronata** (Pallas) GOLDEN-CROWNED SPARROW

Bird not observed on the Chitina at any time, though a single specimen, only one seen, taken at McCarthy, May 11.

Specimen: Male, McCarthy, Alaska, May 11.

60. **Spizella monticola** (Gmelin) AMERICAN TREE SPARROW

On morning of May 27, near camp, a fine, ringing sparrow song that suggested sweetness and power of a fox sparrow, heard at a willow-grown point of river bank. Song traced to a bird almost certainly a tree sparrow, but it could not be secured. Heard here once again a few days later, and then no more.

61. **Junco hyemalis** (Linnaeus) SLATE-COLOURED JUNCO

Common almost everywhere, breeding from river-level to timber-line, but unlike Gambel's sparrow did not continue in alpine willow thickets beyond. No sound more common in June than Junco trill and birds timed that gave twelve songs a minute.

Juncos clever at hiding their nests, sharp warning *"Chip!"* of male apparently always calling female from nest at approach of danger. Alarm notes of male and female always different; male's note *"Chip!"*; female's corresponding call *"Tseep!"* this verified several times. First fledgling seen abroad June 17. On June 20 another fledgling taken from talons of a hawk owl. Yet on this same date a junco nest discovered with only one egg in it. Nest in a hole in a matting of bearberry on a very steep slope and beautifully lined with sheep hair. The one egg white with faintly bluish tint and marked toward the larger end with small, brownish spots and specks.

On July 2 young juncos seen entirely independent of their parents. By July 21 juncos and myrtle warblers rather constant companions, about twenty birds being common in these strangely mixed congregations.

Specimens: Adult male, McCarthy, Alaska, May 11. Adult male, May 22. Three juveniles, June 2 to July 21.

The two adults cannot well be classed as anything but straight *J. h. hyemalis*. May 22 bird does show a slightly dark head as called for by Cassiar junco (Swarth, Birds of the Stikine Region, Univ. of Cal. Pub. in Zool., vol. 24, No. 2, 243-253), but no more so than many eastern specimens. Other adult generally dull-coloured and looks more like a female than a male. Juveniles too young to be seriously identified, though one, a female, July 21, has considerable red on back and incoming first winter feathers on flanks are ruddy pink enough to suggest an infusion of *shufeldti* or *oregonus* blood as understood in Check-List.

62. **Melospiza lincolni** (Audubon) LINCOLN'S SPARROW

Observed only once, August 12, when a juvenal female taken in brushy cover of a portion of river flat where an overflow stream made a damp habitat. Another bird formerly suspected near timber-line, August 6.

Specimen: Juvenile, female, August 12.

By geographic presumption it might be expected that this bird would be *M. l. striata*, but writer finds it indistinguishable from birds in similar plumage from Alberta and Ontario.

63. **Petrochelidon lunifrons** (Say) CLIFF SWALLOW

Not observed on the Chitina. Two or three pairs nested about buildings at McCarthy. One nest rather unusual in that it was built on a beam inside building, birds entering through a small hole. This not a brood nest, but a rest nest?—wide of mouth and without lining, this trait having been noted in other colonies elsewhere. Birds still in vicinity August 22.

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

Violet-green swallows had reached McCarthy before arrival of party, or about May 5, and on 8th were prospecting Capt. Hubrick's bird houses. Two observed May 13 at Young creek and on May 25 had reached upper Chitina. Soon a flock on hand and in possession of Hubrick canyon. Nests judged to be in abrupt face of a gravelly wall of canyon, birds being seen often going in and out of crevices here. Very busy feeding their

young, July 17, and on July 22 first juveniles seen on wing. Two days later a flock of old and young watched working over Teal pond. Birds left nesting locality very soon after young took wing and species almost absent in August, though a few scattered individuals seen as late as August 7.

Specimens: Male, McCarthy, Alaska, May 11. Female, May 27.
Referred to *T. t. lepida* on geographic probability.

65. **Bombycilla garrula** (Linnaeus) Bohemian Waxwing

First seen June 21, when a small flock of six or seven were encountered on top of a high burned bluff at edge of woods. From this date seen fairly often up and down valley and always haunting vicinity of Teal pond, where they doubtless nested. Their favourite perches burned trees at edge of green timber. On July 31 two of these beautiful chaps found in limits of timber above Trail End. Largest daily number noted forty-two, in two flocks, July 24.

First juveniles seen taken July 22. Streaked breasts of young noticeable at considerable distance. Of two juveniles, male and female, taken on this date, "the female seemed more advanced than the male in regard to the black markings of the head. The bill of female is dark olive-grey; the toes and tarsus lighter—the back of tarsus and sole yellowish-grey. The bill and feet of male are blackish. In both sexes the red wax tips are four in each wing, but they still show subdivision and are very slender."

Bohemian noted catching insect prey on wing just as cedar waxwing does. Also found feasting on juicy red fruit of alpine bearberry.

Specimens: Adult male and female, June 21 and August 13. Three juveniles, July 22 to August 10.

Juveniles in soft, fawn plumage and undoubtedly raised nearby. Unable to form any useful opinion as to validity of proposed American race *B. g. pallidiceps.*

66. **Lanius borealis** Vieillot Northern Shrike

On August 2 an angry rumpus from whiskey jacks drew attention to fact that a shrike, a juvenile, was badgering them about camp. On August 17, in scattered woods at point of Barnard glacier, a family of these birds encountered. Probably had nested in valley.

Specimen: Juvenile male, August 2.

Juvenile with skull partly granulated. Heavily vermiculated below and above. In changing plumage, going from a general dull reddish brown into clear grey.

Judging from eastern material early plumages of this species rather variable. Birds that come down to southern Ontario in winter have brownish mouse-coloured backs, some deep enough to be brown rather than grey and others lighter, decidedly grey, and only tinged with brown. Possibly racial distinctions, but writer would not care to regard them as such until distinct breeding ranges demonstrated for the several variations.

This Mount Logan specimen going from one of these darker brownish states into a very light grey—considerably lighter than that shown by others in collection, except one from Revelstoke, British Columbia, April 17, 1890. Wing longer (4·7 inches) than that of any other specimen writer has for comparison, but is equalled in this character by two others he has examined from Didsbury, Alberta, that also show somewhat lighter than normal. All this supports proposed race *L. b. invictus* and until contrary evidence produced he refers this specimen to that form.

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

On morning of August 12 well-known orange-crowned warbler song came from spruces beside tent. Fully a dozen songs heard, which seemed remarkable, as song season long past. Bird seen, but escaped. Later in day, while decoying some warblers—mainly pileolated—on river bank nearby, an orange-crown darted up, almost perched upon point of gun, then suddenly flittered away and disappeared in poplars and willows. Which form of bird seen cannot be stated.

68. **Dendroica aestiva** YELLOW WARBLER

Observed but once, when on rainy morning of July 8 a singing male delivered a song or two beside tent and then fled. Bird seen, but could not be secured.

69. **Dendroica coronata** (Linnaeus) MYRTLE WARBLER

One of half-dozen really common birds of region, found everywhere in timber. At McCarthy May 8 and common all way to Hubrick's camp. Its song, *"Weece-weece-weece-weece, wichy-wichy-wichy!"* ever ringing from spruces, and males delivering it very shy. Usually they sang from a high perch. Species most common at river-level, though found to limit of trees.

No nests discovered, though a pair of birds that played cripple in spruce woods, June 30, evidently giving a clue to a nest. However, no amount of search, even where pair seemed most frantic, could reveal secret.

Small flocks of myrtle warblers and juncos met commonly at time of breaking camp—young of both species being vastly more numerous than adults.

Specimens: Male, McCarthy, May 11. Four adults, May 27 to June 14. Two juveniles, July 19.

These birds show prescribed characters of *H. c. hooveri*, long wing (over 3·00 inches instead of under), slightly pale yellow, and averaging slightly less black below than eastern specimens, but to so slight a degree that it is doubtful if they would be recognized as such were it not for geographical suggestion. Those who have regard for such fine distinctions would call them *hooveri*, but writer hesitates to separate them from *D. c. coronata*.

70. **Dendroica striata** (J. R. Forster) BLACKPOLL WARBLER

Two individuals taken near camp, August 12 and 13, both juvenal females, only ones seen.

Specimens: Two juveniles, August 12 and 13.

71. **Seiurus noveboracensis** (Gmelin) NORTHERN WATER-THRUSH

A small migration of these birds came to upper Chitina August 12. Four juveniles taken and a few more seen, nearly all in moist habitat at river-level. One seen to perch high in a spruce tree, a remarkable denial of habit.

Specimens: Four juveniles, August 12 to 14.

In a collection of over eighty specimens from widely scattered localities in Canada, many of which have been identified as *notabilis* by competent authority, less than six can be said truly to have "white (below) with little or any tinge" as postulated by Ridgway for that race. Differences of colour of yellow below or of olive above do occur throughout species, but series, when proper age, sex, and season compared, so inextricably mixed geographically on both migration and breeding dates as to make it seem hopeless to demonstrate distinct distribution to two extremes—*noveboracensis* and *notabilis*.

These Mount Logan birds happen to be amongst birds sootier on back and with only moderate amounts of yellow below. By diagnosis they, therefore, can be referred to *S. n. notabilis*.

72. **Wilsonia pusilla** (Wilson) WILSON'S WARBLER

First of these golden sprites seen and taken on June 3—only adult female secured. Soon, species fairly common and haunted willows from river-level to timber-line. Its favourite habitat upper edge of spruce at about 4,000 feet, where it could hide in low willow tangles. Its strange, unmusical, explosive song, *"It-chit-chit-chit-chit-chit-chit-chit!"*, first heard June 5, and from that date a common sound in upper woods and in willows of river bank. Bird seemed to have no intermediate range. In nesting season found to be very shy and clever at hiding. A most un-warblerlike call note of alarm heard frequently, a coarse *"Chip!"* suggesting a cross between the note of sparrow and warbler. Its *"Chet!"* resembled *"Chack!"* of ruby-crowned kinglet.

Early in August this warbler almost numerous at river-level. A half-dozen, undoubtedly a family group, found then in almost every bird company. Species still common at time of breaking camp.

Specimens: Four adults, June 3 to 28. Four juveniles, August 11 to 14.

All undoubtedly *W. p. pileolata.* Interesting to note that juveniles (with ungranulated skulls) more yellowish above and approach rather closely to *chryseola.*

73. **Anthus rubescens** (Tunstall) PIPIT

May 10, squeaking notes of pipit heard at McCarthy. A single bird observed at river-level off Barnard glacier, May 27, and not met again until June 14, when found on open alpine slopes at about 5,500 feet, near receding snow—same habitat as occupied by horned larks. Later, June 27, three males taken here and all evidence pointed to fact of their breeding, although no nests could be found. On July 25 feathers of a pipit scattered on a rock pinnacle up at edge of perpetual snow, at over 6,000 feet, showed where one of these birds had been eaten.

Pipit seen several times in its song flight. This in fact only song heard. A musical outburst and a ringing *"Tee-tee-tee-tee-tee!"* delivered over a descent of a few yards. Singer not seen to rise to a greater height than 50 or 75 feet.

Greatest numbers of pipits of the season met on divide above Calamity creek, August 20.

Specimens: Three adult males, June 26.

In greyish-backed, vinaceous-breasted plumage, much worn but similar to those occasionally seen on migration farther south. It has been suggested that this plumage a phase rather than an age or seasonal plumage.

74. **Cinclus mexicanus** Swainson DIPPER

Not met on the Chitina, but several residents of McCarthy told of this bird appearing every winter during coldest weather on stream that ran through town. Stream did not freeze.

75. **Sitta canadensis** Linnaeus RED-BREASTED NUTHATCH

On three or four occasions between June 11 and July 3, unmistakable voice of this bird heard in timber in various localities near camp, but in no case could elusive bird be located.

76. **Penthestes hudsonicus** (Forster) BROWN-HEADED CHICKADEE

Two chickadees with characteristic Hudsonian notes seen near Kennicott, May 10. Species noted several times en route to Hubrick's camp and later found fairly common in all lower spruce forest, even to limit of timber at Trail End. Like most chickadees very secretive at nesting time and their lackadaisical call, *"Si-da-daa!"*, became much commoner in woods after young were abroad. First juveniles taken July 11.

Specimens: Seven adults, June 2 to July 6. Three juveniles, July 11 and 12.

These birds noticably greyer above (less brown) than *P. h. hudsonicus* from northern Ontario, and obviously referable to *columbianus*.

77. **Regulus satrapa** Lichtenstein GOLDEN-CROWNED KINGLET

Not common, but found breeding in two of coolest, gloomiest, wooded canyons at low elevation. On June 17 a female in laying condition taken, and on June 29 a singing male secured at same spot—doubtless same male with a new female, for a pair seen. After nesting birds were met with more commonly. Not early nesters here, no juveniles being seen on wing until July 22.

Specimens: Four adults, June 29 to July 15. Four juveniles, July 22 to August 14.

All have bright green mantles and are referred to *R. s. olivaceus*.

78. **Regulus calendula** (Linnaeus) RUBY-CROWNED KINGLET

Common on lower Chitina and several heard in song May 12 and 13, but apparently did not reach upper part of valley in spring. August 15 when bird appeared at Hubrick's camp and only a single individual seen.

Specimen: Adult male, May 13.

Typical *R. c. calendula*.

79. **Myiadestes townsendi** (Audubon) TOWNSEND'S SOLITAIRE

Solitaire found very sparingly along timbered slope at fairly high elevation. Its penetrating call note, *"Tink! Tink!"* that suggested a little the *"Peet!"* of olive-backed thrush, heard occasionally, and its loud, rich, ringing song sometimes filled the woods. A song that suggested western tanager, robin, and rose-breasted grosbeak all in one. Like most other species occupying this range, found in last patch of spruce at Trail End—this observation July 28. Extremely difficult to find bird in rough country and only two males secured. A juvenile seen at Hubrick canyon August 6 and 7.

Specimens: Two, June 16 and July 4.

80. **Hylocichla ustulata** (Nuttall) OLIVE-BACKED THRUSH

Very common. Its tender song first heard May 27 at camp and in a few days species numerous and woods filled with soulful melody. Most numerous at river-level. Its sharp call note, *"Peet!"* or *"Peent!"*, first answer of alarm to sound of decoy squeak. Woods vocal with thrush music at all hours of day and most of night, there being but a short period of quiet from near midnight until about 2 a.m.—this at height of song during longest June days—but song season closed with a strange abruptness about July 15. On May 30 a bird timed, gave regularly ten songs a minute at 10 p.m.

A fledgling just from the nest taken July 6 and a juvenile August 4, but little sign of bird in August. No certainty that last thrush seen August 14 was of this species.

Specimens: Seven adults, May 31 to June 11. Two juveniles, July 6 and August 4.

Three specimens distinctly and consistently greyer than *H. u. swainsoni* from British Columbia or elsewhere. Writer has noted on migration dates occasional similar birds from Jasper park, Alberta, and Shoal lake, Manitoba. That this Mount Logan locality seems to produce a series of these birds strongly suggests expediency of recognizing *H. u. almae*, supported as it is by Dr. Bishop's record of this form on Yukon (N. A. Fauna No. 19, 1900).

81. **Hylocichla guttata** (Pallas) HERMIT THRUSH

Hermit thrushes sparingly frequented upper woods along edge of timber at about 4,000 feet, where last scattering spruces gave way to willow thickets and stands of dwarfed black poplars. Frequented roughest of country about heads of lesser canyons, and though their far-reaching, ethereal songs were a guide to their whereabouts, extremely difficult to get specimens. A specimen shot from a spruce tip at timber-line, June 3, but bird fell into a canyon and was lost. Though hermits first seen here on this date, it is a certainty that they arrived earlier, as on May 12 at Young creek a suspicion of song heard. On two occasions song heard at river-level from a point 5 or 6 miles below camp.

On June 28, after following elusive song in roughest of country near timber-line, a hermit was located on a spruce tip. "It saw me, ceased singing, began a towhee-like note of complaint, then dived headlong into the poplar and willow underbrush. Here it continued to call like a towhee. I fired at a movement and picked up a male hermit. Immediately the hermit song broke forth again 150 yards distant; then the singer moved. While I ate lunch there was silence; then the song sounded close again, but the singer could not be located. Where were the females? The male that was shot seemed to have a proprietary right here, yet no mate appeared." Such was way of these elusive birds.

The last record of species that on August 7, clucking, scolding notes of bird heard in a thicket at timber-line.

Specimen: One male, June 28.

Very small grey bird, typical *H. g. guttata.*

82. **Planesticus migratorius** (Linnaeus) AMERICAN ROBIN

Robins observed at Cordova May 7, and at three points on railway, May 8. Heard in song on the Chitina May 15, and on May 27, two that might have been a breeding pair taken at Barnard glacier. Not common on upper Chitina and though an occasional wandering bird seen at intervals, is doubtful if any of them bred there. Last appearance at timber-line, August 6, back of camp.

Specimens: Two, May 27.

As far writer can see, perfectly normal *P. m. migratorius.*

83. **Ixorius naevius** (Gmelin) VARIED THRUSH

Present at Cordova May 8, and also at first stop a few miles up railway. Next met near McCarthy May 12; on Young creek next day and henceforth found sparingly up the Chitina. Its eerie whistle always indication of its presence. Doubtless bred throughout region. Heard in song as late as July 13. Here as elsewhere bird an inhabitant of only coniferous woods, and noted in this valley only at low elevation.

Specimens: Two, May 13 and June 21.

Cannot see that these differ in any essential particular from typical *I. n. naevius.*

84. **Saxicola oenanthe** (Linnaeus) WHEATEAR

Found breeding above timber-line in two canyons at about 5,000 feet. First seen June 3. Held to most inaccessible spots toward head of deepest canyons where only wings could have reached their nest sites. Pair in Hubrick canyon apparently nested successfully, birds leaving nest site about July 17. A male taken June 7 in adjoining canyon secured by strategy. By hiding in low willow clumps and imitating his song, male induced to come up on top of pinnacle. Bird seemed to tell his name in a strong *"Wheet-eer!"* and his song on wing rather a fine performance—this being delivered gushingly on a sharp descent. When perched, bobbed somewhat in manner of a dipper. Usually very shy, but on July 25 while writer was lunching on a rock pinnacle at edge of snow, about 6,000 feet and beyond limit of ground squirrels and vegetation, a juvenal wheatear appeared a few feet off and taking perch on a stone, bobbed inquisitively. Again on August 9, while skinning a ram beside the snowbanks at over former elevation, an adult and a young wheatear came close and curtesied on a rock at a distance of a few feet.

Specimen: Male, June 7.
Assumed to be typical form *O. o. oenanthe*, but subspecific determination not verified.

85. **Sialia currucoides** (Bechstein) MOUNTAIN BLUEBIRD

Bluebirds observed but once, when on August 21 a small flock of about fifteen met on Sourdough hill near McCarthy. Though close examination could not be made, doubtless this form. Andrew Taylor also told of seeing bluebirds in White River country in former years.

NOTES ON MAMMALS OF UPPER CHITINA RIVER REGION, ALASKA

By Hamilton M. Laing and Rudolph M. Anderson[1]

1. **Ursus americanus** Pallas BLACK BEAR

Not numerous, but present along entire north side of the Chitina. On day of arrival of alpine party at Hubrick's camp, a large black bear was working upon an open slope just above camp. That he had not rifled the torn tent of its unprotected supplies seemed rather a wonder. Next day another seen on a similar slope farther up valley. After this tracks seen almost daily, but makers kept to timber. On July 17 a large male thought to be first one seen, waylaid and shot as he headed down a sheep trail from near timber-line. On August 3, during a day's absence from camp, a black bear invaded place and carried off and destroyed fresh skin of a ram that had been hung in shade to dry. He returned that evening, coming almost to tent door. A bullet sent after him in dusky timber failed to stop him and he went off spilling bearberry mash profusely and never returned. Truly a sudden boldness in so shy an animal, but undoubtedly a newcomer unschooled to man, come to range of male killed earlier.

Stomach of male specimen held only vegetation, mainly grass. Meat of good flavour, but tough.

Measurements of this specimen as follows: total length, 1,560 mm.; tail, 120 mm.,; hind foot, 195 mm.; estimated weight, 250 lbs.

Specimens: Two.

June 15, juv., McCarthy, Alaska.

July 11, ♂ adult, Hubrick's, Chitina river. This specimen differs from a series of eastern specimens (Quebec, Ontario, and Manitoba) in comparative length and slenderness of skull, breadth of skull being less in proportion to length. Frontal region relatively high and rounded, curving upward from about middle of nasals or posterior tips of premaxillæ, to about line of postorbital processes. Temporal ridges well defined, but not large, and sagittal crest rather low. Rostrum long and slender, and inflated very slightly over nasals. Eastern black bear skulls examined, all show a nearly flat or slightly depressed curvature from postorbital processes to tip of nasals. Neither Chitina River specimen nor a series of skulls from Teslin Lake region show any noticeable resemblance to characters given for *Ursus* (*Euarctos*) *americanus pugnax* Swarth, Univ. Calif., Publ. Zool., vol. 7, 1911, p. 141, the island black bear of southeastern Alaska coast.

H. S. Swarth (Univ. Calif. Publ. Zool., vol. 24, No. 2, 1922, p. 161) considered specimens of black bear from Telegraph Creek, British Columbia, nearest to type of *U. a. perniger* (Allen) from Kenai peninsula and Yakutat bay, Alaska, although pending revision of group he referred them to *U. a. americanus* Pallas.

C. Raymond Hall, however, in his paper, "A New Race of Black Bear from Vancouver Island, British Columbia, with Remarks on Other Northwest Coast Forms of *Euarctos*," Univ. Calif., Publ. Zool., vol. 30, No. 10, 1928, pp. 231-242, considers that so-called glacier bear or blue bear, *U. a. emmonsi* (Dall) of Yakutat Bay region merely a colour phase of geographic race of black bears of mainland of southern Alaska. To this race, he considers name *Ursus americanus emmonsi* will apply, with type locality in St. Elias Alps, near Yakutat bay, Alaska. He states that "some of the skulls of the blue bears from the northernmost part of the range of this colour phase are strikingly like *U. a. perniger*, but the others agree with specimens from Taku river and vicinity."

On the whole, our specimen from Chitina River valley, Alaska, shows a rather close resemblance to description of *Ursus americanus emmonsi* (Dall), and may perhaps be best considered as intermediate between this form and *Ursus americanus perniger* (Allen).

[1] Systematic notes under each species are by R. M. Anderson, who is responsible for the identification and nomenclature.

2. **Ursus** sp. GRIZZLY BEAR

Grizzly tracks observed at intervals all way up the Chitina in May, but not in any numbers, and most commonly toward head of valley. Their grubbing for roots often a feature of flats where roots of *Hedysarum boreale* and *Hedysarum Mackenzii* much sought—former apparently being favourite. Indeed, it was never definitely determined that *Hedysarum Mackenzii* eaten at all; for always when fresh stems found lying as evidence, they belonged to *boreale*. Both plants often grew intimately associated in same habitat.

On evening of May 20 a large, brown grizzly with lighter mantle across shoulders hurried up open gravel flat before tent, passing at 200 yards. Fired at, wounded, but lost—a lamentable affair due to fact that rifle sight had been pounded out of line in rough game of packing. After this grizzlies seen five different times, but always when no rifle available. Observed twice at Trail End and it was undoubtedly grizzlies that destroyed food caches of Mount Logan climbers on lower point of Chitina mountain.

This animal here ranged from river-level to open alpine slopes, his chief interest in heights being ground squirrel. Creamy-coloured grizzlies seen on three occasions. One of these on June 26 found at about 5,500 feet elevation, lying on a knoll, and refused to pay any attention to whistles and shouts calculated to scare him—this at a distance of about 150 yards. Animal lying on breeziest knoll available and seemed worried by mosquitoes that on this date were numerous. Fresh diggings for ground squirrels on slope nearby.

Early spring must have brought lean days for *Ursus* here. A scatological study of a bear, probably a grizzly, May 15, revealed that animal had eaten quantities of rabbit only. Another pile of excrement contained seeds of cranberry (*Vaccinium pauciflorum*), silverberry (*Elaeagnus commutata*), and some seed of smaller berries as well as rabbit bones and fur.

One of surprises given by this animal in life his speed afoot. When walking, his very deceiving gait covered distance amazingly. Following a grizzly across a long open flat near Trail End, June 9, writer had to push hard to hold pace and bear overtaken only when he wasted his time nosing around stream. When walking, grizzly's tracks evenly distributed, front and hind, showing that, unlike best walking horses, hind foot far oversteps front. During a slow walk, this gives a clearance between prints of about only 6 inches. Found, however, that when animal broke into his awkward gallop, his feet came down well in line, two and two, that is, two front followed by two hind, or vice versa; and from hind heel to front toe in two bounds measured, distance was 10 and 11 feet respectively. No very large tracks seen here. Measurements taken May 23 about average, i. e., front foot 7 inches broad and same long; hind foot 6½ inches in width across toes and 11 inches in length (heel to claw).

Grizzly diggings for ground squirrels found on high divide between Calamity creek and the Nizina on August 20.

No less than thirty-one forms (species and subspecies) of grizzly bears recorded from British Columbia, Yukon, and Alaska alone, as well as several allied species of big brown bears (Merriam, C. Hart: "Review of the Grizzly and Big Brown Bears of North America"; North Am. Fauna, No. 41, Washington, 1918, pp. 1-136, Pls. I-XVI). These described in most cases from skulls only. Very little definite knowledge available concerning colour and general appearance of animals, and ranges of different forms have in most cases not been worked out. Several possibilities of different species or geographic forms of grizzly being found in this region, but futile to make any attempt to name them without actual specimens in hand.

3. **Canis lestes** Merriam MOUNTAIN COYOTE

Residents of McCarthy said that coyote had been unknown in region until about 1915, when it appeared and took up residence. A few in Chitina valley. One met by packers at Bryson's cabin, May 15. Tracks seen all summer on upper Chitina, but makers shy and sighted on only three occasions.

On May 29, while writer was working a way up edge of canyon above camp, a coyote below and on opposite side barked at great length. Judged to be a female near den, and this borne out later when tracks of a family of young found on sand at edge of woods. On June 18 an old female outwitted and shot with rifle out on bare river flat. Nursing young. A handful of flat, segmented, whitish worms, judged to be tapeworms, oozed from gaping bullet-hole and a very large mass of same in body cavity. Stomach full and contained remains of a full-grown rabbit that had been bolted in large pieces. It would seem that at this date young could not have been eating meat or mother would have carried at least a portion of her kill to her den.

Coyotes never heard howling on the Chitina, which seemed remarkable.

Not likely that coming of coyote has had much effect upon mountain sheep of this region, unless perhaps young stock are attacked in winter at low levels. It was found that in summer coyotes seldom ranged as high as timber-line. Climbing steep hillsides evidently did not appeal to them. Had they been in habit of climbing, they must have used dusty sheep trails, but their tracks on these highways of travel seldom seen.

Specimen, one, in faded and worn summer pelage, shows skull and dentition characters of *Canis lestes*. Skull larger and more slender than an adult specimen of *Canis latrans* Say from Ontario, but teeth somewhat smaller and less massive. Skull somewhat larger than a specimen of *Canis nebracensis* Merriam, from Alberta. Dr. J. A. Allen, in Bulletin of American Museum of Natural History, vol. 24, p. 584, records a specimen of coyote killed near Whitehorse on Alsek river, Alaska, in February, 1907. Jos. Dixon, in *Journal of Mammalogy*, vol. 9, 1928, p. 64, records a further extension of range northward and saw a skull of *Canis lestes* found at north base of mount McKinley in 1926, stating that this appears to be extreme station in northwest, although there are records of coyote occurring farther north along Yukon river. Mr. A. E. Porsild, of Northwest Territories and Yukon Branch, Department of Interior, wrote on January 15, 1928, that he was sending to Ottawa a skin and skull of coyote taken at Tuktuyaktok on east branch of Mackenzie delta, east of Richards island, Mackenzie district, Northwest Territories. He stated that he saw remains of another skin killed at Tuktuyaktok winter before, and that in Mackenzie delta they are taken occasionally and a few traded every year at McPherson. There is a possibility that these later records may refer to *Canis latrans* Say, northern coyote or prairie wolf.

4. **Lynx canadensis canadensis** Kerr CANADA LYNX

Lynx tracks seen a number of times on river and between Barnard glacier and Trail End. Evidently animal rambled far even in summer, as one often used canyon route in going to and from Trail End where its tracks plain along stream. Often tracked for miles here. Seen but once, when on August 5 a juvenal male almost fully grown was routed from grassy edge of Teal pond, and shot as he ran off through the burn. He had just killed a lesser yellow-legs, but dropped victim in his haste to be off. Weight of this specimen estimated to be about 20 pounds.

Specimen: One, ♂ juv., August 4.

Lynxes from northern Canada and Alaska often conventionally classed as *Lynx canadensis mollipilosus* Stone, type locality, Wainwright inlet, Alaska. A skull from Barter island, Alaska, which writer compared some years ago with specimens in United

States National Museum from Quebec; Norway House (Manitoba); Fort Simpson, Great Slave lake (Northwest Territories); and other places; showed no characters that could not be matched in others. *L. c. mollipilosus* said to be browner and less grey than true *Lynx canadensis*, with a dense, soft, woolly pelage. Skull decidedly narrower, higher, and more arched than *L. canadensis* and much more constricted across frontals and between orbits, postorbital processes conspicuously more slender. Recent comparison of Chitina River specimens with material from James bay and Nipissing district (Ontario), Saskatchewan river and Duck mountain (Manitoba), show no tangible difference, except that postorbital processes if anything thicker and heavier in Chitina specimens. Chitina specimen in faded summer pelage and valueless for comparative colour characters. *Lynx canadensis mollipilosus* Stone described from a single Alaska specimen, and a supposed intermediate specimen from British Columbia, and seems to rest upon insecure premises.

5. Citellus plesius plesius (Osgood) Lake Bennett Ground Squirrel

Very numerous over north slope of the Chitina wherever visited and also numerous on summits above the Nizina. Held very consistently to an elevation of from 3,000 feet to 6,000 feet. Thus although never observed near Hubrick's camp, was down to valley level at Trail End, about 3,000 feet. Equally at home in cliffs that faced valley below timber-line, in willow thickets beyond limits of spruce and poplar, and on barest, rounding pastures far aloft near line of perpetual snow. However, the 1,500 feet above timber-line its favourite range, and it was invariably found in high rock slides, home of the pika.

Species first seen and taken at Trail End, May 21, and on May 24 a few above base camp at timber-line. From this time until mid-August climber could scarcely set his foot in upper reaches of mountains without having shrill *"Chitigit!"* almost constantly dinned into his ears.

Most wary and clever ground squirrels ever seen by writer. System of signalling perfect. Aimed to keep visitor constantly under surveillance, yet never to allow him to make a close approach. Rare to get within gunshot. Always a sentry or two stretched up at a burrow or perched on a commanding rock, but they were always ready to dart down to safety at first move in their direction—and some other voices took up shrill alarm. Almost impossible to secure with a shotgun unless by a head shot and even several head-shot victims had to be hauled out of their burrows where their last spasmodic actions invariably carried them. However, these animals found to be quite tame at old mine on Calamity creek where doubtless they had learned to know man.

Ground squirrels seemed to have two enemies: golden eagle and grizzly bear. Probably Harlan's red-tailed hawk killed a few of them along edge of timber, but hawk never seen aloft in open pastures. Found that squirrels had two alarm calls. At sight of man foe note invariably *"chit-i-git!"* the three syllables uttered rapidly, shrill, staccato. At sight of eagle alarm entirely different: a shrill *"cheep!"* much like that of Richardson ground squirrel *(Citellus richardsonii)* of prairies. Observed many times. Young, too, had this double alarm. Four-footed foes—and doubtless man fell into category of bear—drew one alarm note; winged foes, the other—a rather fine display of intelligence, it would seem.

Grizzly preyed upon *Citellus* only upon higher slopes. At lower level little animals doubtless too well entrenched in their rocky fortresses. But at high levels could be seen that all burrows were shallow, which may have been due to nearness of frost to surface. At any rate, Ephraim merely ripped out shallow burrows and never dug deep holes.

Number in a litter not learned. No females taken carrying young, though a specimen taken July 14 had mammæ plainly in use and abdominal tissue showed usual distention during nursing. Indicated a late arrival for young and same borne out by fact that not until July 25 juveniles recorded as numerous about burrows.

Useless to lay a trap-line for mice above timber-line in vicinity of ground squirrel burrows. Ground squirrels invariably sprung them.

On August 9, on a rock above timber-line, fresh fur of one of these animals found with a large, disgorged gob of fur beside it. Some raptor judged to be killer.

Specimens: Four, from Chitina River glacier.

May 21, No. 5618, ♀ 315-106-51. Still in winter coat. Back greyish with very little tinge of yellowish, some pale yellowish red on shoulders. Face and crown, dusky tawny reddish. Tail blackish above with conspicuous white edging; some dull, tawny below, particularly distally. Feet, pale buffy. Underparts greyish white, slightly mixed with yellowish along median line.

June 3, No. 5632, ♂ 5,000 feet altitude, 337-100-55. Winter coat. Back mostly greyish, with mottled appearance due to whitish sub-terminal portions of hairs, which are blackish-tipped. Very little yellowish on shoulders. Face and crown reddish. Underparts whitish with traces of yellowish along median line. Tail blackish above, white-edged; median portion of tail reddish below.

June 7, ♂ No. 5635, 325-95-53. Colour similar to No. 5632, but with some irregular areas of reddish on underparts; going into summer coat. Tail blackish above; median portion of tail reddish below.

June 14, No. 5641, ♀ 325-88-51. Weight slightly over one pound. Colour similar to No. 5635, but with whitish spots on back less distinct. Reddish areas below smaller and paler.

These specimens in winter coat noticeably grey or hoary in colour, and have a silvery coat on neck and shoulders. Specimens of this subspecies from Teslin Lake region, Yukon, in late summer and autumn, noticeably much yellower above, and underparts almost entirely reddish or rusty. A similar condition found in *Citellus parryi parryi* and its synonyms (*phaeognathus*, *kennicottii*, and *barrowensis*), which have been much confused in their extremely variable summer, winter, and mixed pelages.

6. **Sciurus hudsonicus petulans** Osgood White Pass Red Squirrel

Very abundant in woods from river-level to timber-line and inhabiting even burns where new willow growth afforded cover in summer. Tremendous heaps of cone scales of white spruce (*Picea canadensis*), sometimes 20 feet in diameter and a foot or two in depth, told of activity of these animals in getting a living. Secured most of their food from this source and it is noteworthy that though they once raided camp and carried off much pilot biscuit, did not pick up oats left behind by pack train. Mice about camp also left grain where it fell.

In May and early June families of young commonly met around larger cone-heaps, and as early as June 2, two-thirds grown, taken remote from nest. By about June 7 families began to break up. At this date, during an all-day absence from tent, several of these little pirates carried off contents of a large carton of biscuit. From this time a pest of mild nature about camp. Red squirrel here chief source of food supply for goshawks, Harlan's hawks, and hawk owls, and perhaps coyote and lynx also levied toll.

Specimens, five, all from Chitina River glacier, May 21, No. 5619, ♀ 344-138-49. No. 5620, ♀ 322-132-50. Still with traces of winter coat; obscure red stripe along middle of back and tail; no red on under side of tail.

May 31, No. 5624, ♂ 325-128-50. In summer coat; no red stripe on back, tail red above, bordered with black and with edges yellow-tipped; some red on tail below near tip. No. 5625, ♀ 338-130-49, and No. 5626, ♂ 330-127-48, in similar summer coat. This subspecies fairly well defined, being larger and darker than *S. h. hudsonicus*, more reddish

than *S. h. streatori*, and paler than *S. h. vancouverensis* and *S. h. picatus*. In skull sharp indentation in orbital arch between lachrymal and postorbital process mentioned by Osgood in his original description (North American Fauna, vol. 19, 1900, p. 27) may differentiate subspecies from *vancouverensis*, but it is a character shared by other interior forms to some extent.

7. **Castor canadensis** Kuhl. BEAVER

Beaver cuttings (willow) more or less fresh, observed on Teal pond in May and June, but July 21 when woodcutter met here. Tracks seen earlier two or three times, on river mud at edge of woods, showed that animal had been prowling in spring remote from habitable water. Old male at Teal pond—sex judged from fact that he was building scent mounds—proved very tame and was studied for several hours by daylight, when both still photos and movies made of him. His house in bank, his door half submerged, end of tunnel being built up and roofed considerably. Much submerged material indicated that he had wintered here.

On first meeting full of curiosity only, swimming up to within 50 feet, where he gave exhibitions of diving and tail-splashing. When worried by too much attention, always went ashore on opposite bank of lakelet and sat in sun. One long, under-water swim where he could be watched for some time estimated to cover a distance of about 200 yards. When on August 6 a visit made here to collect him, pond vacant. Nearest suitable water for him at least half a mile off through timber.

Capt. Hubrick of McCarthy informed writer that a few years earlier he had found a large beaver colony well hidden among the islands farther down the Chitina, beyond Barnard glacier.

No specimens secured, but from geographical reasons form found here probably Alaska beaver, *Castor canadensis belugae* Taylor, type locality "Beluga river, Cook Inlet region, Alaska," range "probably from Alaskan mountains on north to central British Columbia"; specimens recorded from Stuart lake, B.C. (Univ. Calif. Publ. Zool., vol. 12, 1916, p. 429).

8. **Cleithrionomys dawsoni dawsoni** (Merriam) DAWSON RED-BACKED MOUSE

Commonest mouse at river-level, but never numerous. Brush-piles about tent best trapping grounds, but a few caught along river bank and in a swampy draw down river, a single specimen taken August 7, above timber in haunts of Yakutat vole. On June 9, in a clump of *Shepherdia* on lower end of Chitina moraine, three or four of what were taken to be these same red-backed mice, seen working at midday. A shot from ·32 auxiliary barrel failed in execution and they refused to come out again. Immature specimens taken commonly. This mouse had widest range of any found here.

Specimens: Twelve.

May 20, ♂ ♂ Hubrick's camp, Chitina river.
May 21, ♀ " "
June 19, ♂ ♀ " "
June 26, ♂ ad. " "
June 27, ♂ juv. " "
July 22, ♂ ♂ juvs. " "
August 7, ♂ ♀ ad., ♂ juv. Hubrick's camp, Chitina river.

May specimens still in full winter pelage with distinct bright reddish area on back, sides yellowish and underparts white. June specimens have thinner hair, are duller and darker in colour above, and underparts washed with buffy. July and August specimens longer-haired, with richer reddish colour on back, and underparts generally more whitish. Alaska specimens of this widely-ranging species average slightly smaller than animals from Yukon and Northwest Territories, and none of specimens from Chitina valley as light in colour as specimens from near Bering sea and Arctic coast.

9. **Microtus pennsylvanicus drummondii** (Audubon and Bachman) DRUMMOND MEADOW-MOUSE

This species caught at camp and in almost same sort of habitat as red-backed voles. Two traps set at a hummock showing mouse runways in muskeg, sometimes caught a mouse of each species. All present species taken at low level. One specimen caught in a trap baited with fresh meat; but these mice, like those of three other species, baited most successfully with a mixture of burned bacon grease and strong cheese. Oatmeal useless.

Specimens: Four.

May 31, No. 5628, ♀ juv., 126-35-16, Hubrick's camp, Chitina river.
June 6, No. 5633, ♂ juv., 130-37-17, " "
June 15, No. 5642, ♀, juv., 130-35-16, " "
July 22, No. 5655, ♂ juv., 131-35-18, " "

These specimens all juveniles and not quite suitable for comparing measurements; being smaller than average, and averaging more grey in colour than typical *drummondii*. Skulls of all four specimens check up same in teeth characters—first upper molar with a normal truncate posterior triangle; second upper molar with four closed triangles and a rounded posterior loop, latter being small; third upper molar with three closed triangles. Second upper molar characteristic for whole *pennsylvanicus*-group which here reaches near northwestern limit of range of this very widely distributed species.

10. **Microtus yakutatensis** Merriam YAKUTAT TUNDRA VOLE

Timber-line mice not numerous and their work observed only here and there in clumps of last straggling willow. Their runways, midden-heaps, and fresh cuttings evidences of occupation in a few of upper hollows in higher slopes investigated. Four of these voles, taken August 7, agreed with a single male caught in same locality July 18. A female, August 7, carried five large embryos. Timber-line mice were invariably fly-blown. As traps always attended in morning before flies abroad, state of mice indicated that they had been active and got caught during the previous day.

Specimens, five, of this large form of *operarius*-group (tundra voles) of meadow mice, taken at Chitina River glacier, at about 4,500 feet elevation.

July 28, No. 5651, ♂ 168-47-20
August 7, No. 5658, ♀ 168-46-19
No. 5659, ♂ 162-45
No. 5660, ♂ 171-45-20
No. 5661, ♀ 152-40-19

Skull: Basal length, 26·5 mm. Nasals, 7·8. Zygomatic breadth, 18. Mastoid breadth, 11·5. Alveolar length of upper molar, 7. Skull rather long and slender, angular, and well-ridged. Nasals slender, ending even with arm of premaxillæ, with medium constriction. Incisive foraminia short, constricted posteriorly. Incisors projecting well in front of nasals, but not excessively so. Colour dusky grey, belly with decidedly buffy tinge. Distinctive characters of *operarius*-group well marked in all specimens, namely second upper molar with four closed sections and no posterior loop; first lower molar with four closed triangles and rounded anterior loop; molars moderately heavy; audital bullæ medium. Dentition of all specimens similar, except that in two specimens first lower molar shows appearances of five closed triangles instead of four triangles and a rounded anterior loop. All microtine series, however, show considerable variability in both patterns.

Strong probability that *Microtus yakutatensis* intergrades with *Microtus operarius operarius* (Nelson), Alaska tundra vole, of western and northern Alaska coast regions, or with *Microtus operarius endoecus* Osgood, Yukon tundra vole, of central Alaska and Yukon, but in absence of specimens from intermediate districts, stands as a distinct species.

11. Microtus mordax mordax (Merriam) MOUNTAIN LONG-TAILED VOLE

One of these mice taken in habitat of Yakutat voles. Possible that a mouse colony found later, considerably higher than this locality, and just beyond line of willow-clumps, may have belonged to this form. Colony discovered in August too late to lay a trap-line.

Specimen: One, No. 5652, ♀ 204-82-21. Chitina River glacier. A large species which reaches nearly its northern limit in this section. Known by long tail about one-third of total length.

Colour greyish; back greyish bistre; sides dull grey; belly washed with whitish; nose dusky. Tail bicolour, dusky above, soiled whitish above. Feet plumbeous. Second upper molar with four closed sections, posterior open; first lower molar with five closed triangles; five inner and four outer salient angles back of anterior loop; third lower molar with anterior crescent, three closed triangles, and posterior loop with two inner salient angles; second and third lower molars each with three outer and three inner salient angles

12. Erethizon epixanthum myops Merriam ALASKA PORCUPINE

Only four specimens seen and all taken. Three of these invaded camp, May 22 and 25, in night in both cases, and raised a disturbance by gnawing charred wood. Fourth taken near timber-line June 12, where on a rainy day he was found sitting 15 feet aloft on a matting of dead spruce twigs of a leaning windfall. All males, one only being adult. Three somewhat smaller and darker than adult, and sex organs, by comparison, but half developed—testes being still within body wall.

Porcupine work upon bark of smaller spruce seen occasionally in woods, but fresh work during summer not noted.

Specimens: Four (two skins and four skulls), May 24, two skins with skulls.

No. 5621, ♂ 750-170-97. Specimen with whole front and sides of head brownish black; top of head and nape with long, light yellow hairs forming a sort of ruff; whole dorsal region, flanks, and legs blackish, becoming dull brown on belly; a few long, sparse, yellow hairs on legs; rump and tail a mixture of black and yellow hairs. In coloration this specimen closely resembles typical *E. e. nigrescens* Allen.

No. 5622, ♂ 800-220-114. Larger than preceding. Front and sides of head pale fuscous brown; top of head and nape with a ruff of rather pale yellow hairs; dorsal, flanks, and legs, a dull mixture of brownish and very pale yellow hairs; a few yellow hairs on legs; tail black along median line, fringed with long, whitish yellow hairs. Specimen corresponds to description of *E. e. myops* in having general colour effect yellow. Much more yellowish and brighter in tint than any specimens in a large series of *nigrescens* from Teslin Lake region, southern Yukon.

May 25, No. 5623, ♂, skull only.

June 12, No. 5638, ♂, skull only.

All skulls adult, but No. 5638 very old with sutures nearly obliterated. Nos. 5622 and 5623 have zygomata nearly straight, No. 5638 slightly bowed, and No. 5621 very much bowed outward throughout whole length. Dr. Merriam, in his original description of *E. e. myops*, gives outward bowed zygomata as a character of *myops*. Specimens vary somewhat in size of occipital crests, these being well developed in Nos. 5622 and 5638, small in No. 5623, and very slight in No. 5621. Sagittal crests well developed in Nos. 5622 and 5623, but smaller in Nos. 5621 and 5638. Skulls all show a marked depression in fronto-parietal region. Outer wall of anteorbital vacuity, from side, slightly concave and sloping a little backward inferiorly. Skulls of porcupines vary greatly individually and from age, but on whole these specimens fairly uniform in character, approaching somewhat to *nigrescens* type, with which form they are probably intergrades.

13. Ochotona collaris (Nelson) COLLARED PIKA

Pikas present sparingly in all suitable rock slides at about 5,000 feet and over, but this animal never observed below timber-line anywhere on range. On only one occasion more than two of little animals found in a slide, three being seen high above Trail End, July 31.

Seemed no reason why jumbled rocks of Chitina moraine should not have supported pikas, but not one could be found. Barnard glacier equally untenanted. Not more than a dozen all told seen and no "hay-piles" found anywhere.

One of wonders of these 'hay-makers' their large and populous fleas that literally swarmed about their necks and throats, but deserted as soon as host grew cold after death.

Only one call ever heard from pika here, as elsewhere; sharp, grating mew.

A female taken June 14 carried two fairly large embryos—about 40 mm.

Specimens: Three.

June 1, No. 5634, ♂, Chitina River glacier, 195-16-27.
June 14, No. 5639, ♂, Chitina river. Altitude, 4,000 feet, 190-15-27.
June 14, No. 5440, ♀, Chitina river. Altitude, 4,000 feet, 188-15-27.

14. **Lepus americanus macfarlani** Merriam MACKENZIE VARYING HARE

Winter of 1924-1925 dying-off year for rabbits of Copper river, Nizina, and lower Chitina. Dead began to appear in woods, May 8, along railway about 50 miles below Chitina Station; most numerous immediately above this point, but still dead littering brown woods at McCarthy and Kennicott. Dead rabbits later found on Nizina, Young creek, and lower Chitina, but not in upper part of latter valley. This area of stricken bunnies over 100 miles in length, but its breadth could not be determined, though probably it extended up all tributary streams of the Copper and Nizina. A count from coach window on one side of train revealed as many as fourteen to mile in a 20-yard strip of visibility—or 1,232 dead to square mile. Usually counts ran less than half this number. Yet all rabbits did not die, as during day twelve seen alive. These now in brownish pelage; stricken had all perished in white coat of winter.

Inquiries of residents brought many explanations of the strange "disease," these varying from internal tumors to actual starvation. Many local areas where rabbit food in form of shrubbery eaten, so bare that starvation seemed most logical explanation, and a certainty that where shrubbery most devastated, there were most dead. In places all saplings to size of a man's thumb mown as with a brush-scythe, and all fallen green trees, even spruces, stripped of leaves, twigs, and bark.

Few dead rabbits found fresh enough for dissection. One found lying on snow at Young creek in fair condition. That blood and other matter had run from nose seemed to indicate internal trouble and when head was removed, throat appeared to be a mass of pus.

From Bryson's cabin upward on the Chitina, rabbits fairly numerous, in good condition, and later multiplied normally. Ranged from river-level to timber-line, though much commoner at lower elevation.

A note in diary, June 9, records: "Rabbits, both male and female, made up today show strange moult. A few long, white hairs still showing—the remnant of the winter coat. The main body of the present coat is quite dark, but a blackish and grey mixture shows in patches under this. The underparts are whitish."

Female shot June 9 had been nursing a family, doubtless a second litter. On June 30, young noted "as large as two fists."

Parts of a young bunny taken from crop of a young Harlan's hawk, July 19. On June 18 entire body of an adult found packed in stomach of a coyote.

Often in spruce woods white tufts of rabbit fur and sometimes a foot or leg noted aloft in spruces, showing that in winter many rabbits here fell prey to raptorial birds.

A rather large adult male specimen taken at McCarthy, May 11, weighed 3¼ lbs.

Specimens: Seven (three skins and seven skulls) May 31. ♂ ♀, Chitina River glacier. Both in new, short-haired, spring pelage, female much the darker, with a sooty brownish cast above. Both specimens have a few long white hairs still hanging on from winter coat.

June 9, ♀ with longer hair than preceding and a distinct blackish median line on back. Feet whitish.

All these specimens noticeably greyer than a large series in our collection from Teslin lake, southern Yukon, but as latter are late summer and autumn specimens, yellower tinge perhaps due to wear and bleaching during long summer days. *L. a. macfarlani* darkest and greyest form of widely ranging species, *Lepus americanus*, which in its various geographical races extends from Nova Scotia to limits of trees in northwestern Alaska.

15. **Alces americana gigas** Miller ALASKA MOOSE

No moose now in Chitina valley, but an old antler at Barnard glacier showed that species recently had occupied region.

Alaska moose intergrades so uniformly with eastern form of species through such a wide extent of its range in northwest, that there seems to be no justification for considering it as more than a subspecies of *Alces americana*.

16. **Ovis dalli dalli** Nelson DALL MOUNTAIN SHEEP

Common and only big game of immediate region other than bears. First observed near Rush pond, one day's march below Bryson's cabin, May 14, where in evening sixteen seen a short distance above camp. On approaching Hubrick's camp, May 17, thirty odd sheep in small flocks scattered along first line of cliffs half-way to timber-line. From this date sheep always in sight of camp except during hottest weather about July 25, when they occupied their highest ranges at edge of snow. Some were seen on this date at about 6,000 feet, panting from exertions in climbing. Winter range very close to river-level wherever open slopes exposed. All spring they kept working gradually higher, following line of new vegetation, food above timber being largely the leafage of *Dryas octopetala*. When cold fogs of early August began to hold to upper mountains, they turned downward again to deserted pastures, by mid-August occupying ranges immediately above timber-line.

In May and early June coats dilapidated, dirty, and shabby. Infested with ticks and spent much time rubbing themselves on projecting rocks. As late as June 20 a yearling ram noted but half shed, whereas a larger ram clean and in short, summer coat. Many dust-baths scraped in dry hillsides and used frequently.

In earlier part of season golden eagles hovered about flocks, but mothers evidently cached their lambs cleverly and did not bring them out to follow them on pastures until about June 7 when strong and nimble. Each ewe seen with a single lamb only. On June 3 a ewe seen with what was judged to be her last year's lamb. New-born lambs probably hidden in cliffs rather than in willow clumps, as at first suspected, for latter cover could scarcely have sheltered them from eagles.

Sheep trails interesting engineering exhibits. Easiest ascents always by way of these trails. Every canyon had its path along rim. Several such highways through wooded draws worn by long usage. These sheep did not hesitate to enter woods and used burns as feeding grounds in May where first sprouting tufts of *Zygadenus elegans* gave first nibbles of greenery. In fact their square tracks—not pointed as in the case of deer—met everywhere except in lower woods.

Excellent climbers and gave many exhibitions of skill on cliffs and canyon walls. Gait stiffer and slower than expected; suggested sturdy strength, lacking bounding sprightliness of deer. Rams always carried themselves proudly, stiffly, and a trifle ungainly, when they bounded up a slope. Favourite sunning perches on dizzy projections of canyons where wind brought word of danger over only route open to foe.

Horns of Chitina rams rather spreading. Those of oldest ram examined—a skull found in woods where bears (?) had eaten rest—showed growth of about twelve years; exact calculation difficult as both horns had lost about 10 inches. In working upon five year-old specimen, August 9, noted that inner ring of horn (annual ring next head) not fully grown and at base much gristle and softer material. Space between base of horns wider than on older animals, quite disappearing in patriarchs. This five-year-old is thus only four years and three months of age, his annual ring not yet complete. Each ring, by growing wide in front and narrow behind, gives horn its curve. Growth takes place entirely at base. Spread of different individuals differs considerably. Thus spread of five-year-old almost equal to that of skull in canyon that denotes six-year-old head; this in turn considerably less than that of specimen shot May 17. New ring must complete growth some time in autumn or winter, doubtless before rutting season, which was said to be in December here.

Same seen in comparing horns of May and August six-year-olds, basal ring of latter measuring (on top of curve) only 1½ inches against 3½ inches on spring specimen. Annual ring, of course, decreases in length with years. Thus basal section of seven-year-old specimen, found in canyon, measured 2½ inches, whereas basal ring of May six-year-old measured 3½ inches. In case of very old specimens annual growth must retreat finally to a mere ridge.

Wide difference also in horns of females, some of more aged ewes carrying horns with considerable curve and diameter. On July 29 old ewe with one straight and one curved horn seen above Trail End.

Measurements of Chitina rams as follows:

Adult six-year-old, May 17, 1926. Total length, 1,480 mm.; tail, 100 mm.; hind foot, 410 mm.; height at shoulder, approximately 900 mm.; circumference of horn base, 349 mm.; spread of tips, approximately 690 mm.

Three-year-old, May 17, 1926. Total length, 1,430 mm.; tail, 85 mm.; hind foot, 395 mm.; height at shoulder, approximately 920 mm.

Adult six-year-old, July 31, 1926. Total length, 1,430 mm.; tail, (skinned), 110 mm.; hind foot, 430 mm.; height at shoulder, 890 mm.; circumference of horn base, 340 mm.; spread of tips, 600 mm.; estimated weight, 275 pounds. (This specimen was destroyed by a black bear that raided camp.)

Adult five-year-old, August 9, 1926. Total length, 1,440 mm.; tail, 115 mm.; hind foot, 410 mm.; height at shoulder, approximately 990 mm.; girth back of foreleg, 1,160 mm.; estimated weight, 200 pounds.

In summer sexes segregated. Old rams often spent time alone. Several rams usually held together and ewes and younger stock formed usual flocks. Sometimes small group of yearling ewes would be seen in an exclusive company. In August younger rams again associating with flocks, but larger rams still hung upon outskirts or rambled about with own sex.

En route out to McCarthy, sheep observed only near Hawkins glacier (five or six), August 17, and again next day above Bryson's cabin where three rams were in company.

Mr. Laing's observations corroborate our conclusion that sheep of Mount Logan region are pure white *Ovis dalli* form. Mr. H. F. Lambart informed the writer that during his work on Alaska-Yukon International Boundary Survey, he observed only white sheep on Natazhat range just north of mount Logan. Mr. Charles Sheldon, on his sheep distribution map in "The Wilderness of the Upper Yukon," 1909, gives limit of range of pure white form *dalli* as extending from north of mount Logan southeast into a small area of northeastern British Columbia where it intergrades with dark form, *Ovis stonei*. A species of sheep described by Rothschild, *Proc. Zool. Soc. London*, 1907, p. 238, as *Ovis cowani* Rothschild, the so-called Cowan sheep. He states: "This sheep is nearest to *O. stonei*, but differs in being entirely deep black, with the exception of a white rump patch and a grey face.....The type shot by an Indian out of a large flock was sent to me by Mr. C. G. Cowan, of Kamloops, and was obtained in the mountain chain near mount Logan in British Columbia." Locality very vague and competent authorities who have seen this specimen consider it undoubtedly a specimen of *Ovis stonei*, the black mountain sheep. Without question the sheep from anywhere near Mount Logan range belong to pure white race, *Ovis dalli dalli*. The writer has for several years listed the blackish Stone sheep as *Ovis dalli stonei* (Allen), as every shade of intergradation is found between it and the pure white *Ovis dalli dalli* (Nelson). The so-called Fannin sheep, or saddle-back sheep, *Ovis fannini* Hornaday of parts of southern Yukon, if it has any value as marking the median point between the two extremes of the species, should stand as *Ovis dalli fannini* (Hornaday).

17. **Oreamnos** sp. Mountain Goat

No goats on north side of the Chitina, but said to be plentiful on Goat creek, a tributary to the Chitina from south side opposite Barnard glacier. Rough southern wall of valley scanned with glasses from Hubrick's camp scores of times, but on only two occasions large white animals seen. On July 2, two seen with glasses, and on August 3, three seen at same place. All on a green slope above timber. On August 17, a large white animal lying on a high slope opposite Short river probably a goat. Andrew Taylor, a big game hunter who knew these animals well, quite sure of it.

From geographical reasons goat of this region presumably Alaska mountain goat, *Oreamnos kennedyi* Elliot, 1900, with type locality given as mountains at mouth of Copper river, opposite Kayak island, Alaska, and stated by Dr. Elliot to range in "Coast mountains of Alaska from Copper river to vicinity of Knik near Cook inlet." Another form of goat, Columbian mountain goat, *Oreamnos americanus columbiae* Hollister, 1904, has been described with type locality "Sheslay mountains, northern British Columbia," at no great distance from general region, and as mountains form no insuperable barriers to these animals, and as specimens not available from intervening regions, question of possible intergradation or type of goat found in Chitina Valley region still remains unsolved.

7.