

mc82
80212
113
oc9re

CANADA
DEPARTMENT OF MINES AND RESOURCES

MINES, FORESTS AND SCIENTIFIC SERVICES BRANCH

NATIONAL MUSEUM OF CANADA

BULLETIN No. 113

**Annual Report of the National Museum
for the Fiscal Year 1947-1948**

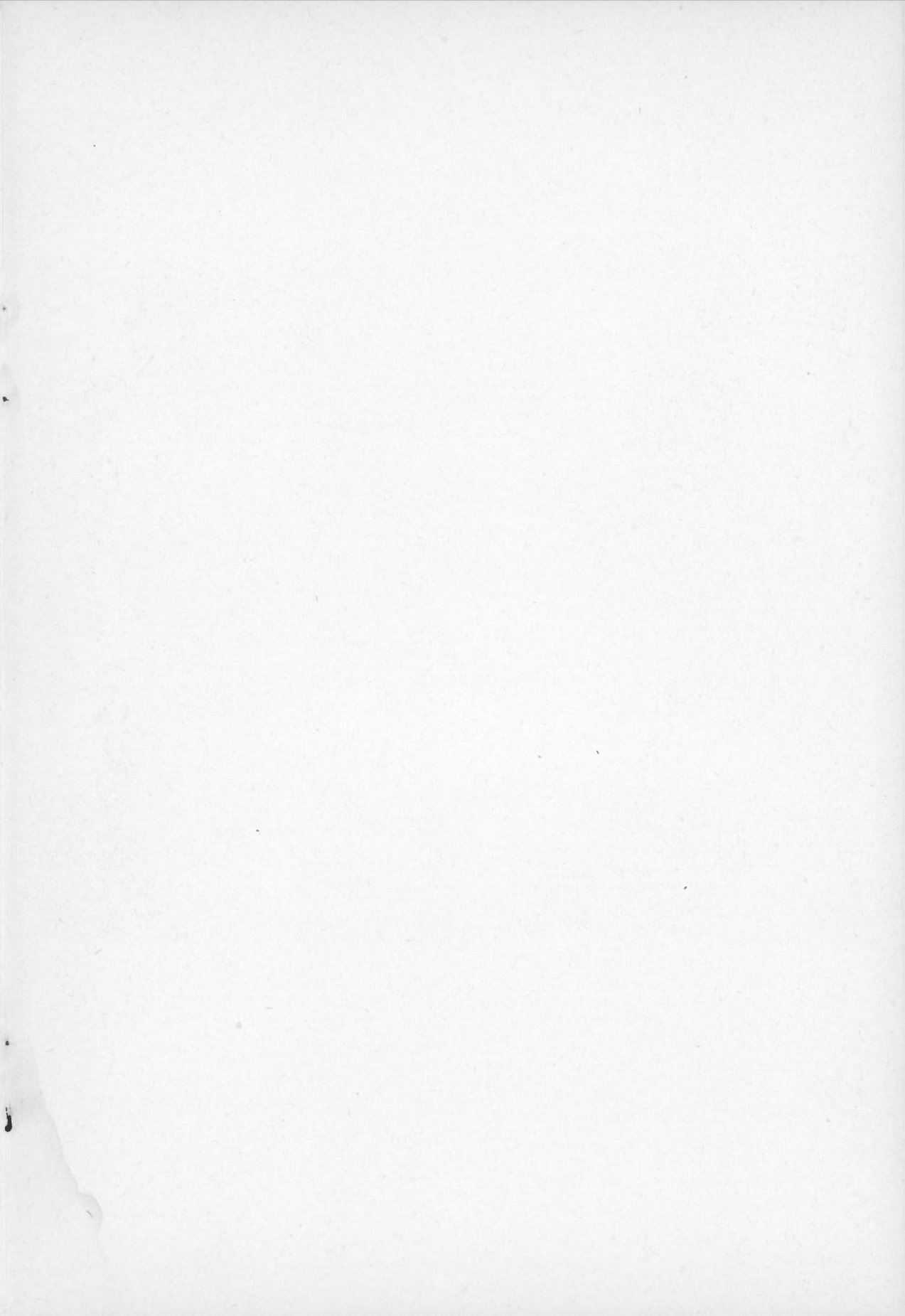


OTTAWA
EDMOND CLOUTIER, C.M.G., B.A., L.Ph.,
KING'S PRINTER AND CONTROLLER OF STATIONERY
1949

Price, 25 cents

This document was produced
by scanning the original publication.

Ce document est le produit d'une
numérisation par balayage
de la publication originale.





Children are among the most enthusiastic visitors to the National Museum.

CANADA
DEPARTMENT OF MINES AND RESOURCES

MINES, FORESTS AND SCIENTIFIC SERVICES BRANCH

NATIONAL MUSEUM OF CANADA

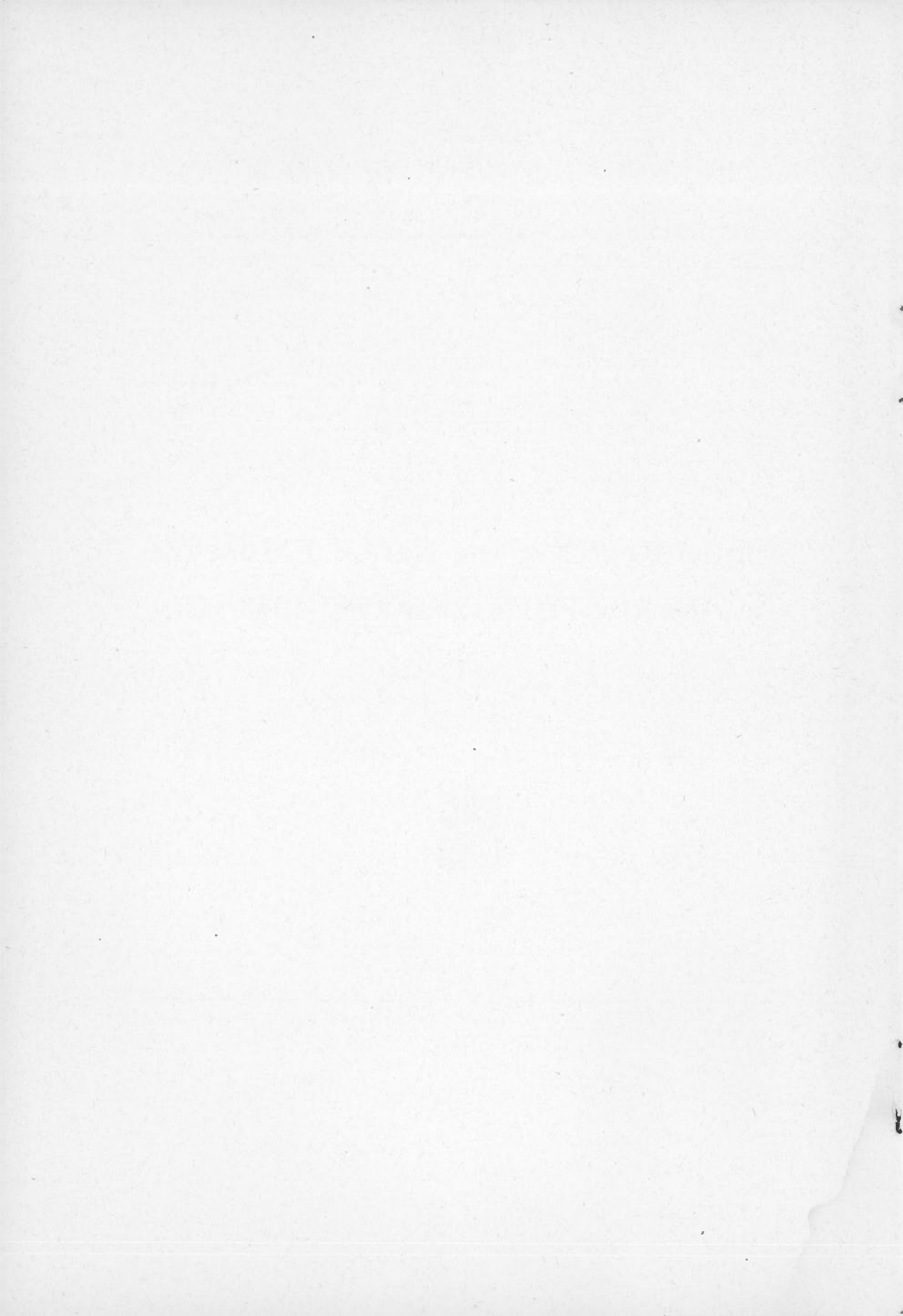
BULLETIN No. 113

**Annual Report of the National Museum
for the Fiscal Year 1947-1948**



OTTAWA
EDMOND CLOUTIER, C.M.G., B.A., L.Ph.,
KING'S PRINTER AND CONTROLLER OF STATIONERY
1949

Price, 25 cents



CONTENTS

	PAGE
General activities.....	1
Anthropological Division.....	3
Biological Division.....	6
Educational work.....	14
Preliminary Report on the Excavations of the Kant Site, Renfrew County, Ontario, by J. N. Emerson.....	17
An Archæological Survey of the North Bank of the St. Lawrence River between Cornwall and Cardinal, Ontario, June 19 to July 11, 1947, by Douglas Leechman and Frederica de Laguna.....	23
The Parker Site, by Douglas Leechman and Frederica de Laguna.....	29
Botanical Investigations on the East Coast of Hudson and James Bays, by W. K. W. Baldwin.....	31
The Edmonton Fauna and Description of a New <i>Triceratops</i> from the Upper Edmonton Member; Phylogeny of the Ceratopsidae, by C. M. Sternberg.....	33

Illustrations

Plate I. Children are among the most enthusiastic visitors to the National Museum.....	Frontispiece
II. Kneehills tuff on west side of Red Deer River.....	34
III. Upper Edmonton member on east side of Red Deer River.....	35
IV. Drumheller Marine Tongue shell bed.....	36
V. Upper Edmonton member and Middle Edmonton member.....	37
VI. <i>Triceratops albertensis</i>	39
VII. A. Nasal horncone of <i>Triceratops</i> sp.....	43
B. Inferior view of nasal bones of <i>Triceratops</i> sp.....	43
Figure 1. Tentative phylogeny of the Ceratopsidae.....	42



GENERAL ACTIVITIES OF THE NATIONAL MUSEUM OF CANADA

By F. J. Alcock, Chief Curator

The fiscal year 1947-48 was an important one in the history of the National Museum from the point of view of renovation, field work, staff increases, and expansion of educational work. The rotunda, exhibition halls, and communication halls were redecorated, the floors made more attractive with new linoleum, the lighting improved, and three exhibition halls on the second floor that had been closed to the public throughout the war and post-war years were reopened. The lecture theatre was made more pleasant and comfortable by placing new seats in the gallery and much needed new projection equipment was installed. The Biological Division was moved to newly decorated quarters on the fourth floor and progress was made on new exhibits, in particular the beaver habitat group. The appearance of the rotunda was greatly improved by the placing of a large totem pole, acquired during the summer in British Columbia, on the west side of the main archway where it forms a balanced counterpart to the very fine totem pole on the east side of the arch.

Most of these changes had been effected by June so that the thousands of visitors who came to Ottawa for the Marian Congress during that month had an opportunity to see the Museum in its improved condition. The summer months saw more visitors than preceding years, the total number for the entire year being over 207,200. In December the Museum was visited by a very distinguished group of scientists. The Geological Society of America and a number of affiliated societies held their Annual Meetings in Ottawa, December 28-31. On the evening of December 29 a social function was held at the National Museum and National Gallery at which over 900 were present, including more than 500 from the United States. The presidential address of Dean A. I. Levorsen was given in the theatre of the Museum and afterwards motion pictures were shown of scenes across Canada, refreshments were served, and an opportunity given to the visitors to see the exhibition halls, offices, and workrooms. Two other special occasions may also be mentioned. On February 13, Brigadier P. H. Hansen of London, England, gave an address on "Britain in Ceremonial", illustrated by coloured motion pictures. Their Excellencies, the Governor General and the Viscountess Alexander of Tunis were present and with many others remained afterwards to see the Museum exhibits. On March 31, Dr. H. R. Lillie of Scotland gave a most interesting account of the whaling industry in the Antarctic and the problems in connection with it. These lectures were in addition to the regular series of Museum lectures arranged by the Museum Lecture Committee.

Of the educational work carried out during the year the series of Museum lectures to children on Saturday mornings and to adults on Wednesday evenings were, as during other years, important features. The Committee lost with regret the services, through superannuation, of Dr. M. E. Wilson who had been a member of the committee since 1925, and

had done much to make these series of lectures the success they have proved to be. The Museum prepared an exhibit illustrating the variety of educational work performed and sent it to Mexico City for the meeting of the International Council of Museums held there in November. An exhibit showing some of the types of work done at the National Museum was also prepared for the Sportsmen's Show at Ottawa in April.

Interest was taken in the work carried out by other museums in order to make our own educational work more effective. Miss M. W. Godwin, assistant in education, attended the meeting of the American Association of Museums at Quebec city in May to take part in conferences and discussions on children's work. F. J. Alcock also attended these meetings and following them took part in organizing a Canadian Museums Association, of which he was elected Secretary-Treasurer. The object of the new organization is to promote the work and welfare of Canadian museums by discussion of problems and keeping one another informed of methods, progress, aims, etc.

The Biological Division on May 9 sustained a loss in the death of P. A. Taverner, Honorary Curator of Ornithology since his retirement in 1942. In Mr. Taverner's long service as Ornithologist to the National Museum, begun in 1911, he exerted a profound influence on the development of Canadian ornithology and his contributions to this field were varied and extensive. The systematic bird collection, now comprising about 35,000 specimens, was built up almost in its entirety under his direction. The Museum's unsurpassed bibliography of bird distribution in Canada was a vast project initiated and accurately maintained by him without assistance until his retirement from active service. Throughout his career he wrote extensively, and the subjects of his publications include almost every phase of bird study. In the popularization of ornithological knowledge, he attained an excellence exceeded by none, notably in his monumental *Birds of Canada*. A bibliography of Mr. Taverner's ornithological publications, compiled by Dr. W. L. McAtee, appeared in the 1946-47 Annual Report of the National Museum of Canada (Bulletin 112).

The Biological Division lost with regret the services of A. L. Rand who left to join the staff of the Chicago Museum. Since the retirement of R. M. Anderson and that of P. A. Taverner, Dr. Rand had been acting as head of the sections of mammalogy and ornithology. The Herbarium was strengthened by the addition of two botanists, H. J. Scoggan and W. K. W. Baldwin. Dr. Scoggan had been working for some 10 years on a study of the flora of Gaspé Peninsula and the St. Lawrence River region, and during the year completed a very valuable monograph on that subject. He has presented to the National Museum his very fine collection of 2,000 beautifully mounted and labelled specimens collected in connection with this work. Two men were added temporarily to the staff of the Anthropological Division, L. P. Marcel Rioux, and J. H. Johnstone. P. R. Haldorsen was secured as Museum artist, S. D. MacDonald as assistant technician in the Biological Division, and additional labouring help was also obtained.

Field work was carried out across Canada. In Nova Scotia Miss Helen Creighton continued her studies in folklore. She had had experience doing such work for the Smithsonian Institution and her researches in a field that had hitherto been largely neglected have formed a most valuable

contribution to Canadian ethnology. In Quebec a number of research workers were granted aid in carrying on investigations in French-Canadian folklore. A biological party in the Mistassini Lake region of the northern part of the province under W. E. Godfrey made collections and studies of the bird and small mammal life of the region. W. K. W. Baldwin carried out botanical studies on the east coast of James and Hudson Bays. This work was done in conjunction with a party under the charge of Dr. I. Hustich of Finland.

In Ontario, Mr. J. N. Emerson, of the anthropological staff of the University of Toronto, carried out excavations on the site of an old Algonkian village near Golden Lake, and Douglas Leechman, assisted by Dr. Frederica de Laguna of Bryn Mawr, Pennsylvania, carried out investigations of Indian sites along the St. Lawrence Valley, which will be flooded if the proposed St. Lawrence waterway plan is put into operation. This part of the valley has been inhabited by several different Indian groups in historic and prehistoric times and a survey of the region from this point of view was greatly needed. Dr. Leechman later carried out work in the Trent valley near Campbellford.

A. E. Porsild made a trip to Aklavik, principally in connection with problems concerning the Dominion reindeer herd of the lower Mackenzie region, and was able to secure some valuable botanical information.

C. Marius Barbeau carried out ethnological investigations in British Columbia and the Yukon. Assisted by Arthur Price, he secured many photographs and drawings of West Coast art and much information regarding native culture, and folklore. In addition, he secured for the Museum by purchase a very valuable collection of Indian carvings, etc. Other collections secured during the year include examples of Indian and Eskimo work from the Baker Lake region of the Northwest Territories obtained from Jean Michea and a large number of birds and some small mammals collected by T. H. Manning from the west coast of Hudson Bay.

The great need of the Museum now is for more space for exhibits, storage, and research. Large collections are stored in several other buildings in Ottawa where they are neither available for the public to see nor for the specialist to study. There are also many phases of the natural history of Canada concerning which the National Museum should have comprehensive exhibits that now are either wholly unrepresented or else illustrated in an almost negligible manner. When more exhibition space is made available in the building by using for that purpose the rooms now occupied by offices the Museum will be in a position to take a great forward step in becoming an institution that will be a credit to Canada.

ANTHROPOLOGICAL DIVISION

Early in May, Marius Barbeau visited Quebec to organize the work in folklore to be undertaken by the various field assistants mentioned below. Mlle Madeleine Doyon continued her work in Beauce county with the intention of writing a monograph on the folklore of that area. M-Francois Brassard, a specialist in music, visited the Lake St. John area and parts of Ontario where he collected the melodies and texts of folk-songs.

Brother Marcellin-André visited various parts of the province of Quebec and collected about 300 folk-songs. Mme Caron-Dupont spent the month of August in the Magdalen Islands recording folklore, songs, and language. Miss Helen Creighton carried on research in folklore in the southern part of Nova Scotia and has submitted a large manuscript to the Museum for publication.

Marius Barbeau carried out field work in the panhandle of Alaska and along the British Columbia coast from the end of May to early in September. Among the Haida Indians of the Queen Charlotte Islands he investigated the history of argillite carving and other art forms and visited a number of deserted villages on Moresby Island. He worked also among the Tshimsyans at Prince Rupert, the Kwakiutls of Fort Rupert and Alert Bay, and the Tlingits of southern Alaska. While engaged in this work he collected a large totem pole, 45 feet high, which now stands in the rotunda of the National Museum of Canada. He was assisted in his field work by Arthur Price, who made drawings of native carvings and other objects both in colour and in monochrome. Numerous photographs were taken in the course of this work and have been added to the permanent collection. Myths and linguistic studies were recorded both in writing and on the phonograph.

While in British Columbia, at the request of the President of the University of British Columbia, he purchased a Kwakiutl house, several totem poles, and a dug-out canoe, to form part of a group of typical Northwest Coast totem poles that will be put up on the University campus.

The Department of External Affairs appointed him as a Canadian delegate to the UNESCO meeting in Mexico city, from November 4 to December 5. He was also instructed by the Department of Mines and Resources to act as representative at meetings of the International Council of Museums. A report was prepared for both departments after the conclusion of the meetings. He was again appointed chairman of the Wild Life Conservation Board, which was reorganized and enlarged in 1937.

In the office during the year, work was undertaken on an extensive monograph on totem poles. The following books by Marius Barbeau were published during the year: "Come a Singing! Canadian Folk-songs" (National Museum Bulletin 107); "Grand'mère raconte", Longmans, Green and Company, Toronto; "Trois beaux canards" (collab. in "Archives de Folklore", Quebec); "Four Indian Tales" (collab. in "A Book of Canadian Stories", The Ryerson Press, Toronto); "L'Arbre des Rêves" (Collection Humanitas, Editions Lumen, Montreal); "Cornelius Krieghoff" (Canadian Art Series, The Ryerson Press, Toronto). The following manuscripts are now with editors who have accepted them for publication: "Le Rêve de Kamalmouk", and "Trésor des Anciens Jésuites" (with Editions Fides, Montreal), and "Tsimshyan Songs" (with the American Ethnological Society). A second mimeographed edition of "Anthropologie ou géographie humaine de l'Amérique du Nord" has been issued for students by Université Laval, Quebec. A manuscript entitled "French Folklore" was prepared for the "Dictionary of Folklore, Mythology and Legend", to be published by Funk and Wagnalls Company, New York.

Douglas Leechman did field work in archæology on the St. Lawrence River between Cardinal and Cornwall, Ontario. The purpose of this sur-

vey was to find and record archæological sites that would be flooded if the St. Lawrence Waterways Program were put into effect. Numerous traces of aboriginal occupation were found, the most noteworthy being an important Woodland site near Cornwall and two less important Iroquoian sites farther west. He then transferred his field party to the Trent River Valley in the neighbourhood of Campbellford, Ontario. Here he discovered a site in which specimens of a well-known, but little understood, rubbed slate culture were found in situ, together with decorated pottery and other objects. This discovery will enable us to assign the rubbed slate specimens to their proper chronological position, a problem that was unsolved until this find was made. Remains of another culture, not yet correlated, were found on the shore of Rice Lake near Keene, Ontario. Assisting Dr. Leechman were Dr. Frederica de Laguna and Miss Catharine McClellan. Another field party under his supervision was led by Mr. Norman Emerson who excavated a Woodland site on the shore of Mud Lake near Eganville, Ontario. After returning from field work, the material collected during the summer was studied and a preliminary report on it was prepared. Further work was done on the Cape Dorset Eskimo culture and chapters on Dorset sites and the distribution and significance of harpoon heads were prepared for publication, the latter in collaboration with Dr. de Laguna. In May he attended the annual convention of the Society for American Archæology at Ann Arbor, Mich., and in October he attended the Third Iroquois Conference near Salamanca, New York. A bulletin on the Middleport Prehistoric Village Site, by the late W. J. Wintemberg, Bulletin 109, was prepared and submitted for publication. The annual reports of the National Museum of Canada, not published from 1939 to 1946, were collected and prepared for publication in a single volume. In connection with this work, bibliographies of the work of two members of the staff, now deceased, were prepared. That of Harlan I. Smith contains over 200 entries and that of W. J. Wintemberg over 75. Advice and assistance were sought by the Bytown Museum in Ottawa in connection with the restoration and cataloguing of specimens; by the Crawley Film Company in connection with some moving pictures of Eskimo life; and by archæologists interested in legislation preventing the wholesale looting of archæological sites. A large body of correspondence, and interviews with people seeking information, testified to the very general interest in archæology and to the necessity for maintaining the operation of the section of archæology at a high peak of efficiency.

Publications

- Mrs. Prairie Fire's Medicine Bundle, by Douglas Leechman. Civil Service Review, June 1947.
 Moravians to Ungava, by Douglas Leechman. The Beaver, Sept. 1947.
 The Pointed Skins (Chipewyan), by Douglas Leechman. The Beaver, March 1948.

Lectures

- Fallacies concerning the American Indians. By Douglas Leechman. Ottawa Teachers' Assoc., May 5.
 The Prairie Indians. By Douglas Leechman. National Museum, November 15.
 The Northwest Migration Route. By Douglas Leechman. The Logan Club, Ottawa, December 9.
 The Village of Old Crow. By Douglas Leechman. Kinsmen's Club, Ottawa, January 22.
 17418—3

Accessions

FROM THE STAFF

- C. M. Barbeau*: maple sap spiles from Ontario.
Douglas Leechman: archæological material from Northumberland, Peterborough, Hastings, Stormont, Grenville, Carleton, and Renfrew counties, Ontario.

BY PURCHASE

- Mrs. Graham Bell*: Prairie Indian material.
Miss Elizabeth Laird: West Coast Indian basket.
J. P. Michea: Caribou Eskimo specimens.
B. Mattice: celt and gouge from Ontario.
J. P. Murphy: West Coast Indian specimens.
R. R. Pringle: Prairie Indian breast ornament.
Mrs. Rose: Prairie Indian specimens.
Mrs. E. A. Scott: West Coast Indian specimens.

BY DONATION

- W. van den Belt*: worked sandstone object from Peterborough, Ont.
H. K. Byers: archæological specimens from Grenville co., Ont.
W. E. Chant: bone awl from Cornwall, Ont.
A. L. Cyr: chert arrowhead from Thorold, Ont.
J. Harvey Davis: bird amulet from Lambton co., Ont.
J. Dillabough: two celts from Dundas co., Ont.
B. Kerr: archæological specimens from the Sleeper Is., N.W.T.
A. McInnis: stone gouge from Dundas co., Ont.
A. E. Nash: archæological specimens from Dundas co., Ont.
D. A. Nichols: Eskimo nuglutang from Baffin Island, N.W.T..
Northwest Territories Branch: anthropological collection from the Arctic.
Mrs. Parlow: celt and point from Dundas co., Ont.
Dr. T. T. Paterson: archæological specimens from Igloolik, N.W.T.
Dr. J. Reeves: archæological specimens from Renfrew co., Ont.
G. Rowley: cast of an Eskimo carving from N.W.T.
A. Taylor: ethnological specimens from Cornwallis Is., N.W.T.
R. T. D. Wickenden: chipped stone object from Cardston, Alta.
J. J. Wood: chipped chert knife from Fort Selkirk, Yukon.

BIOLOGICAL DIVISION

During the year the bird, mammal, and egg study collections, the various filing systems, and the office and studio equipment were moved from the second floor to permanent quarters on the fourth floor. Housing facilities for the collections were improved during the year by a considerable renovation, still in progress, of the specimen cabinets.

A beaver group, showing six beavers and their work in a representation of their natural habitat, was completed, a selection of colourful Canadian birds was put on display, and miniature bear and Indian groups were made for loan purposes. Birds, mammals, and osteological material were prepared for the study collections, and birds and mammals for exhibition and for the School Loan Collection. Material was lent for exhibition at the Sportsmen's Show, and a case of Australian birds was renovated and labelled for the Australian High Commissioner's office. Three large mammal heads and three bison rugs from departmental administrative offices were renovated. Reproductions of two bear skulls were made for exchange. An assortment of palæontological labels was remade, a number of slides coloured, and a series of colour plates, line drawings, and maps prepared for reproduction. Mammals, amphibians, and reptiles were identi-

fied for individuals and other departments, and a list of amphibians and reptiles that may occur in Riding Mountain Park was prepared for the National Parks Bureau. Hair from various kinds of mammals was supplied to the Royal Canadian Mounted Police, for technical analysis and comparative records. A series of marine fishes was lent for examination to Mr. Henry Hildebrand, McGill University.

One hundred and eighty-eight birds and mammals were supplied from the School Loan Collection for use in nature study classes.

R. M. Anderson revised Bulletin No. 69, "Methods of Collecting and Preserving Vertebrate Animals", for publication of another edition.

Substantial progress was made in research on the taxonomy, distribution, and ecological relations of the birds of Canada. Bird specimens added to the study collection were 1,555, and on March 31, 1948, the catalogued bird collection totalled 32,540.

A. L. Rand completed a comprehensive report on the birds of southern Alberta, and a manuscript on the mammals of Canada. He also made progress on a distributional list of Canadian birds and submitted for publication several articles and reviews.

W. Earl Godfrey, Biologist, in addition to routine duties involving the ornithology correspondence, furnishing of information in compliance with the numerous written and telephone requests, identification of specimens, and general supervision of work in ornithology, continued research on the birds of Canada. Especial attention was devoted to certain species, the distribution and taxonomy of which have not heretofore been well understood. Detailed studies were made, or are in progress, of the long-eared owls, swamp sparrows, olive-backed thrushes, water-thrushes, and brown-headed chickadees, and the results of the studies completed were prepared for publication. He completed and submitted for publication, also, a comprehensive report on the birds of the Lake St. John region, Quebec, and another on the birds of Lake Mistassini and Lake Albanel, Quebec, were brought almost to completion. Several articles and book reviews were accepted for publication. The task of bringing up to date the bibliographical files and species range maps, one of the most complete and valuable compilations of bird distributional information in North America, but almost 6 years behind, was begun. The 1942 literature, involving abstraction of data for over 1,000 cards, was completed and the distributional data were plotted on species range maps. He selected the material for, and supervised similar work on, the 1943 bird literature, now nearing completion, and also examined the bird and mammal literature published during the fiscal year 1947-48 and selected suitable titles for carding.

Stuart D. MacDonald, Assistant Technician, who joined the staff of the Biological Division on September 3, devoted part of his time to the Ornithological Division. In addition to considerable maintenance work on the bird collection and other routine duties, he made good progress in labelling of specimens and in cataloguing a large part of the year's ornithological accessions. He prepared bird specimens for the study collection and did local field work.

Colin L. Thacker, Assistant Technician of the Biological Division, catalogued 185 specimens, did local field work, and prepared bird specimens..

Miss P. M. Hurlbert, Stenographer, in addition to routine stenographic duties in connection with typing of manuscripts and correspondence, accurately abstracted a bulk of distributional detail contained in the 1943, and a part of the 1942, bird literature; prepared over 1,000 cards for insertion in the bibliographical files; and made good progress in carefully plotting already more than half of this complicated detail on the distribution maps. In addition, she typed card references to most of the appropriate titles in the literature published during the fiscal year 1947-48, and accessioned the incoming specimens.

Mrs. V. M. Atkinson, in addition to routine work, maintained a card file index (originally set up by her) of correspondence; abstracted and typed on 5 x 8 cards distributional information for use in a distributional list of Canadian birds; did some bibliographical work; and commenced a systematic rearrangement of the material in the pamphlet and reprint cases.

F. Graham Cooch, Assistant Technician, was employed from July 2 to August 31 inclusive. He arranged the bird study collection, within species, in geographical order and prepared species labels for the specimen trays. Also, he accurately abstracted published bird distribution data on filing cards for use in the files, and prepared bird specimens.

Field work was conducted at Lake Mistassini and Lake Albnel, on the southern interior of the Labrador Peninsula, by W. Earl Godfrey with Rodger O. Standfield and William A. Morris as student assistants. Although the coasts of the Labrador Peninsula have frequently been visited by ornithologists, little is known of the vast interior. The expedition brought back comprehensive notes, habitat photographs, and 701 specimens, including 593 birds, 93 mammals, and 11 amphibians and reptiles, all from areas heretofore unrepresented in museum collections. Coloured motion pictures depicting phases of the summer life of the Montagnais-Nascopie Indians were obtained.

During the year, the ornithology study collection continued to contribute its quota to the advancement of scientific ornithology. In addition to serving as the backbone of bird research here in the National Museum, material contained in it was borrowed for research purposes by the following institutions: Carnegie Museum, Pittsburgh, Pa.; Museum of Comparative Zoology, Cambridge, Mass.; University of Michigan, Ann Arbor, Mich.; Universitetets Zoologiske Museum, Copenhagen, Denmark; Museum of Vertebrate Zoology, Berkeley, California; and Chicago Natural History Museum, Chicago, Ill. In addition, several ornithologists from Canada and the United States visited the Museum to do research on the bird collections.

On the other hand, research by National Museum ornithologists was aided by borrowing supplementary material from the bird collections of the following institutions and private individuals: Royal Ontario Museum of Zoology, Toronto, Ont.; United States National Museum, Washington, D.C.; Cleveland Museum of Natural History, Cleveland, Ohio; Chicago Natural History Museum, Chicago, Ill.; Saskatchewan Provincial Museum, Regina, Sask.; New Brunswick Museum, Saint John, N.B.; the respective private collections of Mr. Hoyes Lloyd, Ottawa, Ont., and Mr. J. Dewey Soper, Winnipeg, Man.

Lectures

- History and Functions of the American Ornithologists' Union. By W. Earl Godfrey. Ottawa Field-Naturalists' Club, National Research Building, Ottawa, October 16.
- Less Familiar Aspects of Some Canadian Birds. By W. Earl Godfrey. Ottawa Fish and Game Association, National Museum Lecture Hall, October 17.
- Birds, Masters of the Air. By W. Earl Godfrey. Annual Meeting of Anglican Clerical Guild, Lauder Hall, Ottawa, November 17.
- Exploring Around Lake Mistassini. By W. Earl Godfrey. Museum Lecture Series, February 21.
- Life in the Mistassini Country. By W. Earl Godfrey. Museum Lecture Series, February 25.
- Birds, a National Asset. By W. Earl Godfrey. Radio Station CKCO, Ottawa, March 9.

Publications

- A New Race of the Purple Finch, *Carpodacus purpureus* (Gmelin). By A. L. Rand. Canadian Field-Naturalist, vol. 60, No. 5, pp. 95-96.
- Clutch Size in the Spruce Grouse and Theoretical Considerations of Some Factors Affecting Clutch Size. By A. L. Rand. Canadian Field-Naturalist, vol. 61, No. 4, pp. 127-130.
- Geographical Variation in the Loon, *Gavia immer* (Brunnich). By A. L. Rand. Canadian Field-Naturalist, vol. 61, No. 6, pp. 193-195.
- Variation in the Spruce Grouse in Canada. By A. L. Rand. The Auk, vol. 65, No. 1, pp. 33-40.
- Notes on Some Greenland Birds. By A. L. Rand. The Auk, vol. 64, No. 2, pp. 281-284.
- A New Long-eared Owl. By A. L. Rand. Canadian Field-Naturalist, vol. 61, No. 6, pp. 196-197.

BIRDS

Accessions

By Gift

- Baldwin, W. K. W., Ottawa, Ont.: 1 bay-breasted warbler.
- Blakely, David J., Ottawa, Ont.: 1 kingbird, 1 red-winged blackbird, 1 starling.
- Bourguignon, A. E., Britannia, Ont.: 1 American bittern, 1 white-breasted nuthatch, 1 white-winged crossbill, 2 red crossbills.
- Bryenton, R. W., Herb Lake, Manitoba: 1 northern shrike, 1 American magpie.
- Casey, Laurie, Ottawa, Ont.: 1 blue-headed vireo.
- Carriere, D., Ottawa, Ont.: 1 saw-whet owl.
- DeLury, Dr. Ralph, Ottawa, Ont.: 1 least bittern.
- Dunbar, Dr. M. J., Montreal, Que.: 9 birds from Ungava Bay, Que.
- Eardley-Wilmot, V. L., Ottawa, Ont.: 1 great horned owl.
- Finnie, Richard, Carp, Ont.: 1 red-eyed vireo, 1 northern yellow-throat, 1 goldfinch.
- Frankton, Dr. C., Ottawa, Ont.: 1 oven-bird.
- Frazer, Fred F., Ottawa, Ont.: 1 whip-poor-will.
- Glenny, Fred H., Saskatoon, Sask.: 3 horned larks.
- Harold, C. G., Whitewater Lake, Man.: 2 golden plovers.
- Hewitt, Dr. O. H., Ottawa, Ont.: 1 cowbird, 1 fox sparrow, 1 Savannah sparrow, 1 goshawk, 1 white-winged crossbill.
- Hildebrand, Henry, Montreal, Que.: 58 birds from west shore of Ungava Bay, Que.
- Jones, H. N., Cloyne, Ont.: 1 sharp-shinned hawk, 1 tree sparrow.
- Lawrence, Mrs. Louis de K., Rutherglen, Ont.: 3 red crossbills, 1 pine siskin.
- Leechman, Dr. Douglas, Ottawa, Ont.: 1 king eider, mounted.

- Lemieux, Louis, Quebec, Que.: 11 birds from James Bay, Ont.
 Manning, Thomas H., Ottawa, Ont.: 27 horned larks, 2 redpolls, 1 white-crowned sparrow from Melville Peninsula, N.W.T. (These specimens were collected by the late Reginald Bray.)
 MacDonald, Stuart, staff: 25 birds from Bayhead, N.S., and 17 from Ottawa, Ont.
 MacRae, Alex., Ottawa, Ont.: 1 bald eagle, mounted.
 Michea, John P., Ottawa, Ont.: 1 rough-legged hawk from Chesterfield Inlet, N.W.T.
 Milles, Eric, Ottawa, Ont.: 1 great horned owl.
 Munro, J. A., Okanagan Landing, B.C.: 2 trumpeter swans, from Massett, Queen Charlotte Islands, B.C.
 Ommanney, G. G., Hudson Heights, Que.: 1 downy woodpecker, 1 common redpoll, 1 evening grosbeak, 1 black-capped chickadee, 1 tree sparrow, 1 slate-coloured junco, from Quebec.
 Pinhey, Miss C. H., Ottawa, Ont.: 1 brown creeper.
 Rand, Dr. A. L., staff: 3 yellow warblers from Wolfville, N.S.
 Ross, Miss Verna, Ottawa, Ont.: 1 red crossbill.
 Saville, Dr. D. B. O., Ottawa, Ont.: 1 goldfinch.
 Shaw, F. A., Shellbrook, Sask.: 1 redstart, wings only.
 Stedman, D. F., Ottawa, Ont.: 1 cedar waxwing.
 Tessier, Emile, Ottawa, Ont.: 1 great horned owl.
 Thacker, Colin, staff: 6 birds from Ottawa, Ont.
 Tufts, R. W., Wolfville, N.S.: 1 song sparrow.

By Purchase

- Coates, D. F., Montreal, Que.: 111 bird skins, mainly from the islands of James Bay.
 Manning, Thomas H., Ottawa, Ont.: 633 birds from James and Hudson Bays.

Museum Expedition

- Godfrey, W. Earl, William Morris, Rodger Standfield, Museum Expedition to Lake Mistassini and Lake Albanel, Quebec: 593 bird skins, 4 fragmentary specimens.

By Exchange

- Royal Ontario Museum of Zoology, Toronto, Ont.: 4 Savannah sparrows.

AMPHIBIANS AND REPTILES

By Members of Staff

- W. Earl Godfrey, Mistassini Post, Que.: 3
 William A. Morris, Mistassini Post and Lake Albanel, Que.: 8.

By Gift

- B. Hocking, Churchill, Man.: 6.
 Donald White, Westport, Ont.: 2.

MAMMALS

By Members of Staff

- W. Earl Godfrey, William Morris, Rodger Standfield, Museum Expedition to Lake Mistassini and Lake Albanel, Quebec: 92 skins and skulls, 2 skulls, 1 tail; Ottawa, 1 big brown bat.
 Stuart MacDonald, Ottawa, Ont.: 1 chipmunk.
 C. L. Patch, Ottawa, Ont.: 1 red squirrel.

By Gift

- W. H. Bryenton, Churchill River, Saskatchewan: 1 red-backed mouse.
 D. F. Coates, Montreal, Que.: 3 mammals from south James Bay, Ont.
 J. Crooker, Ottawa: 1 star-nosed mole.
 Rowley Frith, Ottawa: 2 star-nosed moles.
 Gifford Johnson, Ottawa: 1 red fox skull.
 K. H. Lang, Aklavik, N.W.T.: 18 mammals.

Lorne Leafloor, Ottawa: 1 big brown bat.
 Hoyes Lloyd, Ottawa: 1 black squirrel.
 Douglas Leechman, Ottawa: 3 polar bear skulls.
 A. C. Magie, Stittsville, Ont: 1 flying squirrel.
 Thomas H. Manning, Ottawa: 1 fox skull from James Bay, Ont.
 National Parks Bureau: 1 coyote skin and skull, 1 cross fox skin and skull, 1 wolf skin, from Prince Albert, Alberta.
 E. G. Oldham, Fort Smith, N.W.T.: 2 wolverine skulls, 1 lynx skull.
 Wayne Robinson, Ottawa: 2 *Canis* skulls.
 Rev. W. F. Rushbrook, Prince Rupert, B.C.: 1 seal skull from Porcher Island, B.C.

By Exchange

S. C. Hudson, Ottawa: 2 coyote skulls.

NATIONAL HERBARIUM

In March the Herbarium had moved to new and permanent quarters on the fourth floor of the west wing of the Museum and during the summer months all the cases were painted. The early part of the year was taken up with the rearranging of the collections.

On May 8, B. Boivin resigned. On May 15, W. K. W. Baldwin, formerly instructor at the University of Toronto, was appointed to the staff of the National Herbarium, and on June 3, H. J. Scoggan, Assistant Professor of Botany at Macdonald College, McGill, joined the staff.

On May 30, 1947, A. E. Porsild was elected an Honorary Foreign Member of the American Academy of Arts and Sciences, Boston, Mass., and in January 1948 he was elected president of the newly formed society, "The Arctic Circle" of Ottawa.

Field Work

A. E. Porsild during the summer visited the Mackenzie Delta Reindeer Grazing Reserve, making a detailed study of grazing conditions and of the progress in the reindeer experiment. He left Ottawa on June 25 by train and on July 1, accompanied by R. W. Bryenton of Herb Lake, Man., travelled to Hay River, N.W.T., by air. Travelling from Hay River by canoe, frequent stops were made along Mackenzie River for botanical collecting and for studying biotic problems connected with the natural afforestation following destruction of the original forest due to fire. A collection of plants was made along the Mackenzie totalling 350 numbers, including several rare and little known species heretofore known only from single collections made by early travellers in the Mackenzie district. For the survey of the Reindeer Reserve air transportation was provided, which made it possible to visit numerous places that otherwise would have been inaccessible. The return trip to Edmonton was made by air on August 19. From Edmonton Mr. Porsild travelled to Fairbanks, Alaska, to accompany a U.S.A.F. "Polaris" non-stop flight from Fairbanks across the Arctic Archipelago to Northwestern Ellesmere Island. Arrangements for his participation in this flight had kindly been made by the Defence Research Board, Ottawa.

During the summer a National Museum field party conducted a botanical survey of the east shore of James and Hudson Bays, from Fort George

to Great Whale River. The party left Ottawa on June 23 and returned on September 7. It was headed by W. K. W. Baldwin of the National Museum, who was assisted by J. Kucyniak of the Montreal Botanical Garden. With this party travelled the botanists Dr. I. Hustich and Dr. R. Tuomikoski, both of the Botanical Institute of the University of Helsingfors, Finland, and Dr. E. H. Kranck, Professor of geology in the University of Neuchatel, Switzerland.

In addition to large collections of plants, the party obtained much valuable information on the floristics and ecology of the region.

Office Work

A. E. Porsild spent considerable time on the preparation of his manuscript of the Flora of the Yukon, of which the taxonomic part was completed last year. At the invitation of the Swedish National Museum at Stockholm he undertook to prepare a monographic treatment of the genus *Antennaria* in Northwestern North America, which is to be published in Hultén's Flora of Alaska and Yukon. The typescript, which comprised 61 pages, was completed and submitted in December. Simultaneously he prepared a similar but less detailed treatment of the genus for his Yukon flora.

After his return from the Mackenzie Delta Mr. Porsild prepared a detailed 15,000 word report on the Reindeer experiment. He also prepared an obituary of P. A. Taverner for the Transactions of the Royal Society of Canada, besides a number of reviews for publication in the Canadian Field-Naturalist and the Canadian Geographical Journal. In addition, he wrote an article entitled "Greenland at the Crossroads" for the first issue of "Arctic", the journal of the Arctic Institute of North America, as well as several short notes for this and for the "Arctic Circular", published by the "Arctic Circle".

H. J. Scoggan devoted most of his time from June to December to the final revision of his 653 page manuscript "Flora of Gaspé", which was completed and submitted for publication in December. He spent considerable time, together with W. K. W. Baldwin, naming the collection of vascular plants obtained last summer by the James Bay field party, and also did some preliminary research on a proposed series of popular ecological pamphlets that are planned for publication by the Museum. In August, he took part in a symposium at the Montreal meeting of the Botanical Society of America, and gave an illustrated talk on arctic-alpine problems in the Gaspé Peninsula. At the invitation of the Director of Protestant Education, Quebec, he joined a committee organized to draw up a new syllabus for high school biology. The period from Aug. 22 to Sept. 3 was spent in research work at the Gray Herbarium at Harvard University.

W. K. W. Baldwin devoted considerable time in arranging the various botanical collections made in James and Hudson Bays and in transcribing field notes and labelling photographs. He prepared for publication short notices on the James Bay expedition.

Miss H. T. Harkness, technician, during the year was in charge of the mounting and insertion of specimens in the Herbarium, as well as of the preparation of loans and exchanges for shipment to other herbaria; four issues of the Gray Herbarium Index were inserted.

During the year 76 visitors from Canada and abroad consulted the herbarium for shorter or longer periods. Among those who carried out more comprehensive studies were: Dr. Morten P. Porsild, of Copenhagen, formerly director of the Danish Arctic Station in Greenland, who worked in the Herbarium from June 2 to June 10 when he left for the Yukon to study plant life. Following his return on September 8 he spent 3 weeks working on his collections, of which he presented a set of duplicates to the National Herbarium. Dr. I. Hustich and Dr. R. Tuomikoski from Helsingfors, Finland, each spent about 10 days in the Herbarium, and Dr. N. Polunin of McGill University, on several occasions worked there.

Accessions

During the year 2,239 herbarium specimens were received by exchange, 3,263 by donation, and approximately 10,500 from field work by members of the National Herbarium staff. Eight hundred and one specimens were lent to, and 203 specimens were borrowed from, other botanical institutions; 6,707 duplicate specimens were distributed to other herbaria in Canada and abroad in continuation of exchanges; 7,854 were mounted and inserted in the herbarium, bringing the total of numbered specimens in the National collection to 189,120.

Among the notable accessions received by donation are the private collections of H. J. Scoggan, consisting of 2,001 beautifully mounted and prepared specimens of plants of the Gaspé peninsula and a set of 581 plants of southern Yukon collected by Dr. Morten P. Porsild of Copenhagen.

The National Museum gratefully acknowledges these generous donations and the following collections:

- C. S. Lord, Ottawa: plants of N.W.T., 35 specimens.
- A. J. Breitung, Ottawa: 106 plants of Ottawa district.
- C. R. Ball, Washington, D.C.: misc. *Salix*, 19.
- C. Heimburger, Toronto: 1 plant of Toronto district.
- F. Coates, Ottawa: 28 plants of N.W.T.
- Y. O. Fortier, Ottawa: 98 plants of N.W.T.
- H. W. Bryenton, Edmonton: 31 plants of north Saskatchewan.
- H. H. Aime, Ottawa: 21 plants of N.W.T.
- H. S. Bostock, Ottawa: 125 plants collected in Yukon territory by R. L. Christie.
- H. C. Cook, Ottawa: 1 plant of Quebec.
- G. A. Hardy, Victoria: 1 plant of British Columbia.
- Geo. Turner, Fort Saskatchewan, Alta.: 129 plants of Alberta.
- Rev. Ernest Lepage, Rimouski, Que.: 55 plants of Alaska and Alberta.
- Morten P. Porsild, Copenhagen: 581 plants of Yukon.
- H. J. Scoggan, Ottawa: 2,001 plants of Gaspé.

Publications

The following articles were published by the staff of the National Herbarium during the year:

- The genus *Dryas* in North America. By A. E. Porsild, *Canadian Field-Naturalist*, vol. 61:175-192 (1947).
- P. A. Taverner. By A. E. Porsild. *Trans. Roy. Soc., Canada*; 3d. ser. 41:133-135 (1947).

Lectures

- The Reindeer in Canada. By A. E. Porsild. Ottawa Field-Naturalists' Club, Nov. 19, 1947.
- The arctic-alpine element in the Gaspé Flora. By H. J. Scoggan. Botanical Society of America, Aug. 22, 1947, at Montreal.

EDUCATIONAL WORK

The educational section continued its varied program of service to the general public, school classes from Ottawa and outside localities, and to special groups. It is by this channel that the results of conservation and research are interpreted through the medium of correspondence, publications, loans of visual aids, as well as through participation in the various activities of the Museum at Ottawa. The increase in attendance, especially by school groups, following the re-opening of the exhibition halls, closed during the war years, and the increasing demand for the services mentioned, demonstrate the interest of educators and others in co-operating with the Museum. Normal school students resumed their annual visit to the Museum as an aid to their studies, interrupted by the war.

Visitors to the exhibition halls numbered 160,000, and included scientists, teachers, students, and the general public. Special museum educational activities were attended by 47,200 persons; the scientific staff arranged educational exhibits for organized study groups, the largest of which had an attendance of 6,400; the total attendance was 207,200.

NATIONAL MUSEUM LECTURES

The Museum lectures had a total attendance of 23,500; 9,000 adults and 14,500 children. Lectures for adults are given on Wednesday evenings, and those for children on Saturday mornings. The program for the 1947-48 season was as follows:

Adult Lectures

- Mexico, by H. L. Keenleyside, M.A., Ph.D., LL.D., F.R.H.S., Deputy Minister of Mines and Resources, Ottawa.
- Through the Northwest Passage, by Corporal F. S. Farrar, Royal Canadian Mounted Police, Ottawa.
- Moscow Anniversary, 1147-1947, by J. E. Stanley Lewis, O.B.E., LL.D., Mayor of Ottawa.
- The Canadian Arctic in Colour, by A. L. Washburn, Ph.D., Director, The Arctic Institute of North America, Montreal.
- Aircraft, Yesterday, Today and Tomorrow, by J. J. Green, Ph.D., Chief Research Aeronautical Engineer, Air Transport Board, Ottawa.
- The World is Rich, by G. S. H. Barton, C.M.G., D.Sc.A., Deputy Minister, Department of Agriculture, Ottawa.
- St. Ignace, an Old Huronian Town, by William Sherwood Fox, Ph.D., LL.D., F.R.S.C., President, University of Western Ontario, London, Ont.
- Canadian Mines and Metals, by J. M. Humphrey, Travelogue-Lecturer, Vancouver, B.C.

- Motion picture program: School for Danger and Letter from Paris.
 Life in the Mistassini Country, by W. E. Godfrey, Zoologist, National Museum of Canada, Ottawa.
 The Belgian Congo in Colour, by D. M. Hodgson, Montreal, Que.
 Motion picture program: New Zealand, South Africa, Australia, and England.
 Burma Background, by G. S. Jury, M.B.E., M.A., Ph.D., McMaster University, Hamilton, Ont.

In addition to the regular Wednesday evening series, two special lectures were given. On February 13 Brigadier P. H. Hansen, V.C., D.S.O., M.C., gave an outstanding illustrated lecture, Britain in Ceremonial, which was honoured by the presence of Their Excellencies, the Governor General and The Viscountess Alexander of Tunis. On March 31 H. R. Lillie, M.B., Ch.B., B.Sc., A.M.I.C.E., who had been with one of the British whaling fleets, used his splendid collection of lantern slides to illustrate an interesting lecture, "To the Antarctic on a Whaler".

Children's Lectures

- Motion picture program: Mexico and South America.
 Through the Northwest Passage, by Corporal F. S. Farrar, Royal Canadian Mounted Police, Ottawa.
 Indians of the Plains, by Douglas Leechman, Ph.D., National Museum of Canada, Ottawa.
 Two motion picture programs: natural history films.
 Let's play, by Doris Plewes, Ph.D., Department of National Health, Ottawa.
 On Safari in Northern Rhodesia, by C. S. Lord, Ph.D., Geological Survey, Ottawa.
 Exploring around Lake Mistassini, by W. E. Godfrey, National Museum of Canada, Ottawa.
 A Live Program, arranged by Wayne Robinson, Provincial Department of Lands and Forests, Ottawa, assisted by W. E. Steele and Royal Baker, Kemptville, Ont., R. Hewans, Percy and Samuel Headlam, George Boyce, and Guy D Martin, Ottawa.
 A Drop of Water and its Cousins, by Alice E. Wilson, Ph.D., Ottawa.
 A motion picture, Alice in Wonderland, introduced by Mabel Godwin, National Museum of Canada, Ottawa.
 A motion picture: Beyond Bengal.

The assistance of the Boy and Sea Scouts, and Commissionaires on Saturday morning in looking after the large number of children who come to the Museum is greatly appreciated by the Lecture Committee.

Particular acknowledgment is made of the co-operation of the local press in reporting the various lectures, and of the Ottawa Public Library in selecting and providing lists of books for supplementary reading related to the subjects of the lectures. Thanks are due also to broadcasting station CKCO for announcing the Wednesday evening lectures on its Town Crier program.

LECTURE HALL

The Lecture Hall was made available to scientific and related organizations for meetings at which lectures were given, and 155 reservations were made during the year. There was a total attendance of 47,200 persons at these meetings, and approximately 388,140 feet of film were

shown, along with 2,250 lantern slides. The Hall has a seating capacity of 598, and has equipment for showing 35 mm. and 16 mm. films, and lantern slides.

PHOTOGRAPHS

Selections were made of photographs to illustrate scientific publications, textbooks, and magazine and newspaper articles from the large photographic collection taken by officers of the National Museum and Geological Survey. Requests for these photographs were received from England, the United States, and European countries, as well as from Canada.

VISUAL AIDS

A great deal of Museum material on anthropology, biology, and other phases of the natural history of Canada went to teachers, students, and others in all parts of Canada. Motion pictures and lantern slides were seen by 58,316 persons. This material is lent free of charge to educational institutions in Canada except for cost of transportation one way. Natural history specimens were lent under similar conditions.

IDENTIFICATION OF SPECIMENS

The staff of the Museum devoted much time to the identification of specimens sent in from various parts of the country.

PUBLICATIONS

There was a gradual increase in general and specific requests for Museum publications during the year from both organizations and individuals. An increasing number of educational institutions have found Museum publications of value, and have encouraged students and others to make full use of a wide selection of this material. Distribution of Museum publications during the year was in excess of 25,000 copies.

PRELIMINARY REPORT ON THE EXCAVATIONS OF THE KANT SITE, RENFREW COUNTY, ONTARIO

By J. N. Emerson

INTRODUCTION

The Kant site, on the north shore of Mud Lake, near Eganville, Ontario, extends over parts of lots 27, 28, 29, and 30, con. XII, Wilberforce tp., Renfrew co., Ontario. This site was found and described by the late W. J. Wintemberg, an archæologist of the National Museum of Canada, in September 1917. He spoke of it as "one of the largest Algonquian sites I have ever examined."¹ In May 1947 Dr. F. J. Alcock, Curator of the National Museum, Dr. Douglas Leechman, Archæologist of the National Museum, and the author, visited the Kant farm and confirmed the observations of Mr. Wintemberg. Plans were then made for a scientific exploration of the site, and permission to excavate was generously granted by Mr. Charles Kant. During the months of June and July 1947 the author carried out archæological investigations under the general supervision of Dr. Leechman. The following is a preliminary report on this work.

THE SITE

Mud Lake is one of a series of small lakes that are extensions of Bonnechère River, one of the lesser tributaries of Ottawa River. The Bonnechère River system appears to form something of a cul-de-sac from the main body of the Ottawa. By devious routes the Bonnechère ultimately connects with Indian River to the north, which swings in an arc close to the present town of Pembroke and Allumette Island. The latter is the home of the historic Allumette Indians.² The Kant site, on the north shore of Mud Lake, creates the impression that its position is one of relative isolation. It is somewhat off the main routes of trade and culture contact and is likely to have been subject to "cultural lag."

The Kant site is in the heart of the geological area known as the Laurentian Shield. This is a rough, rugged terrain characterized by abundant outcrops of Precambrian rock. The soil conditions preclude to a large degree the development of agriculture and a population density such as appeared normal on Ontario Iroquoian sites.³ The country was best adapted to a hunting and fishing economy. The site gives the impression that it was admirably suited to function as a seasonal village location such as was customary among the Algonquian tribes described by Dr. Frank Speck.⁴

Mud Lake, as the name implies, is a shallow, turbid, and weedy lake. Fish are still relatively abundant and the south end of the lake until

¹ This information is derived from Mr. Wintemberg's field survey notes kindly placed at the author's disposal.

² Fenton, 1940, p. 189.

³ McIlwraith, T. F., 1946, p. 401.

⁴ Speck, F., 1935.

recently was a source of wild rice. Blueberries and strawberries grow wild and probably game was once abundant. The archæological material is concentrated in two major areas along the northern shore of the lake on the Kant property. These two areas are marked by a distinct contrast in elevation. The first is the low-lying ground known as the "Point" on the northwestern part of the Kant farm. The ground is flat and almost at water level. It slopes gently and gradually upwards and eastwards towards Provincial Highway No. 41. North of the highway, the slope becomes rapidly steeper and culminates in the high Laurentian Hills of the area. The Point is traversed, both north and south and east and west, by low sand ridges, which are marked by a concentration of archæological material. The Point may have been the village "habitation" area.

East of the Kant farmhouse, the lakeshore swings to the south, the slope of the land becoming more abrupt as the shoreline is approached. The contour produces the steep sand and gravel formation known as "The Ridge". The Ridge is a finger-like projection that gradually slopes away to a swale on its eastern borders, and was the scene of the greater part of this season's excavation. It appears to be at least one of the burial places associated with this large site.

EXCAVATION METHODS

Seventeen hundred square feet of the Kant farm was excavated down into the sterile subsoil by this season's party, and an accurate and scientific record was kept as excavation proceeded. Most of the excavation was confined to the Ridge in order to avoid crop damage.

The area of excavation was laid out with the use of a transit in a 5-foot grid system to provide a ready set of reference points for location purposes. The excavation was done largely with the trowel, but grapefruit knives and brushes were used for finer work connected with the removal of friable pottery and skeletal material. Squares were dug down by 6-inch levels, using both horizontal and vertical techniques as the excavated feature suggested. Excavation by levels, however, was abandoned when such a feature as a skeleton was encountered.

Work was done under the assumption that as each spadeful of earth is removed the archæologist is destroying a page of history.¹ The recording devices used were: photographs, square descriptions, floor plans, and profile drawings. Materials of a friable nature were treated with a solution of ambroid and acetone prior to their removal, and specimens were packed in straw and tissue paper to protect them.

ARCHÆOLOGICAL REMAINS

Burials

The archæological materials recovered were fewer than we had hoped. However, a sufficient amount was recovered to give important information concerning the culture of the Kant site inhabitants. The most spectacular

¹ Methods and techniques of excavation were those used and taught by Dr. Fay-Cooper Cole of the University of Chicago as indicated in "Rediscovering Illinois", 1937, by Fay-Cooper Cole and Thorne Deuel.

finds were three separate burial units. Each was distinctive and together they provide a picture of the range of variation in the Kant site burial customs.

Burial I, that of an elderly person, was in a flexed position. This grave had been somewhat disturbed by plough action. The body had been placed on its right side and loosely flexed. It had been sprinkled with powdered ferrous oxide (haematite), particularly in the pelvic area. A second skull, probably a "trophy skull", was found lying near the feet of this skeleton. No other grave goods were recovered and there was no evidence of a burial pit. The body had apparently been laid on the sandy surface of the ridge and covered with loose soil.

Burial II presented a much more complex situation. This was a multiple burial of three bodies placed in the same excavated grave pit. The first skeleton lay on its back in an extended position on top of the other two. The top of the skull had been cut by the plough, the upper part being shorn off and the skull tilted back and disarticulated from the mandible, a somewhat grotesque effect. Skeleton 2 of Burial II also lay on its back, but its arms were neatly folded across its abdomen. The legs were tightly flexed and drawn up in an unnatural position until they almost touched the chin. This skeleton was tall, robust, and heavy boned. It had the finest "end-to-end bite" dentition the author has ever seen. Skeleton 3 of Burial II was highly dismembered. It was found in a small concentrated area at the north end of the grave pit. Sections of the hands, feet, and long bones had been piled about the skull, and the mandible had been completely dislocated from the skull proper.

With the exception of one fragment of pottery, which may well have been intrusive, no grave goods were found with Burial II. There was no powdered haematite. It is to be noted that in contrast with Burial I, these three individuals were placed in an excavated pit. The dark outline of this pit could easily be traced by its contrast with the lighter subsoil of the ridge area proper.

In all three skeletons there is evidence that the arm and leg bones had been broken in half just prior to, or immediately after, death. In the case of skeleton 3 the dismembering process had been even more thorough and complete. We might theorize that this ridge-top grave represents the final resting place of marauders who had been captured, tortured, and put to death by the Kant site people.

Burial III was somewhat similar to Burial I, this individual being buried lying face down in a tightly flexed position. No grave goods were found and there was no evidence of a burial pit. Once again it appears that the body had simply been placed upon the sandy ridge surface and covered with loose soil.

Artifacts

In addition to the burials described, a collection of aboriginal artifacts was obtained from the Kant site. Actual excavation was not as rewarding as had been hoped. Although test pits were dug at 5-foot intervals along the ridge area, no rich deposits were encountered. Scientific exploration produced only one hearth, two projectile points, a copper fish-hook, a cache of clam shells, and over five hundred pottery fragments. The

evidence suggested that a small amount of material had been widely spread by plough action, thus creating surface indication of a large and prolific site. It appears to be an unfortunate characteristic of Ontario Algonkian sites to yield only a sparse amount of material.¹ However, surface survey and generous gifts of artifacts supplemented our collection so that a fairly adequate cross-section has been obtained. Future excavation, however, should be directed towards finding the habitation area of the Kant site in order to increase the number of artifacts.

The following specimens were obtained:

- 23 projectile points
- 11 adze fragments
- 1 chopping tool
- 1 large "baton-like" tool
- 1 lanceolate knife blade
- 5 ovate chert scrapers
- 1 rectanguloid scraper
- 1 flake scraper
- 1 thumb-nail scraper
- 1 expanded base drill
- 1 elongated stemmed scraper
- 1 copper fish-hook
- 1 fragment of a copper kettle
- fragments of trade clay pipe stems
- 587 fragments of pottery

The stone complex amply confirms Mr. Wintemberg's original assessment of the Algonkian nature of the site. The projectile points were all of the stemmed, and stemmed and notched, types. Iroquoian triangular forms were lacking. The projectile points were basically Woodland in type, though stemmed points have been found on Ontario Iroquoian sites.² The adzes were mainly plano-convex; one bevelled adze was obtained from this site. The large ovate scrapers and the lanceolate knife blade are Woodland in their features. The large chopping tool is reminiscent of similar tools pictured by Dr. William Ritchie from the Robinson and Frontenac Island sites.

The ceramic materials are typically Woodland. It is a drab, brown-coloured ware, grit tempered and rather friable. The basic vessel form seems to have had a mildly out-flaring rim, although insufficient material was recovered to reconstruct the complete vessel shape. The rims are uncollared and the lips are flat. The decorative techniques involve a profusion of rouletted, rocked, and stamped impressions. Crescentic rocker stamps and "pseudo-scallop shell" decoration, producing a "spiral meander" design, are favourite elements. The body sherds are plain. About half of them have a characteristic striated interior. The ceramic complex is probably related to the Point Peninsula Focus of the Vine

¹ The author met this same scarcity of material on an Algonkian site while excavating in Algonquin Park under the direction of Mr. Kenneth Kidd of the Royal Ontario Museum at Rock Lake, 1939.

² Wintemberg, W. J., 1936, Plate I, figs. 3 and 4.

Valley Aspect of the Woodland Pattern as defined by Dr. W. A. Ritchie.¹ This conclusion is tentative, however, pending a detailed analysis of the finds.

AGE OF THE SITE

The age of the site is not definitely known, but it appears to be an early contact site, at least in part. Mr. Wintenberg has reported the finding of a copper celt and a copper socketed, flanged point.² These may well be prehistoric. He also reported that three adzes or celts had been found bound with copper wire, "perhaps a strip of sheet copper", and an iron axe had also been found. Similarly, a copper point was found on the adjacent Miller farm to the west, but this had apparently been destroyed long ago.³ The author has seen and photographed a copper point from this site.⁴ Surface collections made by this summer's party resulted in the recovery of several fragments of white trade clay pipe stems and a fragment of brass or copper kettle. The copper fish-hook excavated appears to be of native copper.

When the above evidence is considered in conjunction with the evidence from the ceramic complex, there is a suggestion for a fairly lengthy occupation of the Kant site. The Point Peninsula Focus was developing in New York State somewhere in the time period between 1000 and 1400 A.D.⁵ It would seem possible that remnants of this culture moved northward to the Ottawa Valley and formed the culture of the Kant site later on in the 1400s and early 1500s. Here they were subject to some slight amount of white contact before moving farther north and west with the gradual drift of Algonkian tribes. Unfortunately the reported trade materials are all surface finds and are, therefore, not conclusive evidence. However, the date suggested seems to suit the known facts best.

PRELIMINARY CONCLUSIONS

The 1947 excavation of the Kant site has brought to light considerable information on the burial customs and their variation in the Ontario Woodland pattern. It has also produced some information on the artifact complex. It has indicated the presence in the Ottawa Valley of a culture archaeologically closely allied to the Point Peninsula Focus of New York State. The excavation of the Kant site is a step forward in the delineation of the archaeological Woodland culture in Ontario. Mr. Wintenberg recognized and described this culture under the term "Algonkian".⁶ This culture gives every evidence of being as widespread and important as the better known Iroquoian cultures in Ontario. It is to be hoped that this lead taken by the National Museum will inspire other institutions to turn some of their effort towards the excavation of Woodland sites.

¹ Ritchie, William A.

² Mr. Wintenberg's survey notes.

³ Information derived from Mr. Wintenberg's survey notes.

⁴ In the collection of Mr. Sam Blackwell, Cobden, Ontario.

⁵ Ritchie, Dr. William A.

⁶ Wintenberg, William J., 1931.

BIBLIOGRAPHY

- Cole, Fay-Cooper, and Deuel, Thorne (1937): *Rediscovering Illinois*; Univ. Chicago Pubs. in Anthropology, Archæological Series, Chicago.
- Fenton, William N. (1940): Problems Arising from the Historic Northeastern Position of the Iroquois; in *Essays in Historical Anthropology of North America*, Smith. Misc. Collections, vol. 100, pp. 159-251.
- McIlwraith, T. F. (1946): *Archæological Work in Huronia, 1946*; Excavations Near Warminster; *Canadian Historical Review*, December 1946, pp. 394-401.
- Ritchie, William A. (1944): *The Pre-Iroquoian Occupation of New York State*; Rochester Mus. Mem., No. 1, Rochester, New York.
- Speck, Frank (1935): *The Naskapi*; Univ. Oklahoma Press, Norman, Oklahoma.
- Wintemberg, W. J. (1931): Distinguishing Characteristics of Algonkian and Iroquoian Cultures; *Nat. Mus., Canada, Bull. No. 67, Ann. Rept. for 1929*.
- (1936): *Roebuck Prehistoric Village Site, Grenville County, Ontario*; *Nat. Mus., Canada, Bull. No. 83*.

**AN ARCHÆOLOGICAL SURVEY OF THE NORTH BANK OF THE
ST. LAWRENCE RIVER BETWEEN CORNWALL AND
CARDINAL, ONTARIO, JUNE 19 TO JULY 11, 1947**

By Douglas Leechman and Frederica de Laguna

The selection of this region for an archæological survey was determined by the fact that it lies within, or largely within, the area to be flooded by the proposed St. Lawrence seaway. A dam is to be constructed between Barnhard Island (U.S.A.) and the Canadian shore (or, rather, the former shore, which now forms the outer bank of the Cornwall Canal between Locks 20 and 21), about 2 miles above the railway bridge across the St. Lawrence just west of Cornwall. The Cornwall Canal, immediately below the dam, will be shifted slightly. From the dam, a retaining wall will run inland about a mile, almost to the main Canadian National Railways line, and will there turn northeast to a point just north of Milles Roches. From here the water level will follow the 243-foot contour above sea-level. Thus an area will be flooded extending upstream to Cardinal, a distance of about 33 miles to the west-southwest. The following villages and islands will be completely or largely inundated:

<i>Villages</i>		<i>Islands</i>	
Iroquois	Dickinson's Landing	Presqu'île	Steen
Morrisburg	Wales	Toussaint	Wagner
Aultsville	Moulinette	Canada	Grassy
Farran's Point	Mille Roches	Doran	Sheek
		Indian	

The following notes are arranged in geographical order from southwest to northeast, proceeding downstream.

GRENVILLE COUNTY, EDWARDSBURGH TOWNSHIP

Crystal Rock. Artifacts are said to have been found in 1942 in a sand ridge west of the Crystal Rock school. It can be reached from highway No. 16, by turning west on the first road north of the school for an undetermined distance and then walking south. The place was not visited.

Mr. Joe Gore (lot 19, con. I). Marked by a grey stone house on the south side of Highway No. 2, 3.6 miles west of Cardinal Bridge. Nothing was seen here, but Mr. Gore reported finding "stone axes" in the hayfield south of his house, on a point of land. The place could not be visited. An inspection of the terrain at some summer cottages on the west side of the point showed the soil to be clay and revealed no trace of aboriginal occupation.

Adams Island can be reached only from Galop Island (U.S.A.) because of dangerous waters between Adams Island and the Canadian shore. Burials and other finds have been reported on the island.

Mr. H. R. Byers (lot 2, con. I). This farm was originally owned by G. F. Benson of The Canada Starch Company, Cardinal. It is on the east bank of a small draw, about $\frac{3}{4}$ mile east of Cardinal. Mr. Byers presented us with a muller, a hammerstone pitted on both surfaces, two adze or celt fragments, a long concretion said to have been used as a skinning tool, a smooth pebble (pot polisher?), and a stone weight (a flat oval pebble slightly notched on two edges at the shorter diameter), which he said had been found near a spring, now marked by a clump of small trees and bushes, east of the farm. The soil here was sandy loam and contained no recognizable traces of occupation except two potsherds.

DUNDAS COUNTY, MATILDA TOWNSHIP

Mr. William Johnston (N. $\frac{1}{2}$ lot 37, con. I). The house, now in ruins, is on the east side of a road about 2 miles east of Cardinal, and 1 mile inland from the river. It is opposite an abandoned cheese factory. W. J. Wintemberg, in 1914, noted a report that three skeletons had been found in excavating the cellar of the house, and that the bowl of a trumpet pipe was found in the garden east of it. The former owner of the property is dead, and his mother lives in a small house about half a mile south of the place, at a crossroad. The place was not explored.

Mr. Johnson (lots 26, 27, con. I). This farm is on the extreme southwest point at Iroquois Point. Mr. Johnson had in his possession five chipped points. One is of light grey chert 8.5 by 4.5 cm., corner-notched with slightly barbed shoulders and expanded tang, showing very flat pressure flaking. There are two stemmed blades of weathered argillite (?), one 9.3 by 3.5 and the other 6.2 by 5, the fourth is a side-notched blade of dark chert, 8.4 by 3.3, and the last is a stemmed grey chert point, 5.8 by 2.8. Mr. Johnson reported he had found these in one spot near the upper (east) edge of the field that lies on the north side of the road to his house. The field is bounded on the east by an orchard. The soil is stony loam and showed no trace of habitation. He refused to part with these specimens, perhaps because he believes them to be valuable. Mrs. Johnson suggested that they had come from the garden, south of the house, which stretches down to the river. We examined this area without results. Because of the differences in shape, style of flaking, and general appearance of these points it is thought possible that they were not all found in the same place.

Mr. Archibald MacInnis (lot 20, con. I). This was formerly Michael Ault's farm. It is on a slight rise of land, east of a draw on the eastern edge of Iroquois; the house is on the north side of the highway, opposite Sycamore Inn. Mr. MacInnis presented us with a red slate gouge he had found in the woods on top of a ridge some distance inland. The exact finding place could not be determined. None of his neighbours had found anything. An examination of the railway cut north and northwest of his house, and of the terrain along a road running back to the ridge between his farm and Iroquois, gave negative results.

Parlow Farm (lot 12, con. I). The house is on a rise of ground north of highway No. 2, and west of Parlow Road, some 2 miles east of

Iroquois. Mrs. Parlow gave us a celt and an argillite point that had been found in the garden north of the house at a spot about halfway between the house and the barn. Nothing was seen in the garden.

DUNDAS COUNTY, WILLIAMSBURGH TOWNSHIP

Morrisburg. Finds were reported in one of the cemeteries on the west or northwest edges of Morrisburg by a grave-digger. Owing to the fact that he suffered from an impediment of speech, nothing further could be learned. All three cemeteries in question were visited and other grave-diggers interviewed, but without result.

Mr. A. E. Nash (lots 26, 27, con. I). The house is about 1,000 feet north of the highway on high land west of Nash Creek, just west of Morrisburg. Mr. Nash gave us one chipped point and two fragments said to have been found in his field.

Mr. Dillabough (lot 14, con. I). Mr. Dillabough gave us two celts that he said he found in a field on the south side of the highway, on a small point about 3,000 feet west of the Chrysler monument. The soil in this vicinity is clay, but the exact spot was not visited.

STORMONT COUNTY, OSNABRUCK TOWNSHIP

Aultsville (lot 34, con. I). The site is described by W. J. Wintenberg as he saw it in 1914:

"On lot 34, con. I, between Aultsville and the G.T. Railway Station on the east bank of a small creek flowing into the St. Lawrence, is a small dark spot about 10 feet in diameter, and about 1 foot deep, . . . which probably indicates an Iroquoian camp site. Charcoal, clam shells, a few animal bones, but no ashes, were seen. A fragment of an object made of stone, eight fragments of pottery bearing decorations similar to those found at the Iroquoian site at Roebuck, and four fragments of plain earthenware pipes, were collected. A cylindrical bead made of soapstone was collected and presented by Mr. Baker."

The site is in a garden just east of the house now owned by Mr. A. B. MacKenzie. The former owner, Mr. Charles Baker, now deceased, is reported by his brother, Mr. Clarence Baker of Aultsville, to have found a "wash basin full of relics", but the collection is now lost. Possibly Mr. G. Archambault, who bought Charles Baker's farm east of the Chrysler monument, may know something about the collection.

The site is about 2,000 feet north of highway No. 2 on the east bank of the creek that flows through Aultsville. It is on a high point of land that lies at a bend in the creek, giving a view down the stream bed towards the mouth. The north-south road to the railway station here makes a short jog to the west. One or two sherds were found in a garden on low ground south of the house, but had probably been washed down from above. Nothing was found in the garden belonging to Mr. Shaver, which adjoins Mr. MacKenzie's garden on the north, nor was anything found on the north and east side of the road, nor in any garden along the stream between

MacKenzie's house and the highway, although a good many were explored. Mr. Lane, son of the former owner of the land across the creek from the site, has never heard of any finds from his father's land.

The soil at this small site is sandy, but the deeper clay outcrops halfway down the slope of the garden towards the east, i.e., about 100 feet from the road. The sand varies in colour from light orange-tan to dark grey. A test pit was dug at the southern edge of the garden near the garage. Here sand, humus, and a few sherds were found to a depth of 6 to 8 inches, with yellow clay below.

Objects picked up in the garden include the following:

- 3 broken pottery pipe stems
- Chipped point
- Disk-shaped steatite bead
- Tubular steatite bead
- Iroquois-type sherds, with smooth surface, decorated with a slight collar and incised oblique lines.

The original site, once 10 feet in diameter, has been so disturbed by gardening that the dark soil and artifacts have been dispersed over an area at least five times as large. It is not worth excavating.

Wintemberg also reports: "In excavating for the cellar of the Haines tin shop in Aultsville, on the west bank of the mouth of a small creek flowing into the St. Lawrence, 30 or more years ago (1880?), four human skulls and some long bones were found about 2½ or 3 feet deep."

Road near Mr. Bouck's House. A barbed, grey slate blade with a notched tang, grooved on both surfaces, was found by Mr. Richard Sanderson, who lives on the western edge of Aultsville. It was sketched at the home of Mr. Grant (lot 3, con. I). It is said to have been found in the gravel along the roadside by Mr. Bouck's letter box, east of Aultsville, and Mr. Sanderson believes that it was dumped in a load of gravel obtained from the Edgehill pit in lot 15, con. I, Williamsburgh tp., 4 miles east of Morrisburg. Mr. Bouck reports that the road gravel came from Flag road, 1½ miles west of Morrisburg.

Nothing was seen in the gravel along the road, or in the dirt at the edge of the road. A sandy field on a slight rise on the north side of the highway within a quarter mile east of Mr. Bouck's house was also inspected, without results.

Nothing was seen in the Edgehill gravel pit, nor in a nearby sand pit.

Mr. E. Henry (lot 16, con. I). The house is on the south side of the highway, about 4,000 feet west of the road at the Santa Cruz tourist camp. (The camp is 3,000 feet west of Hoople Creek at Dickinson's Landing.) The house is a little west of separate school No. 2 on the north side of the highway.

In the garden between the house and the river, and in the garden just east of the house by the highway, Iroquois pottery was found, as well as a soapstone bead, a clay bead, and pipe stem. The soil is light and sandy. The site is not worth excavating.

The adjoining property on the west was formerly owned by Mr. Bokus, who is reported to have found skeletons in the field between the

highway and the river. Nothing of interest can now be seen here, for he had the field levelled by a bulldozer, which removed 3 feet of top soil and pushed some over the river bank.

The property on the south side of the road just to the west of the Henry's is owned by Mr. Biederman. A few sherds were found in the garden east of the house, but nothing could be found in the small pasture between his house and the Henry's garden. This field has been ploughed, and the original depth of the top soil could not be determined. The Biederman farm is evidently just on the eastern edge of the small site.

Mr. Henry believes that the skeletons found by Bockus and those reported at Santa Cruz were not Indian, but were those of White cholera victims.

Santa Cruz. Skeletons are reported to have been found here when the highway was built. Nothing of interest could be seen, although the area is high and sandy.

A few fragments of pottery were found on the west half of lot 13, con. I, on the west side of the draw at Santa Cruz.

Wales. A skeleton was found recently (1945 or 1946?) in the sand pit on the east side of the road to Wales, but it is reported to have had skin on the bones and was turned over to the Provincial Police.

A chipped point is said to have been found at a chicken farm on the east side of the road, about 500 feet south of the railway crossing at Wales. The soil is a stony loam and nothing was seen here.

STORMONT COUNTY, CORNWALL TOWNSHIP

Mr. Bert Mattice. This property is on lot 35, con. I, and is reached by a lane, along the shore of Bergen Lake, which branches off from highway No. 2, a little less than a mile west of Moulinette church. He sold us a thin celt and a long gouge that he said he had found on a rise of land north of his house. The place was evidently very near the boundary between his land and that of the Tilton's, whose house fronts on the highway. The spot was described as being on a continuation of a line from the junction of the lane and highway to the Tilton's chicken house. The field was in hay, so could not be inspected. The soil on the Tilton's side of the fence is stony clay.

One sherd was found in the garden just east of the Mattice house, and two were found at the top of the former canal bank west of the house. Here Mattice said he had found two skulls when a section of the bank caved away. The soil here is sandy, with dark humus for a depth of 6 to 9 inches, but showed no signs of intensive habitation. It was so thickly overgrown with tansy that adequate exploration was impossible.

Mr. Emphy, Moulinette. Mr. Emphy lives in a red brick house on the south side of the highway, east of a small draw on the west edge of Moulinette, and about 1,000 feet west of Moulinette church. He has a small collection and reported that he had found one chipped point on the sandy ridge south of the highway and west of the draw. This locality is opposite Pine Ridge Farm. It was explored without results. Mr. Emphy said he had found two other chipped points in a garden opposite his house,

i.e., between the highway and the railway. This field was in hay, so could not be visited. His memory is impaired so that this information may not be accurate.

Mr. Willard Hartle (lot 22, con. I, rge. 2). The house is on the south side of the highway, on the east bank of Robertson Creek, about 750 feet east of Lock 20 of the Cornwall Canal. Sherds were found in the potato patch just beyond a small draw east of the house. The surface of the pottery was smooth, and had incised decorations and slight collars. This site is not worth excavating.

Miss Anderson (lot 21, con. I, rge. 2). On the north side of the road, minute sherds of early Woodland type (?) were found in the garden east of the house. The soil is sandy, but the rest of the property down to the creek was in hay and so could not be explored. The place is probably not worth further attention.

Lots 16, 17, con. I, rge. 2. This area lies in the southeast angle formed by the railway and the road leading inland from Lock 19, i.e., it is east of the road and south of the locks, and is within half a mile of the grade crossing. It is crossed by high tension wires on steel towers. Mr. W. E. Chant, 318 Laurier avenue west, Ottawa, claims to have found "bone knives, pots" and other things here, and gave us a bone awl from this place. The land proved to be boulder clay, and slopes down to marsh towards the west. Nothing was seen here of interest and it is possible that the correct locality was not visited.

THE PARKER SITE

By Douglas Leechman and Frederica de Laguna

The Parker site is situated on the old Forrest farm, now owned by Mr. George Parker; it lies on the north shore of Trent River, in lot 16, con. I, Seymour tp., Northumberland co., Ontario; this point is 5 miles south of Campbellford, Ontario.

About 1906, Mr. George Brady of Hoad, Ontario, found a number of stone specimens while ploughing the field that lies between the house and the river. Some of these artifacts eventually found their way into the collection of Mr. George Bailey, of Stirling, Ontario, a barber, now deceased.

In 1914, the late Mr. W. J. Wintemberg recorded that the material from the Parker site included chipped stone points, rubbed slate points, gouges, adzes, potsherds, and plummets.

The Parker farmhouse stands a little over 400 feet north of the shore of Percy Reach, a section of Trent River. All of the field between the house and the river has been ploughed with the exception of a narrow strip of pasture along the shore. The maximum width of this strip is about 36 feet. Its length, which is the width of the point of land on which the site lies, is a little over 400 feet; it runs approximately east and west.

Test pits indicate that the length of the site is about 280 feet and that its edge follows fairly closely the line of an old beach terrace, now about $2\frac{1}{2}$ feet above the water, with some cultural material spilled farther down the bank. Because the field between the house and the river had been ploughed, it was impossible to determine the northern, or inland, extent of the site. A test pit in the highest part of the field 100 feet north of the fence, and another 50 feet north of the fence, failed to disclose any signs of occupation. The top of this slight rise is about 14 feet above the water.

The cultural deposit at the site was covered by turf about $1\frac{1}{2}$ inches thick, in which no artifacts were encountered. Below this was a layer of dark humus, containing traces of charcoal, ashes, fire-cracked rocks, numerous animal bones (mostly fragments), clam shells, snail shells, stone chips, and artifacts, the bottom of which was encountered at depths varying from 6 to 36 inches below the surface. The culture-bearing layer contained many pebbles and stones, chiefly of limestone. There were also lumps of disintegrated granite and schist, and some of this material may have been used to temper pottery. Other stones were of greenstone, slate, quartz, quartzite, chert, and volcanic tuff. This last was the material most commonly used for chipped points. A few flecks of red hematite were also seen. Some of the rocks were large slabs, a foot or more square; they were at all angles, flat, on edge, and tilted, without exhibiting any coherent arrangement. Patches of charcoal were encountered at various levels, but they did not seem to be associated with deliberately constructed hearths.

The bottom of the cultural deposit was difficult to determine, for there was no clear pre-occupation ground surface. The lower levels of the cul-

tural deposit in general were lighter in colour and contained more large stones and fewer artifacts than did the upper levels. The sterile subsoil was a light-coloured, sandy boulder clay of glacial origin; obviously only a small proportion of the pebbles and rocks in the cultural deposit had been brought to the site by human agency.

The bottom of the cultural deposit was uneven. In a number of cases there seem to have been pits or depressions in the sterile subsoil, but the outlines of these were indistinct, and they contained nothing except the usual number of stone chips and animal bone fragments found in other parts of the bottom levels.

Land snails were found at all levels of the deposit, usually occurring in clusters. A group of about 120 of them was found at a depth of 9 to 12 inches.

The excavation of the pits was carried out in 3-inch levels, measured from the surface. Burrows of groundhogs were encountered at 6 inches, extending to a depth of 15 to 22 inches below the surface, i.e., to the bottom of the cultural deposit. The collapse of the walls of these burrows confused the stratigraphy.

This site bears a remarkable resemblance to the site near Vergennes in Vermont excavated by Mr. Bailey in 1937. In each case a narrow slice of pasture land, which has never been ploughed, lies between a ploughed field and a stream, and in each case attention was first drawn to the site by the finding of artifacts on the surface of the field. The principal difference between the two sites is in the total absence of bone and antler in the Vergennes site, owing apparently to the acidity of the soil. Among the types of artifacts common to both sites are rubbed slate blades and points, the semi-lunar slate knife, whetstones, hammerstones, points, drills, and scrapers chipped from chert, and pottery. No copper was found in the Vergennes site, though one copper awl was found on the Parker site. There was no steatite on the Parker site (though it was found at Vergennes), but two pieces of mica schist had been cut into slabs and may well have been used in place of steatite. Among the stone artifacts found at Vergennes, but missing from the Parker site, may be listed: bayonet points in slate, bannerstones, gouges, and sinew-stones.

The correspondence in the pottery is marked and the decorations and technique parallel each other closely. The coiling process is common to both and the marked grooving or channelling of the interior. The principal differences appear to be in the absence of collars in the Parker site and the absence of rocker stamp decorations in the Vergennes pottery. It is hoped to publish a more detailed account of this collection at a later date.

BOTANICAL INVESTIGATIONS ON THE EAST COAST OF HUDSON AND JAMES BAYS

By W. K. W. Baldwin

In the summer of 1947 a botanical field party investigated the east coast of James Bay and Hudson Bay. This expedition was jointly sponsored and financed by the National Museum of Canada and the Arctic Institute of North America. The party consisted of four botanists accompanied by one geologist, with guides engaged in the field. The National Museum provided two botanical members of the expedition—W. K. W. Baldwin from the staff of the National Herbarium and James Kucyniak, a specialist in bryology, from the Montreal Botanical Garden. The Arctic Institute made two research grants, the first to Dr. I. Hustich, a forest botanist, who was accompanied by Dr. R. Tuomikoski, a colleague from the University of Helsinki, Finland; and the second to Dr. E. H. Kranck, a geologist from the University of Neuchatel, Switzerland. The following is a brief summary of the work carried out. More detailed accounts of the ecology and systematic botany are in course of preparation.

The general area investigated comprised the shore of James Bay and Hudson Bay from Moosonee to Port Harrison. The coast from Rupert House to Manitounuk Sound was studied more closely by travelling in canoes equipped with outboard motors. The most intensive field work was carried out in and around the mouth of Great Whale River.

The purpose of the expedition was to obtain collections and records of the vascular plants, mosses, and lichens of the region. The general objectives included detailed ecological notes and photographs to illustrate vegetation types, forest resources, and forage cover for grazing animals; as well as general notes on wild life.

The field party assembled on June 26 at Moose Factory. After crossing the foot of James Bay by motor vessel the canoe trip started from Rupert House on July 6. By coastwise travel with short side trips up the larger rivers, Great Whale River was reached on July 29. From this base excursions were made along the coast and up the river, and for about 15 miles into the interior. A flight to Port Harrison was made on August 11 where Dr. Kranck carried out geological investigations for the remainder of the season. Dr. Hustich and Dr. Tuomikoski left Great Whale River for Moosonee on August 26 by plane, and Mr. Kucyniak and the writer followed on August 28 by motor vessel with the equipment and collections. The total distance travelled by motor vessel, canoe, and plane in James Bay and Hudson Bay amounted to about 1,300 miles.

In the course of this survey a wide range of habitat conditions were studied. At Moose Factory there is a remarkably rich flora along the course of Moose River. This is surrounded by a vast muskeg region that covers the low-lying plain of southern James Bay. The terrain of the Canadian Shield was first encountered at Rupert House, from which point it was followed northwards along the coast. The tree line retreats from

the islands fronting the shore beginning on the islands off Old Factory Bay. From here northwards a strong contrast exists between the many barren islands of the coastal region and the interior area only a few miles inland. A trip up Fort George River of some 15 miles revealed spruce forest with scattered trees of jack pine, balsam fir, and poplar. An arctic tundra area covers Cape Jones, which marks the passage from James Bay into Hudson Bay. Interrupted forest areas in valleys and river basins approach the coast of Hudson Bay as far north as Richmond Gulf, beyond which the northern limit of trees turns inland to the east. North from the tree limit, the tundra stretches over the northernmost point reached by the expedition at Port Harrison.

It would be of great interest to have further information on the vast inland area of northern Quebec, which has remained so long unknown. Only the coastal area has been much travelled.

The great herds of caribou that frequented Great Whale River area more than half a century ago are no more. Only a few old antlers were found on the barrens at Cape Jones. The whales that were formerly trapped by the thousand at the mouth of the river were seen only rarely in 1947. According to the native people, seals have also been greatly reduced in number, and the fur traders reported appallingly low returns for trapping in the region. In contrast with this poverty of game and fur-bearing animals in Hudson Bay the beaver situation on the east coast of James Bay is progressing favourably. The beaver conservation program started 15 years ago at Rupert House has begun to yield sustained results. At Rupert House and Fort George maps of beaver lodges reported by the Indian wardens were examined with great interest by the members of the field party.

The collection of vascular plants amounted to over 5,000 sheets, representing about 500 species. Nearly 1,200 collections have been identified, mounted, and inserted in the National Herbarium, and the duplicates of this set have been prepared for exchange. The moss collection totalled 5,000 samples of about 265 species, including one species that seems hitherto unknown to science. Because the region has been relatively unexplored by bryologists the material includes great extensions of range for several species.

Twenty-two localities were investigated more carefully. Notes and photographs of these points give a clear picture of the vegetation types and general topography. About 100 photographs have been annotated and included in the departmental file.

Four permanent plots were staked in the spruce forest at Great Whale River. The area covered 800 square metres, on which every seedling and tree was measured and registered. In addition, six small sample plots of meadow were examined on the river shore.

Material of tree seedlings of different ages was collected to get data on age classes in forest regeneration in the region. Supplementing this material, 290 increment cores were taken from representative trees.

Thanks are due to many individuals who materially aided in the success of this expedition. Acknowledgment is particularly made for the assistance received from Mr. R. M. Duncan of Moose Factory and the personnel of the James Bay section of the Hudson's Bay Company; and to the members of the Anglican and Roman Catholic Missions.

THE EDMONTON FAUNA AND DESCRIPTION OF A NEW
TRICERATOPS FROM THE UPPER EDMONTON MEMBER;
PHYLOGENY OF THE CERATOPSIDAE

By C. M. Sternberg

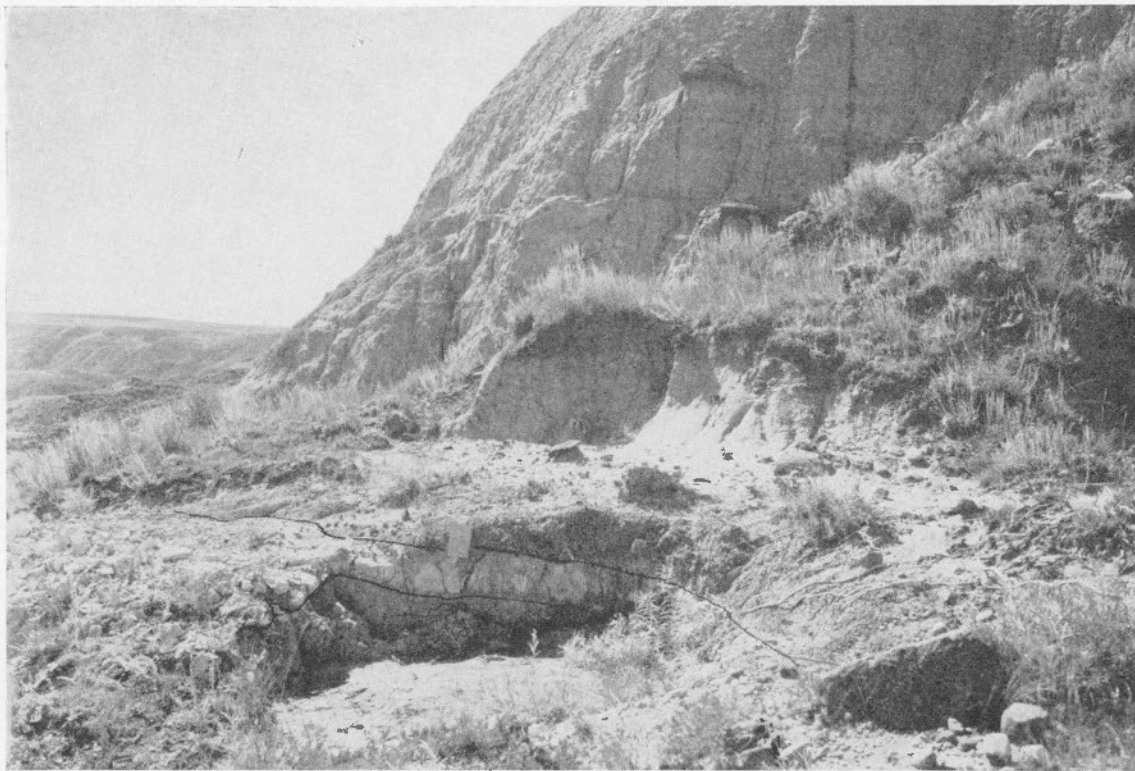
THE EDMONTON FAUNA

While collecting from the upper part of the Edmonton formation, on Red Deer River in 1946, the writer secured an incomplete skull of an undescribed species of *Triceratops*. This is the first record of *Triceratops* from Alberta. In a preliminary report (16) on this work it has been shown that the series of beds above the volcanic tuff horizon (Kneehills tuff) (Plate II) that Sanderson designated as the Upper Edmonton member (1, p. 61) is of Lance age. Previous to Sanderson's division of the Edmonton formation into Lower, Middle, and Upper members, it had been regarded as a continuous series of beds that were older than the Lance (See Plate III).

In his description of the Edmonton formation, Tyrrell drew the upper limits at the top of the Big (Ardley) coal seam (17), but Sanderson included in his Upper member the beds above the Ardley seam, up to the erosional unconformity at the base of the Paskapoo (1, Figure 22), though he had no fossil evidence for such a conclusion. During the 1947 field season, the writer examined the beds above the Ardley seam and, in sec. 5, tp. 39, rge. 22, W. 4th mer., located dinosaurian remains at several horizons up to 90 feet above the top of the Ardley seam. This proves that Sanderson was correct in regarding the beds immediately above the Ardley seam as of Cretaceous age.

It is now known that *Thescelosaurus edmontonensis* (15), *Leptoceratops gracilis* (3), *Palaeospinax ejuncidus* (8), *Ankylosaurus* sp. (2, p. 366), and *Eodelphus* sp. (14) all come from the Upper Edmonton member. In 1947 the writer collected three skeletons of *Leptoceratops*, a skull of *Ankylosaurus* sp., and several bones of *Thescelosaurus* from the Upper Edmonton member, but no parts of these genera or of *Triceratops* have been observed below the Kneehills tuff. A skeleton of *Tyranosaurus*, observed in the Upper member in 1946, was too poor to collect. Hadrosaurs are very scarce in this Upper member, and there is no evidence of *Saurolophus* or any member of the Lambeosaurinae being present.¹ A mammal tooth and a jaw fragment from this Upper member have been identified by Dr. L. S. Russell as similar to teeth from the Lance, to which Marsh gave the name *Stegodon*, and the jaw of a didelphid. *Champsosaurus* and *Aspideretes* and other turtles as well as the fishes, *Ascipenser*, *Myledaphus*, and *Leptososteus*, are more common in the Upper member than in the Lower or Middle members of the Edmonton.

¹ Lull and Wright in Geol. Soc. of Amer. Special Paper No. 40, propose a new subfamily, the Cheneosaurinae, for the reception of *Cheneosaurus* and *Tetragonosaurus*, but the fundamental differences between these genera and other hooded hadrosaurs do not appear to justify this separation.



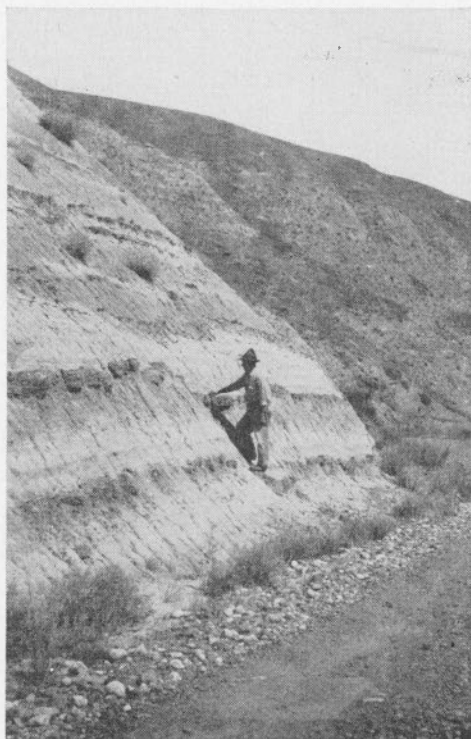
Kneehills tuff near the top of the dark clay bed that marks the top of the Middle Edmonton member, and the overlying Upper Edmonton member, in S.W. $\frac{1}{4}$ sec. 34, tp. 33, rge. 22, W. 4th mer., on west side of Red Deer River. (Neg. No. 75646.)



Upper Edmonton member overlying the dark clay bed that marks the top of the Middle Edmonton member, in sec. 36, tp. 33, rge. 22, W. 4th mer., on east side of Red Deer River. (Neg. No. 99735.)

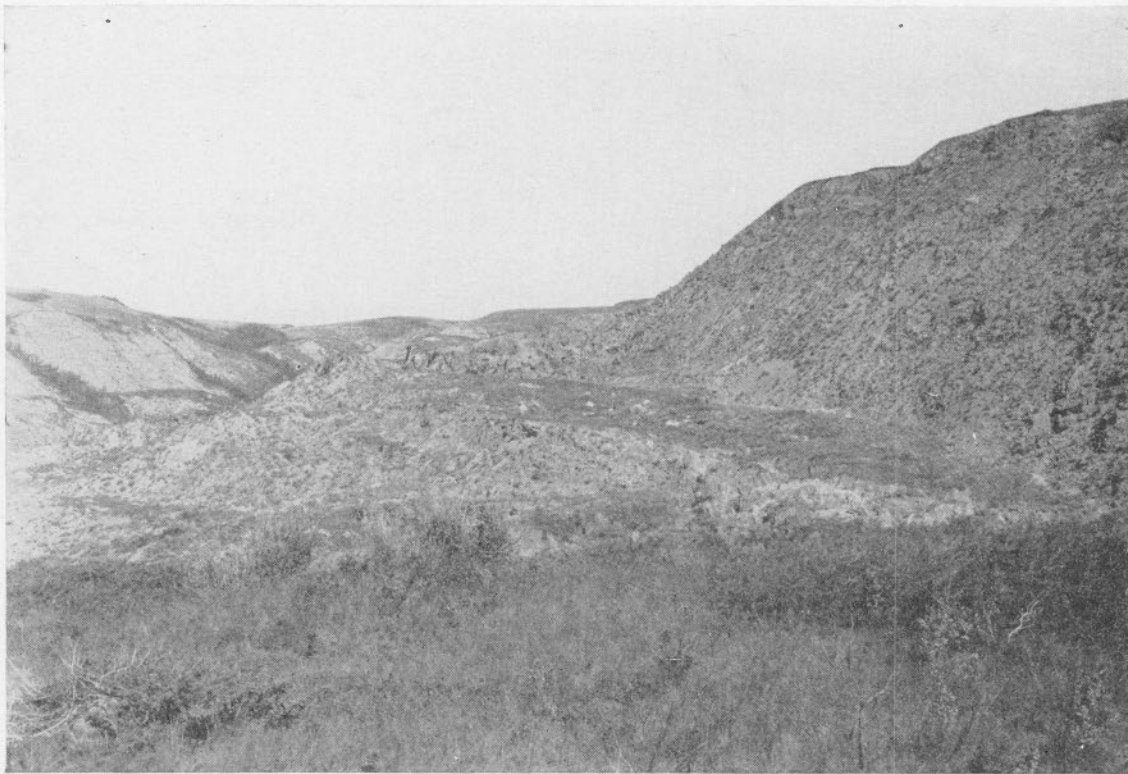
As shown from the above discussion, there is a definite faunal break between the Middle and Upper members of the Edmonton formation, but there does not appear to be any such break between the Lower and Middle members, as shown by a careful check of the horizons at which dinosaurs have been collected.

PLATE IV



C. M. Sternberg standing on and pointing to the two divisions of the Drumheller marine tongue shell bed, about two-thirds up the hill on road on the west side of the Morrin ferry.

The Edmonton ornithomimids have been referred to the Oldman genus *Struthiomimus* and the Lance genus *Ornithomimus*, but due to the paucity of the genotype of *Ornithomimus* it is not possible to differentiate adequately between the two genera. *Troodon*, *Albertosaurus*, *Stegoceras*, *Anchiceratops*, *Cheneosaurus*, *Hypacrosaurus*, *Saurolophus*, *Edmontosaurus*, and *Anatosaurus* are all known from both above and below the Drumheller marine tongue. *Parksosaurus*, *Arrhinoceratops*, *Anodontosaurus*, and *Edmontonia* come from just below this marine tongue and probably also extend up into the Middle Edmonton. It would appear, therefore, that though the country was sufficiently depressed to allow the



Large block of the Upper Edmonton member slumped into the coulée over the Middle Edmonton member, in sec. 3, tp. 34, rge. 22, W. 4th mer. (Neg. No. 75647.)

sea to invade the whole area and deposit the widespread Drumheller marine tongue, the time lapse between the deposition of the Lower and Middle Edmonton members was not sufficient to allow any great evolutionary change to take place.

DESCRIPTION OF SPECIES

Family, CERATOPSIDAE Marsh

Genus, *Triceratops* Marsh

Triceratops albertensis n.sp.

Holotype G.S.C. No. 8862 (Plate VI) (Field No. 13-1946, C.M.S.) consists of left half of skull behind the nasal horncore, two dorsal vertebræ, and several incomplete ribs. The skull lay on its left side, the parietals and right squamosal were pulled away before burial and the right side of the head and the beak had been eroded before discovery. Several dorsal vertebræ and ribs were scattered over a wide area. The specimen was discovered by student assistant R. Steiner, in the Upper Edmonton member, 55 feet above the base, in NW.¼ sec. 2, tp. 34, rge. 22, W. 4th mer., on the west side of Red Deer River. The specimen was preserved in a bed of clay, though in most sections this horizon is composed of rather massive, fairly coarse-grained, soft sandstone (See Plate II). Because of the clay content in this bed, overlying the impervious dark grey clay at the top of the Middle Edmonton member, the beds had not slumped as was usual where the thick bed of soft sandstone lay directly on the impervious clay (16) (Plate V). Two other skulls of *Triceratops* were found near the same horizon but in the slumped soft sandstone, and only pieces of these skulls were recovered.

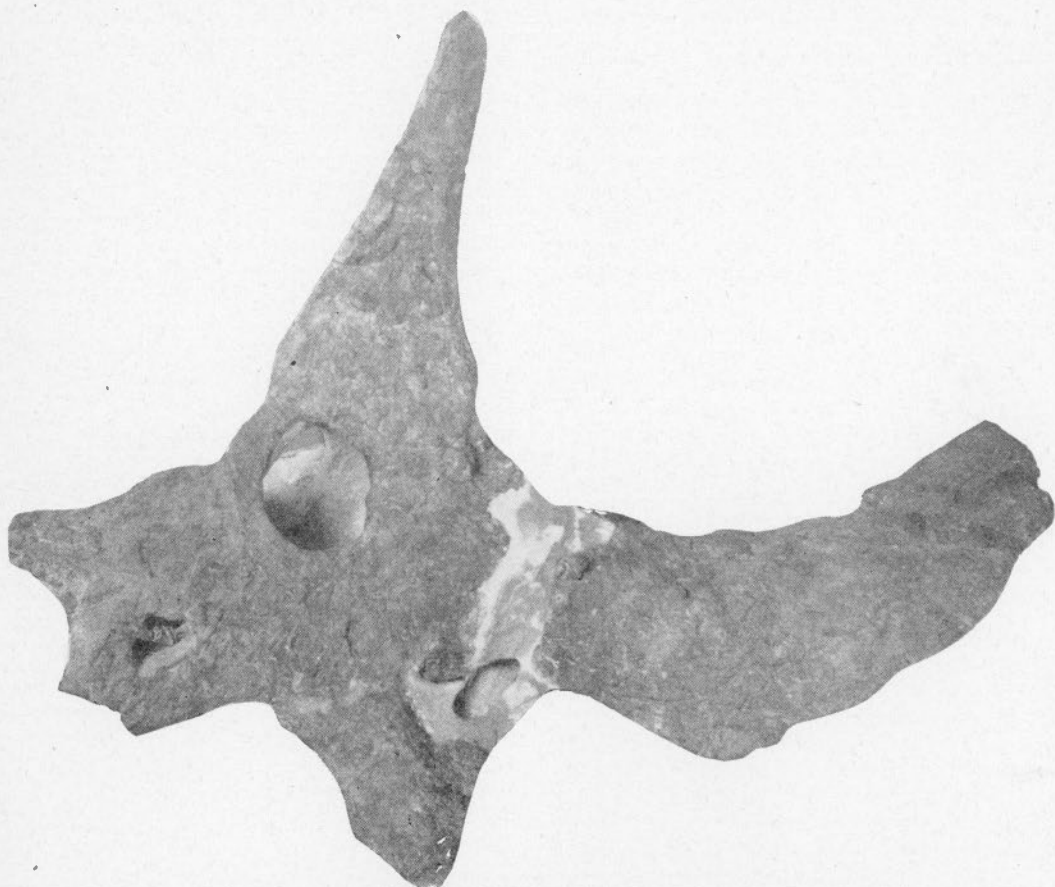
All the bones of *Triceratops* observed seem to represent very large specimens. Our type is very massive and the skull is estimated to have been at least 8 feet from beak to back of parietal. Total length as preserved 1,930 mm.

Specific Characters. Large form; facial region high, long, massive; antorbital fossa large; orbit large, higher than long, top well above nasals and frontals; brow horncore large, mostly behind orbit, flattened externally, tapering, and standing erect or slightly backward; jugal long and heavy with epijugal; squamosal long, thick, with epoccipitals and vascular markings on both sides; crest large, gently rounded, and not strongly upturned behind; vertebræ and ribs massive.

The specimen differs from all other species of *Triceratops*, but appears to most nearly resemble the skull of *T. horridus*. The anterior edge of the nasal, as preserved, is 80 mm. thick. It is slightly upturned and suggests that it was thickening for a nasal horncore, which was, no doubt, formed by an upgrowth of the nasal bones. The nasals and frontals are broad and the top of the head is gently rounded. The face, or that part between the orbit and the nasal excavations, is longer than in *T. horridus*. The orbit is about the same shape and angle as that of the Field Museum specimen illustrated by Lull (10, Pl. 13A). An outstanding feature of our new species is the exceptionally large preorbital fossa, which is larger than in

any other known ceratopsian. It is subcircular in outline and is situated far forward. The bones of the skull are so thoroughly ossified that it is not possible to state what bones bound the fossa. The fore and aft diameter of the fossa is 100 mm. From the anterior edge of the fossa to the posterior edge of the nasal opening is 110 mm. and from the posterior edge to the orbit is 220 mm.

PLATE VI



Triceratops albertensis. Holotype No. 8862, Geol. Surv., Canada. Skull from left. About $\frac{1}{4}$ natural size. (Neg. No. 99690.)

The orbit extends well above the top of the nasal bones. It is oval in outline, with the base of the oval at the anteroinferior angle and the long axis inclined more than 15 degrees from the perpendicular. It is buttressed in front, especially at the anterosuperior and anteroinferior angles. The anterior edge of the brow horncore is over the middle of the orbit.

The brow horncore is very broad-based and the fore and aft diameter is considerably greater than the transverse diameter. It stands well

behind the orbit and is directed posterior to the perpendicular. As the skull was preserved on its side, the angle of the horn could not be due to distortion. As in other species of the genus, the horncore is hollow in its lower half and the walls are relatively thin, the thickness of the external edge being about 20 mm. and that of the internal and posterior edges from 30 mm. to 40 mm. The external side is flattened, though this may be partly due to crushing. The fore and aft diameter is about 340 mm. and the transverse about 200 mm. It is uniformly tapered and the top, as preserved, is 720 mm. above the level of the orbit. Considerable of the tip is missing. Though none of the right horncore is present it appears that the bases of the two horncores met on the midline. Vascular markings are well shown, but not particularly deep.

The teeth were all destroyed before discovery, but the upper part of the maxilla is preserved on the same plane as the nasal and lachrymal. This, as well as all the other parts of the surface, is marked by vascular grooves.

The jugal is large and the long descending limb slopes slightly backward. The anterior edge is slightly concave in its midlength, but in the distal one-third the sides converge rapidly. The suture between the jugal and the lachrymal is indicated. The anterosuperior part of the jugal is greatly thickened, and with the lower edge of the lachrymal forms a well-pronounced buttress at the anteroinferior angle of the orbit. The edges of this buttress converge and a narrowing ridge extends down onto the anterior face of the jugal and plays out just short of the maxilla. There is no sharp ridge on the external face of the jugal, which is gently rounded toward the distal end. A well-pronounced, blunt epijugal is thoroughly fused to the inferoexternal edge. The quadratojugal and quadrate are not preserved and the lateral temporal fossa is not enclosed. The posterior edge of the jugal widens as it proceeds upward, and though this edge is not complete it appears certain that the expansion extended below the lateral temporal fossa as in *T. obtusis* (10, Fig. 41). The greatest height of the jugal, below the orbit, is 580 mm. and the greatest breadth of the descending process is 240 mm. plus. The jugal notch is moderately deep but broad, due to the anteroexternal angle of the squamosal sloping gently backward as in *T. serratus*. Frost action had separated the main body of the squamosal from the rest of the skull and deposition of ironstone on the edges made it impossible to make contact. It is believed, however, that it has been placed approximately in the correct position.

The squamosal is long and of moderate breadth. It is rounded laterally and posteriorly it gradually flattens out, suggesting that the crest was not upturned posteriorly. Both upper and lower surfaces are marked with vascular grooves though they are not extremely deep except on the external face of the anteroinferior part. There are seven low, epoccipitals thoroughly fused to the edge of the squamosal. In general shape and proportions, the squamosal is intermediate between that of *T. eurycephalus* (12, Pl. 4) and *T. flabellatus* (7, Pl. 44) though the jugal notch is more like that of the latter. The angle of the internal edge of the squamosal suggests that the parietals were not particularly broad behind but rather that the crest was long but of moderate breadth.

The two dorsal vertebræ that were collected are not sufficiently well preserved to determine their position in the column, but it is believed that they are mid-dorsals. They are higher than broad, relatively short. The neural arches are massive but the neural spines are short. The height of the centrum is 220 mm., the breadth 190 mm., and the anteroposterior length 90 mm. The breadth across the lateral processes is 380 mm. and across the prezygopophyses (extreme width) 140 mm. The ribs are extremely massive. They are oval to flattened oval in cross-section except near the proximal end; the greatest diameter of the largest rib is 90 mm., the length as preserved 1,230 mm. It is estimated that 140 mm. is missing from the distal end.

PHYLOGENY OF THE CERATOPSIDAE

Students of the Ceratopsidae have not always been in complete agreement regarding the phylogeny of the family, but all seem to believe that *Anchiceratops* from the Edmonton and *Torosaurus* from the Lance are probably derived from the Belly River *Chamosaurus* or some closely related form. In this group the crest is long, flat, and rectangular, with large fontanelles, and the squamosal extends to the back of the crest. The nasal horn was borne on outgrowths of the nasal bones, which in the earlier forms was larger than the brow horncores. In some forms the parietals and squamosals bear epoccipitals, whereas in others the periphery is scalloped. In *Chamosaurus* and *Eoceratops* the large fontanelles are bounded by the parietals and squamosals, but in all Edmonton and Lance forms the parietals have expanded and the fontanelles are wholly within these bones. The thin, vertical parts of the premaxillæ that divided the external nares (the osseous septum) were pierced by a well-defined fenestra.

In a second group, including *Monoclonius*, *Brachyceratops*, *Centrosaurus*, and *Styrocosaurus*, all of Belly River age, the crest is short and round with moderate-sized fontanelles wholly within the parietals. The squamosals are short and roundish and never reach to the back of the crest. The nasal horn was always larger than the brow horns and, as in other forms, was borne on an outgrowth of the nasal bones. The premaxillæ were not pierced by a fenestra.

These two groups seem to have been well differentiated by Belly River time, but short squamosaled forms have not been reported from the Edmonton or Lance (Figure 1).

In *Triceratops* the crest is generally round, but the squamosals flank the parietals and reach to the back of the crest as in *Chamosaurus*. There is no evidence of fontanelles in the crest. The brow horncores, which arise from behind the orbits, are very large and, unlike earlier genera, the base is hollow. The nasal horncore was much smaller than the brow horncores, was far forward, and in some species it was very small or was developed as a separate ossification attached to the blunted nasals, but in others it was formed by a well-pronounced outgrowth of the nasal bones. The premaxillæ were pierced by a fenestra, as in the rectangular crested forms.

It has been generally believed that the nasal horncore of *Triceratops* always developed as a separate ossification, and Hatcher figured what he regarded as a separate nasal horncore of *T. prorsus* (7, Fig. 29). The writer

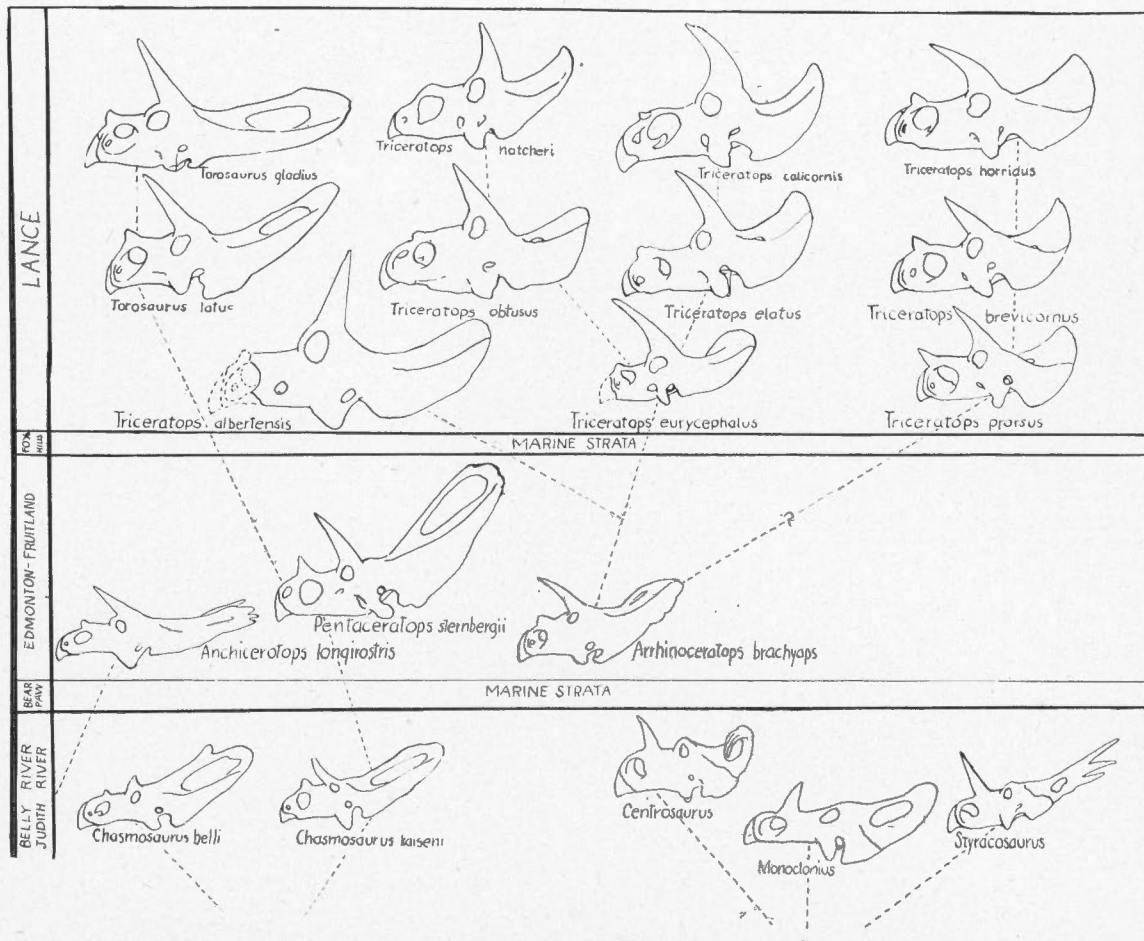
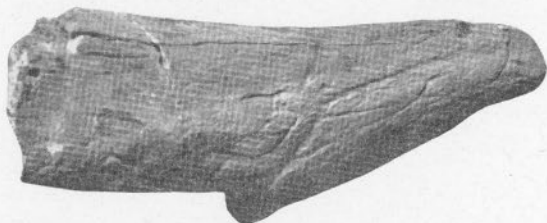


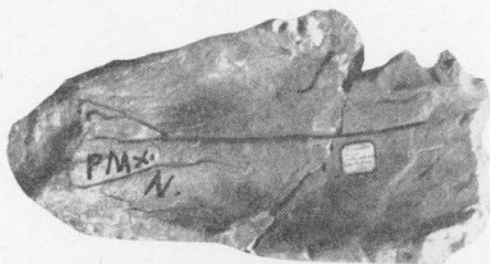
Figure 1. Tentative phylogeny of the Ceratopsidae, modified from Lull.

tried unsuccessfully to locate this specimen, for it was not found at the University of Chicago where Hatcher stated that it was preserved. It is impossible to state what this specimen represents, but the illustration suggests something like a long epijugal. In the collections of the Geological Survey of Canada there are two nasal horncores that were collected from the Frenchman formation of southern Saskatchewan. In size, form, and angle these suggest the nasal horncore of a large *Triceratops prorsus* (See 7, Pl. 34). One specimen (Plate VII), G.S.C. No. 8598, was collected from Morgan Creek (east branch of Rocky Creek), Saskatchewan, and consists of the anterior part of the nasals and the horncore. From the anterior base of the horncore to the tip is 12 inches and from the anterior base back to the broken edges of the nasal bones is the same distance. Posteriorly the right and left nasals can be taken apart, and the suture dividing them is visible on the top of the horncore almost to the tip. The extreme tip was injured by exposure, but there is no evidence of a separate bone on or near the tip. The other specimen, G.S.C. No. 8864, collected from the north side of Frenchman River east of Eastend, Saskatchewan, does not have as much of the nasal bones behind the horncore, but the tip is preserved. The two halves of this horncore are thoroughly fused, but the sutural union can be detected on the anterior face. These specimens show that in at least one species of *Triceratops* the nasal horncore was developed as outgrowths of the nasal bones, as in other Ceratopsidae.

PLATE VII



A. Nasal horncore of *Triceratops* sp., showing the division of the nasal bones, on the superior surface. Cat. No. G.S.C. 8598.



B. Inferior view of nasal bones of *Triceratops* sp., divided anteroinferiorly by the tips of the premaxillae. Cat. No. G.S.C. 8598.

Lull states that in *Triceratops* the nasal bones in front of the horncore are not divided by the premaxillæ (10, p. 32). In the Geological Survey specimen, No. 8598, the superior tips of the premaxillæ are clearly shown

between the anteroinferior tips of the nasals, but as the horncore is much farther forward in *Triceratops* than in other genera, the nasals do not extend forward but rather downward (See Plate VII B).

Lambe regarded *Eoceratops* as the probable ancestor of *Triceratops*, and his restoration of *E. canadensis* showed a deep short face with the nasal horn far forward (9). The writer examined Lambe's type and, after removing some rock from certain notches, found that the nasal and prefrontal fit perfectly and that the nasal horncore stands more erect than shown by Lambe, and over the posterior edge of the nasal opening. The anterosuperior and anteroinferior tips of the nasal point forward and downward, as they do in all Belly River ceratopsians, rather than almost vertically as shown by Lambe. With the new arrangement the nasal resembles that of the University of Alberta specimen that Gilmore referred to *Eoceratops* (4), but which Lull later referred to *Chasmosaurus kaiseni* (10, p. 95). The epinasal shown by Lambe (9, Pl. I) extends well beyond the inner edge of the right nasal, and the writer does not believe that there could have been more than the one epinasal. He considers it doubtful that this so called epinasal has any morphological significance.

Though it is now known that the nasal horncore was not as far forward as illustrated by Lambe, there is still good evidence that the face was much deeper than in *Chasmosaurus*, the squamosal was shorter and triangular, and the shape and angle of the horncore differ from that of *C. kaiseni*. The lack of vascular markings on the parietal and squamosal may or may not be due to immaturity. However, though *Eoceratops* appears to be distinct from *Chasmosaurus*, it certainly falls within the long-squamosaled group.

In discussing the evolution of the Ceratopsia Lull says: "The nasal horn seems to have reached its maximum size by Belly River time for no subsequent short squamosal form such as *Triceratops* has proportionately longer horns than *Centrosaurus*". This statement implies that *Triceratops* was a short-squamosaled form, but in all species of *Triceratops* the squamosal flanks the parietal and reaches to the back of the crest. This is definitely not the case in *Brachyceratops*, *Monoclonius*, *Centrosaurus*, and *Styracosaurus*, which are here called short-squamosaled forms. In all of these the short roundish squamosal stands almost upright in front of the posterior expansion of the parietal and does not extend back to even mid-length of the crest. The premaxillæ are not fenestrated as they are in long squamosaled forms. The writer agrees with Lull that the nasal horn developed first, and as long ago as 1927 (13), while discussing the folding of the frontal bones, he pointed out that the nasal horn was the first to develop, and that the development of the browhorns went hand in hand with the development of the false roof.

Lull in his chart (10, Fig. 3) shows *Triceratops* as having derived from two possible lines of descent, that is, direct from *Centrosaurus* or from the rectangular-crested forms through the Edmonton genus *Arrhinoceratops*. The writer cannot believe that *Triceratops* could have evolved directly from *Centrosaurus* or from *Brachyceratops* as shown by Schlaikjer (12), but he sees no objection to deriving it from *Arrhinoceratops*.

Since the appearance of Lull's Revision of the Ceratopsia (10) Schlaikjer has described a new ceratopsian, from the Gashan Hole area

of Wyoming, as *Triceratops eurycephalus* (12). Schlaikjer's new species resembles *Arrhinoceratops brachyops* Parks (11) from the Lower Edmonton member in such respects as: squamosal very long and rather wide; crest very broad, flat, and thin; brow horncores arising from behind the orbits oval to circular in cross-section, long, tapering, and with longitudinal sulcus; nasal horncore far forward, small or incipient. The close resemblance of these two forms seems to justify Lull's alternate suggestion that *Triceratops* was derived from the long squamosal forms through *Arrhinoceratops* (10, Fig. 3). It would also suggest that *T. eurycephalus* was a primitive species of *Triceratops* rather than an advanced form as suggested by Schlaikjer (12).

Lull derives *Pentaceratops* from *Chasmosaurus kaiseni* of the Oldman formation, but has left some doubt as to the direct ancestry of *Arrhinoceratops* (10, Fig. 3). This would appear to be justified, for in *Eoceratops* and all known species of *Chasmosaurus* the brow horncores are directly over the orbits, the rather large laterally compressed nasal horncore is over the posterior edge of the narial opening, and the fontanelles in the crest are very large. Everything points to the probability that *Arrhinoceratops* was derived from a long-squamosaled form related to, but distinct from, *Chasmosaurus* and *Eoceratops*. So little is known about *Ceratops montanus* (10, p. 96), from the Judith River formation, that it is not possible to determine if it might have been ancestral to *Arrhinoceratops*.

Fragments of the posterior part of a crest, that the writer collected from the Oldman formation in sec. 24, tp. 2, rge. 4, W. 4th mer., east of Lost River in Alberta, show large epoccipitals that resemble those of the Edmonton genus *Anchiceratops*. This form might be ancestral to *Anchiceratops* but is too incompletely known for positive determination.

The lack of an adequate ancestor for *Triceratops* in the Oldman formation on Red Deer River, may signify that the delta and flood-plain habitat was not favourable but that they preferred somewhat higher country that must have existed a few miles to the west. The complete lack of eggs and the almost complete lack of juveniles, of forms of which adults are so common, suggests that the delta was the habitat of the more or less adult forms only.

Most students refer to *Brachyceratops* as a primitive form and the genotype does display primitive characters. Since the publication of Gilmore's description of the nearly adult *Brachyceratops* (6, Fig. 11) and our better understanding of *Monoclonius* (16, p. 471) the writer is forced to conclude that the type of *Brachyceratops montanensis* was an immature *Monoclonius*. Indeed, Gilmore was leaning toward this opinion as shown in a personal communication: "Enjoyed your article appearing in the last number of the Journal. It makes me wonder if my genus *Brachyceratops* is going to remain valid much longer. I am very dubious, looks to me now as though the type may be a juvenile *Monoclonius*."

It is a well recognized fact that the Ceratopsia evolved very rapidly, and it may be that in some of the advanced forms much of the evolution was re-enacted in the individual between the time of hatching and maturity. In young individuals the jaws were shorter and fewer teeth were present. Hatcher has shown that the incipient teeth of *Triceratops* were single-rooted (7, p. 43). In fact the teeth of the Ceratopsidae are not truly

double-rooted, but rather the crown of the succeeding tooth pushes up into the very open pulp cavity and with the edges of the anterior and posterior teeth divides the root in two. It may be that in very young ceratopsians as well as in primitive forms, the teeth were less crowded and the roots were not divided. The folding of the frontal bones was just beginning in the type of *Brachyceratops montanensis*, and perhaps in very young individuals it would not be shown at all.

It is interesting to note that all of the American Ceratopsia that have been described as primitive forms are represented by juveniles, whereas no very young specimen of any of the more advanced forms has yet been described.

REFERENCES

- (1) Allan, J. A., and Sanderson, J. G. O.: Geology of the Red Deer and Rosebud Sheets, Alberta; Research Council of Alberta, Report No. 13 (1945).
- (2) Brown, B.: Cretaceous Eocene Correlation in New Mexico, Wyoming, Montana, Alberta; Bull. G. S. A., vol. 25, pp. 355-80 (1914).
- (3) ———Leptoceratops, new Genus of Ceratopsia from the Edmonton Cretaceous of Alberta; Bull. Amer. Mus. Nat. Hist., vol. 33, pp. 567-580 (1914).
- (4) Gilmore, C. W.: A New Species of Corythosaurus with Notes on Other Belly River Dinosauria; Can. Field-Nat., vol. 37, pp. 46-52 (1923).
- (5) ———Brachyceratops, a Ceratopsian Dinosaur from the Two Medicine Formation of Montana; U.S. Geol. Surv., Prof. Paper No. 103 (1917).
- (6) ———Ceratopsian Dinosaurs from the Two Medicine Formation, Upper Cretaceous of Montana; Proc. U.S. Nat. Mus., vol. 87, pp. 1-18 (1939).
- (7) Hatcher, J. B., Marsh, O. C., and Lull, R. S.: The Ceratopsia; U.S. Geol. Surv., Mon. 49, pp. 1-300 (1907).
- (8) Lambe, L. M.: On the Remains of a Selachian from the Edmonton Cretaceous of Alberta; Ottawa Nat., vol. 32, pp. 27-8 (1918).
- (9) ———On Eoceratops Canadensis gen. nov. with Remarks on other Genera of Cretaceous Horned Dinosaurs; Dept. of Mines, Mus. Bull. No. 12, pp. 1-49 (1915).
- (10) Lull, R. S.: A Revision of the Ceratopsia; Mem. Peabody Mus. of Nat. Hist., vol. 3, pt. 3, pp. 1-175 (1933).
- (11) Parks, W. A.: Arrhinoceratops Brachyops, a New Genus and Species of Ceratopsia from the Edmonton Formation of Alberta; Univ. Toronto Studies, Geol. Ser. No. 19, pp. 1-15, Pls. 1-2 (1925).
- (12) Schlaikjer, E. M.: The Torrington Member of the Lance Formation and a Study of a New Triceratops; Bull. Mus. of Comp. Zool., vol. 76, pp. 31-68, Pls. 1-6 (1935).
- (13) Sternberg, C. M.: Homologies of Certain Bones of the Ceratopsian Skull; Trans. Roy. Soc., Canada (3), vol. 21, sec. IV, pp. 135-43 (1927).
- (14) ———Notes on the Edmonton Formation of Alberta; Can. Field-Nat., vol. 40, No. 5, pp. 102-4 (1926).
- (15) ———Thescelosaurus Edmontonensis n.sp., and Classification of the Hypsilophodontidae; Jour. Pal., vol. 14, No. 5, pp. 481-94 (1940).
- (16) ———Ceratopsidae from Alberta; Jour. Pal., vol. 14, pp. 468-80 (1940).
- (17) ¹Colbert, E. H.: Evolution of the Horned Dinosaurs; Evolution, vol. 2, No. 2, pp. 145-63 (1948).

¹ Dr. Colbert's article appeared too late to be considered in this paper:

