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DOMINION OF CANADA

REPORT

OF THE

DEPARTMENT OF MINES

FOR THE

FISCAL YEAR ENDING MARCH 31, 1926

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FISCAL YEAR ENDING MARCH 31, 1926



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DOMINION OF CANADA

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OF THE

DEPARTMENT OF MINES

AND

FISCAL YEAR ENDING MARCH 31, 1930

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*To General His Excellency the Right Honourable Lord Byng of Vimy, G.C.B.,
G.C.M.G., M.V.O., Governor General and Commander-in-Chief of the
Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

The undersigned has the honour to lay before Your Excellency, in compliance with 6-7 Edward VII, chapter 29, section 18, the report of the work of the Department of Mines for the fiscal year ending March 31, 1926.

CHARLES STEWART,
Minister of Mines.

To General Sir Frederick the Right Honorable Earl Bessborough, G.C.B.,
G.O.M.G. M.P.O., Governor General and Commander-in-Chief of the
Dominion of Canada.

May it please Your Excellency:

The undersigned has the honor to lay before Your Excellency, in compli-
ance with 8-7, Article VII, Chapter 22, section 18, the report of the work of the
Department of Mines for the fiscal year ending March 31, 1936.

CHARLES STEWART,

Minister of Mines.

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REPORT

OF THE

DEPARTMENT OF MINES

FOR THE FISCAL YEAR ENDING MARCH 31, 1926

To the Hon. CHARLES STEWART,
Minister of Mines,
Ottawa.

SIR,—I have the honour to submit the Annual Report of the Department of Mines for the year ending March 31, 1926.

Statements covering the work performed by the various branches of the department indicate that in spite of the growth of the mining industry and the consequent increased demands upon the department, the staff has been able to fulfil all necessary requirements and to satisfy all the urgent needs of the industry. As time goes on, however, new avenues of service open up, not only in the technology of mineral development, but in the field of mineral trade and commerce, which cannot be satisfactorily entered upon without additional staff.

In all, about seventy-two parties conducted field investigations throughout Canada, except in Prince Edward Island, carrying out investigations in geology, mineral resources, ethnology, archæology, botany, and biology. Routine and research investigations were also carried out in the laboratories of the department in metallurgy, ore dressing, fuel testing, ceramics, road materials, chemistry, and mineralogy.

In all its activities the department has followed a policy of co-operation, both in field and laboratory work, with all other bodies, whether federal or provincial, public or private, whose duties touch upon those of the department. The program of field investigations is finally settled only after consultation with the provincial organizations concerned with mineral resources and with officers of the Canadian National railways, and in the carrying out of this program employment is given during the summer months to sixty to ninety university students who are taking courses in geology or mining engineering, thus supplementing the value of the training given by the universities.

In the laboratory work the type of investigations carried out by the department has been distinctly different from that hitherto undertaken by provincial government organizations, so that there has been little or no danger of overlapping. Some of the universities and the Governments of Ontario and Alberta, however, do undertake certain work similar to that of the Mines Branch, and studied effort is made to co-ordinate our work with that of these organizations.

Active co-operation is maintained with the Industrial Development organization of the Canadian railways in the exchange of information and the provision of laboratory facilities. Advantage was taken of this arrangement last year by the Canadian Pacific railway, and an engineer from that organization was given the facilities of our ceramic laboratory for the purpose of testing a number of samples of clays from the province of Saskatchewan.

Of British and foreign organizations, the department is in active co-operation with the Imperial Institute and the British Department of Scientific and Industrial Research; with the Bureau of Mines in Washington, and certain technical societies in the United States.

Since the Deputy Minister became a member of the National Research Council of Canada, the department is in close touch with that organization, and a number of investigations of a joint character have been undertaken, notably, one in connexion with the magnesite industry.

The results of all major investigations, whether in the field or the laboratory, are finally embodied in reports, and these are issued both as annual statements or as special bulletins or memoirs. In addition to this method of publishing the results of investigations, the policy of disseminating information by papers to the public and technical press and by addresses has become firmly established. The following list of papers and addresses by members of the staff indicates the extent to which this policy is being carried out:

List of Papers and Addresses

- Influence of Minerals on Human History, by Charles Camsell. Arts and Letters Club, Ottawa, January, 1926.
- The Future of Canada's Mineral Development as Reflected on Her Mineral Trade, by Charles Camsell. Canadian Institute of Mining and Metallurgy, Winnipeg, November, 1925.
- The Influence of Minerals on Canadian History and Development, by Charles Camsell. Canadian Institute of Mining and Metallurgy, Montreal, March, 1926.
- The Dominion Fuel Board, Its Formation, Functions, and Work, by C. P. Hotchkiss. Canadian Mining Journal, March 26, 1926.
- Lead and Zinc in Eastern Canada, by F. J. Alcock. Mining and Metallurgy, February, 1926.
- Volcanoes, Old and New, by F. J. Alcock. Lecture, Victoria Memorial Museum, January 9 and 13, 1926.
- The New Glasgow Conglomerate Member of Pictou County, Nova Scotia, by W. A. Bell. Transactions Canadian Institute of Mining and Metallurgy, vol. 28.
- The Topographical Work of the Geological Survey, by W. H. Boyd. Canadian Defence Quarterly, vol. 11, No. 4, July, 1925.
- The Heritage of Nova Scotia, by W. H. Collins. Halifax Chronicle, January 1, 1926.
- Field Work of the Geological Survey, 1925, by W. H. Collins. Canadian Mining Journal, June 19, 1925, and in other publications.
- Progress of Structural Determinations in the Archæan Rocks of Ontario and Quebec, by H. C. Cooke. Royal Society of Canada, Transactions, vol. 19, 1925.
- The Place of Fossils in Earth History, by W. S. Dyer. Lecture, Victoria Memorial Museum, March 13 and 17, 1926.
- Rocks and How They are Formed, by W. F. James. Lecture, Victoria Memorial Museum, January 2 and 6, 1926.
- James Bay Coastal Plain, by E. M. Kindle. Geographic Review, vol. XV, No. 2, April, 1925.
- Note on Rhizocretions, by E. M. Kindle. Journal of Geology, No. 7, vol. 33, October-November, 1925.
- Prospecting Under Water, by E. M. Kindle. Canadian Mining Journal. No. 50, vol. 46, November, 1925.
- The Bottom Deposits of Lake Ontario, by E. M. Kindle. Transactions Royal Society of Canada, vol. XIX, 3rd series, 1925.
- Review of "Index to Palæontology" (Frank Nicolas), by E. M. Kindle. Canadian Field Naturalist, vol. XL, No. 2, February, 1926.
- Review of "Stratigraphy and Fauna of Hackberry Stage of Upper Devonian" (C. L. and M. A. Fenton), by E. M. Kindle. Canadian Field Naturalist, No. 1, vol. XL, January, 1926.
- Influence of Temperature on Colour and Lamination in Sediments, by E. M. Kindle. Report of the Committee on Sedimentation (Issued by the National Research Council, Washington), 1924.
- The Geological History of Ottawa, by E. M. Kindle. Lecture to Boy Scouts, Unitarian Church, March, 1925.
- Asbestos and the Merger, by W. Malcolm. High Commissioner for Canada, London.

- Field Work of the Survey, 1925, by W. Malcolm. High Commissioner for Canada, London.
- Canada's Mineral Industry, Past and Future, by W. Malcolm. High Commissioner for Canada, London.
- Salt in the Maritime Provinces, by W. A. Bell. High Commissioner for Canada, London.
- Oil Development in Alberta, by G. S. Hume. High Commissioner for Canada, London.
- Cassiar, B.C., Gold Rush, by W. A. Johnston. High Commissioner for Canada, London.
- Recent Discovery of Lithia Mineral Deposits in Southeastern Manitoba, by J. F. Wright. High Commissioner for Canada, London.
- Recent Developments in Northwestern Quebec, by H. C. Cooke. High Commissioner for Canada, London.
- The Mineral Industry of Canada during 1925, by W. Malcolm. Natural Resources, vol. 5, No. 1, January, 1926.
- Economic Geology of Canada, 1923 and 1924, by W. Malcolm. For the Canada Year Book, 1925.
- The Mining Industry of Canada during 1925, by W. Malcolm. For a special Canadian number of the Christian Science Monitor.
- The Mineral Industry, by W. Malcolm. The financial review number of the *Montreal Gazette*, January, 1926.
- The Expression of Land Forms on Topographic Maps, by A. C. T. Sheppard. Lecture, Dominion Land Surveyors Association, Annual Meeting, Ottawa, February 4, 1926.
- The Value of the Topographic Map to the Community, by A. C. T. Sheppard. Lecture, Gyro Club, Cranbrook, B.C., Sept. 22, 1925.
- The Bison and Its Relations, by C. M. Sternberg. Canadian Field Naturalist, No. 5, 1925.
- Integument of *Chasmosaurus Belli*, by C. M. Sternberg. Canadian Field Naturalist, No. 5, 1925.
- Dinosaurs the Real Giants of the Past, by C. M. Sternberg. *La Presse*, Montreal, December 26, 1925.
- Hunting Dinosaurs in the Badlands of Alberta, by C. M. Sternberg. U.F.A., Morrin, Alberta, Sept. 4, 1925.
- Hunting Dinosaurs in the Badlands of Alberta, by C. M. Sternberg. Lecture, Rotary Club, Camrose, Alberta, Sept. 14, 1925.
- Animals of the Past, by C. M. Sternberg. Lecture, Y.M.C.A., Ottawa, November 19, 1925.
- Hunting Dinosaurs, by C. M. Sternberg. Lecture, Ottawa Field Naturalists Club, December 1, 1925.
- Hunting Dinosaurs in the Badlands of Alberta, by C. M. Sternberg. Lecture, Victoria Memorial Museum, January 23 and 27, 1926.
- Hunting Dinosaurs in the Badlands of Alberta, by C. M. Sternberg. Lecture, Grant's Consolidated School, Britannia, February 26, 1926.
- Evidence of Liquid Immiscibility in a Silicate Magma, Agate Point, Ontario, by T. L. Tanton. *Journal of Geology*, vol. 33, August-September, 1925.
- The Building of Mountains, by J. F. Walker. Lecture, Victoria Memorial Museum, February 6 and 10, 1926.
- The Grenville Pre-Cambrian Subprovince, by M. E. Wilson. *Journal of Geology*, vol. 33, May-June, 1925.
- Geology and Mineral Deposits of the East Central Manitoba Mining District, by J. F. Wright. Canadian Institute of Mining and Metallurgy, Bulletin, December, 1925.
- A Prehistoric Petroglyph on Noeick River, British Columbia, by Harlan I. Smith. *Man*, vol. XXV, No. 9, September, 1925.
- Unique Prehistoric Carvings from near Vancouver, B.C., by Harlan I. Smith. *American Anthropologist*, vol. 27, No. 2, April-June, 1925.
- Mackenzie Park as a Field for Survey, Exploration, Literature, and Art, by Harlan I. Smith. *Science*, vol. LXII, No. 1601, September 4, 1925.
- Indian Culture of Canada's Pacific Coast, by Harlan I. Smith. *The Southern Workman*, January, 1926.
- A Semi-Subterranean House-site in the Bella Coola Area on the Coast of British Columbia, by Harlan I. Smith. *Man*, vol. XXV, No. 11, November, 1925.
- Entomology among the Bella Coola and Carrier Indians, by Harlan I. Smith. *American Anthropologist*, vol. 27, No. 3, July, 1925.
- The Economic Value of Prehistoric Canadian Art, by Harlan I. Smith. *Engineering Society*, Vancouver, B.C., October, 1925.
- The Development of Museums and Their Relation to Education, by Harlan I. Smith. Annual Meeting, City of Ottawa Teacher's Institute, February, 1926.
- The Government Work on the Conservation of Totem-Poles as Tourist Attractions, by Harlan I. Smith. *Gastronomic Club*, Ottawa, February, 1926.
- The Commercial Value of Prehistoric Canadian Art, by Harlan I. Smith. *Women's Canadian Club*, Vancouver, October, 1925.

- The Economic Uses of Prehistoric Canadian Art, by Harlan I. Smith. Rotary Club, Prince Rupert, B.C., and University of Chicago, Chicago, October, 1925.
- The Norway of Canada and Its Archæological Treasures, by Harlan I. Smith. Hurdman Bridge School, Ottawa, May, 1925.
- The Culture Areas of Canada, by Harlan I. Smith. Y.M.C.A., Ottawa, January, 1926.
- Was Hochelaga Destroyed or Abandoned, by W. T. Wintemberg. Royal Society of Canada, May, 1925.
- Canada's Eskimo Problem, by D. Jenness. Queen's Quarterly, April-June, 1925.
- A New Eskimo Culture in Hudson Bay, by D. Jenness. Geographical Review, July, 1925.
- Eskimo Dentition, by D. Jenness. Ottawa Dental Society, December, 1925.
- Social Organization of the Sekani Indians of British Columbia, by D. Jenness. American Anthropological Association, December, 1925.
- The Indian in Canadian Literature, by J. D. Leechman. Convention of Canadian Authors' Association, June 10, 1925.
- Indians of Canada, a series of four lectures, by J. D. Leechman. Canadian Standard Efficiency Training Camp, July, 1925.
- The Art of the West Coast Indian, by J. D. Leechman. Arts and Letters Club, Ottawa, October 13, 1925.
- Indian Literature, by C. M. Barbeau. Young Men's Canadian Club, Montreal, April 2, 1925.
- Temlaham and the Totem Pole Indians of the Skeena, by C. M. Barbeau. The Arts Club, Montreal, April 4, 1925.
- Folk Songs of French Canada, with illustrations, by C. M. Barbeau. Empire Club, Toronto, April 9, 1925.
- Canadian Folk-Lore, by C. M. Barbeau. Arts and Letters Club, Toronto, April 10, 1925.
- The Songs of the Canadian Indians, by C. M. Barbeau. The Royal Society of Canada, May meeting, Ottawa, 1925.
- The French Colonial Architecture of Quebec, by C. M. Barbeau, conjointly with Prof. Ramsay Traquair. Ottawa Section of the American Folk-Lore Society, January 14, 1926.
- L'Ecole des Beaux-Arts fondée par Mgr. de Laval, by C. M. Barbeau. Cercle universitaire de Montréal, March 20, 1926.
- An Ancient School of Art in Canada, by C. M. Barbeau. Women's Guild of St. George, Montreal, March 23, 1926.
- A School of Colonial Architecture in New France, by C. M. Barbeau. St. James Literary Society, Montreal, March 23, 1926.
- The Salmon Run on the Upper Skeena (Field and Stream, February, 1926); Historical Sketches on the Architecture of the Churches of Ste. Famille, St. François, St. Pierre, and St. Jean, Ile d'Orléans (Les Vieilles Eglises de la Province de Québec, publ. par la Commission des Monuments historiques de Québec, 1925).
- Amphibians and Reptiles of Canada, by Clyde L. Patch. St. Matthew's Men's Club, December 3, 1925.
- Where Animals Go in the Winter, by Clyde L. Patch. Ottawa Detention Home, December 22, 1925.
- Animal Life on Our Pacific Coast Islands, by Clyde L. Patch. Lindenlea Boy's Club, January 13, 1926.
- Animal Life of Our Pacific Coast Islands, by Clyde L. Patch. Creighton School Classes, March 19, 1926.
- Graptemys geographica* in Canada, by Clyde L. Patch. Copeia, December 22, 1925.
- Colour Description of *Ambystoma macrodactylum*, by Clyde L. Patch. A synopsis of the Amphibia of California, 1925.
- Bent Grasses, by M. O. Malte. The Golfer, Toronto, Ontario, May, 1925.
- Investigation by the Mines Branch in 1925, by John McLeish. Canadian Mining Journal, June, 1925, and other journals.
- Ores of Western Quebec; Their Character and Metallurgical Treatment, by W. B. Timm. Financial Post.
- Fuels and Fuel Situation in Canada, by B. F. Haanel. 8th Annual Convention of Dominion Chemists at Guelph, June, 1925.
- Canada Is Third in Silver Production, by A. W. G. Wilson. Natural Resources, June, 1925.
- Carbonization of Canadian Fuels; the Application of the Principles of High and Low Temperature Carbonization to Wood, Peat, and Different Classes of Canadian Coals, by R. E. Gilmore. Presented to joint meeting of Society of Chemical Industry, and Canadian Institute of Chemistry, January 5, 1926, at Toronto, and published in Canadian Chemistry and Metallurgy, February, March, and April, 1926.

- Development of a Standard Canadian Laboratory Distillation Method for the Examination of Oil-shale, by R. E. Gilmore and A. A. Swinnerton. 8th Annual Convention of Dominion Chemists at Guelph, June, 1925. Published in Canadian Chemistry and Metallurgy, October and November, 1925.
- Asphalt Deposits of the Peace River District, by S. C. Ells. Mining and Industrial News, Winnipeg, April, 1925.
- Bituminous Sands of Northern Alberta, by S. C. Ells. Address before meetings of Calgary and Edmonton Branches Engineering Institute of Canada and Board of Trade, Calgary.
- New Developments in the Turner Valley Oil Field, Alberta, by R. T. Elworthy. Saturday Night, July, 1925, and Natural Resources.
- Silica Refractories in Canada, by L. H. Cole. Imperial Mineral Resources Bureau.
- Glass Sands in Canada, by L. H. Cole. Imperial Mineral Resources Bureau.
- A New Deposit of Lithium Ore in Canada, by L. H. Cole. Natural Resources.
- The Origin of Sodium Sulphate Deposits of Western Canada, by L. H. Cole. Address at Western Annual Meeting, Canadian Institute of Mining and Metallurgy, November, 1925.
- Raw Materials of the Ceramic Industries, by H. Frechette. Natural Resources, October, 1925, and other papers.
- Brick for Architectural Effects, by H. Frechette. Contract Record and Engineering News, December, 1925.
- Technical Books for the Brick Plant, by H. Frechette. Address at Annual Meeting Canadian National Clay Products Association, January, 1926, Toronto.
- Care and Use of Heat-Measuring Devices in Ceramic Plants, by L. P. Collin. Address at Annual Meeting Canadian National Clay Products Association, January, 1926, Toronto.
- Causes and Prevention of Scumming and Efflorescence in Bricks, by L. P. Collin. Address at University of Toronto, January, 1926.
- Texture of Ceramic Raw Materials, by J. F. McMahon. Address at University of Toronto, January, 1926.
- Gold in Canada, by A. W. G. Wilson. Office of the High Commissioner.
- Canada's Place in Silver Production, by A. W. G. Wilson. Office of the High Commissioner.
- Spray Dried Salt Cake for Textile Dyeing, by A. W. G. Wilson. Office of the High Commissioner.
- Canadian Magnesite in the British Market, by H. Frechette. Office of the High Commissioner.
- Recent Development in Lead and Zinc Mining in Eastern Canada, by W. B. Timm. Office of the High Commissioner.
- Electrolytic Iron and Titanium Pigment, by A. W. G. Wilson. Office of the High Commissioner.
- Canada Leads in Cobalt Production, by Miss D. M. Stewart. Office of the High Commissioner.
- Asbestos, by A. H. A. Robinson. Office of the High Commissioner.
- Nickel, by A. H. A. Robinson. Office of the High Commissioner.
- Mica, by A. H. A. Robinson. Office of the High Commissioner.
- Zinc and Lead in Eastern Canada, by A. H. A. Robinson. Office of the High Commissioner.
- Developments in the Rouyn District, 1925, by A. H. A. Robinson. Office of the High Commissioner.
- Lead and Zinc Mining in Eastern Canada, by C. S. Parsons. Office of the High Commissioner.
- The Graphite Situation in Canada, by C. S. Parsons. Office of the High Commissioner.
- Canada as a Copper Producer, by A. Buisson. Office of the High Commissioner.
- Tour Through Wembley Park, by A. W. G. Wilson. Address, Royal Can. Inst., Toronto, April 4, 1925.
- A Random Talk on Gold and Gold Mining, by A. H. A. Robinson. Radio broadcast, March, 1926.
- Story of a Cup and Saucer, by H. Frechette. Address, Victoria Memorial Museum, January, 1926.
- Porcelain Manufacture, by H. Frechette. Address, Victoria Memorial Museum, January, 1926.

In addition, the usual course of lectures on the natural resources of Canada were delivered in the Lecture Hall of the Museum by officers of the department, assisted by officers from the Departments of Interior, Agriculture, and Trade and Commerce. Some 14,650 persons attended the lectures during the winter.

In addition to his departmental duties, the Deputy Minister acts in the capacity of chairman or member of the following committees, namely: Council

of the North West Territories, Dominion Fuel Board, Lignite Utilization Board, Canadian Committee of the World Power Conference, Committee on Mining Regulations, National Research Council, Advisory Committee on Minerals of the Imperial Institute. Meetings of each of these committees were held throughout the year, though participation in the last mentioned was by correspondence only.

The Act of the British Parliament reorganizing the Imperial Institute received the Royal Assent on May 28, 1925, and the amalgamation of the Imperial Mineral Resources Bureau and the Imperial Institute became effective on July 1 of the same year. A Board of Governors has been set up in accordance with the Act and a Managing Committee and Laboratory Committee appointed. Canada is represented on the Board of Governors by the Canadian High Commissioner. Two main departments have been set up within the Institute, one dealing with mineral resources and the other with plant and animal products, and each of these departments functions under the direction of Advisory Councils. The Deputy Minister of Mines is the Canadian representative on the Advisory Council on Minerals. In addition, the institute maintains exhibition galleries, in which are displayed specimens of raw materials and finished articles secured from all parts of the British Empire. For its maintenance the institute depends mainly upon annual grants made by Great Britain, the Dominions, India, and the Colonies.

Canada's mining industry in the year 1925 enjoyed the best year of its whole history. Though production figures as issued by the Dominion Bureau of Statistics show a larger value in the year 1920, yet, if computation for 1925 were made on the same basis as for 1920, the values for 1925 would have been shown to be greater. As far as quantities are concerned, the figures for 1925 show an increase in the great majority of products over any previous year.

In the treatment and reduction of ores progress was also made corresponding to that in the field of production.

Not only is progress made from year to year in the development of minerals from known fields, but as time goes on new fields are being discovered which, though they take years to come to the stage of actual production, all tend not only to strengthen the mining industry in the general industrial life of the country, but to open up our great northern region to settlement for agricultural purposes. One has only to read our past history to appreciate the fact that time and again Canadian development has received incalculable impetus from mineral discoveries; and the colonizing and civilizing influence of such discoveries may be seen in the history of British Columbia, Yukon territory, northern Ontario, and more recently western Quebec.

To gauge the national value of our mineral industry merely in terms of the number of millions of dollars' worth of metals produced is to present only one side of the picture. It ignores perhaps the greatest lesson of mining history, namely, that mining contributes to national development a vital and indispensable service which reaches far beyond the mining industry itself. Our northern country might lie dormant for generations were it not for the fact that the exploitation of mineral deposits acts just as a catalyser in a chemical reaction. It causes the surrounding region to spring to life and encourages and even compels the development of agriculture and other permanent industries. So that while the mineral wealth does ultimately become exhausted, there is left behind a legacy of permanent development, in some cases vastly surpassing in importance the mining development itself. In this way the mining industry operates as one of the chief factors in spreading development across and over the Dominion.

Dominion Fuel Board

During the year, the Dominion Fuel Board continued its work of investigation and collection of data relating to the many phases of the fuel problems of Canada.

Following publication of the reports, "Coke as a Household Fuel in Central Canada," and "Central and District Heating, Possibilities of Application in Canada," published in 1925 and 1924, many thousands of copies of both the English and French editions were distributed to interested parties. The Fuel Board is convinced of the advantages to be derived from erection of coke plants in central Canada, and, through the distribution of the report on coke and of over 120,000 cards explaining how it should be burned, has assisted in developing a market for that product, which appears to warrant the erection of other plants to supply this market.

Further investigations of the use of wood as an auxiliary fuel in Ontario have been added to the information collected by the survey made last year, and a report covering this subject will be published in the near future.

The Board co-operated with the Fuel Testing Division of the Mines Branch in conducting an investigation on the coking properties of the coals of the Maritime Provinces. In view of the growing importance and development of the coking industry in central Canada, this investigation is of more than passing interest. A report has been published which indicates that coals of the Maritime Provinces are highly suitable for making a domestic coke.

"House Construction and Insulation" is the subject to be covered by a series of popular pamphlets now being prepared for the information of the public. The Board proposes to give these pamphlets a wide distribution, for it is felt that great economies in fuel consumption can be effected by giving proper consideration to the simpler phases of this subject.

In order to determine the relative heating efficiency of the various Canadian coals, the Board, in conjunction with the Fuel Testing Division of the Mines Branch, conducted a series of tests in domestic heaters. It has been considered advisable to extend this work to include British coals and coke. A report is now being compiled by officers of the Fuel Testing Division which will show the results of these tests.

The Secretary of the Board visited western Canada and made a survey of the various coal fields being operated, mining methods employed, and market conditions. From the information thus obtained he has been able to outline a series of needed investigations dealing with the problems of the coal industry in western Canada.

In connexion with the investigation of coal transportation costs by the Board of Railway Commissioners for Canada, the Minister of Mines arranged that the Board be granted a hearing before the commission and a memorandum has been submitted to the commission upon the importance from a national point of view of establishing the lowest possible freight rates on coal. It is expected that further information will be submitted in the form of evidence when the inquiry is resumed.

The secretary's office carried out the annual survey of fuels used to replace anthracite in the Central Provinces, and a report showing the amount of these fuels used in the Acute Fuel Area was compiled.

During the early days of the strike in the American anthracite coal fields the board made a survey in the Acute Fuel Area of the stocks of domestic fuel in the dealers' yards and of future shipments of assured delivery, and advised the Government that there would be no danger of serious shortage until the early part of the month of February, but if the strike were to continue much beyond that date it would become necessary to take action toward bringing a considerable quantity of Alberta coal to eastern Canada. About 75,000 tons

of Alberta coal was marketed in Ontario during the latter period of the strike, which proved a factor in steadying domestic coal prices at a time when they showed a tendency to soar in a very decided manner.

The secretary's office has established connexions with the coal trade and industry, which enables the Board to keep in constant and close touch with the fuel situation in both Canada and the United States, and it continues to investigate problems which have to be thoroughly studied before any national fuel policy can be outlined. A number of important points have been covered during the past year by these investigations and the information has been placed before the Government.

The co-operation of the Natural Resources Intelligence Service, the Geological Survey, and the Mines Branch was freely given throughout the year.

In conclusion, it is gratifying again to be able to report progress in the campaign to free central Canada from her dependence on a single source of supply of domestic fuel. Importations of British anthracites in 1925 amounted to 549,247 tons, and other competitive domestic fuels became firmly established in our markets, all of which tended to reduce our importation of American anthracite.

Your obedient servant,

CHARLES CAMSELL,
Deputy Minister.

OTTAWA, September 30, 1926.

GEOLOGICAL SURVEY

W. H. Collins, Director

CHANGES IN STAFF

Changes in the personnel of the staff of the Geological Survey were unusually few. L. J. Weeks was appointed assistant geologist, S. M. Steeves junior topographical engineer, and Miss Alice McCain assistant photographer in place of Miss Eleanor James, who resigned.

By the death of D. B. Dowling, on May 26, 1925, the Survey lost one of its ablest and most experienced geologists. During the earlier part of his period of service, which lasted continuously from 1884, he was engaged chiefly in exploratory work in the Hudson Bay region and western Canada, and in later years he became a recognized authority on coal, petroleum, and natural gas.

FIELD WORK

The total number of geologists, topographers, palæontologists, and mineralogists permanently employed and available for field duty in 1925 was only forty-two and the net amount of money available for field operations about \$160,000, yet fifty-four parties were placed in the field. This was rendered possible by obtaining for the field-season period, from May until October, the services of geologists who are regularly employed for the rest of each year in Canadian and, to a less extent, in foreign universities. Employment as student assistants was also afforded to about ninety university students, who obtained in addition a valuable practical training.

One of these fifty-four parties was sent to Yukon, thirteen to British Columbia, five to Alberta, three to Saskatchewan, three to Manitoba, eleven to Ontario, seven to Quebec, five to New Brunswick, five to Nova Scotia, and one to the Arctic regions. Ten were engaged wholly in mapping and studying ore deposits; twenty-two in the geological study and mapping of areas containing mineral deposits or of prospective interest for their minerals; eight in geographical and geological exploration of remote parts of the country; ten in making topographic surveys, mostly in mineralized areas and for use in geological work that will follow, but made also to produce maps of standard quality and general utility, contributory to the systematic primary survey of Canada. Three parties were engaged in purely scientific investigations, and one in collecting for the Victoria Memorial Museum. A fuller explanation of the work of each party is given below.

Probably never before has so much interest been taken both by Canadians and by people of other countries in the investments in and development of Canadian mineral deposits and in the search for new deposits. The causes need not be considered here further than to note that they afford ground to believe that the present activity and enthusiasm will be sustained. There seems to be an enduring supply of money seeking investment, especially from other countries, and the rapidly accumulating knowledge of geological conditions in Canada affords a reasonable and promising outlook for the discovery and development of fresh mineral wealth. In Nova Scotia and New Brunswick, for example, it is now reasonably certain that the marine Carboniferous measures (Windsor series), which are of great extent, contain valuable deposits of gypsum and salt, utilization of which is only in an early stage. Only within recent years has it been realized how closely deposits of gold, copper, and certain other

metals in the Precambrian Shield of northern Quebec, Ontario, Manitoba, Saskatchewan, and the North West Territories are related to irregularities in the surface of the great granitic masses intrusive in the older "Keewatin" schists. The discoveries of copper-gold-zinc ores in Rouyn district of western Quebec and of gold at Red lake in Patricia district, Ontario, are attributable partly at least to recognition of the accumulating experience that the larger a "Keewatin" area is and the more these Keewatin rocks are penetrated by porphyries and other granitic protuberances from beneath, the more richly mineralized is it likely to be. Attention is consequently being directed more than ever to mapping and prospecting the numerous large "Keewatin" areas of the Precambrian region. In Alberta and Saskatchewan a great impetus has been given to drilling exploration for petroleum and natural gas by the discoveries in the Turner valley and at Wainwright, and by the location at other places, of structures favourable for accumulation of these minerals. In this case enthusiasm is necessarily tempered by realization that these fuels so valuable to industrial life are by their nature susceptible to rapid and wasteful exhaustion. The geological study of British Columbia and Yukon is now advanced far enough to indicate that the deposits of copper, gold, silver, lead, zinc, and some other metals are chiefly distributed along the edges of the Coast Range batholith, a backbone of granite that extends the length of the western mountain system, and that these mineral deposits came from the granite. Extremely valuable ore-bodies have been found, and geologists and prospectors are now exploring with satisfactory success the eastern margin of the batholith, that is as yet little or not at all known.

This acceleration of activity in the mineral industry has increased the demands upon the Geological Survey. In the field the demand has been met, as explained above, by supplementing the permanent staff of field officers with geologists from the universities. This, however, has resulted in more work for the office staff, which cannot be so easily reinforced. The need for help is being felt, especially in the preparation of maps, and it is hoped that provision will be made for employment of a few more draughtsmen and engravers.

GEOLOGICAL DIVISION

G. A. Young, Chief Geologist, reports:

Thirty-nine geological field parties carried on field work in various parts of Canada during the summer of 1925.

Yukon

C. H. Stockwell, under the direction of W. E. Cockfield, made a detailed survey of the geology and silver-lead deposits of Galena hill, northeast of Mayo. A full account of these important deposits, accompanied by a detailed map, is presented in the Summary Report, 1925, part A.

British Columbia

W. E. Cockfield geologically and geographically explored the region extending for 120 miles southeast from Atlin lake to Telegraph Creek on Stikine river. Very little was known of the geology, mineral resources, or geography of this very extensive district, which lies along the eastern margin of the Coast Range batholith. A report giving the results of the exploration and accompanied by a geological and topographical map is incorporated in the Summary Report, 1925, part A. Mr. Cockfield also examined certain silver-lead deposits in the vicinity of Atlin. A detailed description of these deposits appears in the Summary Report, 1925, part A.

W. A. Johnston examined the gold placers of Dease Lake area, Cassiar district. The placer field is an old one, but a new discovery caused about two hundred prospectors to enter the area in the spring of 1925. The results of the field examination, accompanied by detailed plans of some of the more important placer deposits, are incorporated in the Summary Report, 1925, part A.

F. A. Kerr geologically and topographically mapped a large area in the vicinity of Dease lake and river, Cassiar district. The interest aroused by the reported discoveries in this district of gold placer deposits rendered it probable that many prospectors would enter the field and that some would extend their search to other than placer mineral deposits. A report on the geology and mineral resources of the district, accompanied by a geological and topographical map, appears in the Summary Report, 1925, part A.

George Hanson made a geological reconnaissance of the area between Smithers and Usk, on the Canadian National railways, Coast district. The area includes part of the border of the Coast Range batholith along which valuable mineral deposits have been found in other localities. The geology and mineral deposits of the area are described in the Summary Report, 1925, part A.

R. H. B. Jones, under the direction of G. Hanson, made a detailed study of the geology and mineral deposits of Hudson Bay mountain a few miles east of Smithers, Coast district. A full report on this work appears in the Summary Report, 1925, part A.

J. R. Marshall conducted a geological reconnaissance of an area of approximately 1,000 square miles in the vicinity of Eutsuk Lake basin and east to the forks of Nechako river, Coast district. The area is adjacent to the eastern border of the Coast Range batholith, elsewhere characterized by the presence of valuable mineral deposits. The work is a continuation of that commenced in 1924 in the vicinity of Whitesail lake, and an account of the results obtained, accompanied by a geological map, is given in the Summary Report, 1925, part A.

Victor Dolmage spent the greater part of the field season geographically and geologically mapping a narrow strip of territory about 100 miles long and extending from Tatlayoko lake to Bella Coola, Coast district. The work was a continuation of that done by Mr. Dolmage in 1924 in the vicinity of Taseko, Chilko, and Tatlayoko lakes and is a part of a general exploration of the eastern contact of the Coast Range batholith which is considered to be a locality favourable for the occurrence of mineral deposits. A report upon the area covered in 1925, accompanied by a map, is included in the Summary Report, 1925, part A.

H. T. James, under the supervision of V. Dolmage, and with the generous permission and assistance of the Britannia Mining Company, made a detailed survey of the Britannia copper ore deposit and of the geology of the surrounding district. A full report, accompanied by a geological map, is being prepared.

B. R. MacKay, in addition to work in the Alberta coal fields, examined the lignite deposits on Hat creek, Kamloops district. A detailed report covering this work is included in the Summary Report, 1925, part A.

C. E. Cairnes began a resurvey of the geology and mineral deposits of Slocan mining area, Kootenay district. Until recent years Slocan area has been the chief producer of silver-lead and zinc ores in the province. It comprises over one hundred distinct, mostly small, mining properties, and study of the camp was undertaken largely for the purpose of comparing geological conditions in these numerous ore deposits and arriving at an understanding and solution of some of the physical problems that confront mine operators. The necessary field work was not completed in 1925 and the final report cannot yet be prepared, but a report which includes brief descriptions of many of the properties is presented in the Summary Report, 1925, part A.

J. F. Walker carried out a reconnaissance of the eastern slopes of the Purcell range from Windermere area northwest to Spillimacheen river. A brief account of the results of this work and a description of various silver-lead deposits will be found in the Summary Report, 1925, part A. Mr. Walker also made a brief examination of a titanium-bearing deposit on Moose creek, southeast from Leancoil. The occurrence is described in the Summary Report, 1925, part A.

C. S. Evans, under the direction of J. F. Walker, made a detailed geological survey of Columbia River valley and the western part of the Beaverfoot-Brisco range, between Windermere area and the main line of the Canadian Pacific railway. The results of this work will be the subject of a memoir.

B. Rose investigated the geology and mineral resources of the hitherto unstudied parts of a large area extending from British Columbia into Alberta, with a width of 45 miles and extending north from the International Boundary for 70 miles. The area includes important coal fields. A memoir treating of the geology, mineral deposits, and other features of the area, and accompanied by a geological and topographical map, is in course of preparation.

Alberta and Saskatchewan

G. S. Hume continued the detailed study of a large area extending from the Viking natural gas field, Alberta, eastward into Saskatchewan. Petroleum has been found within this area in the vicinity of Wainwright. The field work resulted in the discovery of a structure favouring the presence of an important oil field. An account of the results obtained is given in the Summary Report, 1925, part B. Advance copies of the report have been widely distributed.

B. R. MacKay continued the detailed geological survey of the coal measures and associated strata in the general vicinity of Mountain park, Alberta. Publication of a final report and maps is being withheld until the investigation has progressed further.

B. Rose worked in a field extending along the International Boundary, and from Alberta into British Columbia. (For a further notice see under British Columbia.)

W. S. Dyer and M. Y. Williams, working separately, continued the resurvey of the geology and mineral resources of an area in southern Alberta and adjacent parts of Saskatchewan and British Columbia, extending from the International Boundary north to latitude 52° and from longitude 109° to $115^{\circ}30'$. This work was commenced in 1923 and, it is expected, will be concluded in 1926. As one important result of this work it is contemplated to publish a map of the area showing the areal distribution, succession, and fold-structure of the rock formations, which should be of much service in the development of supplies of natural gas, coal, petroleum, water, etc.

P. S. Warren commenced an investigation of the geology and mineral resources of the southern part of Saskatchewan between latitudes 49° and 52° and longitudes 102° and 109° .

Manitoba

J. F. Wright made a geological and geographical reconnaissance of the basin of Oxford lake, east-central Manitoba. A report and map setting forth the results obtained are incorporated in the Summary Report, 1925, part B.

C. H. Merritt, under the direction of J. F. Wright, conducted a geological and geographical exploration along Bigstone and Fox rivers, northeastern Manitoba. The results of this work are given in the Summary Report, 1925, part B.

Ontario

T. L. Tanton commenced the detailed geological and geographical survey of an area of 400 square miles in the vicinity of Steepprock lake, Rainy River district. The area is important for the general understanding of Precambrian geology in the Lake Superior region and contains several types of mineral deposits. An account of various mineral deposits is given in the Summary Report, 1925, part C.

E. Thomson, in addition to restudying certain parts of a quadrangle in the vicinity of Woman river, Sudbury district, commenced a detailed geological and geographical survey of an adjoining area of about 400 square miles. These are parts of a large area of Precambrian schists similar in general character to other large schist areas in which gold, copper, and other metals occur. Mr. Thomson also examined the Sakatawi zinc deposits; the results of the latter work will be incorporated in a report upon the lead and zinc resources of Canada.

R. C. Emmons continued the detailed geographical and geological investigation of an area north of Thessalon, Algoma district. Mr. Emmons also made a detailed examination of the Victoria and Cascade lead mines. An account of these mines will be incorporated in a report upon the lead and zinc resources of Canada.

W. H. Collins began geological mapping of the Espanola quadrangle, an area of about 400 square miles lying immediately west of the Sudbury nickel basin. The area is important for the general understanding of Precambrian geology in northeastern Ontario and also for the solution of various geological problems encountered in the nickel basin, particularly respecting the faults which are believed to cross the nickel basin and to have had an influence on ore deposition. He also re-examined the anthraxolite deposits near Larchwood, in which interest as a possible fuel supply has been revived by the increasing cost and scarcity of anthracite coal in Ontario.

T. T. Quirke completed a detailed geological and geographical survey of an area of about 400 square miles in Sudbury district, north of lower French river, and commenced a similar investigation of an adjoining area to the south. This area contains various non-metallic deposits close enough to water transportation on the Great Lakes to be of prospective importance. It is also of great scientific interest because it seems to afford a means of correlating the Precambrian successions in the Huronian and Grenville geological sub-provinces.

M. E. Wilson completed the systematic geological and geographical survey of Madoc and Marmora map-areas, Hastings county. Various valuable mineral deposits occur within this area.

F. J. Alcock, in the course of a systematic investigation of the lead and zinc ore deposits of eastern Canada, examined a number of such deposits in Ontario. The information obtained is to be embodied in a report upon the lead and zinc resources of Canada.

Quebec

H. C. Cooke re-examined the Argonaut mine and the Canadian Associated Goldfields property near Larder Lake, Ontario. His main work was the examination of the newer gold and copper discoveries in western Quebec and the revision of the geology of the Opasatika map-area. An account of the various properties visited is given in the Summary Report, 1925, part C.

W. F. James and J. B. Mawdsley continued the detailed geological and geographical examination of the eastern extension of the "Rouyn" mineral belt, western Quebec. The study of the La Motte and Fournière map-areas was completed and a report accompanied by two geological maps is incorporated in the Summary Report, 1925, part C.

B. S. W. Buffam, under the direction of Mr. Mawdsley, completed the examination and mapping of an area of 200 square miles, including Duparquet and Destor townships, and situated immediately north of the "Rouyn" mineral belt. Results of this work are presented in the Summary Report, 1925, part C.

R. A. Pelletier, under the direction of M. E. Wilson, investigated and mapped the geology and mineral resources of an area extending northward from Thurso, Papineau county, along the railway newly constructed by the Singer Manufacturing Company.

J. W. Goldthwait commenced the study of the physical features and geological history of the lowland areas extending from the foot of lake Ontario and Pembroke on the Ottawa river, eastward past Quebec city.

W. V. Howard, under the direction of F. J. Alcock, commenced the study and mapping of the geology of an area near Carleton, Bonaventure county, Quebec, and including the neighbourhood of Dalhousie in New Brunswick. The field is of considerable geological interest and the work, when completed, should prove of service in the development of the mineral resources of the Maritime region.

F. J. Alcock examined a number of lead and zinc properties in Quebec. The information obtained is to be embodied in a report on the lead and zinc resources of Canada.

New Brunswick

W. L. Uglow made a detailed examination of all known occurrences of manganese ore in New Brunswick and Nova Scotia. The information obtained is to be incorporated in a report upon the manganese resources of Canada. Mr. Uglow also examined a body of limestone at L'Etang, Charlotte county, N.B. An account of this deposit is given in the Summary Report, 1925, part C.

H. D. Squires geologically surveyed a district which includes L'Etang peninsula, Charlotte county, N.B.

A. O. Hayes commenced the geological examination of an area of 400 square miles extending east and northeast of St. John, N.B.

A. Anrep surveyed and sampled in detail various peat bogs in Gloucester and Northumberland counties, N.B. A full report, accompanied by plans of the various bogs, is incorporated in the Summary Report, 1925, part C.

F. J. Alcock examined a number of zinc and lead properties in New Brunswick. The information obtained is to be embodied in a report upon the lead and zinc resources of Canada.

Nova Scotia

E. R. Faribault continued the systematic geological survey of Nova Scotia which has been in progress for many years and has resulted in the issuance of a series of map-sheets, on a scale of 1 mile to 1 inch, that represent all the province except the southwestern part. The area mapped in 1925 completes part of the Digby sheet (area 425 square miles) and includes the Clementsvale iron ore deposits.

F. J. Alcock made a systematic examination of zinc and lead properties in Nova Scotia. The information obtained is for a report upon the lead and zinc resources of Canada.

North West Territories

L. J. Weeks accompanied the C.G.S. *Arctic* on her annual cruise to the Arctic islands. Brief stops were made at several places on Baffin, North Devon, and Ellesmere islands. An examination was made of the coal deposit near Ponds inlet, Baffin island. An account of the work accomplished is included in the Summary Report, 1925, part C.

TOPOGRAPHICAL DIVISION

W. H. Boyd, Chief Topographical Engineer, reports:

FIELD WORK

During the year a change has been made in the system of Geological Survey 1-mile map-sheet names. Hitherto, a unit 1-mile map-sheet embraced an even 15 minutes of latitude and longitude and had a distinctive name; under the present system a unit 1-mile map-sheet embraces 15 minutes of latitude and 30 minutes of longitude. This unit sheet or full sheet is given a distinctive name and the two halves, 15 minutes of latitude and longitude, comprising the full sheet, are called the east half and west half respectively. The system now conforms with the sheet outlines adopted by the Military Surveys, Department of National Defence, for their 1-mile maps.

In the following report the names of sheets refer to the full sheets 15 minutes and 30 minutes of latitude and longitude.

Topographical and geographical surveys, for the requirements of the Geological Survey, were carried on in British Columbia, Alberta, Manitoba, Ontario, New Brunswick, and Nova Scotia.

British Columbia

A. C. T. Sheppard carried out the topographical mapping of the west half of the Cranbrook sheet. This half sheet lies between latitudes $49^{\circ} 30'$ and $49^{\circ} 45'$, and longitudes $115^{\circ} 45'$ and $116^{\circ} 00'$. This area, which was mapped by photo-topographical and plane-table methods, includes the town of Cranbrook and the Sullivan, North Star, and Stemwinder mines. The field scale was 1 inch to $\frac{1}{2}$ mile, with a contour interval of 100 feet. S. M. Steeves, junior topographical engineer, was attached to Mr. Sheppard's party.

J. A. Macdonald carried out photo-topographical and plane-table surveys in Portland Canal district. The area was mapped on the scale of 1 inch to $\frac{1}{2}$ mile, with a contour interval of 250 feet, and two half sheets will be published as follows: west half of Stewart sheet, latitudes $55^{\circ} 45'$ to $56^{\circ} 00'$ and longitudes $129^{\circ} 45'$ to $130^{\circ} 00'$; and the west half of American Creek sheet, latitudes 56° to $56^{\circ} 15'$ and longitudes $129^{\circ} 45'$ to $130^{\circ} 00'$.

Alberta

J. W. Spence continued the topographical mapping of the coal basins south and southeast of Mountain park. The west half of the Cardinal River sheet was completed. This half sheet lies between latitudes $52^{\circ} 45'$ and $53^{\circ} 00'$ and longitudes $116^{\circ} 45'$ and $117^{\circ} 00'$; about one-half of the half sheet lying directly to the north of this was completed.

Manitoba

R. C. McDonald continued geographical control surveys for geographical and geological work. The route surveyed included Gods lake, the rivers to Island lake, and Island lake itself. One hundred and twenty-nine permanent reference posts were established along the route at conspicuous places, such as entrances to deep bays and the mouths of tributary rivers. A permanent reference post was also established at the east end of Island lake. The positions of the Hudson's Bay Company's posts at Gods and Island lakes were established in latitude and longitude, using a radio receiving set for time signals. The total length of traverse run was 550 miles. Eleven hundred miles of shore-line was mapped.

Mr. McDonald also surveyed a new route located by Indians in the winter of 1922-23 from Hayes river to Gods lake. This route shortens the canoe route from Norway House to Gods lake by about 50 miles.

Ontario

D. A. Nichols carried out the primary traverse for the control of the Key Harbour geographical sheet. This sheet lies between latitudes $45^{\circ}45'$ and $46^{\circ}00'$, and longitudes $80^{\circ}30'$ and $81^{\circ}00'$. The traverse was carried along the Canadian Pacific railway from Pickerel river south to Naiscoot station, and along the Canadian National railway from Pickerel river to Mowat station, including the spur line to Key Harbour. Connexion was made to the astronomical station at Pickerel. Permanent monuments were established about every 2 or 3 miles along the routes. The positions of these in latitude and longitude, based on the position of the astronomical station at Pickerel, have been computed and are available for future reference.

A. G. Haultain carried out geographical surveys to complete the French River sheet, latitudes $46^{\circ}00'$ to $46^{\circ}15'$ and longitudes $80^{\circ}30'$ to $81^{\circ}00'$; and the Panache sheet, latitudes $46^{\circ}00'$ to $46^{\circ}15'$ and longitudes $81^{\circ}00'$ to $81^{\circ}30'$. All of the work in this region is being carried out in connexion with geological investigations in the area. Mr. Haultain also carried a transit and tape traverse along the Nipissing Central railway from Swastika to the interprovincial boundary. This traverse is for the control of geographic surveys in the area.

New Brunswick

R. Bartlett commenced work on the Loch Lomond sheet. This sheet lies between latitudes $45^{\circ}15'$ and $45^{\circ}30'$ and longitudes $65^{\circ}30'$ and $66^{\circ}00'$. The work is being carried out in connexion with geological investigations in the area. Very bad weather and heavy fogs greatly retarded the progress of the work.

S. C. McLean carried out the triangulation control for the Loch Lomond sheet. In order that information concerning the relief of the ground may be had from the map, spot elevations showing the height above sea-level will be shown at many places.

Nova Scotia

K. G. Chipman completed the topographical surveys for the Margaretville sheet, latitudes $45^{\circ}00'$ to $45^{\circ}15'$ and longitudes $65^{\circ}00'$ to $65^{\circ}30'$; for the Bridgetown sheet, latitudes $44^{\circ}45'$ to $45^{\circ}00'$ and longitudes $65^{\circ}00'$ to $65^{\circ}30'$; and also for the Granville Ferry sheet, latitudes $44^{\circ}45'$ to $45^{\circ}00'$ and longitudes $65^{\circ}30'$ to $66^{\circ}00'$. About one-half of the Digby sheet, latitudes $44^{\circ}30'$ to $44^{\circ}45'$ and longitudes $65^{\circ}30'$ to $66^{\circ}00'$ was also completed.

J. V. Butterworth, junior topographical engineer, was attached to this party.

W. H. Miller completed the topographical surveys for the west half of the Springhill sheet. The area embraced in this half-sheet is between latitudes $45^{\circ}30'$ and $45^{\circ}45'$, longitudes $64^{\circ}00'$ and $64^{\circ}15'$. The coal deposits around Joggins are included in this area.

S. C. McLean completed the triangulation of about 422 square miles of territory for the control of the Springhill and Oxford sheets. A monumented traverse also was run from Joggins to Westchester via River Hebert, Southampton, and Springhill. Permanent reference posts were set about every 2 or 3 miles along the routes followed.

The primary traverse in the southwest was continued from Meteghan to Yarmouth. This work is the same as that carried on for the last two years.

H. N. Spence, junior topographical engineer, was attached to this party.

OFFICE WORK

The regular office work of the division consists of the computation of various data, of the compilation, assembling, drawing up and inking in of the various map-sheets of the territory surveyed. This work is carried on entirely by the chiefs of parties on their return from the field.

In addition to the preparation of the finished maps of the areas surveyed by the division, geographical maps, for the use of the geological division, were compiled and drawn up. These maps are made up of control surveys by the Topographical Division, surveys by the Geological Division, and surveys by other Federal and Provincial Government departments.

D. A. Nichols, during the winter months, concluded his special studies in physiography at Columbia University, New York.

The following map work was completed during the year:

Province.	Map-sheet	Latitude and longitude	Scale
British Columbia.....	Slocan, east half.....	49° 45' to 55° 00' 117° 00' to 117° 15'	1 inch to 1 mile.
British Columbia.....	Kamloops, west half.....	50° 30' to 50° 45' 120° 15' to 120° 30'	1 inch to 1 mile.
Alberta.....	Mountain park, east half.....	52° 45' to 53° 00' 117° 00' to 117° 15'	1 inch to 1 mile.
Quebec.....	Kinojevis.....	48° 00' to 48° 15' 78° 30' to 79° 00'	1 inch to 1 mile.
Quebec.....	Cléricy.....	48° 15' to 48° 30' 78° 30' to 79° 00'	1 inch to 1 mile.
Quebec.....	Eastmain river.....		1 inch to 8,000 ft.
Quebec.....	Fournière.....	48° 00' to 48° 15' 78° 00' to 78° 30'	1 inch to 1 mile.
New Brunswick.....	Chipman, west half.....	46° 00' to 46° 15' 65° 45' to 66° 00'	1 inch to 1 mile.
Nova Scotia.....	Berwick, west half.....	45° 00' to 45° 15' 64° 45' to 65° 00'	1 inch to 1 mile.

Computations of the geographical positions, based on the Geodetic Survey of Canada, of the permanent marks established in Nova Scotia, have been completed.

These permanent marks consist of a 2-inch pipe with brass cap or 2-inch brass plug bearing the inscription "Geological Survey, Ottawa, Canada, No. ". The pipe is used for marking points in soil and the plug for marking points in solid rock.

Permanent marks in Nova Scotia have been set at intervals of about 3 miles along the following routes:

Dominion Atlantic railway, from Aylesford to Yarmouth.

Canadian National railway, from Middleton to Bridgewater and along the Caledonia branch line.

Liverpool-Annapolis highway, from Caledonia to Annapolis Royal.

Road from Cherryfield, Lunenburg county, to Aylesford, Kings county, via Dalhousie Settlement.

Boar's Back road (river Hebert) from Joggins to the Springhill-Parrsboro road, thence along this road to Westbrook; thence along the Cumberland Railway and Coal Company's line to East Southampton, thence along the road to Springhill, thence along the road to River Philip station on the main line of the Canadian National railway, and along this railway to Westchester.

Lists of these monuments with descriptions of their location and geographical position are available on request to the Director.

MINERALOGICAL DIVISION

Eugene Poitevin, Chief of the Division, reports:

FIELD WORK

H. V. Ellsworth examined areas of granite and pegmatite at Cutler, Webbwood, Sudbury, and other localities north of lake Huron, in continuation of the systematic investigation of radioactive and rare-earth minerals upon which he has been engaged since 1923. A report upon occurrences of these minerals through Canada is being prepared.

LABORATORY AND OFFICE WORK

The number of minerals and rocks sent in, for free examination, by prospectors, mine owners, and others interested in the mining industry was more than 50 per cent greater than last year. A total of 1,068 samples received from different parts of Canada were examined and reported upon by H. V. Ellsworth and Eugene Poitevin. One of these reports was sent to Prince Edward Island, sixty-one to Nova Scotia, twenty-nine to New Brunswick, two hundred and seventy-seven to Quebec, five hundred and twenty-five to Ontario, fifty-four to Manitoba, twenty-three to Saskatchewan, thirteen to Alberta, and eighty-five to British Columbia. In addition to the above a large number of minerals were determined for members of the staff of the Geological Survey and Mines Branch.

H. V. Ellsworth also continued his chemical investigations of Canadian rare minerals.

Up to February 14, 1926, when he retired on leave preliminary to his resignation, M. F. Connor completed a number of chemical analyses.

MUSEUM WORK

The work of arranging the systematic collection of Canadian and foreign minerals, which was commenced last year by Dr. W. F. Ferrier, was continued this year and considerable progress was made. Particular attention was paid to the economic series of ores and other minerals of commercial value. Owing to the fact that these collections have been moved twice since 1910 and are still in temporary quarters, these collections have suffered considerable loss, damage, and confusion. Additional material, as detailed below, was added to the collections.

The first of a new type of exhibition case for the systematic collection of minerals was built by D. A. Esdale, chief mechanic.

Accessions

Donations

- Fairlie, M. F., Manager, Mining Corporation of Canada, Ltd. Millerite, Frontier mine, Cobalt, Ont.
- Tanton, T. L. Clinzoisite, one mile north of Overflow station, Canadian National railway, Rainy River, Ont.
- Hume, G. S. Dolomite, Pincer Co. mine, Okla., U.S.A.
- Hanson, Geo. Large specimen of collinsite, quercyite, and wurtzilite.
- Ferrier, W. F. Series of specimens.
- Ellsworth, H. V. Series of rare earths.
- Faribault, E. R. Large series of zeolite specimens from ile Haute, bay of Fundy, N.S.
- Wright, W. J. One specimen lepidolite ore from Bear mining claim, lot 20, range 16, tp. 16, Manitoba; spodumene ore from Bear mining claim, lot 20, range 16, tp. 16; montebrasite ore from Bear mining claim, lot 20, range 16, tp. 16, Manitoba.
- Cole, L. H. One specimen of spodumene and one specimen of lepidolite from Bear mining claim, lot 20, range 16, tp. 16, Manitoba.
- Dandurand, Senator R. Two beautiful rock salt crystals from Wieliczke, Poland.

Exchange

Vonsen, M., Petaluma, Cal. Camsellite, Marin county, Cal.

Purchase

Kennedy, M. D., Bestel, Ont. Two specimens ruby silver, Castle mine, Ont.

EDUCATIONAL COLLECTIONS

The demand for collections Nos. 1, 2, and 3, which are supplied to educational institutions, continued steady. There was a greater demand than last year for prospectors' collections.

Mr. A. T. McKinnon, who is in charge of this work, reports that about 4,000 specimens, arranged in 130 collections, were distributed this year, as follows:

Province	Standard	Grade II	Grade III	Miscellaneous	Chips	Boy Scouts	Kegs	Prospectors
British Columbia.....				3				22
Alberta.....				1				2
Saskatchewan.....	1		2					3
Ontario.....	2		17	16	1	6	16	19
Quebec.....	3	1	2	7	1		2	10
New Brunswick.....			1					
Nova Scotia.....				2				
Foreign.....				7				1
Total.....	6	1	22	36	2	6	18	57

A charge of \$35 is made for Grade I collection, which consists of 144 mineral and rock specimens in a seven-drawer oak cabinet. Twelve dollars is charged for the Grade II collection of 44 specimens in a flat oak cabinet, and \$6 for the Grade III collection of rocks, minerals, and fossils in two plain deal trays. Prospectors' collections, which are not charged for, are composed of small specimens made from the trimmings from large specimens.

PALÆONTOLOGICAL DIVISION

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

FIELD WORK

W. A. Bell was engaged in the field from May to October upon the Carboniferous rocks in Nova Scotia, preparatory to a new edition of the geological map-sheet of Nova Scotia. The Carboniferous system is being subdivided into three parts corresponding to the mineral contents as well as to the geological history of these rocks. The new map, which is now in course of publication, will distinguish a marine Carboniferous division (Windsor series) that contains salt, gypsum, and limestone, the coal-bearing measures, and a third non-productive division.

E. M. Kindle was engaged during the early part of the summer in working out the geological succession of the Palæozoic rocks on the north side of Chaleur bay along Scaumenac bay and Nouvelle river. The section studied includes the remarkable fish faunas found at Maguacha and an early Devonian fauna. The latter part of the season was devoted to a study of the Devonian and associated sediments in Bear River district in southwestern Nova Scotia. Good collections of fossils were secured both in Gaspé peninsula and in Nova Scotia.

Brief studies were made en route to and from the Nova Scotia field of the Devonian section of St. George, Beauce county, Que., and of the unique sand-bars in the estuary of Avon river trending across the channel and known locally as "split bars."

A short trip was made in October at the request of the Department of Railways and Canals to the New Welland Canal section which was traversed from the Lake Ontario to the Lake Erie terminus.

Miss A. E. Wilson spent about six weeks in the area of the Cornwall map-sheet, Ontario, mapping parts of it and collecting Ordovician fossils.

C. M. Sternberg was in the field from June 1 to September 30, collecting dinosaurian and other vertebrate fossils of the Edmonton formation along Red Deer river above Drumheller, Alberta. The most important specimens secured were a nearly complete skeleton of *Thescelosaurus*, tracks representing a new dinosaur genus, and a nearly complete skeleton of horned-dinosaur. This is the first record of the genus *Thescelosaurus* from rocks of other than Lance age. The dinosaur tracks are the first to be reported from the rich dinosaur beds along Red Deer river. The horned-dinosaur skeleton secured is the only good skeleton of this family thus far collected from the Edmonton formation. Several other less important species were found in the Edmonton for the first time.

OFFICE WORK

A large share of the office work of the division has been devoted, as in preceding years, to the preparation of reports for other members of the staff on collections made by them in their several fields of work. Dr. C. D. Walcott and Dr. Chas. Resser have generously furnished reports on certain Cambrian collections from British Columbia.

Preparation of a special report on certain features of the Welland canal, for the Department of Railways and Canals, and a general report on the Welland Canal section, have been prepared by E. M. Kindle (*See list elsewhere of papers published*).

The office work of W. A. Bell comprised a revision of a number of the published mile to inch geological map-sheets of Nova Scotia, a report on fossil collections from the vicinity of Sussex, N.B., a report on a collection of fossils from Markhamville, N.B., and preparation of material for a forthcoming memoir dealing with the fauna of the Windsor Mississippian series of the Maritime Provinces (*See list elsewhere of papers published*).

Miss A. E. Wilson has given a large share of her time to a continuation of the catalogue of type fossils of the Geological Survey, Canada, which is nearing completion. She has also prepared twenty-five sets of the Grade III educational collections of fossils and minerals sold to schools (*See report of Division of Mineralogy*) and has furnished reports on a number of collections of Ordovician fossils.

F. H. McLearn has been engaged throughout the year with the description of Mesozoic faunas.

Miss M. A. Fritz was occupied during the summer in re-arranging the older reference collections of the Survey.

MUSEUM EXHIBITS

A case of Jurassic fossils is the most important addition made to the invertebrate collections in the Victoria Memorial Museum during the year. The stump of one of the Upper Devonian fern trees from Gilboa, N.Y., has been placed with the palæobotanical exhibits, so that the Museum now possesses representatives of Devonian, Carboniferous, and Cretaceous forests. For this specimen the Geological Survey is indebted to the courtesy of Mr. Jos. A. Guttridge, of the

New York Aqueduct Engineers. Additions to the vertebrate collections include a camel and two open mounts of complete skeletons of *Chasmosaurus belli*. These three specimens have been prepared and mounted by C. M. Sternberg and Jos. Skillen.

Collections of Fossils Received During the Fiscal Year 1925-1926

- Ami, H. M. Numulites of Eocene age from Ghizeh pyramid, Egypt. Accession No. 630.
- Bell, W. A. A large collection of Carboniferous fossils from the Maritime Provinces. Accession No. 594.
- Cairnes, C. E. Fossils from Slocan district, B.C. Accession No. 598.
Two lots of fossils, fossiliferous limestone, Schroeder peak, Slocan area, B.C. Accession No. 611.
- Cheney, H. W. Ordovician fossils from quarry north of road just over bridge at Hogsbach, Ottawa. Accession No. 623.
- Cornwall, Ira E. Some barnacles from glacial deposits of Vancouver island, B.C. Accession No. 592.
- Crickmay, C. H. A collection of Triassic, Jurassic, and Cretaceous fossils from Harrison lake, collected by C. H. Crickmay, 1924. Accession No. 628.
- Dolmage, V. Mesozoic fossils from British Columbia. Accession No. 599.
Fossil plants from the Mesozoic rocks of Taseko district, British Columbia. Accession No. 610.
- Dyer, W. S. A collection of freshwater Mesozoic fossils from southern Alberta. Accession No. 631.
- Ells, S. C. A large slab of tar sand fossils from Athabaska River valley, Alberta. Accession No. 618.
- Evans, C. S. A large collection of Palaeozoic fossils from Golden, B.C. Accession No. 595.
- Faribault, E. R. A collection of Devonian fossils from Bear River district. Accession No. 626.
- Guttridge, Jos. A. Devonian tree stump from Ithaca beds, Gilboa Dam, Gilboa, N.Y. Donation. Accession No. 607.
- Hanson, G. Mesozoic and Palaeozoic fossils from Hazelton district, B.C. Accession No. 600.
Cretaceous and Palaeozoic fossils from Hazelton series of Hudson Bay mountain and other localities in Hazelton district. Accession No. 609.
- Hayes, A. O. A small collection of Palaeozoic fossils from St. John, New Brunswick. Accession No. 614.
- Houldsworth, Edgar. A donation of fossils from Pierre shale, Fox Hill sandstone, and Devonian, collected from glacial boulders in southern Saskatchewan near Brooking and Ceylon. Accession No. 593.
- Howard, W. V. A collection of Devonian fossils from south side Gaspé peninsula, Que. Accession No. 606.
- Hume, G. S. A collection of Ordovician fossils from lake Timiskaming, Ontario. Accession No. 602.
Some Cretaceous fossils from east-central Saskatchewan. Accession No. 601.
- Johnston, Mary A. A donation of "mud-balls" from beach at Weston-super-Mare, England. Accession No. 596.
- Johnston, R. A. A. Recent corals, sea fans, and sponges, Bermuda islands. Donation. Accession No. 615.
- Kelly, W. A. Devonian and Mississippian fossils from the Cadomin and Mountain Park areas. Accession No. 605.
- Kerr, F. A. A small collection of fossils from Cassiar district, northern British Columbia. Accession No. 612.
- Kindle, E. M. A large collection of Devonian fossils from the north side Chaleur bay, Que., Dalhousie, N.B., Bear River, N.S., St. George, Que.
- Lepage, Athanase. A *Stricklandinia* from the Silurian. Accession No. 597.
- Maddox, D. C. A small collection of *Exogyra crietina* (Cretaceous) from Del Rio shale, Austin, Texas. Accession No. 603.
- Pelletier, R. A. A collection of Ordovician fossils from the region around Thurso, Que. Accession No. 613.
- Reinhard, E. Fossils from Ridgeway, Ont., and Buffalo, N.Y. Accession No. 620. (Purchased.)
Fossils from Welland Canal vicinity and western New York. Accession No. 619. (Purchased.)
Fossils from Humberstone, New Welland canal (Onondaga limestone). Accession No. 621.

- Rogers Imperial Well (through Borings Division). Some minute Jurassic gastropods, from range 11, tp. 1, southern Alberta. Accession No. 627.
- Smith, Mr. Supt. Buffalo park. Fossilized wood with worm borings from the Battle River valley on west side Buffalo National park. Accession No. 608.
- Sternberg, C. M. A large collection of vertebrate fossils including a horned dinosaur, dinosaur tracks, etc.
- Weeks, L. J. A small collection of Ordovician fossils from Ellesmere land, Devon and Baffin islands. Accession No. 616.
- Wilson, M. E. A large collection of Black River fossils from Madoc region. Accession No. 617.
- Wilson, A. E. A collection of Ordovician fossils from Cornwall region, Ont. Accession No. 629.

BORINGS DIVISION

E. D. Ingall, Chief of the Division, reports:

The Borings Division exists for the purpose of accumulating and studying records of borings made in any part of Canada, so that information of a general geological character thus rendered available may be utilized for the guidance of operators and in geological research leading to a fuller understanding of the strata in depth. It strives to obtain full sets of samples illustrative of the strata passed through, by the study of which in the laboratory the preliminary determinations given in the logs may be corroborated and amplified. These samples should come direct from the driller to the Borings Division without previous washing or other preparatory operations which might change the proportions of the different constituent materials or even result in the removal of minute fossils or mineral grains, such as foraminifera, glauconite, etc. Such selective change is inherent in rotary drill methods, but it is far less apt to be present where the samples come from the Standard or "Churn" drill rigs, and in examining samples from the latter allowances can be made. In view of the policy followed by some other Government organizations of requiring that all samples be washed by the driller previous to submitting them to the engineer, the need for securing *unaltered* material for intensive laboratory work may be further stressed.

British Columbia

Considerable boring was doubtlessly done with the diamond drill in testing the ore-bodies of metal mines, but these being of value only to owners and giving no data of general geological value do not come within the scope of the Borings Division. Since the practical cessation of deep boring in the Fraser River delta about two years ago, what little deep boring was reported has been from two places, viz., the exploration in search of petroleum on Sage creek in Flathead valley and the experimental borings near Armstrong in Okanagan valley and near Kamloops.

The Sage Creek boring, begun about 1916, has been reported on to a depth of 3,000 feet in previous Summary Reports of the Geological Survey, where the geological conditions have been explained and the problems discussed. Only eighteen samples were received during the year from the Crow's Nest Oil Company, operating at this point, and these exhibited characteristics very similar to those received in 1924, so that at the last depth shown (3,191 feet) the well seemed to be still in the somewhat siliceous dolomites of the Altyn formation.

The only well reported as active in Fraser River Delta area was the Empire, but the only information available has been that appearing in the newspapers. This boring was rumoured to have attained a depth of about 5,700 feet early in the year.

Correspondence was entered into with the Okanagan Coal, Oil, and Gas Company, who were reported to contemplate boring near Armstrong, in Okanagan valley, B.C. This company was reorganized under the name of the Arm-

strong Oil and Gas Company. The latest news received—September 1—reported difficulty with water and caving at 250 feet. A report and log were received of a boring by the Kamloops Natural Gas, Oil, and Coal Company to a depth of 717 feet, located on L.S.D. 5, sec. 36, tp. 19, range XVIII, W. 6th mer., but no official reports have been received from this company. These borings being in a district where very little knowledge of the character of the strata in depth can be gained from surface geological surveys, should, if complete sets of samples be obtained, result in interesting additions to the knowledge of the geological conditions bearing on the possibility of encountering oil or gas.

Prairie Provinces and North West Territories

Boring operations were prosecuted at various points, but especially in the Wainwright-Irma and in the Turner Valley fields, following the discoveries of oil in the British Petroleum and Royalite No. 4 wells.

As in past years, the Borings Division has co-operated with the officials of the North West Territories and Yukon Branch of the Department of the Interior. Through their courtesy logs and sets of samples were received from most of the important wells, supplementing the information which was obtained by direct correspondence. With the appointment of Mr. S. J. Davies as petroleum engineer to this branch of the Interior Department, with headquarters at Calgary, the Borings Division was relieved of the necessity of assisting operators by preliminary work on the samples to meet the need for immediate, if approximate, determinations of horizons reached. As this work is now performed in the Calgary office of the Department of the Interior the Borings Division has concentrated on determining by chemical and microscopic laboratory methods the characteristics of the strata passed through by the borings.

Logs of a number of shallow wells put down in search of water were received from various points in the Prairie Provinces, through the courtesy of the Soldiers' Settlement Board, per Messrs. H. Tarry and Clem Brady, to whom thanks are due, as also to Messrs. Thos. Moore, A. N. Duff, Thos. Duncan, W. D. Martin, the Dominion Drilling Company, and the Canadian Pacific Railway Company.

Thanks are also due to Mr. E. Dougherty for samples and information relating to the W. E. Reid and the H. Johnson wells being put down by him, in search for oil, on the Cretaceous escarpment near Mafeking, in Manitoba.

Ontario

As in the past few years, the aims of the Borings Division have been prosecuted in the province of Ontario largely in co-operation with Col. R. B. Harkness, the Provincial Government Commissioner of Natural Gas. Through him have been received, during the year, seventy-two original logs of borings made in the Interlake peninsula between 1923 and 1925.

Supplementing the records above mentioned there were received through the Commissioner of Natural Gas about seven hundred and fifty samples from the various wells. Copies of certain logs in the files of the Borings Division were furnished to Col. Harkness, which were needed by him in his studies of the geological conditions of the gas and oil districts of the Interlake peninsula, and laboratory work has been begun on sets of samples from several wells working out the horizontal extension of the Whirlpool, Grimsby, and Clinton horizons.

Detailed laboratory work was also done on the samples from the Coste No. 7 well and chemical determinations of gypsum and anhydrite in various wells were made for the assistance in working out the gypsum deposits under study by W. S. Dyer when acting as Col. Harkness' assistant early in the year.

During investigation of the St. Lawrence Waterways route the Department of Railways and Canals applied to the Director for assistance in inter-

preting the results of their borings near Lachine, Que. The matter was placed in the hands of G. A. Young, D. C. Maddox of the Borings Division staff acting as his field assistant. After the necessary information and advice had been given by Mr. Young to the engineers in charge of the work, samples from their borings were received by the Borings Division and examined in the laboratory by Mr. Maddox, and the descriptions and results so obtained were transmitted to the Department of Railways and Canals.

Quebec

There are many indications of natural gas in a zone extending from Ottawa along the south shore of Ottawa river and the north and south shores of the St. Lawrence as far as Quebec. These have been exploited in depth by boring at a number of places, but so far without locating gas in any large pools. It was hoped by the operators that petroleum might accompany the gas, judging by the slight indications found at various places, but none was found. In St. Hyacinthe district, about 25 miles in an easterly direction from Montreal, in a group of deep borings, a little natural gas was found under high pressure, but no petroleum. These borings were with one exception confined to a synclinal trough and did not reach the same horizon as that in which the gas, with occasional oil indications, is found in the Ottawa end of the district.

Maritime Provinces

No information as to boring activities in Nova Scotia came to hand, other than the records published, as in former years, by the Department of Mines of the province. The records of the Government drills are, however, chiefly of value to private interests and give no data of general geological interest.

In New Brunswick, correspondence was carried on in regard to the advisability of borings for water by the Farmer's Co-operative Creamery of Moncton, and in connexion with proposed boring operations by the Trask Well Company of Berwick, N.S., on Grand Manan island. Information was sent, as well as published maps and reports, but no reports of operations were received in reply to our invitation to co-operate.

The New Brunswick Gas and Oil Company have continued to send in records, and about 3,000 samples from eight wells were received during the year and filed for study later. This field, adjacent to Moncton, has been so systematically tested and developed by the company that most of their boring activities for some years past represent deepening of old wells to reach proved lower gas-bearing horizons.

On Prince Edward island, in the harbour at Charlottetown, an activity of the greatest interest was started. As this boring was likely to be carried to a considerable depth and to give results of the greatest geological significance, correspondence was immediately entered into with the officials of the Henry L. Doherty Company, of New York, who are prosecuting the boring. A favourable reply to a suggestion of co-operation was received on October 26 from Mr. Stuntz, the representative of the company at Charlottetown; a number of samples have been received and a preliminary eye examination made.

The belief held many years ago that the coal measures of Nova Scotia and New Brunswick might be found to underlie the younger strata of the island led to the boring of five deep holes by the Geological Survey in 1909. Of these the shallowest was 1,670 feet and the deepest 2,082 feet. Geological studies had shown the presence of seven flat anticlines in the strata, and the borings were located on three of these, near the crest, so as to start as low in the formations as possible. The fragile nature of the strata passed through and the heavy

flows of water under pressure greatly added to the difficulties of the undertaking, and it was considered that coal seams did not exist at a depth at which they might be commercially worked. The records of these wells present a monotonous variation of soft shales, sandy shales, and sandstones, and no important change of formation was demonstrated. Should the underlying formations be reached in the present boring not only will relationships of great geological interest be established, but the possibility of encountering gas and oil in these lower formations will have been partly demonstrated.

Apart from the general work of the division a great deal of information has been given to operators regarding the general geological conditions to be expected in various districts.

The laboratory research work was in charge of D. C. Maddox and the results of his work are published in the Summary Report of the Geological Survey for the year.

The table given below gives particulars of samples and records received in 1925.

Province	Number of samples received	Number of wells from which samples were received	Number of records received
Maritime Provinces.....	3,246	8	16
Quebec.....	173	43	53
Ontario.....	750	5	190
Northwest Provinces.....	3,004	29	105
British Columbia.....	36	3	3
Total.....	7,209	88	367

GEOGRAPHICAL AND DRAUGHTING DIVISION

C.-Omer Sénécal, Geographer, and A. Dickison, Chief Map Draughtsman, jointly report:

Mapping and map publication constitute an important phase of the work of the Geological Survey; reports and bulletins are illustrated according to their needs by maps, plans, and diagrams; the supervision and output of the final production of geological maps and associated illustrations, and also topographical maps for engraving and printing, are carried out by this division.

Twenty-six new maps were published during the fiscal year; only one map is in the hands of the King's Printer for lithographing, and this is in the final stage of printing.

All topographical maps completed by the Topographical Division have been prepared for engraving, and engraved.

A large number of maps and associated illustrations were also drawn for reproduction by zinc-cut process; the discriminating use of this method of output for the production of ephemeral or the less important class of work greatly facilitates the issuance of reports and correspondingly reduces the cost of reproduction.

The work of assembling and indexing the valuable collection of engraved map-plates, 484 in all, has been completed and is in the custody of the engraver-in-charge. Geological field-books were transferred from the custody of the division to the Chief Geologist for the purpose of readier access.

The duties of the Geographer in connexion with the Geographic Board of Canada have, as usual, been attended to.

Maps Published April 1, 1925, to March 31, 1926

Publication number	Title	Remarks
YUKON		
✓ 2064	Upper Beaver River area, Mayo district; scale, 1 inch to 2 miles.....	Geology. In report by W. E. Cockfield, Summary Report, part A, 1924
BRITISH COLUMBIA		
2040	Driftwood Creek sheet (west half), Coast district; scale, 1 inch to 1 mile.....	Topography
✓ 2043	Heffley sheet (North Thompson valley), Kamloops district; scale, 1 inch to 1 mile.....	Topography
2044	Creston sheet (east half), Kootenay district; scale, 1 inch to 1 mile.....	Topography
✓ 2046	Barkerville area, Cariboo district; scale, 1 inch to 1 mile.....	Geology and topography. In memoir by W. A. Johnston and W. L. Uglow
✓ 2048	Driftwood Creek sheet (west half), Coast district; scale, 1 inch to 1 mile.....	Geology and topography. In report by G. Hanson, Summary Report, part A, 1924
✓ 2063	Chilko lake and vicinity, Coast and Lillooet districts; scale, 1 inch to 4 miles.....	Geology. In report by V. Dolmage, Summary Report, part A, 1924
✓ 2068	Kamloops sheet (west half), Kamloops district; scale, 1 inch to 1 mile.....	Topography
✓ 2070	Windermere, Kootenay district; scale, 1 inch to 2 miles.....	Geology and topography. In memoir by J. F. Walker
ALBERTA		
2058	Wainwright-Vermilion area; scale, 1 inch to 4 miles.....	Geology. In report by G. S. Hume, Summary Report, part B, 1924
SASKATCHEWAN		
✓ 2078	Wapawekka and Deschambault Lakes area (in two sheets); scale, 1 inch to 2 miles.....	Geology. In report by J. S. DeLury, Summary Report, part B, 1924
SASKATCHEWAN AND MANITOBA		
✓ 1994	Flinflon Lake area; scale, 1 inch to $\frac{1}{2}$ mile.....	Geology. In report by F. J. Alcock, Summary Report, part C, 1922
MANITOBA		
✓ 2059	Oiseau River area, southeast Manitoba; scale, 1 inch to 1 mile.....	Geology. In report by J. F. Wright, Summary Report, part B, 1924
✓	Figure 1, Part of Oiseau River mineralized area, township 17, range 15, east of principal meridian, southeast Manitoba; scale, 1 inch to 1,250 feet.....	Geology. In report by J. F. Wright, Summary Report, part B, 1924
ONTARIO		
✓ 1960	Bruce Mines, Algoma district; scale, 1 inch to 2 miles.....	Geology. In memoir by W. H. Collins
✓ 1970	Blind river, Algoma district; scale, 1 inch to 2 miles.....	Geology. In memoir by W. H. Collins
✓ 1971	Lake Panache, Sudbury district; scale, 1 inch to 2 miles.....	Geology. In memoir by W. H. Collins
✓ 2050	Missinaibi area, Algoma district; scale, 1 inch to 1 mile.....	Geology. In memoir by E. Thomson
✓ 2069	Eastern part of Matawin iron range, Thunder Bay district; scale, 1 inch to 1 mile.....	Geology. In report by T. L. Tanton, Summary Report, part C, 1924
✓ 2081	Goudreau pyrite area, Michipicoten district (Figure 12); scale, 1 inch to 40 chains.....	Geology. In memoir by W. H. Collins, T. T. Quirke, and E. Thomson

Maps Published April 1, 1925, to March 31, 1926—*Con.*

Publication number	Title	Remarks
QUEBEC		
✓ 2033	Mount Albert sheet, Gaspé county; scale, 1 inch to 1 mile....	Topography
✓ 2057	Barrabute area, Abitibi county; scale, 1 inch to 4 miles.....	Geology. In Summary Report, part C, 1924
✓ 2060	Mount Albert sheet, Gaspé county; scale, 1 inch to 1 mile....	Geology and topography. In memoir by F. J. Alcock
✓ 2074	Matane Lakes Cap-Chat River area, Matane county; scale, 1 inch to 1 mile.....	Geology. In report by F. J. Alcock, Summary Report, part C, 1924
✓ 2085	Clérecy sheet, Abitibi and Témiscamingue counties; scale, 1 inch to 1 mile.....	Geology. In report by W. F. James and J. B. Mawdsley, Summary Report, part C, 1924
✓ 2087	Kinojevis sheet, Abitibi and Témiscamingue counties; scale, 1 inch to 1 mile.....	Geology. In report by W. F. James and J. B. Mawdsley, Summary Report, part C, 1924

Map in Hands of King's Printer, March 31, 1926

Publication number	Title	Date of requisition	Remarks
2071	Whitehorse sheet, Yukon; scale, 1 inch to 4 miles.....	Dec. 11, 1925	Geology

Other Map-work in Varying Stages of Progress

—	Title	Remarks
YUKON		
1	Galena hill, Mayo district; scale, 1 inch to 2,000 feet.....	Geology. For report by C. H. Stockwell, Summary Report, part A, 1925
YUKON AND BRITISH COLUMBIA		
1	Sheet map, latitudes 58° to 61° and longitudes 131° to 139°; scale, 1 inch to 8 miles.....	Geology. Preliminary work begun
BRITISH COLUMBIA		
✓ 1	Reconnaissance between Atlin and Telegraph Creek, Cassiar district (in two sheets); scale, 1 inch to 4 miles.....	Geology. For report by W. E. Cockfield, Summary Report, part A, 1925
2	Zymoetz River area, Coast district; scale, 1 inch to 4 miles..	Geology. For report by G. Hanson, Summary Report, part A, 1925
3	Eutsuk Lake area, Coast district; scale, 1 inch to 4 miles....	Geology. For report by J. R. Marshall, Summary Report, part A, 1925
✓ 4	Dease Lake area, Cassiar district; scale, 1 inch to 2 miles....	Geology. For report by F. A. Kerr, Summary Report, part A, 1925

Other Map-work in Varying Stages of Progress—*Con.*

—	Title	Remarks
BRITISH COLUMBIA—<i>Con.</i>		
5	Gold placers of Dease Lake area, Cassiar district; six plans of creeks.....	Geology. For report by W. A. Johnston, Summary Report, part A, 1925
6	Index to the geology of parts of Golden and Windermere mining divisions, Kootenay district.....	Geology. For report by J. F. Walker, Summary Report, part A, 1925
7	Slocan sheet, Kootenay district; scale, 1 inch to 1 mile.....	Topography. East half of sheet engraved
ONTARIO		
1	Thunder Cape sheet, Thunder Bay district; scale, 1 inch to 1 mile.....	Topography. East half of sheet engraved
QUEBEC		
1	St. Urbain area, Charlevoix county; scale, 1 inch to 1 mile..	Geology. For memoir by J. B. Mawdsley
2	Port Daniel-Gascons area, Bonaventure county.....	Geology. For Museum Bulletin
3	Sheet map, latitudes 48° 30' to 52° and longitudes 74° to 79° 30'; scale, 1 inch to 8 miles.....	Geology
NEW BRUNSWICK		
1	Chipman sheet (west half), Queens and Sunbury counties; scale, 1 inch to 1 mile.....	Topography. Engraved
2	Chipman sheet (west half), Queens and Sunbury counties; scale, 1 inch to 1 mile.....	Geology. For memoir by W. S. Dyer
3	Minto sheet (east half), Sunbury and Queens counties; scale, 1 inch to 1 mile.....	Geology. For memoir by W. S. Dyer
NOVA SCOTIA		
1	Revision of Map 39 A, Geological Map of Nova Scotia; scale, 1 inch to 8 miles.	

MAP ENGRAVING DIVISION

Robert Veitch, in charge, reports:

Standard Topographical Maps Completed

(For reproduction in three colours)

Kamloops sheet, west half, Kamloops district, British Columbia; scale, 1 inch to 1 mile. Three plates engraved.

Slocan sheet, east half, Kootenay district, British Columbia, scale, 1 inch to 1 mile. Three plates engraved (part of black plate engraved in Draughting Division).

Thunder Cape sheet, east half, Thunder Bay district, Ontario; scale, 1 inch to 1 mile. Two plates engraved.

Standard Geographical Maps Completed

Cléricy sheet, Abitibi and Témiscamingue counties, Quebec; scale, 1 inch to 1 mile. One plate engraved.

Kinojevis sheet, Témiscamingue and Abitibi counties, Quebec; scale, 1 inch to 1 mile. One plate engraved.

Geological Maps Completed

Cléricy sheet, Abitibi and Témiscamingue counties, Quebec; scale, 1 inch to 1 mile. One plate engraved.

Kinojevis sheet, Témiscamingue and Abitibi counties, Quebec; scale, 1 inch to 1 mile. One plate engraved.

Other Work Completed

- Topographical map, Chipman sheet, Queens and Sunbury counties, New Brunswick; scale, 1 inch to 1 mile. Offsets for three plates laid down.
- Topographical map, Fort William and Port Arthur sheets, Thunder Bay district, Ontario; scale, 1 inch to 1 mile. Additional work engraved on one plate.
- Topographical map, Thunder Cape sheet, west half, Thunder Bay district, Ontario; scale, 1 inch to 1 mile. Additional work engraved on one plate.
- Topographical map, Creston sheet, Kootenay district, British Columbia; scale, 1 inch to 1 mile. Revision carried out on topographic plates.
- Topographical map, Chipman sheet, Queens and Sunbury counties, New Brunswick; scale, 1 inch to 1 mile. Revision carried out on topographic plates.
- Geological map, Windermere, Kootenay district, British Columbia; scale, 1 inch to 2 miles. Offsets laid down from three topographic plates.
- Geological map, Barkerville area, Cariboo district, British Columbia; scale, 1 inch to 1 mile. Revision carried out on three plates.
- Geological map, Minto sheet, Sunbury and Queens counties, New Brunswick; scale, 1 inch to 1 mile. Offsets laid down from three topographic plates.
- Geological map, Chipman sheet, Queens and Sunbury counties, New Brunswick; scale, 1 inch to 1 mile. Offsets laid down from three topographic plates.
- Standard Geological Pattern Plate. (To depict metamorphism on lithographed maps.)

Standard Geographical Maps in Progress

Projections have been engraved for the following sheets:

- Opasatika sheet, Quebec.
- Fournière sheet, Quebec.
- La Motte sheet, Quebec.

Geographical Maps in Progress

- Sheet map, portion of Quebec, latitude 48° 30' to 52° and longitude 74° to 79° 30'; scale, 1 inch to 8 miles. Engraved on two plates.
- Sheet map of southern Alberta, latitude 49° to 52° and longitude 109° to 115° 30'; scale, 1 inch to 8 miles. Projection engraved on two plates.

PHOTOGRAPHIC DIVISION

G. G. Clarke, Chief of the Division, reports that the following work was done during the fiscal year:

	Inches	Inches	Number
Contact prints	4 by 5	to 36 by 48	15,402
Bromide enlargements	4 by 5	to 40 by 72	416
Exposures developed	3½ by 4½	to 6½ by 8½	5,645
Dry plate negatives	4 by 5	to 11 by 14	508
Wet plate negatives	8 by 10	to 24 by 30	203
Zinc plates	11 by 14	to 24 by 36	53
Photostat copies	7 by 11	to 11 by 14	174
Lantern slides		3½ by 4	749
Photos and titles mounted			4,567
Total			27,717

GEOLOGICAL INFORMATION AND DISTRIBUTION DIVISION

Wyatt Malcolm, Chief of the Division, reports:

The work of the division consists in answering inquiries for information regarding the geology and mineral resources of Canada. This information is imparted verbally to those making application in person, and is given also in the form of correspondence, memoranda, and published reports and maps. A considerable part of the technical correspondence of the Geological Survey is dealt with.

Articles were prepared during the year for publication in the Gazette, the British press, and the Canada Year Book. These articles dealt with such subjects as the importance of the mineral industry of Canada, the status of the industry, and the progress made. Numerous short articles were prepared for the use of the press, and were well received. In this way the readers of the newspapers and mining and scientific journals were kept informed of the nature of the publications issued from time to time by the Survey.

The publications of the Geological Survey and of the Victoria Memorial Museum are distributed by this division. During the year 49,057 publications, exclusive of the French editions, were distributed. Of these, 3,791 were sent to addresses on the regular mailing lists, and 45,266 were distributed in compliance with written and personal requests for named publications, or requests for general or specific information.

LIBRARY

Mrs. F. E. Forsey, Librarian, reports:

The accessions for 1925-26 include:

Volumes received as gifts or exchanges.....	555
Books purchased	359
Volumes bound	897
Pamphlets	529
Maps	311
Periodicals subscribed for.....	169
Periodicals received as exchanges.....	367
Foreign Government documents (not otherwise counted).....	460
Canadian Government documents (not otherwise counted).....	152

The recorded loans were 6,374 books, not including those used by the 7,123 readers who consulted the library in person. In the operation of the inter-library loan system, the library supplied reference material to the following institutions, as well as to individuals: University of British Columbia, University of Alberta, University of Saskatchewan, Manitoba University, Manitoba Agricultural College, University of Toronto, Macdonald College, Ste. Anne de Bellevue, McGill University, McGill Medical Library, Institut Agricole d'Oka, and the various Government departments in Ottawa. Books have been borrowed from the following institutions for the use of the staff: United States Geological Survey Library, the Peabody Institute of Baltimore, the libraries of Toronto and McGill Universities, the Library of Parliament, and from some departmental libraries.

Among the bibliographies which render the library extremely valuable for scientific research none ranks higher than the Royal Society Catalogue of Scientific Literature, which this year completed its series of nineteen volumes, covering the century 1800-1900.

BRITISH COLUMBIA OFFICE

V. Dolmage, in charge, reports:

The British Columbia office of the Geological Survey was opened in 1918, under the direction of Charles Camsell, for the purpose of making more easily available to the mining public of British Columbia and the Yukon the large amount of mining and geological information now in the possession of the Geological Survey, and also to enable the Survey to keep more closely in touch with the Provincial Bureau of Mines, with the mining industry in general, and particularly with the geological needs of the mining industry in this province.

The reports of the Geological Survey dealing with British Columbia are distributed from the office and much information is given directly to the public by personal interview, correspondence, and telephone. A number of public lectures are given each year by the geologists of the office staff. A reference library is maintained and a laboratory equipped for the microscopic examination of rocks, minerals, and ores.

Until December 17, 1925, the offices were located in the Pacific building, but on that date they were changed to rooms 508 and 512 Winch building, on the corner of Howe and Hastings streets.

During the fiscal year 1925-26 the office was in charge of V. Dolmage, assisted by C. E. Cairnes, associate geologist, and A. J. C. Nettell. During the year over 4,000 visitors were received at the offices, an increase over the previous year of 1,000; 400 inquiries were received and answered by mail and a much greater number by personal interviews; 2,662 Geological Survey reports and a similar number of maps were distributed, besides several hundred provincial reports. Many specimens of rocks and ore were examined and reported on.

VICTORIA MEMORIAL MUSEUM

L. L. Bolton, Acting Director

Pending the appointment of a successor to the late Dr. McInnes, the duties of Director were performed throughout the year by L. L. Bolton, Assistant Deputy Minister.

It is a matter of regret still to have to record that no information has come to hand to shed any light on the disappearance of Mr. F. W. Waugh on or about September 20, 1924.

Dr. Edward Sapir, who was selected in 1910 to organize, and to become the Chief of, the Division of Anthropology, and who had attained such excellent success therein, resigned at the end of September, 1925, to accept the chair of Associate Professor of Anthropology and Indian Linguistics in the University of Chicago, a position which offers a wider field to a man of his varied talents. He was succeeded as Chief by Diamond Jenness, who has been with the division since 1913.

Mrs. M. A. M. Peat resigned in August, 1925; a permanent appointment to the position she vacated had not been made at the end of the fiscal year.

The work on Preservation of Totem Poles mentioned in the report for the fiscal year 1924-25 was commenced, under the direction of Mr. Harlan I. Smith, of the Division of Anthropology. Funds for this work were provided by the Department of Indian Affairs; noteworthy progress was made largely through the co-operation of the Canadian National railways. The only change in the personnel of the committee directing the work was the appointment of D. Jenness to succeed Dr. Sapir.

When the Mount Logan expedition (1925) was being planned by the Canadian Alpine Club, the opportunity was offered the Museum to attach to that expedition a naturalist; and the Museum reciprocated by allowing its officer to act as motion picture photographer. The naturalist selected was Hamilton M. Laing, of Comox, B.C. Mr. Laing sent in a comprehensive collection (accompanied by field notes) of the fauna and flora of a region of which there was scarcely anything known, a good collection of photographs, and about 3,500 feet of standard motion picture film. A portion of this film was combined with another taken by Mr. Allen Carpe (one of the six men to reach the summit of mount Logan) to make one film entitled "The Conquest of Mount Logan", which is a vivid and realistic portrayal of the hardships endured and an excellent record of the journey to and from the mountain.¹

A portrayal of the museum activities in anthropology and biology was included in a Department of Mines exhibit prepared for the annual meeting of the Canadian Institute of Mining and Metallurgy held in Montreal, March 3-5, 1926.

In the autumn of 1925 an invitation from the Honourable Charles Stewart, Minister of Mines and of the Interior, the Museum officials, and the Ottawa Field Naturalists' Club was carried by R. M. Anderson, Chief of the Division of Biology, to the American Ornithologists' Union, in session in New York, to hold its next annual meeting in Ottawa. The invitation was accepted; in October, 1926, therefore, the Union will hold its first meeting in Canada. This meeting is looked forward to with pleasure by local students of natural history

¹ A record of the trip including an article by H. M. Laing entitled "Wild Life of the Upper Chitina" appears in the Canadian Alpine Journal, vol. XV, 1925.

who will have an opportunity to meet ornithologists from the United States; and by the officials of this department for the opportunity of showing to visitors the extent and character of our collections of the fauna and flora of Canada.

Details of the work in Anthropology and Biology are given in the reports of D. Jenness and R. M. Anderson, respectively, that follow.

MUSEUM LECTURE COURSE

The committee in charge of the lectures consisted of M. E. Wilson (nominated by the Director of the Geological Survey to succeed D. B. Dowling, deceased), and C. L. Patch and H. I. Smith, of the Museum staff, the last-mentioned officer being chairman. The committee reports as follows:

The interest evinced in the lectures in previous years was well maintained. Because of the limited capacity of the lecture hall it was necessary to repeat the Saturday morning lectures so as to accommodate all the children attending. The total attendance of children was 12,350, and of adults 2,303. The lecturers were secured from the Entomological Service, the Central Experimental Farm, the Canadian National Parks, the Dominion Observatory, the Geodetic Survey, the Dominion Forestry Service, the Geological Survey, the Mines Branch, and the Victoria Memorial Museum. The lectures were illustrated by stereopticon views and by moving pictures supplied by the Canadian Government Motion Picture Bureau, the Ontario Provincial Motion Picture Bureau, the Canadian National Parks, the Central Experimental Farm, and by a few from the small collection at the Museum. The lectures (which were given on Saturdays for children and on the following Wednesdays for adults) are listed below.

How Some of the Indians Lived, by J. Douglas Leechman, December 5 and December 9, 1925.

How Insects Live, by H. G. Crawford, December 12 and December 16, 1925.

Birds and Their Protection, by Hoyes Lloyd, December 19 and December 23, 1925.

How We Make a New Wheat, by L. H. Newman, December 26 and December 30, 1925.

Rocks and How They Are Formed, by W. F. James, January 2 and January 6, 1926.

Volcanoes, Old and New, by F. J. Alcock, January 9 and January 13, 1926.

A Cup and Saucer, by H. Frechette, January 16 and January 20, 1926.

Hunting Dinosaurs in the Badlands of Alberta, by C. M. Sternberg, January 23 and January 27, 1926.

Earthquakes and Their Autographs, by E. A. Hodgson, January 30 and February 3, 1926.

The Building of Mountains, by L. J. Weeks, February 6 and February 10, 1926.

Some Insect Invaders, by L. S. McLaine, February 13 and February 17, 1926.

The Ascent of Mount Logan, by H. F. Lambert, February 20 and February 24, 1926.

How We Make a New Apple, by W. T. Macoun, February 27 and March 3, 1926.

Indian Masks and Totem Poles, by Marius Barbeau, March 6 and March 10, 1926.

The Place of Fossils in Earth History, by W. S. Dyer, March 13 and March 17, 1926.

The People's Forests, by D. Roy Cameron, March 20 and March 24, 1926.

Poultry Keeping For Young People, by F. C. Elford, March 27 and March 31, 1926.

The lecture hall was, as in previous years, much in demand for lectures, meetings, recitals, and plays, by the Ottawa Drama League. The total number of engagements, additional to those of the museum lecture course, was ninety-eight.

ANTHROPOLOGICAL DIVISION

CHANGES IN ORGANIZATION AND STAFF

D. Jenness, Chief of the Division, reports:

The outstanding event of the past year was the resignation of Dr. Edward Sapir, who had been Chief of the Division since its formation in 1910. While the Division deeply regrets his loss, it rejoices that he has not severed his connexion entirely, but will complete for it some of the important studies that he has undertaken during his term of service.

Mr. D. Jenness was appointed to succeed Dr. Sapir as Chief of the Division on January 12, 1926, and Mr. Harlan I. Smith was placed in charge of the exhibition halls.

Exhibits and Care of Material

A number of the exhibits in the west hall were rearranged and provided with new labels during the past year. Comprehensive plans have been prepared for the complete reorganization of the east hall. The types and number of cases required have been determined, and hopes are entertained that a certain number can be provided yearly until the plan is complete. One-half of the hall will then display specimens from the Indian tribes of the Plains and Plateau areas, the other half will contain synoptic exhibits of Indian basketry, wood carving, and similar handicrafts.

A special exhibit illustrating the work of the division was arranged for the meeting of the Canadian Institute of Mining and Metallurgy held in Montreal, March 3 to 5, 1926. Furthermore, a small case was placed in the east exhibition hall for the display of newly acquired specimens that were calculated to attract public interest, and this exhibit has been changed monthly to give variety.

All collections received by the division during the last twelve months have been cleaned, repaired when necessary, catalogued, and placed in storage or on exhibition as expeditiously as possible. New storage quarters were secured on Frank street, and shelving and other necessities were provided there. The extra space now available will simplify the care of material now stored in several places and render it more accessible for examination and study, each storage room being equipped with a desk and working table.

Much use has been made of the special collections of specimens which are lent to students of the Normal School, and to teachers. Specimens have also been borrowed by artists interested in designs, and more requests for assistance along this line are anticipated.

Mr. Leechman, the preparator, inspected all the exhibition and storage cases at least once a month, as a safeguard against moths and other insects; no specimens were lost during the year through these agencies. He rearranged some of the exhibition cases in the west hall, and catalogued and placed on exhibition a collection of Eskimo and other specimens for the Northwest Territories and Yukon Branch, Department of the Interior. In addition he rearranged all the storage rooms, catalogued about 4,500 specimens, and cleaned and repaired about 5,000.

The catalogues of the division contained on March 31, 1926, 49,777 specimen entries, divided as follows:

Canadian ethnology.. . . .	17,049
Non-Canadian ethnology.. . . .	84
Physical anthropology.. . . .	685
Archæology.. . . .	31,959

Specimens of the same type, from the same locality, are in many cases grouped under one number, and distinguished by letters of the alphabet, so that the total number of anthropological specimens in the possession of the Museum approaches 60,000. During the fifteen years of its existence, therefore, the division has gathered representative collections, probably the most complete in existence, illustrating the material culture of the native tribes of Canada. Every year it is adding several thousand specimens. At present only about one-tenth of its collections can be placed on view, but when the division secures proper cases for the east exhibition hall, and a museum helper to aid the preparator in the care of specimens and cases, the quantity of material that can be exhibited to the public will be more than doubled.

Field and Office Research

The division had four parties in the field during the year for scientific research: Mr. C. M. Barbeau studied the folk-lore and handicrafts of French Canada at île d'Orléans, Quebec; Mr. Harlan I. Smith supervised the preservation of the totem poles along Skeena river and studied the archæology and ethnobotany of that region; Mr. W. J. Wintemberg made an archæological reconnaissance in Saskatchewan and Alberta; and Prof. Leonard Bloomfield carried on linguistic work for the division among the Crees of Saskatchewan.

Mr. D. Jenness had arranged to work on linguistics with two Eskimo prisoners detained at Stony Mountain Penitentiary, but the project fell through because the ill health of the prisoners compelled their immediate restoration to their homes in the Arctic. He, therefore, continued his work in the office on Eskimo linguistics, technology, and archæology, and on the social organization of the Sekani Indians of British Columbia. After Dr. Sapir's resignation he devoted much time to administrative work. He attended a meeting of the American Anthropological Association at New Haven between Christmas and New Years, where he read a paper on Sekani social organization. He then visited Philadelphia and New York to study the Eskimo collections in the University of Pennsylvania Museum and the American Museum of Natural History. After his return he examined and identified for Mr. C. C. McCaul, K.C., of Edmonton, a large collection of Eskimo specimens recently recovered from some ancient ruins on Victoria island, North West Territories. He also superintended the final passage through the press of "The Songs of the Copper Eskimo," a five hundred page work that forms volume 14 of the series of reports of the Canadian Arctic Expedition, 1913-1918; and prepared a memorandum for the Department of Indian Affairs outlining a comprehensive plan for the education of the Eskimos of northern Canada.

Mr. C. M. Barbeau resumed his folk-lore investigations in Quebec early in June and continued them until the end of October, principally on île d'Orléans and neighbouring districts. Though he recorded, as on previous surveys, a large number of folk songs and other narratives, his attention this year was chiefly directed to the study of ancient manual arts, in the sphere of both folk and academic crafts. The colonial lore and technology have exerted an overwhelming influence on the traditions, decorative arts, and material culture of the Indians, not only in St. Lawrence valley, but also, directly or through indirect contacts, throughout a considerable part of North America. The new field of architecture (including sculpture, painting, and embroidery for mural or panel decoration) has proved immensely rich—the School of Art founded in 1669 by Mgr. de Laval having implanted here the French "renaissance" tradition so definitely that it has survived to the present day. Several additional surveys will be required to cover this field satisfactorily. As in former years Mr. Barbeau enlisted the support of several collaborators, who generously contributed to our collections; in particular M. E. Z. Massicotte, M. Adélard Lambert, Mrs. J. Mount-Duckett, Prof. F. O. Call, M. Arthur Tardif, M. Philippe Angers, MM. les abbés F. X. Cimon et O. Maurault, and others.

Mr. Harlan I. Smith superintended from June to September the work of preserving the Indian totem poles at Kitwanga, on Skeena river, B.C., as arranged interdepartmentally with the Department of Indian Affairs and the Canadian National railways. The few days he was able to spare from this work he devoted to the study of the archæology and ethnobotany of the region, and to the collection of specimens illustrating the material culture of the natives. The totem-pole work also occupied much of his time in the office.

*Accessions**Accessions of Ethnological Specimens*

Specimens collected in the course of field work by members of the Division of Anthropology include:

By C. M. Barbeau:

Collection of approximately 275 specimens illustrating French Canadian arts and crafts from Quebec.

By Harlan I. Smith:

Collection of approximately 50 specimens from British Columbia.
60 Carrier baskets from Hazelton, B.C.

By W. J. Wintemberg:

21 Stony Indian specimens from Alberta.
25 Cree specimens from Alberta and Saskatchewan.

There have been received as gifts:

From Mr. E. T. Adney:

6 models of Malecite canoe building tools.

From Mr. R. S. Finnie:

9 Eskimo specimens from Baffin island.

From Mr. O. S. Finnie:

19 Eskimo specimens from Coronation gulf.
1 pair of Nahane armlets from Liard river.

From Mr. Cameron Stanton:

1 rattle from British Columbia.

From Mr. J. H. McLeod:

2 wooden carvings from British Columbia.

From Mrs. J. T. Mitchell:

11 specimens from the west coast of Africa.

From Mr. J. D. Soper:

3 Eskimo specimens from Baffin island.

There have been acquired by purchase:

From Major C. A. Bradbrooke:

11 Chipewyan specimens from Saskatchewan.

From V. Hyde Baker:

154 Kootenay specimens from British Columbia.

Exchanges

There have been transmitted to other institutions as exchange material:

1 Tsimshian fish-trap in exchange for one box of archæological specimens from Mr. C. C. Willoughby, Peabody Museum, Cambridge, Mass.

1 Tsimshian fish-trap in exchange for three woven Ojibwa bags from the American Museum of Natural History, New York.

Accessions in Physical Anthropology

Specimens collected in the course of field work by members of the Division of Anthropology include:

By W. J. Wintemberg:

1 Indian skeleton from Buena Vista, Sask.

There have been received as gifts:

From Prof. E. E. Prince:

- 1 human mandible from the strait of Georgia, B.C.
- 3 human crania from Australia.

From Mr. R. S. Finnie:

- 6 incomplete Eskimo skeletons from Dundas harbour.

From Mr. P. A. Davy:

- 2 incomplete human mandibles from Healy falls, Ont.

Accessions of Manuscripts

Ethnological manuscript collected for the Victoria Memorial Museum by members connected with the Division of Anthropology:

By Professor L. Bloomfield, Columbus, Ohio:

- 726 typewritten pages of Cree texts.

There have been received as gifts:

From Richard Finnie, Ottawa, Ont.:

- MS. of 4 typewritten pages and sketch map of part of Kane basin.

From Mr. Blanchet, Department of Interior, Ottawa:

- MS. of 8 typewritten pages of Notes on Indian Life in Mackenzie River area.

From Mr. Harwood Steele, Montreal, Que.:

- MS. of 3 typewritten sheets and 4 plans of rivers in Eclipse sound, Baffin island, to accompany specimens of Sergeant Joy, R.C.M.P.

Accessions of Phonograph Records

There have been collected by members of the Division of Anthropology in the course of field work:

By C. M. Barbeau:

- 160 phonograph records from Quebec.

There have been received as gifts:

From M. A. Lambert:

- 124 phonograph records from Quebec.

From Mr. Percy Grainger:

- 8 Victor records of English folk-songs.

Photographic Work

Ethnological photographs taken or collected for the Museum by officers connected with the Division of Anthropology:

By Harlan I. Smith:

- 2 Tsimshian photographs from Kitwanooc, B.C.
- 18 Carrier photographs from Hagwelgate, B.C.
- 18 Tsimshian photographs from Hazelton, B.C.
- 622 Tsimshian photographs from Kitwanga, B.C.

By C. M. Barbeau:

- 2 Kootenay photographs.
- 5 Micmac photographs.
- 1 Haida photograph.

There have been received as gifts:

From C. Johnson:

- 4 Eastern Cree photographs from near Battleford, Saskatchewan.

From Richard S. Finnie:

2 Eskimo photographs in the Northern archipelago.

From Harwood Steele, Montreal, Que.:

3 prints from Eclipse sound, Baffin island.

From Dr. J. M. Cooper, Catholic University of America, Washington, D.C.:

50 Montagnais photographs from Tête-de-Boule, St. Maurice river, Que.

11 Carrier photographs from Babine village, B.C.

7 Carrier photographs from Moricetown, B.C.

1 Carrier photograph from Bulkley valley, B.C.

13 Carrier photographs from Babine village and river, B.C.

1 Tsimshian photograph from Kitwanga, B.C.

4 Tsimshian photographs from Kispiox, B.C.

FOLK-LORE

C. Marius Barbeau reports that the folk-lore data collected for the Museum during the past year stand as follows (a summary of the totals covering the years 1914-1926 is also appended):

Accessions

French

The Barbeau (C. M.) Collection:

615 song texts collected chiefly on île d'Orléans (Quebec county)

159 melodies (of the same songs) recorded on the phonograph; 1 melody recorded by ear

279 specimens illustrating the manual arts of French Canada

954 photographs taken of people, buildings, church carvings, and technical devices

130 photographs obtained from various sources not otherwise listed below

A vast amount of historical notes and data on the colonial architecture of French Canada (1648-1925), copied from parish records and the archives of several institutions

Bulky notes on the manual arts and material culture of the peasants of île d'Orléans and île aux Coudres.

The Massicotte (E. Z.) Collection:

144 song texts, chiefly the Lavallée collection (Berthier county); some from Gaspé and Quebec

15 melodies recorded by ear

135 photographs of buildings, shrines, and people in Montreal district

The Lambert (Adélarde) Collection:

23 song texts from Berthier and other counties

24 song melodies recorded on the phonograph

The Call (Prof. F. O.) Collection:

84 photographs of buildings, shrines, and people of the province of Quebec

The Mount-Duckett (Mrs. J.) Collection:

6 folk-song texts of Quebec

5 rhymes and sayings

The Tardif (Arthur) Collection:

11 folk-song texts, chiefly from the Acadians of the Maritime Provinces

The Angers (Philippe) Collection:

8 folk-song texts, from Beauce county

Miscellanea:

MS. notes on ancient architecture furnished by Rev. F. X. Cimon, Rev. Olivier Maureault, Aegidius Fauteux, and P.-George Roy; 24 photographs of settlements of the north shore of the St. Lawrence, by Frits Johansen; 3 photographs, by Paul Beau; 1 French folk song, by A. Roche; 3 photographs, by J. M. Gibbon; 1 folk song, by J. de L. Taché.

*English**The Wintemberg (W. J.) Collection:*

Folk-lore data from Grey county, Ont.; 9 similes; 18 sayings and expressions; 11 rhymes; 2 riddles; 1 tongue-twister; 5 items on weather lore; 9 items, miscellaneous lore

7 folk songs, in text only

1 specimen, from the Dukhobors of Saskatchewan

Miscellanea:

From Mrs. J. Mount-Duckett, 3 folk-song texts; from E. Z. Massicotte, 1 folk-song text; from Charles Macnamara, 1 folk-song text; from Percy Grainger, phonograph reproductions of 9 English folk songs

*Totals (1914-1926)**French*

6,216 song texts, excluding those in a few manuscripts

3,762 song melodies recorded on the phonograph

494 song melodies recorded by ear

316 folk tales

184 anecdotes and narratives

3,761 photographs

105 dance melodies (excluding those in old notebooks)

300 specimens illustrating the manual arts of Quebec

Blason populaire (or folk nicknames in a few counties)

A large number of rhymes, sayings, remedies, folk beliefs, etc.

Voluminous data on the ancient architecture and manual arts of Quebec (a small part of this material has been published)

English

2,000, or over, formulæ, beliefs, sayings, remedies recorded in various parts of Canada
125, or more folk songs

(A considerable part of this material has been published)

91 manuscript pages, British folk-lore as recorded along Fraser river, B.C., by J. A. Teit

Miscellaneous folk-lore from Ontario (Wintemberg Coll.); Nova Scotia (B. Hay-Shaw Coll.); Canadian negro lore, etc., 1 specimen.

English-Scandinavian

"The Water-beings of Shetlandic Folk-lore," recorded by J. A. Teit in British Columbia (published, 21 pages)

German-Canadian

134 typewritten pages of folk-lore collected in Ontario by W. J. Wintemberg

ARCHÆOLOGY

Harlan I. Smith, archæologist, reports:

The archæological exhibits remained practically unchanged during the year, and were open to the public.

Accessions

The accessions to the archæological collections are as follows:

Collected by Officers of the Division

Accessions 312, 316-320, 323, and 325. Archæological specimens and a squeeze of a petroglyph, from Saskatchewan and Alberta. Collected by W. J. Wintemberg.

Accession 337. An adze made of stone, from Kitwanga, British Columbia; a harpoon point, from Hazelton, B.C.; a petroglyph, from Kispiox, B.C.; a pile-driver made of stone, from Bella Coola valley, B.C.; and plaster of paris moulds of two petroglyphs, from Kispiox, B.C. Collected by Harlan I. Smith.

Accessions 329-333. Five hundred and seventy-eight archæological specimens, from the Arctic coast of Canada and Alaska. Collected by the Canadian Arctic expedition, 1913-1918.

Collected by Other Officers of the Department

- Accession 324. A perforated clam shell, from near Rumsey, Alberta. Collected by C. M. Sternberg.
- Accession 328. Archæological specimens from the neighbourhood of Bylot island, near Baffin island. Presented by J. Dewey Soper.

Gifts

- Accession 310. Twenty-seven archæological specimens, from the coast of Florida. Presented by Clarence B. Moore, Philadelphia, Pa.
- Accession 311. Fifteen fragments of pottery, from the coast of Florida. Presented by Prof. E. E. Prince, Ottawa.
- Accession 313. A point for an arrow, a scraper, and a leaf-shaped blade, all clipped from stone, from NE. $\frac{1}{4}$ sec. 11, tp. 2, range 8, W. 2nd mer., Saskatchewan. Presented by William Bevan, Estevan, Saskatchewan.
- Accession 314. A grooved hammer made of quartz, from near Roche-Percée, Saskatchewan. Presented by William McQuarrie, Roche-Percée, Saskatchewan.
- Accession 315. A grooved hammer made of stone, from SE. $\frac{1}{4}$ sec. 36, tp. 4, range 8, W. 2nd mer., Saskatchewan. Presented by William Allison, Estevan, Saskatchewan.
- Accession 321. An inscribed quartzite boulder, from southeastern Alberta. Presented by John MacDonald, Fort Qu'Appelle, Saskatchewan.
- Accession 326. Archæological specimens, from Beausoleil island, Simcoe county, Ontario. Presented by Hoyes Lloyd, Canadian National Parks Branch, Department of the Interior.
- Accession 327. Plaster of paris cast of one side of a disk made of stone, from Wawota, Saskatchewan. Presented by H. H. Mitchell, Provincial Museum, Regina, Saskatchewan.
- Accession 334. Archæological specimens, from west side of Navy Board inlet, Baffin island. Presented by H. E. Steele, Montreal, Que.
- Accession 335. Plaster of paris casts of two archæological specimens from southern Alberta. Presented by Dr. J. A. Allan, University of Alberta.
- Accession 336. Gouge made of stone, from bank of river de la Graise, Glengarry county, Ontario. Presented by Mr. A. J. MacLaurin, Dalkeith, Ontario.
- Accession 338. One of a pair of arrow-shaft smoothers, from the west side of the stillwater of Atnarko river, B.C. Collected and presented by Walter E. Ratcliffe, Atnarko, B.C.
- Accession 309. Seventy-eight archæological specimens, from the New England States, U.S.A. Exchange from Peabody Museum, Cambridge, Massachusetts.

Purchases

- Accession 306. Prehistoric perforated skull, from near St. Williams, Ontario. Purchased from F. V. Dedrick, St. Williams, Ontario.
- Accession 322. Three archæological specimens, from near Batoche, Saskatchewan. Purchased from Mrs. Napoleon Venne, Batoche, Saskatchewan.

Field Work

Archæological explorations were carried on in British Columbia by Harlan I. Smith, and in Alberta and Saskatchewan by W. J. Wintemberg.

Mr. Smith's work was incidental to directing the interdepartmental work of totem-pole conservation. He discovered and photographed a pictograph, consisting of eight pictures, within sight of the Canadian National railway about 2 miles east of Tyee, B.C., on the north side of Skeena river near tide-water. Seven pictures, painted red, represent "coppers;" the eighth, painted brown, a large anthropoid face, possibly of a mythical being. Since this pictograph should be a valuable tourist attraction a recommendation has gone forward that it be set aside as a national monument.

A small petroglyph from between Kispiox and Hazelton, B.C., was secured, and tracings, photographs, and plaster of paris moulds were made of two others from Kispiox, one in the possession of the C. V. Smith estate of Hazelton, the other on the Hospital grounds at the same town. Motion pictures were also made of these petroglyphs.

A nearly semi-cylindrical arrow-shaft smoother, made of sandstone, was secured as a gift from the collector, Mr. Walter E. Ratcliffe, Atnarko, B.C. It was found on the west side of the stillwater of Atnarko river, B.C., and is of particular interest, because it marks, probably, the northwestern limit of the distribution of this form of artifact so common in the plateau country from Nevada to southern British Columbia. The location is in old Bella Coola territory, but the form has not been found among Bella Coola remains, and is probably assignable to the Chilcotin who inhabited the neighbourhood.

Mr. Smith also reported upon a petroglyph, about 2 miles east of Kamsack, Saskatchewan, unique because the outline was formed by scraping away the lichens and other dirt on the face of a limestone boulder. It represents a thunderbird, and dates back four generations. Like the pictograph near Tyee, B.C., it is of value as a tourist attraction, being visible from trains running over the main line of the Canadian National railway between Winnipeg and Edmonton.

Mr. Wintemberg made an archaeological reconnaissance in Alberta and Saskatchewan, lasting four months. Commencing at Estevan, in the south-eastern part of Saskatchewan, he examined the country near Roche-Percée, Weyburn, Regina, Pilot Butte, Mortlach, Regina Beach, Fort Qu'Appelle, Kamsack, Saskatoon, Dundurn, Duck Lake, Prince Albert, North Battleford, Maple Creek, Swift Current, and Radville. In Alberta, he examined the country near Vermilion, Edmonton, Wabamun, Wetaskiwin, Red Deer, Big Valley, Rumsey, Calgary, Cochrane, High River, Macleod, Lethbridge, Taber, and Medicine Hat.

Notes and drawings were made of specimens in the Provincial Museum, Regina; in the Museum of the University of Saskatchewan, Saskatoon; in the Museum of the University of Alberta, Edmonton; and in three private collections at Vermilion, High River, and Mortlach.

Tepee circles of stones were found near most of the places, except in the northern part of the country, between Edmonton and Kamsack. They are located mostly on the high banks of streams and lakes. Some of the circles, judging from the fact that the stones composing them are deeply embedded in the ground, are probably old. Others are recent, as is indicated by the presence of glass beads and pieces of sheet brass; although even in these, tools chipped from stone are found. Very few artifacts are found within or near the tepee circles. Cairn graves occur near many of the circles, the majority probably of recent origin.

No mounds were discovered, but some are reported near Oxbow, in south-eastern Saskatchewan.

Several boulder mosaics were examined, and information was obtained concerning the location of others. All appear to be recent. Detailed measurements were made of a human figure which forms part of the group near Rumsey. Associated forms included a figure like a sun-dial, with a large cairn grave in the centre, and what is supposed to represent a dog and a horse.

Photographs were made of some petroglyphs on rocks near Roche-Percée, a stone disk with the figure of a turtle incised on one side from Wawota, Saskatchewan, and of a human face carved on a large boulder, from somewhere east of Last Mountain lake. A paper squeeze was made of a similar carving on a boulder found in the File hills, Saskatchewan. Mr. Wintemberg also examined what is known as the "Thunderbird Rock" near Kamsack.

As compared with finds at Iroquoian, and even Algonkin sites in eastern Canada, the number and variety of artifacts discovered by Mr. Wintemberg are very limited. Very characteristic of the plains, but rare in Ontario, are: grooved hammers, tepee circles, petroglyphs, boulder mosaics, and cairns; characteristic of Ontario, but rare in the plains, are: grooved stone axes, celts, adzes,

gouges, old stone pipes, shell objects, pottery, and mounds. To develop in detail the differences outlined above, however, would require intensive field work carried on through several seasons.

The archæological material from the site of Hochelaga, in the Redpath and McCord Museums and in the Chateau de Ramezay, Montreal, was studied by Mr. Wintemberg for a short time during the winter.

Office Work

Mr. Smith prepared a report on the petroglyph near Kamsack, Saskatchewan, for the Canadian National Parks Branch, Department of the Interior, at whose request he had visited it. He also prepared for publication several papers, some of which were published during the year.

A list of the chief sites of petroglyphs and pictographs in British Columbia was supplied from the archæological file for use by the Legislative Assembly of British Columbia, which has passed a law for the conservation of these and similar objects.

A cast of the petroglyph on a boulder from Kispiox was presented to the Provincial Museum, Victoria, B.C., and to the collection at Kitwanga; one of the petroglyph on a slab of rock from Kispiox was presented to the Prince Rupert Museum and to the collections at Kitwanga.

Mr. W. J. Wintemberg continued his study of the culture of the prehistoric Iroquoian village site near Roebuck, Grenville county, Ontario, and the preparation of the monograph on this subject. He wrote numerous notes covering the results of his reconnaissance in Alberta and Saskatchewan for the archæological file, and also prepared a few papers for publication.

BIOLOGICAL DIVISION

EXHIBITS AND RESEARCH

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

Since April, 1925, considerable progress has been made in installation of biological exhibits in the Museum halls. Six of the unit-sized cases of mahogany and plate-glass construction have been set up by the staff carpenters and these have been devoted to the systematic exhibit of Canadian birds, which is being rapidly installed. Nine of these cases along the north wall of the east hall on the second floor of the Museum building will contain the systematic exhibit of mounted birds and will display well-mounted single specimens or small habitat groups of almost all the species of birds now found in Canada. This will enable the visitor or bird student easily to examine any species desired for identification or comparison. Expansion of the work of the department and contraction of space have also prevented the staff from preparing many new display groups, but much of the old material has been cleaned, remounted, and put on new stands. A few new groups have been added.

The exhibits are as rapidly as possible being provided with new labels, giving in large type the English, French, and scientific names of each species. The labels will also carry important facts about the bird and its habits, distribution maps showing range of each species, and, wherever possible, photographs illustrating some phase of the life-history of the species.

Some progress has also been made in mounting small mammals for a systematic series of Canadian mammals, paralleling the bird exhibits, and for this exhibit four new unit-sized cases of the same type as used for the mounted birds will be installed on the south side of the zoological hall. One large steel-frame case of mammal skeletons and skulls of representative species has been installed

in the west hall on the second floor in a space hitherto occupied by Indian exhibits. This includes complete mounted skeletons of musk-ox, American bison, elk, horse, polar bear, woodland caribou, white-tailed deer, prong-horned antelope, fur seal, and fruit bat. The mounted skulls include walrus, bighorn, Dall sheep, white-faced musk-ox, moose, Osborn caribou, white-tailed deer, mule deer, and Columbian black-tailed deer. A fine series of tusks of the narwhal are also exhibited in this case. These have all been comprehensively labelled, calling attention to the most important characteristics of the species represented. As the mammals are migratory only to a very limited extent, the coloured distribution maps are designed to show the present range, as well as the former range, to illustrate the contraction or expansion of the animal's range with the advent of settlement, amounting to extermination of many of the larger species over great areas where they were formerly abundant.

Some temporary exhibits which were installed in the Museum for the twenty-seventh Annual Meeting of the Canadian Institute of Mining and Metallurgy, March 4, 5, and 6, 1925, attracted considerable attention and were allowed to remain in place for some time in order to give the general public an opportunity to examine them at leisure. One of the most interesting of these was the collection of one hundred small coloured paintings of birds prepared by Major Allan Brooks, D.S.O., of Okanagan Landing, B.C., to illustrate "The Birds of Western Canada," which has now been published.

Many specimens in the lines of botany and vertebrate zoology are sent in every year from different parts of the country for determination, and numerous requests for information on a large variety of natural history topics and the literature on the subject are received from different departmental officers of the Dominion Government and the various provinces, as well as from the general public, and such inquiries have been answered by the officers of the Biological Division.

Numerous specimens have been loaned to schools for the illustration of natural history work, and selected natural history slides, particularly of birds, have been loaned for lecture purposes to persons engaged in educational work or wild life protection and conservation. Series of bird slides have been kept for loan at the British Columbia office of the Geological Survey in Vancouver, as well as in the Museum at Ottawa. Loans of special groups of animals and plants have also been made to museums, other institutions, and qualified individuals who have been preparing technical monographs of certain groups. Among such groups which have been loaned and returned to the Museum are the chipmunks of genera *Tamias* and *Eutamias*, ground squirrels of the genus *Citellus*, and shrews of the genus *Sorex*, to aid in completing monographs of the North American species of the above groups by officers of the United States Biological Survey.

The pressure due to lack of storage space was relieved to some extent by allowing the Biological Division some storage space in a storehouse on Frank street, sharing the storerooms with the Division of Anthropology of the Museum, and the Division of Palæontology of the Geological Survey.

OFFICE AND FIELD WORK

Considerable new data have been secured, and systematic efforts made to fill important gaps in the list of mammalian species in the Museum, both for purposes of exhibition in the mounted state and for research purposes. The filling in of these gaps is rapidly bringing together the necessary material for a systematic and popular handbook of the mammals of Canada, including the big game, fur-bearers, and other mammals of more or less doubtful economic importance.

Alarm is being felt in many quarters over the threatened extermination of many of our most interesting game and fur-bearing mammals, and it is very desirable that the National Museum obtain representative specimens of all species before it becomes too late to do so. The Museum has, for several years, been much handicapped in obtaining specimens of the most valuable fur-bearing mammals, because the prices of skins have been too high for limited funds. Most of the Museum field work has been done in the summer, when fur mammals are difficult to capture and are not in good condition, and as almost all the winter specimens are obtained by trappers, it is nearly impossible to obtain specimens except by purchase.

Specimens of valuable fur mammals are occasionally contributed to the Museum by public-spirited citizens. The situation is somewhat better in respect to the species of large game mammals. Good specimens are obtained from time to time from the Canadian National Parks, animals which die in the parks or are killed for various reasons, and from public-spirited sportsmen who kill desirable specimens during the autumn hunting season. It is to be hoped that Canadian sportsmen will adopt this policy of donating typical and desirable specimens to the nation, a custom which has been followed for years by British officials and travellers in all parts of the world and has resulted in building up the magnificent collection of the British Museum. The United States National Museum also has, during the last few years, received collections in this manner, and especially large cities such as Philadelphia, Chicago, Cleveland, Milwaukee, San Francisco, and Los Angeles. Some of these museums have recently obtained groups of Canadian large mammal species which are not to be equalled in any museum in Canada, and which in a few years will not be obtainable even in Canada.

Mr. Anderson spent some time editing, arranging, and proofreading the scientific reports of the Canadian Arctic Expedition, 1913-18, as general editor of reports for the Arctic Publications Committee. One of these volumes, in preparation, deals with "Mammals of the Western Arctic"; the other is on "Birds of the Western Arctic". The Arctic collections of the Museum are receiving valuable additions every year from the recent expeditions, and from individuals who have been working in the far north.

Mr. Anderson represented the Department of Mines on the Advisory Board on Wild Life Protection, the Northern Advisory Board, and the Committee on Oil Pollution of Navigable Waters. As a member of the Board of Directors of the American Society of Mammalogists he attended the business meetings and scientific sessions of the seventh annual meeting of the society held at the National Museum, Washington, D.C., April 7-10, 1925. During this meeting much valuable information was obtained from a symposium on the care and preservation of mammal material in museums. With Mr. P. A. Taverner, ornithologist of the division, he attended the Forty-third annual meeting of the American Ornithologists' Union, held at the American Museum of Natural History, New York city, November 10-12, 1925, presenting the invitation of the Honourable Charles Stewart, Minister of the Interior and Mines, the Museum officials, and the Ottawa Field Naturalists' Club, to hold the forty-fourth stated meeting of the Union at Ottawa in 1926. The invitation was accepted and the meeting will be held in the Victoria Memorial Museum in Ottawa, October 11-14, 1926. Although the American Ornithologists' Union is an international society, and has many Canadian fellows, members, and associates, it has never held a meeting in Canada, and the 1926 meeting is looked forward to by Canadian scientists as affording an admirable opportunity for exchange of scientific ideas, as well as being a stimulation to the causes of natural history study and wild life protection and conservation in Canada.

Leaving Ottawa September 21, 1925, Mr. Anderson proceeded to North Hatley, Stanstead county, Que., about 3 miles from lake Massawippi and about

12 miles north of the border of the state of Vermont. A trip was made to Orford mountain, where two days were spent near the summit and specimens collected from elevations ranging from 1,500 to 2,500 feet, on both sides of the line between Brome and Sherbrooke counties. The field work was brought to an abrupt close by an unseasonable fall of heavy snow on October 9 and 10.

P. A. Taverner (assisted part of the time by C. G. Harrold) worked along Red Deer river from Red Deer to Drumheller from June 20 to August 24. During the descent of the river and afterwards, particular attention was paid to the large raptorial birds, the study of which was begun in that region in 1917. New and valuable data were secured as to their occurrence, habits, and relationships.

Mr. Taverner proceeded to Comox, Vancouver island, B.C., where the week from September 9 to 16 was spent reviewing the summer's work of Mr. H. M. Laing, who had just returned from the Mount Logan expedition. On the route west Mr. Taverner studied the wader migrants at Beaverhill lake, Alberta, and stopped at Okanagan Landing and Victoria, interviewing prominent ornithologists and studying local collections.

The week of September 18 to 25 was spent studying the collections of the Museum of Vertebrate Zoology, University of California, Berkeley, and the week following at Pasadena, Cal., where much interesting specimen material was seen and numerous personal contacts made that will be of considerable value to the Museum. At Pasadena, opportunity was offered to do some collecting and a few particularly desirable specimens were secured. The return to Ottawa was made via the Grand canyon of the Colorado, Chicago, Detroit, and Toronto. Valuable information was obtained at a number of museums in these places and a good generalized idea obtained as to the character of the winter homes of many of our Canadian birds. Acknowledgments are due to the officers of the institutions visited, the game departments of the states passed through, and to the United States Biological Survey.

Charles H. Young, collector-preparator specialist, commenced work in Nova Scotia early in May. From Shag harbour, Shelburne county, he made trips with local fishermen to Mud island, one of the small group of low islands off the southern tip of Nova Scotia, for the purpose of collecting breeding sea birds and their eggs. The season was cold and backward, and the birds were late in arriving. Mr. Young proceeded to Yarmouth June 8, and remained there about three weeks. Noteworthy collections made by him in southern Nova Scotia were nests and eggs with surrounding accessories for habitat groups of Willet and Acadian Sharp-tailed Sparrow. Mr. Young then went to North Head, on the island of Grand Manan, New Brunswick, and remained there until about August 1, collecting birds and the insular forms of small mammals. From Grand Manan he recrossed to Digby, Nova Scotia, and spent the remainder of the season in the vicinity of Bear River, Digby county, returning to Ottawa on October 15.

Mr. Young also added a number of bird stomachs to the collection of bird stomachs and contents in the Museum. The collection now numbers over 15,000 specimens of bird stomachs, representing 389 species. Some of these have been critically examined and add much to our knowledge of the food habits of the different species of birds. Holders of federal permits to collect migratory birds are urged to preserve stomachs of birds in formalin and send them to the Museum, adding so much more to the scientific value of the specimens killed by the permit-holders.

The Museum lacking in spring plumages of certain species of birds from Manitoba, and needing fresh material for mounting other species for exhibition, Mr. C. G. Harrold, an expert taxidermist and field collector, of Winnipeg, was engaged to collect during the months of April and May, 1925, at Whitewater

lake, southwestern Manitoba. Mr. Harrold succeeded in securing good specimens of the most desired species, including Blue Goose, as well as a very large and complete collection of the smaller migrant and resident birds of that district. After June 1, Mr. Harrold proceeded to Alberta as ornithological assistant to Mr. Taverner on Red Deer river until August 1.

Baffin Island Expedition

Baffin island is approximately 950 miles long, 250 miles wide, with an area of about 211,000 square miles, the greater part of the interior being virtually unknown. The main part of the island has never been crossed by white men and possibly not even by Eskimos.

Although Scotch whalers have been operating on the east coast of the island for more than a century, and English and Canadian missionaries as well as traders have worked in some of the coast districts for a number of years, the coast-line has been only roughly charted on the eastern side, and much of the western coast-line is unknown.

Even on the coast, biological observations have been irregular and meagre, and of the interior still less is known. Some notes on the natural history of the northeast coast of Baffin island were given by J. C. Ross of the Barry expedition of 1824. The United States National Museum published some notes made by Ludwig Kumlien on the southeast coast in 1877. A few observations were made by one of the MacMillan expeditions on the southwest coast in 1922 and by a branch of the Danish Fifth Thule expedition on the northeast coast about the same time. Major L. T. Burwash, exploratory engineer of the Northwest Territories and Yukon branch, Department of the Interior, spent the winter of 1923-24 on the southeast coast and crossed in the early spring from Pangnirtung to Amadjuak on the north coast of Hudson strait, making some collections near Amadjuak, but owing to snow was not able to gather much information about the interior. Very few and scanty collections were made by the expeditions in natural history.

Owing to the present interest in Arctic and subarctic lands, and in the interests of national self respect and progress it has been deemed expedient to possess material in Dominion repositories illustrating the resources and products of these vast lands.

A well-known Canadian field naturalist, J. Dewey Soper, was sent with the annual expedition of the ship *Arctic* in 1923, visiting Greenland, Ellesmere island, North Devon, and Baffin island. Mr. Soper was enabled to make collections in various branches of natural history of such scientific importance that the authorities of the Museum were impressed with the possibilities of the large unknown field on Baffin island and the desirability of obtaining representative collections in zoology, botany, and ethnology. It is almost impossible to carry on any extended or complete scientific investigations during the short stops of an Arctic summer voyage, and a still greater handicap is the fact that the short Arctic summer is nearly over before the ice packs open enough to let the ships come in. To obtain knowledge of spring and early summer conditions under present methods of travel an observer must spend the winter in the north. For this reason the Museum sent Mr. Soper to Baffin island in 1924, prepared to winter there and spend the following season in intensive field work.

Mr. Soper sailed from Quebec July 5, 1924, on the C.G.S. *Arctic*, and was landed at Pangnirtung, Cumberland sound, on the southeast coast of Baffin island, July 22, 1924. It had been intended that he should go on the *Arctic* to the more northern posts and be landed at Pangnirtung on the return voyage, but loss of a large part of the ship's deck-load in a severe storm in the north Atlantic caused a shortage of coal, making it doubtful whether the *Arctic* would be able to revisit Pangnirtung in 1924. Mr. Soper decided to go ashore at the

first opportunity. Some of his stores were short, but the Royal Canadian Mounted Police and the Hudson's Bay Company have posts at Pangnirtung and Mr. Soper was able to get what he needed and received valuable assistance from both these sources. The autumn of 1924 was spent in preliminary work around Pangnirtung, which is in latitude 66° 09' north, longitude 65° 30' west. The following is a brief summary of Mr. Soper's itinerary and scientific work, based on the last reports received from him written in September, 1925:

1924. July 28. A trip was made to Kekerton islands on Hudson's Bay Company's launch *Ungava*. The rugged and precipitous coast, high tides, and frequent and terrific gales make summer work on the coast hazardous and impracticable except with a fairly large sea-going boat.

July 30. A trip was made to Kingwah fiord on *Ungava*, visiting the site of the old Dutch Polar station of 1881. Melooalee fiord was also visited and a 2,000-foot mountain climbed and named mount Edmonton. Returned to Pangnirtung August 4.

August 17. A voyage was made to Blacklead island on the *Ungava*. Extensive collections were made, illustrative of the fauna and flora of a wind-swept Arctic coast island.

August 24. Niantilik harbour and the old mica mine were visited. Returned to Pangnirtung on the Hudson's Bay Company's ship *Nascopie*, and several boxes of specimens were shipped to Ottawa.

September 15. A trip was made to end of Pangnirtung fiord on Royal Canadian Mounted Police power-boat *Lady Borden*.

September 24. Patrol to cape Mercy on *Lady Borden*, but heavy seas caused return.

October 12. Accompanied patrol to Kingwah fiord and made cache of provisions and gasoline.

October 21. The Hudson's Bay Company's launch landed goods for Mr. Soper on Nettilling fiord.

October 22. Caribou came down to Pangnirtung fiord and eleven specimens taken on the big hunt were preserved. These specimens have arrived at Ottawa, being the first caribou specimens received from the eastern Arctic region.

December 3. Made a sledge trip up Koolee river, northwest of Pangnirtung fiord. A sketch map was made of the river and a series of lakes explored.

1925. January 5. Started for Kingwah fiord, and turned back on January 11 on account of deep snow. A good sketch map was made, founded on compass angles and corrected for full length of this fiord. Geological notes were made and record left showing the impracticability of certain routes.

January 16. Crossed head of fiord to Nunata, and to Mr. Duval's post on January 20, returning to Pangnirtung after a 400-mile sledge trip. A sketch map was made of the whole route, with many valuable notes on the topography.

February 6. Went up Pangnirtung river, exploring a series of lakes and glaciers, with mountains up to 4,000 to 5,000 feet elevation. Crossed Pangnirtung pass over the Penny Highland and down to the north side of Cumberland peninsula to Broughton island, Kevato, and Merchant bay, returning a little farther to the eastward over Kingnait pass, which is much lower than Pangnirtung pass. Compiled a sketch map of the route traversed, about 600 miles, made in thirty-four days, returning to Pangnirtung March 11, 1925. Mr. Soper writes: "This doubtless is the first time these passes have been traversed by anyone capable of, or with the inclination to render, a detailed account accompanied by approximately correct sketch maps."

With the report up to March, 1925, are given summarized and annotated lists of thirty-eight species of birds and thirteen species of mammals.

In the autumn of 1924, 1,200 pounds of provisions had been laid down near the head of Nettilling fiord, and an additional 300 pounds in the spring. The large canoe and wooden boat which had been brought in for exploring the interior were not considered by the local experts to be safe for navigating the very large lakes of the interior of Baffin island and the Royal Canadian Mounted Police authorities co-operated by loaning the *Fly*, a 23-foot surf boat of 5-foot beam and with sails, and by allowing Constable T. Tredgold, R.C.M.P., to accompany Mr. Soper as an exploratory police patrol. The *Fly* was hauled from Nettilling fiord to Netsalik¹ lake on a large sledge. Constable Tredgold was interested in natural history, and Mr. Soper was fortunate in having his assistance, and is also under obligations to Staff Sergeant J. E. F. Wight, R.C.M.P., for co-operating in carrying on this patrol and for many other kindnesses.

¹ Netsalik lake is the same as Nettilling lake, as used in Report for 1924-25, p. 24.

The party left Pangnirtung April 22, 1925, with eleven Eskimos, five sledges, and seventy dogs, arriving at Netsalik lake May 5, about 180 miles from Pangnirtung. The summer was spent in intensive field work collecting, surveying, and photographing. The lake did not break up until August 5. Soper and Tredgold were obliged to return to the coast in accordance with an agreement with the police and could not get back to the base camp on the lake until August 17. They set sail in the *Fly* August 18, and passed around the south end of Netsalik lake, crossing the mouth of Amadjuak river which comes in from the south, proceeding on the west side of Netsalik lake to its outlet, the Koudjuak river, which empties into Fox channel. Freezing weather compelled return from Koudjuak river after descending it for several miles, and the base camp was reached September 9. Sergeant Wight arrived with the *Lady Borden* on September 20, and as it was too late to get the summer's collection to the station in time to send it out by the *Arctic*, the collection was cached in a cave and plans made to haul it out early in the winter of 1925-26.

Mr. Soper's plans as sent out were to spend part of the winter at Pangnirtung, haul the specimens out to the coast by sledge and pack them for shipment to Ottawa in 1926 on the annual Government patrol vessel, and then to travel south overland to Amadjuak lake and Amadjuak bay on the south coast of Baffin island, on the north shore of Hudson strait. During the summer of 1926 it was hoped to find out something about the well-known Blue Goose, the nest of which has never been found by white men, to make botanical collections which may throw light on the possibilities of the island as a range for reindeer, and also to make some investigations on the question of the early Eskimo settlements which are supposed to have left ruins in the interior of Baffin island. Mr. Soper is expected to return to Ottawa in the autumn of 1926. The expedition has already added much to our knowledge of Baffin island. Mr. Soper's collections up to September, 1925, are in part as follows:

Birds and mammals, including sets of birds' eggs, 548.

Plants, 606 botanical sheets, with many duplicates, numbering altogether 2,000 to 3,000 specimens, being what he considers a practically complete collection of the flora of the Netsalik Lake region of central Baffin island.

Insects, including 80 butterflies, 168.

Photographic prints sent out, 178, and many other negatives. These do not include photographs taken on Mr. Soper's exploratory trip in the interior in the summer of 1925.

Geological collections, all important rock formations, sketches, and maps.

A rare opportunity was suggested in the spring of 1925 by the expedition of the Alpine Club of Canada to mount Logan, Yukon, to obtain zoological and botanical collections from the biologically little known Chitina River Valley region of Alaska, up to the base of mount Logan. Mount Logan, the highest mountain peak in the Dominion of Canada, is situated in one of the most inaccessible regions. Arrangements were made with the committee in charge of the expedition, particularly Captain A. H. McCarthy, Wilmer, B.C., and Mr. H. E. Lambert, Geodetic Survey of Canada, second-in-command, to take along Mr. Hamilton M. Laing, of Comox, Vancouver island, B.C. Mr. Laing had worked as junior zoologist for the Museum in the field during two previous seasons, and for the Museum as naturalist on the cruise of the C.G.S. *Thiepval* in 1924. It was agreed that Mr. Laing, who is an expert photographer, would reciprocate by taking motion pictures illustrating the work of the expedition. The Department of Trade and Commerce kindly loaned a motion picture camera and accessories for the use of Mr. Laing.

The expedition sailed from Seattle May 2, 1925, reaching Cordova, Alaska, May 12, proceeding thence by rail to McCarthy, Alaska, from which point the expedition travelled up the Chitina River valley by pack train.¹ Advance parties had hauled considerable quantities of provisions and equipment to the base of

¹ An account of the expedition, including an article by Mr. Laing, is published in *The Canadian Alpine Journal*, volume XV, 1925.

mount Logan during the preceding winter by horse sledges and dog teams. Mr. Laing remained at the base camp on Chitina river, near timber-line, near the Alaska-Yukon International Boundary line, making large collections of mammals, birds, plants, and other natural history specimens, until the return of the advance party in July, after a successful ascent of mount Logan. The mountain climbers built rafts here and floated down the river to McCarthy, while Mr. Laing remained at the upper camp for several weeks longer, according to arrangement, in order to complete his biological collections. He returned to Comox about September 1, and his collections eventually arrived in Ottawa in good condition. They numbered, birds 203, mammals 61, plants 245, and a few other specimens, about 60 excellent photographs, and nearly 4,000 feet of excellent motion picture film, including a large percentage of good natural history pictures—birds, mammals, and plants. Mr. Laing has prepared an extensive report on the natural history of the region traversed, which may later be published by the department as a Museum bulletin.

PREPARATORY DEPARTMENT

Clyde L. Patch, chief taxidermist and herpetologist; Claude E. Johnson, artist; D. Blakely, taxidermist; and J. E. Perron, museum helper-tanner, have spent most of their time in the preparation and arrangement of exhibits in the Museum halls and in the preparation of specimens for the study collections. Mr. Patch by request spent several days at Christie lake, Ont., as instructor in natural history subjects at a boys' camp. Five lectures on natural history subjects were given locally by Mr. Patch.

The following is a partial outline of work done by the above-mentioned staff:

Bird and smaller mammal skins prepared for study collections.....	227
Larger mammal skins tanned (wolf, deer, martin, lynx, otter, polar bear, black bear, seal, beaver, coyote, wolverine, bison, mountain sheep).....	42
Mammals and birds prepared for exhibition purposes.....	79
Specimens collected	119
Plaster casts	220
Wax and celluloid pieces for group accessories.....	844
Lantern slides, photographs, and map-labels coloured.....	43
Drawings and colour plates.....	28

Donald MacDonald, who was on sick leave in the autumn of 1925, brought back some selected skulls of domestic animals from Saskatchewan for comparative purposes. A good many of the teeth and bones which are sent in for identification are from domestic animals and the Museum has been very short of material for comparison.

Work done in the laboratory includes:

- Specimens macerated: 1 moose, complete skeleton; 3 moose skulls and legs; 2 deer skeletons and 1 skull; coyote skeleton and skull; 1 murre; 1 razor-billed auk.
- Specimens cleaned and prepared: moose, 14 old skulls of different ages; 9 caribou skulls; 6 deer skulls; 1 bear skull with legs; 1 musk-ox calf, skull and legs; 1 mink; 7 weasels; 1 murre; 1 razor-billed auk.
- Mounted specimens, cleaned and prepared: 2 fur seals; 1 musk-ox; 1 polar bear; 1 bison; 1 elk.
- Specimens bleached and mounted: 1 bull moose partly mounted, leg-bones articulated; 4 moose; 4 deer; 4 musk-ox; calf; 4 mule deer; 4 mountain sheep; 4 white-tailed deer.

A list of the papers published by, or addresses given by, members of the division is included in the report of the Deputy Minister, pages 2 to 5.

A loan collection of mammals, birds, amphibians, and reptiles is maintained by this department for use in connexion with nature study and art in the various educational institutions. As the specimens comprising the original loan collection become dilapidated by use they are replaced by more sturdily prepared individuals. Three hundred and sixty-seven specimens were loaned during the past fiscal year.

Accessions

Accessions to the biological collections:

Mammals received and catalogued.....	447
Birds received and catalogued.....	994

Accessions of mammals:

By members of staff:

C. H. Young, Nova Scotia and New Brunswick.....	125
R. M. Anderson, Quebec.....	41
J. Rochon, Quebec.....	27
P. A. Taverner and C. G. Harrold, Manitoba and Alberta.....	22
J. D. Soper, Baffin island, Frank.....	69
H. M. Laing, Alaska.....	61
D. Blakely and C. E. Johnson.....	3
C. E. Johnson, St. Thomas, Ontario.....	1

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

M. Y. Williams, 1 musk deer, from north of Hong Kong, China	
Canadian National Parks, Department of the Interior: 3 mountain sheep; 2 mule deer; 1 Am. elk; 1 young beaver; 2 skins mink; 3 Am. buffalo; 1 black bear, Alberta	
A. J. Gauthier, 2 black bear, Quebec	
Rev. Dr. Fyles, 1 Yukon flying squirrel, N.W.T.	
C. M. Sternberg, 1 buffalo skull, Little Sandhill creek, Red Deer river, Alberta	
Division of Palaeontology, 1 skull with lower jaw (mounted) Belly river, Alberta	
D. Jenness, 1 grizzly bear, skull only, Hazelton, B.C.	
Henry McManus, 1 white-tailed deer, near Kiosk, Ontario	
Dudley L. Dimock, 1 star-nosed mole, Bonaventure county, Quebec	
Gordon Conlin, 1 skin, with skull, of brown bat	
R. E. DeLury, 2 red bats, Central Experimental Farm, Ottawa	
C. G. Harrold, 2 silver-haired bats, Winnipeg, Manitoba	
I. R. Michelson, 1 walrus skin and skull, Craig harbour, Ellesmere island	
H. F. Lambert, 1 porcupine, Petawawa, Ont.	
J. A. Wilson, 1 white-tailed deer, Petawawa, Ont.	
R. W. Langford, 2 beaver, from Jasper park, Alberta	
B. Slattery, 1 white-tailed deer, from Maniwaki, Quebec	
John Hornby, 1 arctic hare; 2 white foxes; 1 wolverine; 2 ground squirrels; 1 wolf; 3 lemmings; from near Artillery lake, N.W.T.	
Major L. T. Burwash, 2 walrus (skull only), Salisbury islands, Hudson strait, N.W.T.	
Mrs. E. Eden, 1 brown bat, Ottawa, Ont.	
Capt. J. C. C. Bullock, 1 arctic hare; 1 deer mouse; 1 lemming; 1 ground squirrel; all from near Great Slave lake, N.W.T.	
Prof. E. E. Prince, 2 vertebræ of Florida manatee from New Smyrna, Florida	
Jack Miner, 1 weasel, from Kingsville, Ont.	

By purchase:

Johr Bloomfield, Fort Smith, N.W.T., 1 coyote	
A. L. Blaney, Moose Creek, Stormont, Ont., 1 black bear	
Eugene Sarazin, Montebello, Labelle co., Quebec, 1 black bear (reddish brown colour phase)	
A. R. Scharf, Point Comfort, Thirtyonemile lake, Que., 1 timber wolf	
John Hornby, near Artillery lake, N.W.T., 2 white wolves	

Accessions of birds:

By members of staff:

P. A. Taverner, Alberta and British Columbia, 164 birds and 2 nests of rock wren and Says phoebe.....	166
H. M. Laing, Alaska, 202 birds and nests, 4 eggs of redpoll.....	203
J. D. Soper, Baffin island, Frank.....	37
C. H. Young, Nova Scotia and New Brunswick, 41 birds, 5 nests and eggs of sharp-tailed sparrow.....	46
C. G. Harrold, Manitoba.....	322
R. M. Anderson, Quebec.....	11
J. Rochon, Quebec.....	12
D. Blakely and C. E. Johnson.....	14

By gift, outside of collections by members of staff:

- Allan Brooks, Atlin, B.C., 2 Brewer's sparrow (*Spizella taverneri*)
 Allan Brooks, Atlin, B.C., nest and 3 eggs of Bohemian waxwing
 R. E. DeLury, Ottawa, 1 sora, 1 black-billed cuckoo, 1 Savannah sparrow, 1 northern shrike
 R. Owen Merriman, Hamilton, Ont., 1 starling
 W. K. Bentley, Ottawa, Ont., 1 Cape May warbler, 2 chimney swift
 F. W. Salzman, Betchewum, Saguenay co., Que., 1 starling
 F. Johansen, 32 warblers, sanderling, and phalarope from Miscou Lighthouse, Miscou point, N.B.
 J. H. S. Kinsella, Franktown, Lanark co., Ont., 1 pied-billed grebe
 Arthur English, near St. John, Newfoundland, 5 willow ptarmigan
 S. K. Patton, M.D., Crescent Beach, Lunenburg co., N.S., 1 willet, 2 dowitcher, 2 hudsonian curlew, 1 pigeon hawk, 2 black-bellied plover, 2 knot
 J. M. Roberts, Interior Department, 1 osprey
 May Holland Cox, Ottawa, 2 prairie chicken (mounted)
 E. G. White, 2 greater snow goose, 1 sternum of barnacle goose, all from cape Tourmente, Que.
 John Hornby, 1 Mandt's guillemot, from port Harrison, Hudson bay
 Allen L. Moses, North Head, Grand Manan, N.B., 1 green heron, 1 purple sand-piper
 R. W. Tufts, Wolfville, N.S., 1 eider duck
 Howard Trueman, Kemptville, Ont., 1 starling
 John Marshall, 1 Brunnichs murre, from Ottawa river near Ottawa
 R. Rowan, Edmonton, Alberta, 6 pigeon hawk
 J. C. C. Bullock, 38 birds' skins and 11 sets of birds' eggs, all from near Great Slave lake, N.W.T.
 Wm. Wolf, Edmonton, Alberta, 1 red-tailed hawk from Innisfree, Alberta
 Harold Crieton, Ottawa, 1 song sparrow, with banded No. 140810 by C. E. Johnson, Sept. 24, 1924, found dead (fractured skull)
 C. G. Harrold, Winnipeg, Manitoba, 1 buff-breasted Sandpiper
 C. H. Young, Ottawa, 3 downy red-shouldered hawk (mounted) from Hurdmans Bridge, Ont.
 Jack Miner, Kingsville, Ont., 1 cooper hawk
 Elmer Dicks, Ottawa, 1 pine grosbeak (found dead)
 H. Mousley, Montreal, 6 nests of blackpoll, 2 yellow warbler, robin, house sparrow, Canada warbler
 Allan Brooks, 32 birds' skins, 24 skins from California, 8 red-tailed hawk from Graham island, Queen Charlotte islands, B.C.

By purchase:

- Allen L. Moses, North Head, Grand Manan, N.B., 23 murre, 7 razor-billed auk, 5 Iceland gull, 1 bald eagle

Accessions of amphibians and reptiles and localities from which they were received:

R. M. Anderson, Hatley, Quebec.....	2
D. Blakely, Norway Bay, Quebec.....	1
J. Roland Brown, Hamilton, Ont.....	11
T. B. Campbell, Hazelton, B.C.....	1
Ian Cowan, North Vancouver, B.C.....	11
M. Cowan, Vancouver, B.C.....	2
C. S. East, Washington, D.C.....	3
L. S. Frierson, jun., Gayle and Frierson, La.....	24
R. D. Grant, Lac des Iles, Quebec.....	1
Carlyle Heggteit, Ottawa, Ont.....	3
F. Johansen, Dalhousie and Bathurst, N.B., and Gaspé and Hull, Que..	94
C. E. Johnson, St. Thomas, Ont.....	15
Hoyes Lloyd, Christie lake and Georgian bay, Ont.....	14
E. G. Lucas, Hazelton, B.C.....	1
Erich Marherr, Germany	2
Clyde L. Patch, Christie lake and Ottawa, Ont., Edgewater, Md., and Mt. Vernon, Va.	74
Lloyd W. Patch, Edgewater, Md.....	8
E. E. Prince, Quebec, N.B., and B.C.....	7
Harlan I. Smith, Hazelton, B.C.....	15
Chas. M. Sternberg, Rumsey and Camrose, Alta.....	41
Wm. Stevenson, Galetta, Ont.....	1

L. M. Stoechr, Ironside, Quebec.....	1
P. A. Taverner, Beaver Hill lake, Alberta.....	2
C. C. Taylor, Eureka, Fla.....	2
J. P. Williams, Pioton, Ont.....	1
M. Y. Williams, Manyberries, Alberta.....	1
Whitton Young, Norway Bay, Quebec.....	1

Three hundred and forty-nine amphibians and reptiles were acquired during the year, which brings the total number of specimens in the herpetological collection up to 2,605. This year's accessions include 25 species not previously represented in the collection.

Important in the zoological accessions of the year are several specimens of mammals from Mr. John Hornby, England, a well-known subarctic traveller who has spent many years in the Mackenzie, and who, starting from Edmonton in the spring of 1924, in company with Captain James C. Critchell-Bullock, F.R.G.S., spent the winter at the edge of Barren Grounds east of Artillery lake, and in the summer of 1925 passed down Hanbury and Thelon rivers to Chesterfield inlet and out by Hudson strait.

Mr. Hornby presented the Museum with a beautiful specimen of black wolf, two blue foxes, one wolverine, and other specimens; Captain Bullock presented a number of small mammals and a small collection of birds from the region east of Great Slave lake, from which we previously had little material. Among the ornithological varieties were several eggs of yellow-billed loon, of which authentic breeding records were not previously known, from outside of northern Alaska. Captain Bullock also presented the Biological Division with a number of interesting prints of mammal and bird life in the North West Territories.

Thanks are particularly due to the Royal Canadian Mounted Police stationed in the far north, for specimens and for continued reports on wild life conditions; to the North West Territories and Yukon branch for similar courtesies, and to the Canadian National Parks branch for various valuable specimens from the National parks, including American buffalo, mountain sheep, elk, mule deer, and black bear.

NATIONAL HERBARIUM

M. O. Malte, Chief Botanist of the National Herbarium, with W. R. Watson, of the University of Toronto, as assistant, was engaged in botanical work in Alberta from June 2 to September 28. The areas visited included Waterton Lakes park, Pincher creek, Castlemount Forest reserve, Calgary, Banff, Red Deer, Nordegg, Edson, Coalspur, and Mountain Park.

During the summer 2,735 numbers were collected, with a total of 5,875 well-filled sheets which, it is estimated, will make about 9,000 herbarium specimens. Attention was especially paid to more difficult genera, particularly to the willows, of which close to 1,200 herbarium specimens were collected.

Of the districts visited, Nordegg and Mountain Park were perhaps the most interesting from a botanical point of view, as neither of them had been visited before by any botanist of the Department of Mines. At Nordegg, about 100 miles west of Red Deer, at an altitude of 4,500 feet, the arctic-alpine element of the flora is conspicuous at comparatively low levels, with several arctic-alpine types occurring at an elevation of less than 5,000 feet. According to Mr. K. Bowman of Edmonton, who has spent several summers in the district, the same applies to the insect life, several species of insects having been found there which typically belong to the Canadian Arctic regions. Mountain Park, situated at an elevation of 6,000 feet, is also exceedingly interesting. Although visited late in the season, vast collections of very great botanical interest were made near tree-line and above it.

The excellent results attained by Mr. Malte in the parks and forest reserves were made possible only by the hearty co-operation of officials of the Department of the Interior.

After return from the field the Chief Botanist determined sundry collections of plants and revised the National Herbarium and the grass herbarium of the Division of Forage Plants, Central Experimental Farm, Ottawa.

During the past few years the Chief Botanist has had numerous inquiries pertaining to what grass or grasses might be best suited for golf greens. It appears that much of the seed handled by the trade and supposed to be of particular value for greens does not come up to the desired standard. As a result of investigations carried out during the last three or four years it has been found that there are growing in Canada several varieties of Creeping Bent Grass which make greens far superior to any that formerly could be obtained from commercial seed which, by the way, is imported from foreign countries. Many golf clubs have already availed themselves of the information secured and are now obtaining highly satisfactory greens from Canadian-grown, genuine Creeping Bent Grass. This grass occurs plentifully in moist situations all over eastern Canada and on the Pacific coast; it is rather rare in the Prairie Provinces. As evidence of its hardiness it may be mentioned that it was found in a thriving condition last year by the Chief Botanist at Mountain Park, Alberta, at an elevation of 6,000 feet.

Mr. Malte, as a member of the Arctic Publication Committee, assisted in the preparation of reports of the Canadian Arctic Expedition, 1913-18.

A small but interesting collection of plants from the vicinity of mount Logan was gathered for the National Herbarium by Hamilton M. Laing, who also furnished some photographs of Alaskan plants in situ.

Plants received outside of collections made by staff:

Royal Botanic Garden, Kew, England.....	649
The Danish Biological Station, Disco, Greenland.....	165
University of Toronto	165
The Botanical Museum, Copenhagen, Denmark.....	197
The Provincial Museum, Victoria, B.C.....	1
Dr. Carleton R. Ball, Washington, D.C.....	55
Dr. A. S. Hitchcock, Washington, D.C.....	2
Mr. L. E. James, St. Thomas, Ont.....	1
Professor J. E. Howitt, Guelph, Ont.....	1
Mr. Hamilton M. Laing, Comox, B.C., from the Mount Logan expedition to Alaska	245
Total	1,481

Plants distributed:

Professor F. Marie-Victorin, Université de Montréal, Montreal, Que....	153
Dr. Carleton R. Ball, Washington, D.C.....	339
Total	492

At the end of the fiscal year the number of mounted sheets was about 117,000 as against 114,000 at the end of the last fiscal year.

MINES BRANCH

John McLeish, Director

It is probably safe to say that at no previous period in the history of the development of mining in Canada were the prospects for its future growth and expansion as great and as promising as they are at the present time. Although the actual value of the mineral production in 1925 was exceeded by the value of the production in 1920, the production of many important metals and mineral products reached a maximum in 1925. The statistical record shows the recent growth more effectively when it is remembered that, compared with 1925, the average range of metal prices was 35 per cent higher in 1920, and that the coal mining industry suffered severely in 1925 through labour troubles.

The present increasing mineral production is due not alone to the extension of operations in old fields and the opening up of new areas: it is in large measure due to improvements and developments in metallurgical practice.

The work of the Mines Branch is a directly contributing factor to the greater development of Canada's mineral wealth. The reports and records of the Branch furnish a storehouse of information respecting the occurrence, preparation, and utilization of mineral products, and the department laboratories are continuously engaged in test work on the character of minerals and the determination of methods of treatment, and in research investigations for the proving or development of new uses or processes.

The activities of the several divisions of the Mines Branch organization during the year are briefly reviewed in the following pages, wherein are shown the variety and extent of the work accomplished and under way. Two representatives of the Branch, the Director and Mr. H. S. Spence, of the Mineral Resources Division, were sent to the Wembley Exposition during its second season in 1925 to assist in the dissemination of information respecting Canada's mineral resources. The Director established closer relations with British institutions for the study of mineral research, and with the organizations in Great Britain for the dissemination of information respecting Canadian and Empire resources.

The report entitled "The Mineral Industries of Canada," specially prepared for Wembley, of which about 24,000 copies were distributed at the exhibition, proved to be an exceedingly popular and useful review. A thousand copies have been specially requested for distribution to the delegates attending the forthcoming meeting of the Empire Mining and Metallurgical Congress to be held in Canada in 1927.

The Mines Branch monographs on mineral resources are universally accepted as standard authorities. The staff of the Mineral Resources Division keeps in close personal touch with developments and progress in the mining industry, and prepares each year a number of monographs on particular subjects. In respect to all of the various types of investigations conducted by the Mines Branch, the public is urging and the National interests demand more and more work and continued extensions of laboratory accommodation and equipment.

In the Ore Dressing laboratories such excellent results have been secured in the electro-chemical treatment of ilmenite ores and of pyritic and pyrrhotite ores, and such great progress is being made along similar lines in many other laboratories that it is now highly essential that this equipment should be made available permanently for regular test purposes. Additional laboratory space will, however, be required to carry out this programme efficiently. In the study of

fuels, plans have been developed and approved for the establishment of semi-technical scale laboratories for the carbonization and briquetting of coals, but the provision of the necessary buildings has been delayed.

It is highly important that study should be made of the utilization of gases, both those derived from coal and natural gas. Enormous economies in the utilization of natural resources will be effected with the application of processes, so many of which are now being developed for the more complete utilization of coal. Moreover, western Canada is faced with the probable development of immense supplies of natural gas which may be wasted in enormous quantities to permit the recovery of the light oils which some of them contain unless, through research investigations or other means, new uses are found for the gas. In order to keep abreast of the progress being made in Europe in the use of gas for many purposes, Mr. R. T. Elworthy, who has been carrying on research work on the production of formaldehyde from gas, spent some months during 1925 in England and the continent visiting the principal coal, gas, and oil research stations.

The Mines Branch has continued to co-operate to the fullest extent with provincial and other government departments and with scientific organizations engaged in similar lines of investigations. It renders service to those government departments desiring assistance, and consulting advice of the character which the Mines Branch is able to give.

MINERAL RESOURCES DIVISION

FIELD INVESTIGATIONS

The Chief of the Mineral Resources Division, A. W. G. Wilson, was able to devote only a very small part of his time to field inquiries, owing to the pressure of routine office work. In the summer of 1924 Mr. Wilson spent five months at the British Empire Exhibition, Wembley. On his return to Canada he gave four public addresses on the exhibition and its significance, before different public bodies, three in Ottawa and one in Toronto. The lecture in Toronto was presented early in April before the Royal Canadian Institute and was illustrated by coloured lantern slides prepared in the Natural Resources Intelligence Branch of the Department of the Interior. Two short trips were made during the summer to Magnesite, Que., in preparation for some special investigation work to be undertaken by the department to assist in the development and expansion of the magnesite industry. A longer inspection trip was made in September and October to points in the western United States, British Columbia, and Alberta. In the United States a number of localities where copper and lead ores are mined, milled, and smelted were visited. In British Columbia visits were paid to the metallurgical plant of the Consolidated Mining and Smelting Company, at Trail, and the Sullivan mine, at Kimberley. In Alberta a short time was spent in the field with Mr. S. C. Ells near McMurray, and with Mr. L. H. Cole in Alberta and Saskatchewan. Late in the season it was necessary to make a business trip to Toronto in connexion with a report on "Marketing Canadian Building Stones."

H. S. Spence was assigned to duty at the Canadian pavilion, British Empire Exhibition, and left Ottawa early in May. He was in attendance at Wembley from May 20 to August 28. His principal duty was the furnishing of information upon Canadian mineral resources to inquirers who were interested in Canada either as a source of supply of mineral products or as a field for investment. Mr. Spence in commenting on his experience points out that it is difficult to adequately appraise the value of the service rendered by officers in attendance at Wembley. He notes, however, that the possibilities which Can-

ada has to offer in the field of mining development are engaging the attention of British and European industrialists and capitalists to an increasing degree, and he expresses the opinion that it may soon become advantageous to maintain at Empire headquarters a Federal Mines Office, from which full and authentic information regarding the mineral resources of the Dominion may be obtained and disseminated. At the close of his services at Wembley Mr. Spence spent two months in field work, visiting mines in Great Britain and on the Continent to study methods for mining and milling a number of non-metallic minerals. The districts visited and the deposits seen included: Cornwall, china clay and china stone; Kent, whiting and cement; Durham, fluorspar; Sweden, feldspar and soapstone; Austria, asbestine and graphite; Italy, talc and graphite; Germany, barytes; Belgium, glass sand. Attention was also devoted to the possibility of developing a market for Canadian mineral products in Europe, and special endeavours were made to put mineral dealers and consumers in touch with Canadian producers.

L. H. Cole was engaged on office work for nearly the whole of the year, part of his time being given to the completion and proofreading of his report on "Sodium Sulphate in Western Canada." About two months were spent in the field. Silica deposits in British Columbia and the Prairie Provinces were examined to obtain data for a bulletin on the silica resources of western Canada. A number of moulding sands also were examined, and samples were collected for laboratory study. Before returning in November Mr. Cole visited the property of the Silver Leaf Mining Company at Pointe au Bois, Manitoba, where lithium ores were being mined.

S. C. Eells completed the office work on his report on the "Bituminous Sands of Northern Alberta" in the early summer. The field season was devoted to a study of the methods best adapted to sampling deposits of bituminous sands by core drilling. The assembling of the outfit and other preliminary work consumed a good deal of time and only one test bore-hole was completed. It is proposed to continue these experiments during the coming season. Late in November, after completing the season's work in the vicinity of McMurray, Mr. Eells visited a deposit of bentonite situated west of Edmonton, in SE. $\frac{1}{4}$ sec. 30, tp. 57, range 1, W. 5th mer. He reports a quantity of bentonite at this point, but systematic sampling by drilling would be necessary to determine the amount and quality of the material.

M. F. Goudge commenced a systematic survey of the limestone and dolomite resources of Canada. It is proposed that this investigation will include the industrial uses of these stones and products derived from them. About five months were devoted to field work in Ontario and Quebec, where more than five hundred outcrops or quarries were examined and sampled. Numerous industrial plants using limestone, dolomite, or limes made from these stones, were visited to learn the various trade requirements and to study operating practice.

A. H. A. Robinson completed a short report on the titaniferous iron deposits in Bourget township, Chicoutimi county, Que. The field season was devoted to an investigation of conditions in the metal mining industry of eastern Canada, having special reference to lead and zinc ores. Visits were paid, during the season, to mines and prospects in Nova Scotia, New Brunswick, Quebec (including the Rouyn gold-copper fields), and Ontario east of Sudbury. Late in the season a visit was paid to Winnipeg, Man., at the time of the western meeting of the Canadian Institute of Mining and Metallurgy, to learn about mining conditions in Manitoba, with a view to more detailed investigation next season.

V. L. Eardley-Wilmot has been engaged for two seasons on an investigation of abrasives, their preparation and industrial applications. The past field season was devoted chiefly to studies of the preparation and uses of abrasive products. This work involved visits to plants in Canada and the United States where

abrasive powders, coated papers, wheels, and other products are being made, and to plants where industrial operations require coarse grinding, fine grinding, precision grinding, buffing, or polishing. During the season short visits were paid to localities where deposits of the following mineral products occur: garnet, lepidolite, dolomite, calcite, diatomite, and pigments.

R. T. Elworthy, of the Chemical Division, continued his field work on Canadian natural gas occurrences, with special reference to helium. About two months' field work was devoted to an investigation of the possibilities of the extraction of helium from certain natural gas fields in Ontario. The work included both field tests and the collection of samples for analysis in the laboratories in Ottawa. In September a visit was paid to the Stony Creek field, N.B., to investigate natural gases in this area.

Dr. W. A. Parks, of the Department of Geology, Toronto University, was employed for a period of about four weeks investigating the British market for building and ornamental stones. His report will be published in the annual report of the Mineral Resources Division.

E. H. Wait, of the records section of this division, spent nearly three months in the field. During part of this time he acted as field assistant to Mr. L. H. Cole in Alberta and British Columbia. During the course of his field work he investigated the sources of moulding sands used locally in the principal business centres of western Canada, noted any current mining activities in the areas visited, and checked our records of operators covering the territory between Port Arthur and Calgary.

C. H. Freeman, of the records section of this division, spent about two months on field duties in Ontario and Quebec. He was engaged in studying current mining activities, and also checked records of operating companies, in connexion with the preparation of new lists of non-metallic mineral producers.

OFFICE WORK

The greater part of the time of the Chief of the Division was devoted to routine office work, and to the preparation of memoranda on various subjects, either administrative or technical. Last year 306 memoranda were written. This does not include letters or memoranda written by members of the staff of the division.

Arthur Buisson, assisted by a staff of six, is in charge of the mineral resources record files. During the past season two of Mr. Buisson's assistants were in the field for a total period of five months for the purpose of checking records and of obtaining current information about mining operations in the areas visited. The greater part of the time of this staff is devoted to collecting and classifying information about the Canadian mineral industries. This information is checked and filed for reference. A considerable part of the time of the staff is taken up by the assembling of material for replying to inquiries received by the Mines Branch. More than half of Mr. Buisson's time is devoted to these inquiries alone. During the year about 2,000 letters and answers to inquiries were prepared, in addition to 563 circular letters asking for information, and 1,500 printed lists sent for correction.

John Casey, with one assistant, is in charge of the statistical records of all kinds relating to the mineral industry. During the year he also prepared special statistical tables, as required, for use both in reports being prepared by members of the staff and for memoranda requested by correspondents. Much of this work is of a routine character, but a number of special reports were also required during the year.

ORE DRESSING AND METALLURGICAL DIVISION

W. B. Timm, Chief of the Division, reports:

There was increased activity in the investigatory work carried on by the technical staff in the various laboratories of the division. The expanding industry, with the opening up of new mining fields, and the advance in metallurgical practice, has been responsible for a greater demand for experimental and research work.

Mr. Timm directed the work of the laboratories and devoted considerable time to the equipment of a non-metallic laboratory. In connexion with the investigations in progress he visited concentrating plants and metallurgical works in western Canada and the western states, securing information regarding the progress in ore dressing and metallurgical practice in existing works and on new processes on which research was being conducted, which might be applicable to the treatment of Canadian ores. The summary report of the investigations in ore dressing and metallurgy was prepared, and two reports for the Mines Branch memorandum series, as follows:

- "The Concentration of Canadian Molybdenite Ores," by W. B. Timm and C. S. Parsons.
- "The Concentration of Flake Graphite Ores," by C. S. Parsons.

INVESTIGATIONS IN ORE DRESSING AND METALLURGY

C. S. Parsons, assisted by J. S. Godard, conducted the investigations on metallic ores. Mr. Parsons visited the lead-zinc concentrator at Notre-Dame-des-Anges, Que., and the graphite concentrators at Guenette and Buckingham, Que., and was able to give valuable advice to the operating companies on their treatment problems. He also visited some of the chemical works in the east in connexion with the extended use and manufacture of flotation reagents in Canada. The investigations conducted and reported on by Messrs. Parsons and Godard were as follows:

- The concentration of molybdenite ore from the Bain mine, Indian lake, Masham, Que.
- The concentration of the zinc-iron middling dump at Notre-Dame-des-Anges, Que.
- The concentration of a silver-lead-zinc ore from the Enterprise mine, Slocan district, B.C.
- The treatment of the gold-copper ore of the Argonaut mine, Larder lake, Ont.
- The recovery of foundry metal from sweepings.
- The amalgamation and concentration of a Matatchewan gold ore.
- The concentration of a dry silver ore from the Slocan Silver Mines Ltd., Alamo, B.C.
- The concentration of a copper ore from the Pitt Mining Co., Pitt lake, B.C.
- The concentration of a copper-lead-zinc ore from Albert co., N.B.
- The concentration of the copper ore ("C" ore-body) of the Horne mine, Noranda Mines Ltd., Rouyn, Que.
- The concentration of a lead-zinc ore from the Kicking Horse mine, Field, B.C.
- The treatment of a gold ore from the Contact mines, Paulson, B.C.
- The concentration of a zinc ore from Renfrew, Ont.
- The concentration of the lead ore from the Frontenac mine, Ont.
- The concentration of a copper-zinc ore from the Amulet mine, Rouyn, Que.
- The concentration of a zinc-silver ore from the Wonderful mine, Sandon, B.C.

R. K. Carnochan devoted the greater part of his time to the equipment of a non-metallic laboratory which will be ready for full operation about July 1, 1926. More extended and intensive investigatory work on the preparation and utilization of Canadian non-metallic minerals will be undertaken under his supervision. He conducted a number of tests of a minor nature and reported on the preparation of volcanic ash from Waldeck, Sask., for industrial purposes.

H. C. Mabey supervised the work of the chemical laboratories and reports that over 4,850 chemical determinations were made on 1,109 samples of ores and products from test operations. He reports progress with the investigation he is conducting with A. E. Smail who was engaged during the year in a

temporary capacity, on the recovery of the iron and sulphur content in heavy sulphide ores (pyrrhotite and pyrite) in addition to the base and precious metal values which are now being recovered.

B. P. Coyne was engaged on the chemical analytical work and assisted the investigatory engineers on chemical problems encountered in conducting their investigations.

R. A. Rogers was engaged on the chemical analytical work of the division.

R. J. Traill visited some United States points in connexion with the investigations under his supervision in the electro-chemical laboratory. He reports progress on:

The hydro-metallurgical treatment of iron sulphide ores (pyrrhotite and pyrite) for the production of electrolytic iron and the recovery of sulphur and other metals as by-products.

He conducted investigations and reported on:

A hydro-metallurgical treatment for pyrrhotite of low gold and copper content from the Noranda Mines, Ltd., Rouyn, Que.

He undertook a new investigation on Canadian titaniferous iron ores, obtaining very satisfactory results, reporting on:

A new process for the treatment of ilmenite ore for the production of electrolytic iron and titanium oxide concentrate for pigment and other purposes.

W. R. McClelland ably assisted Mr. Traill with the above investigations in the electro-chemical laboratory.

The operating and maintenance staff of the division, under the mill foreman, B. M. Derry, was fully engaged in the various laboratories of the division.

FUELS AND FUEL TESTING DIVISION

B. F. Haanel, Chief of the Division, reports increased activity. Two changes occurred in the chemical staff during the year, viz., H. McLeod, junior chemist, transferred and promoted to a higher position in the Dominion Bureau of Statistics, and H. McD. Chantler, junior chemist, transferred and promoted to assistant chemist, Department of Agriculture. Three appointments were made, viz., J. D. Johnston as permanent junior chemist; J. L. Bowlby as temporary junior chemist, and G. E. LeWorthy as permanent senior laboratory assistant. R. A. Bolton, temporary technical engineer, left the division to assume activities elsewhere, thus leaving G. W. Read as the only temporary technical engineer.

INVESTIGATIONS AND EXAMINATIONS MADE BY THE CHIEF OF THE DIVISION AND TECHNICAL ENGINEERS

In addition to planning and directing the work of the division, Mr. Haanel spent much of his time in the preparation of plans for a new carbonizing and briquetting laboratory, in conjunction with Messrs. Gilmore and Strong. In this connexion a large amount of time was given to the studying of processes for the carrying out of carbonization of solid fuels at high and low temperatures, and for the conversion of fuels into oils and other products, with a view to determining what type of apparatus would be best adapted for installing in the new laboratories which it is proposed to erect on the ground near the present experiment station. Mr. Haanel also kept in close touch with the efforts which were made at Alfred, Ont., by Peat Fuels Limited, which company, under an agreement with the Federal Government and the Government of the Province of Ontario, took over the plant left on the bog by the Joint Peat Committee. He had several conferences with Mr. Nyeboe of Denmark regarding the Hydro-Peat process which is employed in Denmark for the manufacture of peat fuel and which Mr. Nyeboe hoped to be able to introduce into Canada. During the latter

part of the year the Chief of the Division spent much of his time in the negotiations between the Peat Fuels Limited and the Federal Government regarding the taking over of the plant at Alfred by the latter, and the carrying on of operations, to demonstrate the economy of manufacturing peat fuel according to the process developed by the Peat Committee. Processes for carbonizing coal at low temperature, which were submitted to him for his opinion, were examined and reported upon.

Mr. Haanel prepared an address entitled "Fuels and the Fuel Situation" which was delivered before the Dominion Convention of Chemists at Guelph, Ont., in June last. He also made a special trip to Buffalo and Columbus, Ohio, to confer with the Jeffrey Manufacturing Company at Columbus, regarding the construction of a Hammer mill for treating peat, which it was proposed to employ in the new plant, in the event of the Federal Government assuming charge of the operations at Alfred. Considerable time was spent in working out details in connexion with the Fuel Power Survey, which will be actively begun as soon as the technical engineers complete the report on fuels for domestic heating. These activities involved travelling to Montreal, Toronto, and elsewhere.

E. S. Malloch continued the work of testing fuels in domestic hot-water boilers. Fifty-seven tests in all were made at various loads on fourteen different fuels. During November, Messrs. Baltzer and Read, of the Division of Fuels and Fuel Testing, were loaned to the Dominion Fuel Board for special work. The working up of the results of the above tests was discontinued on that account for a short period. Since the completion of the testing of the fuels in domestic hot-water heaters at the Fuel Testing Plant on January 30, 1926, the engineering staff has been drawing curves and collecting data for the report on the relative value of various fuels sold in Canada for house-heating purposes.

FUEL TESTING LABORATORY WORK

R. E. Gilmore, Superintendent, reports that during the year a total of 916 samples of solid, liquid, and gaseous fuels were examined. Three hundred of these, roughly a third of the total samples, were sent in from other Mines Branch divisions, from the Geological Survey, and from other Government departments, and from commercial firms and individuals. The remaining two-thirds pertained to investigations conducted by the technical staff of the division.

Of the total samples originating within the division, 112, which is slightly less than one-fifth, were in connexion with the investigation of substitute domestic fuels in the experimental heating plant. The remaining four-fifths of the samples pertained to investigations and surveys of solid and liquid fuels carried out by Messrs. Nicolls, Rosewarne, Strong, and Swinnerton.

Of the total samples sent in from outside, 82 were from other divisions of the Mines Branch, 34 from the Geological Survey, 75 from the Department of Soldiers' Civil Re-establishment, 26 from the Department of Customs, National Defence, etc., and 83 from commercial firms and individuals. For most of the last, that is the non-government samples, a charge, according to schedule, was made.

Routine Chemical Work

The following is a classification of the samples analysed according to standard laboratory practice by Messrs. C. B. Mohr, H. McD. Chantler, J. D. Johnson, J. L. Bowlby, and G. E. LeWorthy.

Solid fuels: total samples examined.....	457
Coal (various kinds)	302 samples
Coal ash residues	84 "
Coke and char	63 "
Briquettes, peat, etc.....	8 "

Liquid fuels: total samples analysed.....		237
Gasoline	108 samples	
Lubricating oils	47 "	
Other petroleum oils	57 "	
Coal tar oils.....	25 "	
Oil-shales and tar sand products.....		141
Gases from coal and oil-shale.....		81

Investigations Conducted by the Chemical and Engineering Staff

Mr. Gilmore gave his immediate attention to a preliminary analysis survey of domestic coke wholesaled in Canada and to special technical scale experimental runs of New Brunswick oil-shale by the Pritchard process. In the coke sampling he was assisted by Mr. Mohr and others, and in the oil-shale experiments by Messrs. Swinnerton, Rosewarne, and Chantler. Considerable time was given to plans and specifications for a new carbonizing and briquetting laboratory. Other investigations conducted under Mr. Gilmore's supervision are given under the names of staff as follows:

J. H. H. Nicolls, in addition to looking after the routine analyses of solid fuels, and the indexing and recording of the results of the same, continued his friability and air-drying experiments conducted and reported in "Investigations for 1924." Mr. Nicolls also continued his study of the forms of sulphur in Canadian coals, 23 samples from British Columbia and 23 from Alberta being examined, and reports progress in his study of Canadian coals according to various schemes of chemical classification.

P. V. Rosewarne, assisted by Mr. Chantler, conducted the fourth annual survey of gasoline sold in Canada. The samples for this survey, 73 in number, from thirteen widely separated Canadian cities, were collected by inspectors of the Department of Health in the respective cities. In addition to looking after the routine analyses of samples of oil sent in from outside the division, Mr. Rosewarne brought nearer to completion his investigation on used lubricating oils and the carbon deposits from same in internal combustion (automobile) engines. Mr. Rosewarne also gave special attention to the erection of a large-scale laboratory still and rectifying accessories to handle 5 gallons of oil, and made trips to Canadian oil refineries to gather information in connexion with the refining of such as crude shale oil from oil-shales and bitumen from tar sands.

R. A. Strong paid special attention to carbonization problems and carried out a series of carbonization experiments on washed coal from Minto, N.B., and from Sydney, N.S., and compared these with Westmoreland (Pennsylvania) bituminous coal used in commercial coking plants. He also compared the F.R.S. (Fuel Research Station) small-scale assay method with the somewhat larger scale lead bath carbonization method used in our Fuel Testing Laboratories. Other duties assigned to Mr. Strong were co-operation with the Department of S.C.R. in respect to the purchasing of their coal according to specifications; consultation with commercial firms in Montreal with respect to a Welsh fines briquetting problem; co-operation with Mr. Baltzer in carrying out special burning tests on Maritime Provinces domestic coke, and the preparation of a process exhibit for the Canadian Mining Institute meeting in Montreal. Mr. Strong also spent considerable time on plans and specifications for a new technical scale carbonization and briquetting laboratory and the equipment for the same.

A. A. Swinnerton spent almost all his time on oil-shale and tar sand work. To him was assigned the supervision of the mining and shipment of a car-lot of oil-shale from Rosevale, N.B., to Ottawa, to serve as samples for technical scale investigational work, a part of which car-lot after being crushed to desired size was reshipped to Toronto for tests in the Pritchard retort, in which tests he took an active part. Mr. Swinnerton conducted a series of laboratory distillation

runs with tar sands and bitumen and also compared on a laboratory scale the distillation of oil-shale by the recirculation of uncondensed gases, as in the Pritchard process, to the ordinary distillation methods.

CERAMICS AND ROAD MATERIALS DIVISION

Howells Fréchette, Chief of the Division, reports a very active year in ceramic investigations.

Several additional pieces of apparatus were installed in the ceramic laboratory, including a down-draft gas kiln of the double chamber type. This kiln, the larger chamber of which measures 30 by 24 by 22 inches and attains a temperature of about 1,500°C., was designed for use in burning magnesite bricks and porcelain. Having a second chamber, this kiln is particularly useful for burning draw trials when a large number of clay samples are under test.

Owing to the illness of R. H. Picher, road materials engineer, only a limited amount of work was carried out on road material surveys.

CERAMICS

During the early part of the field season of 1925, L. P. Collin, ceramic engineer, spent two weeks at brick plants in the vicinity of Hamilton and Toronto, completing the collection of data in connexion with the cost of burning bricks in that district, in continuation of his work of the previous year. The report on this investigation has been published.¹

Mr. Collin visited a number of brick and tile plants in Quebec and almost all the operating plants in the Maritime Provinces. Technical advice was given at many plants, and in every case was gratefully accepted. Data on the cost of burning were obtained at one brick plant in Nova Scotia. Other plants where this work was to have been done were operating on reduced schedule or were temporarily closed.

The developing demand for highly refractory materials for the ceramic industries makes it desirable to locate, if possible, suitable deposits of minerals of the andalusite group in Canada. With this in view, Mr. Collin visited a number of localities in Nova Scotia where these minerals are reported to occur.

With the exception of one occurrence in Guysborough county, the deposits seen appeared to possess no commercial possibilities. On the northwest arm of Whitehaven, Guysborough county, an occurrence of andalusite of considerable extent was found, but partial alteration of the mineral has rendered it low grade.

Laboratory Work

In co-operation with the Research Council of Canada, an exhaustive laboratory investigation of the suitability of the magnesite from Grenville township, Quebec, for the manufacture of high-grade refractory brick has been undertaken. R. T. Watkins, ceramic engineer, was appointed by the Research Council, and began work in the Mines Branch laboratories on November 4, under the direct supervision of Mr. Fréchette.

J. F. McMahon, ceramic engineer, was appointed on the temporary list, October 3, to carry out a research on the refractoriness of moulding sands and to devise a method for determining this property in sands.

The preliminary work in both these investigations consumed considerable time, due to the necessity for adapting apparatus to the work and trying out various methods of procedure. Several delays were occasioned through inability to get apparatus constructed when it was required. At the end of the year material progress had been made and the work was advancing satisfactorily.

¹ Mines Branch, Dept. of Mines, Canada, "Investigations of Ceramics and Road Materials"; 1924, p. 8.

Mr. Collin continued his research on the compounding of porcelain bodies for electrical heating devices, but the time available for this work did not permit of its completion.

During the year numerous fire-clay, zirconia, and carborundum refractory shapes were made for use in the ceramic laboratory and for the Ore Dressing and Metallurgical Division.

One hundred and fourteen samples of clay were tested, to determine their physical properties and their suitability for use in the manufacture of ceramic products. Several samples of fire-brick were tested for the Naval Service.

The facilities of the laboratories and assistance of the staff were placed at the disposal of the Air Board for special tests.

Permission was granted to the Department of Colonization and Development of the Canadian Pacific railway to place one of their engineers in the ceramic laboratory to test a large number of clays from Saskatchewan, on condition that the results of the tests and data regarding the source of the samples be reported to the Mines Branch, with permission to publish. Many of the samples were of high-grade clays suitable for finer ceramic products. The work was conducted by Mr. G. M. Hutt, of the Canadian Pacific railway, under the direction of Mr. Collin.

Stuart McEachen was appointed on the temporary list on December 28, as laboratory helper, to aid in the general work of the ceramic laboratory.

ROAD MATERIALS

During the year 1925, the activities of R. H. Picher, road materials engineer, were considerably limited on account of illness. About two weeks were spent in field work, visiting commercial plants producing broken stone and gravel in eastern Ontario. Many inquiries are received regarding the quality, size, and price of broken stone available in particular districts.

In addition to the above, Mr. Picher inspected and sampled several gravel pits and rock quarries operated exclusively for road material purposes, although not on a commercial basis. Nine samples were collected and tested in the laboratory. Tests were also made on six samples of rock sent to the laboratory by road contractors and stone producers.

CHEMISTRY DIVISION

F. G. Wait, Chief of the Division, reports:

From April 1, 1925, to March 31, 1926, eight hundred specimens have been reported upon.

The work of the different members of the chemical staff has been as follows:

H. A. Leverin was assigned to an investigation of the process of manufacture of titanium oxide pigments which was carried out in co-operation with Messrs. McArthur-Irwin Ltd., Montreal. He acted independently during the early part of the year, and from September, 1925, to March, 1926, with Mr. L. Firing of the McArthur-Irwin Company. This work has absorbed the major part of his time. The investigation has been finished and a report prepared, upon the findings of which the setting up of a semi-commercial plant has been decided upon by the interested company.

He has also made several analyses of ores, minerals, and alloys.

R. T. Elworthy continued the investigation of helium and natural gas resources, both in the field and in the laboratory.

From September to March he carried on, in Europe, an investigation of the possibilities of chemical uses of industrial gases.

E. A. Thompson has made complete analyses of fifteen rock specimens and of three new phosphatic minerals collected by officers of the Geological Survey. He has also made microscopic examinations of several titanium oxide pigments, as well as metallographic studies of different electrolytic irons, and has made microphotographs of the same.

A. Sadler has made a large number of furnace assays and analyses, complete and partial, of ores and minerals. He has, also, examined several earths and clays as to their suitability for decolourising agents for oils and fats. The object in view was to find a Canadian substitute for imported Fuller's earth and other like media. The investigation is only in its initial stages, but is promising. It will be continued as opportunity offers.

James Moran has had charge of the analyses of samples of mine air taken in the collieries of western Canada. The main object of the work is to check the reliability of approximate routine determinations made in the workings by the mine inspectors and operators. He has also collected and analysed samples of air taken on board a cattle transport plying between St. John and Liverpool. This latter work was done on the request of the Department of Marine with the object of providing the best possible system of ventilation on such carriers.

G. P. Connell, between April 1 and July 31, made analyses of several samples of diatomaceous earths and of western brines.

His services were loaned to the Fuel Testing Division from August 1.

DOMINION OF CANADA ASSAY OFFICE, VANCOUVER, B.C.

Mr. G. N. Ford who, since the death of Mr. George Middleton, the manager, on April 8, 1925, continued in charge of the Assay Office, was appointed manager, February 1, 1926.

In consequence of the sale of the building known as the old post office building, in which the Assay Office has been located for the past fifteen years, it was necessary to secure new quarters. These were provided by the Public Works Department in the Customs Examining Warehouse situated at the foot of Howe street immediately north of the Winch building. The space allotted to the Assay Office is on the second floor (north section) of the Examining Warehouse, where on February 11, 1926, operations were begun.

Acting on the request of the Finance Department, a change was made in the disposal of gold purchased at the Assay Office. Since December 2, 1924, it had been the practice to make shipment of the gold to Seattle. This procedure was discontinued and instead the gold is now forwarded to the Royal Mint, Ottawa, the first consignment leaving Vancouver March 12, 1926.

The official statement of the Assay Office for the calendar year ending March 31, 1925, shows an increase of the business over that of the previous year. The value of gold bullion deposited during the year amounted to \$2,065,217.16, an increase of \$214,843.42 over that of the year 1924. The number of deposits during 1925 also showed an increase, there being 1,679 as compared with 1,618 of the preceding year.

The purchase and disposal of the gold bullion deposited during the year required a total of 1,782 meltings and 1,782 assays (quadruplicate check assays being made in each instance), including the melting into large bars of the smaller deposits after purchase and the assaying of same prior to shipment.

The aggregate weight of deposits before melting was 140,691.78 troy ounces and after melting 123,233.35 troy ounces. There were 123 deposits of bars containing a very large proportion of lead, all from one source, which, instead of being melted in the ordinary way, were required to be refined in the large muffle furnace in the melting room; the aggregate weight of these particular deposits before melting was 32,515.64 troy ounces and after melting 17,742.56

troy ounces, showing the comparatively large loss in melting of 45.433 per cent. The average loss in melting all other bullion deposited, viz., 108,176.14 troy ounces before melting, and 105,490.79 troy ounces after melting, was 2.482 per cent.

The loss in weight by assaying (base and parted silver) was 30.96 troy ounces, making the weight of bullion after melting and assaying 123,202.39 troy ounces, the average fineness of same being 808 $\frac{1}{4}$ gold and 145 $\frac{1}{2}$ silver.

The deposits were derived from the following sources:

	Number of deposits	Before melting and assaying	After melting and assaying	Net value	
		Troy ozs.	Troy ozs.	\$	cts.
<i>Bars, nuggets and dust, amalgam, etc.</i>					
British Columbia.....	571	71,917.30	56,461.03	1,026,873	97
Yukon territory.....	423	61,096.43	59,784.75	977,624	02
Alaska.....	3	15.49	13.86	245	95
Siberia.....	3	458.96	458.70	8,648	82
<i>Dental and jewelry scrap</i>					
British Columbia.....	525	6,090.10	5,540.00	40,893	14
Alberta.....	120	877.04	754.30	9,117	31
Saskatchewan.....	34	234.28	187.66	2,281	36
Manitoba.....	1	2.18	2.09	32	59
	1,679	140,691.78	123,202.39	2,065,217	16

DRAUGHTING DIVISION

H. E. Baine, Chief Draughtsman, reports:

Twelve maps were published during the year, and are listed in the catalogue of Mines Branch publications as follows:

Map No. 633, Bituminous Sands of Northern Alberta, Sheet No. 1	1
“ 634, “ “ “ “ “ 2	2
“ 635, “ “ “ “ “ 3	3
“ 636, “ “ “ “ “ 4	4
“ 637, “ “ “ “ “ 5	5
“ 638, “ “ “ “ “ 6	6
“ 639, “ “ “ “ “ 7	7
“ 640, “ “ “ “ “ 8	8

Four sheets of east-west profiles (34 sections) showing projected portion of bituminous sands accompany the above maps.

The following maps were prepared during the fiscal year ending March 31, 1926:

Map No. 647, Sodium sulphate occurrences in the western provinces, Canada.
“ 648, Muskiki Lake sodium sulphate deposits, Saskatchewan.
“ 649, Frederick Lake sodium sulphate deposits, Saskatchewan.
“ 650, Chain Lake sodium sulphate deposits, Saskatchewan.
“ 651, Snakehole Lake sodium sulphate deposits, Saskatchewan.
“ 652, Corral Lake sodium sulphate deposits, Saskatchewan.
“ 653, Ingebright sodium sulphate deposit No. 1, Saskatchewan.
“ 654, Berry Lake (Viscount) sodium sulphate deposits, Saskatchewan.
“ 655, Sybouts Lake sodium sulphate deposit No. 1, Saskatchewan.
“ 656, Ceylon Lake sodium sulphate deposits, Saskatchewan.
“ 657, Whiteshore Lake sodium sulphate deposits, Saskatchewan.
“ 658, Vincent Lake sodium sulphate deposits, Saskatchewan.
“ 659, Regina Beach sodium sulphate deposit No. 1, Saskatchewan.
“ 660, Regina Beach sodium sulphate deposit No. 2, Saskatchewan.
“ 661, Horseshoe Lake sodium sulphate deposit, Saskatchewan.
“ 662, Boot Lake sodium sulphate deposit, Saskatchewan.
“ 663, Grandora Lake sodium sulphate deposit No. 1, Saskatchewan.
“ 664, Grandora Lake sodium sulphate deposit No. 2, Saskatchewan.

Map. No. 665, Sybouts Lake sodium sulphate deposit No. 2, Saskatchewan.
" 666, Alsask Lake sodium sulphate deposit, Saskatchewan.
" 667, Metiskow Lake sodium sulphate deposit, Alberta.
" 668, Ingebright Lake sodium sulphate deposit No. 2, Saskatchewan.
" 594, Molybdenum in British Columbia.
" 595, Molybdenum in Ontario.
" 596, Molybdenum in Quebec.
" 613, Mineral map of Canada.

Two hundred and nineteen page maps, drawings, charts, and flow-sheets were prepared during the year.

One thousand four hundred and seventy-six negatives and black and white prints were made from the photostat machine.

One hundred and seventy-two negatives, black and white, and blue prints were made from the blue-print machine.

Three hundred and ninety-one half-tone blocks and zinc cuts were received, sent out, and filed during the year.

DISTRIBUTION OF PUBLICATIONS

The distribution of Mines Branch publications is under the direct supervision of G. W. Richardson of the secretary's office.

During the fiscal year ending March 31, 1926, the distribution of Mines Branch reports, bulletins, memoranda series, press bulletins, lists of mine operators, etc., amounted to 40,410 copies, including 12,350 copies sent to the British Empire Exhibition. The details were as follows:

Mailing lists	10,794	
Casual requests for reports.....	8,090	
Casual requests for maps, bulletins, memoranda series, lists of mine operators, etc.....	9,176	28,060
Material sent to British Empire Exhibition:		
Report No. 611, "The Mineral Industries of Canada" (first edition)	750	
Report No. 611, "The Mineral Industries of Canada" (re- vised edition)	8,000	
Report No. 627, "The Mining Laws of Canada".....	2,600	
Report No. 624, Catalogue of Mines Branch Publications...	500	
Report No. 597, "Development of Chemical, Metallurgical, and Allied Industries in Canada".....	250	
List of Gold Mines in Canada.....	50	
Supplement to Catalogue of Publications.....	200	12,350
Total		40,410

Distribution of each report when published is made to a mailing list on which there are at present over 2,800 names. This mailing list comprises 397 Canadian libraries; 253 libraries in the United States; 249 foreign libraries; 136 newspapers, technical and trade journals in Canada, the United States, and other countries; 537 private individuals in Canada, the United States, and other countries; 23 Canadian Trade Commissioners; senators and members of the House of Commons; an exchange list of 104 names; an extra copies list; and a notification list of 565 names.

Applications are received for Mines Branch publications from almost every country in the world, but the bulk of the requests come from Canada, the United States, and Great Britain.

The Catalogue of Mines Branch Publications (No. 624) was revised and brought up to date during the year. An index of reports of field investigations and other reports of interest, contained in the Mines Branch Summary Reports from 1907 to 1923, inclusive, was compiled, but it has not yet been published.

LIBRARY

Mrs. O. P. R. Ogilvie, Librarian, reports:

Accessions to the Library, 1925:

Books (by purchase).....	295
Books (by gift)	79
Books (bound)	150
Canadian Government documents (by exchange).....	1,516
Foreign Government documents (gift and exchange).....	1,275
Scientific societies, bulletins, proceedings and transactions (gift and exchange)	1,013
Pamphlets (by gift)	82
Trades catalogues (by gift).....	162
Maps (by gift)	64

There has been an increasing number of additions of foreign technical periodicals, and we now have extensive files of these publications which are the official organs of the mining, metallurgical, and chemical industries of various foreign countries. Much careful attention has been devoted during the year toward securing translations from these and making the investigations therein recorded of service to research investigators on the staff. Considerable progress has been made toward transferring and shelving these foreign files to the new room especially assigned for this purpose.

Much reference work has been done on industrial processes which has been of value to members of the staff, and this information has further been disseminated to investigators of other departments in the Government, and also to representatives of Canadian industries who have visited the library to search our files.

A revision in alphabetizing the card catalogue has been undertaken and additional improvement in cataloguing is anticipated for the coming year.

EXPLOSIVES DIVISION

Lt.-Col. G. Ogilvie, Chief Inspector of Explosives

Explosives Factories

The only change in the distribution of explosives factories, which occurred in the year under review, was one arising from the formation of the Canadian Giant Company. In this company are merged the Giant Powder Company of Canada and that section of the Canadian Explosives Limited which operated in western Canada. Of the two factories formerly in operation that of the Giant Powder Company at Nanoose, B.C., was closed down, and that of the Canadian Explosives Limited, at James Island, B.C., retained by the Canadian Giant Company. This reorganization of the companies concerned tends to reduce costs of production and distribution and, in consequence, to benefit the consumer.

One serious accident, whereby three men lost their lives, occurred in a gelatin eartridging house at the factory of the Canadian Explosives Limited, at Beloeil, Que., on November 13. The accident was caused by the unfortunate victims continuing to operate the machine, notwithstanding an abnormal heating of the hopper containing the explosive. This condition had been observed by other employees, who, in the course of their duty had visited the building shortly before the explosion. About 1,750 pounds of gelatin dynamite were involved. The building was completely wrecked and the barricades destroyed, but these served their purpose of localizing the effects of the explosion, no other buildings being damaged. This accident formed the subject of a special report.

Two other accidents, involving minor injuries to employees, are to be recorded.

The explosion of a bundle of electric detonators was attributed to accidental contact being made by the leads with an exposed electric throw switch. An operator sustained a number of wounds from the projection of the fragments. The other accident was caused by the explosion of a small arm cartridge in a cartridge filling room, the flash from it igniting loose powder and communicating to a receptacle containing two pounds of powder. Two employees suffered burns.

In regard to the efforts continually being made by manufacturers to perfect all measures taken for the safeguarding of their employees, it should be noted that in addition to reporting accidents which occur, they bring promptly to the notice of the division a number of minor incidents which arise and which, though not causing accidents, suggest conditions under which such might have resulted. The free discussion which follows between the manufacturer and the division, and also between the officials of the companies engaged in the manufacture of nitroglycerine explosives and operating the three large plants in the Dominion, fosters the spirit of vigilance in matters pertaining to safety, and in many cases leads to the adoption of devices and methods by which all benefit.

The production of blasting explosives for the year 1925 showed an increase of about 15 per cent, 17,470 tons of explosives belonging to classes 1 to 4 having been made.

Magazines

The number of magazines under licence on March 31, 1926, is 214, in addition to 153 which are operating under temporary magazine licences. No accident, fire, or explosion occurred in any licensed magazine during the year, but four were forcibly entered and small quantities taken from two of them.

The inspections made by inspectors of the division, and by members of the Royal Canadian Mounted Police have indicated a general improvement in standard of maintenance of magazines operated by those of the dealers and users of explosives, who at first did not fully appreciate the requirements and purposes of the regulations.

Explosives Condemned

Though no large stock of abandoned explosives was brought to light during the year, four abandoned small stores were found containing explosives, and three caches were uncovered. The explosives so found, amounting in all to about 200 pounds of blasting cartridges and 3,000 detonators; were destroyed. In addition, approximately 4,500 pounds of explosives, distributed over eighteen places, were condemned on inspection and destroyed. Over 3,000 pieces of unauthorized fireworks were handed over for destruction, and several large shipments were condemned at port of entry and returned to China.

Unlicensed Premises

Over 700 inspections were made of unlicensed premises by inspectors of the division, and over 2,000 by members of the Royal Canadian Mounted Police. Though the purpose of these visits of inspection, both to licensed magazines and to unlicensed premises, is to enforce the regulations, the advice of inspectors is often invited on all matters relating to the storage of explosives, by parties desirous of improving existing conditions and by those who have not previously had occasion to stock explosives, but contemplate doing so. With a view to providing such with information on the matters demanding attention in the proper and safe keeping of explosives, a pamphlet "The Storage of Explosives," has been prepared and distributed.

Prosecutions

Prosecutions were instituted in nine cases for violation of the regulations governing the keeping of explosives in unlicensed premises, in three cases for contravention of those relating to the conveyance of explosives, and in one case for importing explosives without a permit. Convictions were obtained in all cases.

Importations

The number of permits for importation granted during the year was 636; 34 of Special Importation permits referred to in the last report were also granted.

Authorization of Explosives

Applications were received for the addition of 38 explosives, exclusive of fireworks, to the authorized list, 28 were accepted after examination.

Accidents

Data have been collected in respect to miscellaneous accidents with explosives which occurred during the year 1925. These were tabulated, according to attributed causes, and published in the Annual Report of the division. The continued prominence of those brought about by playing with explosives remains the most distressing feature, reflecting as it does the gross carelessness of some persons whereby explosives are lost, or left so exposed as to get into the hands of children. In the last three years approximately 30 per cent of all casualties with explosives were brought about by persons, usually children, playing with them.

EDITORIAL DIVISION

F. Nicolas, Editor-in-Chief

The duties of Editor-in-Chief, which had been temporarily assumed by L. L. Bolton, Secretary, Department of Mines, on March 16, 1925, were taken over by F. Nicolas on November 11, 1925. The strength of the staff of the Editorial Division remained unchanged, but the office of the editor in charge of publications of the Mines Branch was transferred to the Victoria Memorial Museum.

During the fiscal year twenty-three separate English publications were issued by the department, consisting of annual reports, memoirs, bulletins, pamphlets, and volume IV, part F (Marine Diatoms), of the Canadian Arctic Expedition (1913-18); there were issued also sixteen lists of mine operators and mines. Five reports were published in French.

At the end of the fiscal year 1925-26, there were in the hands of the King's Printer eight English reports and two French translations of the Geological Survey, three English reports of the Victoria Memorial Museum, three English reports of the Mines Branch, one English report and a French translation of the Explosives Division, and the French translation of the Annual Report of the Department of Mines for the fiscal year ending March 31, 1925. Several reports also were being edited preparatory to dispatch for printing, and several French translations are now nearly ready for the printer.

The following list includes the publications issued by the various branches of the department during the fiscal year 1925-1926, under the supervision of the Editor-in-Chief, and the French publications distributed¹ during that period:

DEPARTMENT OF MINES

Report
No.

English Publications

2076. *Report of the Department of Mines for the Fiscal Year Ending March 31, 1925*; 75 pages; 4,000 copies; published November 18, 1925.

French Translations

2054. *Rapport du Ministère des Mines pour l'année financière se terminant le 31 mars, 1924*; 75 pages; 1,000 copies; published May 9, 1925.

GEOLOGICAL SURVEY

English Publications

2034. *Index to Palaeontology (Geological Publications 1847-1916)*—By Frank Nicolas; 383 pages; 1,500 copies; published December 29, 1925.
2052. Memoir 143. Geological Series 124. *North Shore of Lake Huron*—by W. H. Collins; 160 pages; 17 plates; 9 figures; 3 maps; 3,000 copies; published October 30, 1925.
2056. Memoir 145. Geological Series 125. *The Palaeozoic Outlier of Lake Timiskaming, Ontario and Quebec*—by G. S. Hume; 129 pages; 16 plates; 7 figures; 2,000 copies; published August 10, 1925.
2061. Memoir 146. Geological Series 126. *Retreat of the Last Ice-sheet in Eastern Canada*—by Ernst Antevs; 142 pages; 19 plates; 37 figures; 2,000 copies; published October 15, 1925.

¹The distribution of English publications was made as usual by the branches that prepared them.

Report
No.

2062. *Economic Minerals of Canada*. (British Empire Exhibition Edition 1925). Pamphlet—by Wyatt Malcolm; 28 pages; 1 plate; 50,000 copies; published June 19, 1925.
2066. *Summary Report of the Geological Survey, Department of Mines, for the Calendar Year 1924, Part A*; 159 pages; 5 plates; 11 figures; 3 maps; 3,000 copies; published September 8, 1925.
2075. *Economic Minerals of Canada* (New Zealand and South Seas International Exhibition Edition 1925). Pamphlet—by Wyatt Malcolm (reprint from No. 2062); 28 pages; 1 plate; 25,000 copies; published September 11, 1925.
2077. *Summary Report of the Geological Survey, Department of Mines, for the Calendar year 1924, Part B*; 127 pages; 4 plates; 2 figures; 3 maps; 3,000 copies; published March 4, 1926.

French Translations

2067. *Rapport sommaire de la Commission géologique du Ministère des Mines, 1923, Partie C I-II* (extract); 134 pages; 2 plates; 28 figures; 2 maps; 1,000 copies; published March 31, 1926.

VICTORIA MEMORIAL MUSEUM

English Publications

2072. Museum Bulletin No. 40. Biological Series 9. *Birds Collected and Observed during the Cruise of the "Thiepvul" in the North Pacific, 1924*—by Hamilton M. Laing; 46 pages; 3 plates; 1 figure; 2,000 copies; published November 28, 1925.
- Report of the Canadian Arctic Expedition 1913-1918¹: Volume IV: *Botany, Part F, Marine Diatoms*—by Albert Mann; 33 pages; 2 plates; 4,500 copies; published November 12, 1925.

MINES BRANCH

English Publications

592. *Molybdenum: Metallurgy and Uses and the Occurrence, Mining, and Concentration of Its Ores*—by V. L. Bardley-Wilmot; 292 pages; 11 plates; 55 figures; 3 maps; 4,000 copies; published November 30, 1925.
611. *The Mineral Industries of Canada* (British Empire Exhibition Edition 1925)—by A. H. A. Robinson with the co-operation of the Mines Branch staff; 140 pages; 35 plates; 1 map; 13,000 copies; published June 19, 1925.
624. *Catalogue of Mines Branch Publications, with Alphabetical Guide*; 43 pages; 1,500 copies; published November 30, 1925.
642. *Investigations of Mineral Resources and the Mining Industry, 1924*; 118 pages; 5 plates; 7 figures; 4,000 copies; published March 31, 1926.
- Separates:*
- Magnesium Sulphate in B.C.*—by M. F. Goudge; 18 pages; 2 figures; 500 copies; published March 31, 1926.
- Sodium Carbonate in B.C.*—by M. F. Goudge; 21 pages; 5 plates; 1 figure; 500 copies; published March 31, 1926.
643. *Investigations in Ore Dressing and Metallurgy, 1924*; 115 pages; 6 figures; 4,000 copies; published March 16, 1926.
644. *Investigations of Fuels and Fuel Testing, 1924*; 81 pages; 4 plates; 5 figures; 8 diagrams; 4,000 copies; published March 10, 1926.
645. *Investigations in Ceramics and Road Materials, 1924*; 45 pages; 3,500 copies; published January 15, 1926.

¹ The Arctic report was published under the supervision of R. M. Anderson, Chief, Biological Division, Victoria Memorial Museum, as general editor of the Arctic Publications Committee.

Lists of Mine Operators:

- Abrasives in Canada; 1,000 copies; published March 26, 1926.
 Asbestos Mines in Canada; 1,000 copies; published March 26, 1926.
 Coal Mines in Canada; 2,000 copies; published November 14, 1925.
 Copper and Nickel-Copper Mines in Canada; 1,000 copies; published July 9, 1925.
 Feldspar Mines in Canada; 1,000 copies; published March 26, 1926.
 Gold Mines in Canada; 1,000 copies; published June 5, 1925.
 Graphite Mines in Canada; 1,000 copies; published March 26, 1926.
 Gypsum Mines in Canada; 1,000 copies; published March 26, 1926.
 Iron Mines in Canada; 1,000 copies; published July 9, 1925.
 Magnesium Sulphate, Sodium Carbonate, and Sulphate Operators in Canada; 1,000 copies; published March 26, 1926.
 Milling Plants in Canada; 1,000 copies; published March 31, 1926.
 Molybdenum, Antimony, and Tungsten Mines in Canada; 1,000 copies; published July 9, 1925.
 Quartz (Silica) Mines in Canada; 1,000 copies; published March 26, 1926.
 Silver Mines in Canada; 1,000 copies; published July 9, 1925.
 Silver-lead-zinc Mines in Canada; 1,000 copies; published July 9, 1925.
 Talc and Soapstone Mines in Canada; 1,000 copies; published March 26, 1926.

EXPLOSIVES DIVISION

English Publications

15. *Annual Report of the Explosives Division of the Department of Mines for the Calendar Year 1924*; 22 pages; 2,000 copies; published April 24, 1925.
 17. *The Storage of Explosives*. Pamphlet—by Lt.-Col. G. Ogilvie; 21 pages; 6 figures; 5,000 copies; published February 19, 1926.

French Translations

16. *Rapport annuel de la Division des Explosifs du ministère des Mines pour l'année civile 1924*; 23 pages; 1,000 copies; published October 15, 1925.

DOMINION FUEL BOARD

English Publications

- Card—*How to Burn Coke*. 1st edition; 100,000 copies; published January 14, 1926; 2nd edition; 50,000 copies; published February 20, 1926.

French Translations

- Card—*Comment Brûler le Coke*. 1st edition; 30,000 copies; published January 30, 1926; 2nd edition; 20,000 copies; published February 20, 1926.
 6. *Le Coke comme combustible de ménage dans le Canada central*—by J. L. Landt; 149 pages; 51 plates; 18 figures; 1,500 copies; published November 10, 1925.

DISTRIBUTION OF FRENCH PUBLICATIONS

The French publications of the Department of Mines, including those of the Geological Survey, the Mines Branch, and the Explosives Division, are distributed by the Editorial Division of the Department, the distribution being under the direct supervision of P. E. Levesque. During the fiscal year 1925-26, 7,621 copies were distributed in Canada and foreign countries, as follows: 1,894 addresses on the mailing lists, through the Printing Bureau Distribution Office; 3,327 copies in compliance with written or personal requests, distributed from our Distribution Office; and approximately 2,400 copies of the publications issued by the Explosives Division and the Dominion Fuel Board were sent by these offices to their correspondents.

ACCOUNTING DIVISION

ACCOUNTANT'S STATEMENT

P. R. Marshall

The funds available for the work and the expenditure of the Department of Mines for the fiscal year ending March 31, 1926, were:

	Grant	Expenditure	
		Amount	Total
	\$ cts.	\$ cts.	\$ cts.
DEPARTMENT—			
Amounts voted by Parliament.....	104,339 00		
Civil Government salaries.....		71,054 67	
Grant to Imperial Institute.....		12,848 00	
Expenses of Explosives Division.....		6,517 99	
Civil Government contingencies.....		4,870 11	
Grant to Canadian Institute of Mining and Metallurgy.....		3,000 00	
			98,090 77
Balance unexpended and lapsed.....			6,248 23
GEOLOGICAL SURVEY—			
Amounts voted by Parliament.....	613,255 00		
Civil Government salaries.....		274,360 60	
Explorations, surveys, and investigations.....		197,024 89	
Publication of reports and maps.....		55,000 00	
Wages.....		24,920 67	
Sundry printing and stationery.....		15,891 31	
Miscellaneous.....		7,623 48	
Instruments and repairs.....		6,163 71	
Specimens for Museum.....		2,999 03	
Photographic supplies.....		1,707 36	
Miscellaneous gratuities.....		1,550 00	
Laboratory.....		961 88	
International Geological Congress.....		225 00	
Advances 1925-26 to be accounted for in 1926-27.....		2,466 51	
			590,894 44
Balance unexpended and lapsed.....			22,360 56
MINES BRANCH—			
Amounts voted by Parliament.....	445,105 00		
Civil Government salaries.....		158,676 38	
Expenses of fuel testing plant and laboratory.....		55,063 17	
Expenses of ore dressing and metallurgical laboratories.....		46,816 31	
Investigation of mineral resources and deposits.....		27,745 68	
Expenses of Dominion Fuel Board.....		25,805 41	
Publication of reports and maps.....		15,797 05	
Wages.....		12,228 30	
Sundry printing and stationery.....		9,730 22	
Ceramic and structural materials laboratories.....		7,168 88	
Chemical laboratory.....		6,293 25	
Compassionate allowance to widow of the late Harold Kohl.....		3,000 00	
Miscellaneous.....		2,694 95	
Miscellaneous gratuities.....		530 00	
Compensation to J. H. Fortune for quarters vacated.....		333 30	
			371,882 90
Balance unexpended and lapsed.....			73,222 10
Forward.....			
ASSAY OFFICE—			
Amount voted by Parliament.....	26,000 00		
Earnings.....	1,175 35		
Salaries of staff.....		16,580 00	
Express charges on bullion.....		2,994 96	
Contingencies.....		2,253 26	
Assayers supplies.....		1,374 83	
Fuel, power, and light.....		1,236 81	
Premium on bonds.....		412 50	
Electric burglar alarm service.....		360 00	
			25,212 36
Balance unexpended and lapsed.....			1,962 99
	1,189,874 35		1,189,874 35

DEPARTMENT OF MINES

Summary

	Grant		Expenditure		Grant not used	
	\$	cts.	\$	cts.	\$	cts.
Civil Government salaries.....	581,670	00	504,091	65	27,578	35
Department.....	32,549	00	27,036	10	5,512	90
Geological Survey.....	3,180	00	314,983	84	3,016	16
Mines Branch.....	275,400	00	209,676	52	65,723	48
Assay Office.....	27,175	35	25,212	36	1,962	99
Earnings.....		1,175				
\$ 26,000 00						
Miscellaneous gratuities.....	2,080	00	2,080	00		
Compassionate allowance to widow of late Harold Kohl....	3,000	00	3,000	00		
	1,189,874	35	1,086,080	47	103,793	88

Casual Revenue

Sales of equipment, explosives permits, publications, school collections, etc.	\$ 4,407 35
Profit from sale of bullion.....	2,560 23
Advances from 1924-25 accounted for in 1925-26.....	380 76
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