1878.

NEW ZEALAND.

TENTH ANNUAL REPORT OF THE NEW ZEALAND INSTITUTE, 1877-78.

Presented to both Houses of the General Assembly by Command of His Excellency.

MEETINGS of the Board have been held during the past year on 29th of August, and 8th September, 1877; and 2nd of January, 29th of May, and 28th June, 1878.

In accordance with the Act the following members retired from the Board:—Mr. W. T. L. Travers, the Hon. Mr. G. M. Waterhouse and the Hon. Mr. E. W. Stafford. The two former gentlemen were re appointed, and Mr. Thomas Mason was appointed in the room of the Hon. Mr. Stafford.

In compliance with clause 7 of the Act, the Incorporated Societies elected the following gentlemen as Governors of the Institute:—Mr. J. C. Crawford, F.G.S., Mr. Thomas Kirk, F.L.S., and the Bishop of Nelson.

The honarary members elected under Statute IV. of the rules of the Institute, are:—His Excellency Governor F. A. Weld, C.M.G., Tasmania; Professor Spencer Baird, U.S.A.; and Dr. D. Sharp, Scotland.

The following is a list of members now on the roll of the Institute, showing an increase of 113 during the past year:—

Honarary Members	27
ORDINARY MEMBERS.	
Auckland Institute	278
Hawke Bay Philosophical Institute	68
Wellington Philosophical Society	222
Nelson Association	50
Westland Institute	175
Canterbury Philosophical Institute	99
Otago Institute	224
Total	1143

Volume X. is now being issued to members, and also to the various Libraries, Societies, and persons mentioned in the list appended.

The publication of the volume was commenced on the 2nd of January, and the first copies were received from the publisher towards the end of May.

The large accession of members to the affiliated Societies, not having been notified to the Manager at a sufficiently early date, the number of copies of Volume X. was not increased, so that the edition will be at once exhausted, and no spare copies of this volume will remain on hand.

Volume X. contains 78 articles besides several short notices which appear in the Proceedings, 23 plates, and 629 pages of letter-press.

The following is a comparison of the sections of the work, with last year's volume:—

	1878 Pages.	1877 Pages.
Miscellaneous	190	316
Zoology	154	173
Botany	78	61
Chemistry	36	7
Geology	48	42
Proceedings	63	62
Appendix	60	63
	629	724

The number of Volumes of Transactions now on hand, is as follows:—

Volume I., 2nd edition, 448: Volume II., : Volume III., 10: Volume IV., 8: Volume V., 74: Volume VI., 80: Volume VII,, 169: Volume VIII., 36: Volume IX., 177: Volume X., .

The appended statement of accounts shows a balance to the credit of the Board of £37 1s. 10d.

The annual reports of the various departments attached to the Institute, are also appended, together with a list of the additions to the Library.

JAMES HECTOR,
Manager.

Approved by the Board, 4th September, 1878,
W. B. D. MANTELL, Chairman.

LIST of PUBLIC INSTITUTIONS and INDIVIDUALS to whom the VOLUME is PRESENTED by GOVERNORS of the NEW ZEALAND INSTITUTE.

No. of Copies.	
1	His Excellency the Governor, President of the Institute
11	Governors of the Institute
27	Honorary Members
1	The Prime Minister
1	The Colonial Treasurer
1	The Native Minister
1	The Under-Colonial Secretary
2	For Parliament
1	The Colonial Office, London
1	The Agent-General, London
1	Messrs. Trübner & Co. (Agents), 57, Ludgate Hill, London
1	British Museum, London
1	Royal Society, London
1	Royal Geographical Society, London
1	Royal Asiatic Society, London
1	Royal Society of Literature of the United Kingdom
1	Royal Colonial Institute, London
1	Geological Society, London
1	Zoological Society, London
1	Linnean Society, London
1	Anthropological Institute of Great Britain and Ireland, London
1	Geological Survey of the United Kingdom, London
1	Geological Magazine, London
1	Geological Record, London
1	Zoological Record, London
1	Philosophical Society of Leeds, England
1	Literary and Philosophical Society, Liverpool, England
1	Literary Institute, Norwich, England
1	University Library, Oxford, England
1	University Library, Cambridge, England
1	School Library Committee, Eton, England
1	School Library Committee, Harrow, England
1	School Library Committee, Rugby, England
1	Natural History Society, Marlborough College, England
1	Royal Society, Edinburgh
1	Royal Botanic Garden Library, Edinburgh
1	Geological Society, Edinburgh
1	University Library, Edinburgh
1	Philosophical Society of Glasgow
1	Royal Irish Academy, Dublin
1	Royal Society, Dublin
1	Asiatic Society of Bengal, Calcutta
1	Geological Survey of India, Calcutta
1	Geological Survey of Canada, Montreal
1	Canadian Institute, Toronto
1	Royal Society of New South Wales, Sydney
1	Linnean Society of New South Wales, Sydney
1	Public Library, Sydney
1	University Library, Sydney
1	Royal Society of Victoria, Melbourne
1	Public Library, Melbourne
1	University Library, Melbourne
1	Geological Survey of Victoria, Melbourne
1	Legislative Library, Adelaide
1	South Australian Institute, Adelaide
1	Public Library of Tasmania, Hobart Town
1	Royal Society of Tasmania, Hobart Town
1	Smithsonian Institute, Washington, D.C.
1	Geological Survey of U.S. Territory, Washington, D.C.
1	American Geographical Society, New York
1	American Philosophical Society, Philadelphia
1	American Institute of Mining Engineers, Philadelphia.
1	Franklin Institute, Philadelphia
1	Academy of Natural Sciences Library, Philadelphia
1	Academy of Natural Sciences, Buffalo
1	Academy of Natural Sciences, San Francisco
1	Academy of Natural Sciences, Davenport, Iowa
1	Harvard College, Cambridge, Mass.
1	Literary and Historical Society of Quebec, Quebec, Canada East
1	Royal Society of Literature and Arts of Belgium, Brussels
1	Royal Imperial Institute for Meteorology and Earth Magnetism, Hohe-Warte, Vienna
1	Jahrbuch der Kaiserlich-koniglichen Geologischen Reichsanstalt, Vienna
	Imperial German Academy of Naturaists, Dresden.
1	Physico-economic Society of Konigsberg, E. Prussia
1	Abhandlungen, Bremen
1	R. Accademia dei Lincei, Rome
1	Imperial Museum of Florence
1	Royal Geographical Society of Italy, Florence
1	Tuscan Natural Science Society, Pisa
1	Editor of Cosmos, Turin
1	Royal Academy of Science, Stockholm
	Libraries and Societies in New Zealand.
1	Secretary, Auckland Institute
1	Secretary, Hawke Bay Philosophical Society
1	Secretary, Wellington Philosophical Society
1	Secretary, Nelson Association
1	Secretary, Westland Institute
1	Secretary, Philosophical Institute, Canterbury
1	Secretary, Otago Institute
1	General Assembly Library
1	Secretary New Zealand Institute
	Publishing Branch.
1	Editor
1	Assistant Editor
2	Draftsman
1	Lithographer
1	Government Printer
1	Photo-lithographer.

MUSEUM.

The number of names entered in the Visitors' book at the Museum during the past year has been 15,000.

Since the 7th of July the Museum has been opened to the public for two hours on Sunday afternoons, and the large attendance, varying from 300 to 800 persons, indicates that there are many who are glad to take advantage of the opportunity thus afforded for examining the collections.

There have been 9,880 specimens added to the collections during the past year; 7,519 of which are mineral and fossil specimens obtained during the geological survey of the colony which is in progress, and 135 specimens deposited on loan.

HERBARIUM.

The collections in this department have received only inconsiderable additions, and the arrangements for the thorough preservation of the dried plants are quite insufficient. It has, therefore, been considered inadvisable to unpack the large herbarium of foreign plants until proper cabinets have been provided for their reception, so that this special gift from the Trustees of the British Museum, which numbers 28,000 species of plants for reference, is still inaccessible to students.

NATURAL HISTORY COLLECTIONS.

The detailed study and classification of the collection is rapidly advancing, and arrangements have been made with the Education Department to secure the services of a wood engraver, so that the illustrations for the new editions of the Natural History Catalogues, which are now out of print, may be obtained in a form that will admit of them being also used for the illustration of elementary text books for the use of schools.

Mammalia.

The classification of the New Zealand Cetacea has undergone revision, and the results so far as they relate to the larger forms, have been published in the Transactions of the Institute (On the Whales of the New Zealand Seas. By Dr. Hector. Vol. X., 331).

The most important addition to the collection in this section has been a fine skeleton of the Whale Killer *(Orca pacifica)*, presented by the Royal Society of Tasmania.

Birds.

The principal additions to the collection of birds during the year, was obtained by exchange from the private Museum of Mr. Macleay, F.L.S., at Sydney.

Fishes.

Very extensive additions have been made to the alcoholic collections in this department, 360 specimens having been received, including a typical collection of the Australian sea and river fishes; a small collection of Polynesian fish made by Lord Hervey Phipps; and a series of the fishes of the Atlantic Coast of the United States, contributed by the Smithsonian Institute.

The collection of New Zealand fishes has been greeatly extended and improved by the substitution of fresh preparations.

Invertebrata.

The additions in this section number 887, and consist chiefly of Australian Crustacea, Echinodemata, and Mollusca, and a large series of preparations of the New Zealand Mollusca to facilitate the study of the soft parts of the animals.

Mention has also to be made of a valuable collection of New Zealand Insects, 37 in number collected and presented by the Rev. Father Sauseau, of Blenheim.

Ethnological.

The only important addition, has been a collection of the weapons of the Isle of Paris, New Cale donian natives, the most interesting of which, are sling-stones made of steatite, which are projected from a sling made of cloth spun from the hair of the flying fox.

Minerals.

In addition to the various mineral and rock specimens obtained by the Geological Survey, a very valuable series, numbering 400 specimens, illustrating the geology of Canada, from Mr. A. R. C. Selwyn, F.R.S., the Director of the Geological Survey of the Province, have been added, and a few ores of interest collected in Cornwall, have been received from Mr. J. D. Enys, F.G.S.

The collection of New Zealand minerals and ores has been re-arranged and catalogued, and the volcanic and metamorphic rocks are now undergoing a more thorough chemical and microscopical examination than they have hitherto received, while, at the same time, duplicate specimens are being selected for exchange.

Palæontology.

The most important collection of foreign fossils added to the Museum during the past year, is a series illustrating the carboniferous rocks of New South Wales and Tasmania, obtained by the Director during a visit to Australia. This series has proved of great service in comparing the equivalen tformations in New Zealand.

Geological Survey Collections.

These have been very ample and important in their bearing on the geology of the Islands, and especially in relation to the lower mesozoic rocks, which have, until now, been very imperfectly understood.

The chief field work of the year was the detailed survey of the Hokanui range in Southland, which has, for many years, been known to present the most typical development of the formations from Jurassic to Permian.

The results obtained are fully detailed in the Geological Reports for the year, but it may be stated here, that the above formations form a stratigraphical sequence, but were divided into 76 well defined beds, the outcrops of which were traced and studied in section, over an area of 32 square miles.

The fossils, which number over 5,000 specimens, were collected from twenty-five distinct horizons, and form a very large and important addition to the palæontological data now in the Museum, which is only partially arranged and worked out :—

The total thickness of the strata represented in the sections is 21,000 feet, viz. :—

Upper Oolite	3,500
Middle Oolite	850
Lower Oolite	2,200
Lias and Rhœtic	2,000
Permian Triassic	6,400
Permian Carboniferous	6,150

The most remarkable feature is the great development of our Infra-Triassic Marine formation, characterised by a great profusion of Brachiopoda, several of these forms being generically distinct from any hitherto described, while there is a total absence of any true Spirifera. It is thus rendered probable that we have in the New Zealand area, developments of Lower Mesozoic strata, representing gaps in the record elsewhere.

A further examination of the Mount Potts Spirifer beds, during the past year, has afforded a large number of fossils and proved the existence of three marked horizons in that locality,—the Upper Plant beds; the Spirifer beds (although no true Spirifer is present) corresponding to the Lower Triassic of the Hokanui section; and at the base, beds containing Glossopteris, which is a characteristic fossil of the New South Wales Coal Fields.

A thickness of 2,000 feet separates the Glossopteris from the Spirifer beds. From the bone beds associated with the latter, a good series of the Saurian bones was also collected, some of the vertebral centra having enormous proportions, being 18 inches in diameter, and 3½ inches in length.

Besides vertebra, rib and limb bones were also obtained, and what appears to have been dermal plates; but the large blocks in which these interesting remains are embedded are not yet worked out sufficiently.

A further discovery of great interest, is the determination by Mr. McKay of the age of the Maitai calcareous slates near Nelson. These underlie, unconformably, the whole of the beds that are developed in the Hokanui section, and contain the true Spirifer bisulcatus and Productus punctatus of the Middle Coal measures of New South Wales.

The discovery of Graptolites in the strata of the Collingwood district during the past year, is also an important advance in New Zealand palæontology.

In Upper Mesozoic formations, the most interesting novelty is the discovery by Mr. Cox of an extension of the West Coast Coal measures towards the limit of the Te Anau lake, while the heavy bedded grits and conglomerates enter into the structure of lofty mountain ranges.

The additions to the tertiary fossils have chiefly been from the East Coast of Wellington, while the evidence of the relative position of the Greensands and Chalk marls to the Miocene strata of the Taipos and the Pliocene Tertiaries of the Wairarapa, have received support by ample collections.

The New Zealand Fossils now accumulated in the course of the Geological Survey, represent collections from 450 different localities, and comprise about 6,200 trays, which have been thoroughly classified, and 1,200 specific types withdrawn into a separate collection for publication. A large number of types have been figured and their publication will be proceeded with as rapidly as the other work of the Department will permit.

Publications.

The volume of Geological Reports for the past year, is now in the press and will contain the progress reports of the Survey, and in addition descriptions and figures of the most important of the Lower Mesozoic fossils.

Meteorology.

The number of Meteorological Stations is now 14, namely:—Mongonui, Auckland, Taranaki, Napier, Wanganui, Wellington, Nelson, Cape Campbell, Christchurch, Bealey, Hokitika, Dunedin, Queenstown, Southland.

The returns made by the Observers are published in the usual form, but it is very desirable that the re-organization of this branch should be effected, with the view of reducing the present number of stations, and substituting a few thoroughly equipped observatories, and a large number of stations where only rainfall, direction of wind, and temperature would be observed. By this means the same expenditure would give more valuable results.

Time Ball Observatory.

The necessity for certain additions and repairs to the Observatory have been represented to Government, and, in particular, the desirability of having a second rating clock, as at present, when the single astronomical clock is under adjustment, intervals occur during which the time-ball cannot be dropped with accuracy.

LABORATORY.

The following is a summary of analyses performed in the Colonial Laboratory during the past year:—

1. Coals	15
2. Rocks and Minerals	46
3. Metals and Ores	53
4. Examination for Gold and Silver	70
5. Waters	22
6. Miscellaneous	25
Total	231

A full account of these analyses will be found in the Annual Report on the work performed in the Laboratory, published separately.

Accounts of New Zealand Institute, 1877-8.

Receipts.	£	s.	d.	Expenditure.	£	s.	d.
Balance in hand, 23rd August, 1877	123	9	4	Expense of printing Proceedings of Vol. IX., of Index, and Binding	91	16	11
Vote for 1877-8	500	0	0	Expenses of printing Vol. X.	510	8	6
Contribution from Wellington Philosophical Society	31	10	0	Miscellaneous items	21	18	1
Sale of Volumes	6	6	0	Balance	37	1	10
	£661	5	4		£661	5	4

September 4th, 1878.

Arthur Stock,
Hon. Treasurer.