

1881.
NEW ZEALAND.

NEW ZEALAND INSTITUTE, 1880-81

(THIRTEENTH ANNUAL REPORT OF THE).

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

THE following are the dates upon which meetings of the Board have been held : 21st July and 31st December, 1880.

The retiring members from the Board, in conformity with the Act, were Mr. W. T. L. Travers, the Hon. Mr. G. R. Johnson, and Dr. Hector, all of whom were reappointed by His Excellency the Governor.

The elected governors under clause 7 of the Act are : Dr. Newman, Captain Russell, M.H.R., and Mr. J. McKerrow

The vacancy on the roll of honorary members, caused by the death of Dr. Garrod, was filled by the election of the Marquis of Normanby. Two other vacancies have occurred in the roll of honorary members, through the death of Dr. Lander Lindsay and Dr. Filhol.

The members on the roll of the Institute now number as follows : Honorary members, 28. Ordinary members : Auckland Institute, 277 ; Hawke's Bay Philosophical Society, 85 ; Wellington Philosophical Society, 274 ; Nelson Association, 50 ; Westland Institute, 100 ; Philosophical Institute, Canterbury, 219 ; Otago Institute, 216 ; Southland Institute, 66. Total, 1,315.

Since the last report the Southland Institute has been incorporated, in terms of the Act, with the New Zealand Institute.

The printing of Volume XIII. was commenced on the 18th January and completed on the 28th March, and a portion of the edition ready for issue early in May. The volume contains sixty-two articles, also Presidents' Addresses, and abstracts of papers which appear in the Proceedings and Appendix. There are 503 pages of letter-press and eighteen plates.

The following division of the contents of the volume, under the various subjects, is given for comparison with last year's work :—

| | 1881. Pages. | 1880. Pages. |
|----------------|-----------------|-----------------|
| Miscellaneous | 170 | 240 |
| Zoology | 79 | 76 |
| Botany | 147 | 84 |
| Chemistry | 4 | 14 |
| Geology | 21 | 6 |
| Proceedings | 42 | 52 |
| Appendix ... | 40 | 66 |
| | <hr/> 503 | <hr/> 538 |

The volumes of the Transactions now on hand are,—Vol. I., second edition, 420 ; Vol. II., none ; Vol. III., none ; Vol. IV., none ; Vol. V., 60 ; Vol. VI., 55 ; Vol. VII., 160 ; Vol. VIII., 25 ; Vol. IX., 165 ; Vol. X., 15 ; Vol. XI., 80 ; Vol. XII., 80 ; Vol. XIII., not yet fully distributed.

It will be seen from the Honorary Treasurer's balance-sheet that there is a sum of £49 2s. 1d. to the credit of the Board.

The Annual Reports of the various departments connected with the Institute are appended.

JAMES HECTOR,
Manager.

Approved by the Board, 28th July, 1881 :

ARTHUR STOCK,
Chairman.

ACCOUNTS OF NEW ZEALAND INSTITUTE, 1880-81.

| <i>Receipts.</i> | | | | <i>Expenditure.</i> | | | | |
|--|------|-----|----|---------------------|--|------|----|---|
| | £ | s. | d. | | £ | s. | d. | |
| To Balance in hand, 21st July, 1880 | ... | 4 | 8 | 3 | By Balance of account for printing Vol. XII... | 66 | 6 | 6 |
| Vote for 1880-81 | ... | 500 | 0 | 0 | Printing Vol. XIII. | 498 | 18 | 5 |
| Contributions from societies in aid of printing Vols. XI. and XII., under clause d of Regulations of Institute | ... | 79 | 18 | 0 | Miscellaneous items, including binding, &c. | 2 | 5 | 1 |
| Contributions from Wellington Philosophical Society (one-sixth of annual revenue)... | ... | 28 | 1 | 10 | Balance | 49 | 2 | 1 |
| Sale of volumes | ... | 4 | 4 | 0 | | | | |
| | £616 | 12 | 1 | | | £616 | 12 | 1 |

28th July, 1881.

1—H. 25.

ARTHUR STOCK,
Treasurer.

LIST OF FREE COPIES.

List of Public Institutions and Individuals to whom the Volume of Transactions is Presented by the Governors of the Institute.—His Excellency the Governor, President of the Institute; Governors of the Institute (eleven); Honorary Members (thirty); the Prime Minister; the Colonial Secretary; the Colonial Treasurer; the Minister of Lands; the Minister for Public Works; the Postmaster-General; the Attorney-General; the Under-Secretary for the Colony; the Legislative Council; the House of Representatives; the Colonial Office, London; the Agent-General, London; Messrs. Trübner and Co. (Agents), 57, Ludgate Hill, London; British Museum, London; Linnean Society, London; Royal Society, London; Royal Geographical Society, London; Royal Asiatic Society, London; Royal Society of Literature of the United Kingdom; Royal Colonial Institute, London; Geological Society, London; Zoological Society, London; Anthropological Institute of Great Britain and Ireland, London; Geological Survey of the United Kingdom, London; Geological Magazine, London; Geological Record, London; Editor of Nature, London; Zoological Record, London; Philosophical Society of Leeds, England; Literary and Philosophical Society, Liverpool, England; Literary Institute, Norwich, England; University Library, Oxford, England; University Library, Cambridge, England; School Library Committee, Eton, England; School Library Committee, Harrow, England; School Library Committee, Rugby, England; Natural History Society, Marlborough College, England; Royal Society, Edinburgh; Royal Botanic Garden, Library, Edinburgh; Geological Society, Edinburgh; University Library, Edinburgh; Philosophical Society of Glasgow; Royal Irish Academy, Dublin; Royal Society, Dublin; Asiatic Society of Bengal Calcutta; Geological Survey of India, Calcutta; Geological Survey of Canada, Montreal; Canadian Institute, Toronto; Literary and Historical Society of Quebec, Canada East; Royal Society of New South Wales, Sydney; Linnean Society of New South Wales, Sydney; Public Library, Sydney; Library of Australian Museum, Sydney; University Library, Sydney; Royal Society of Victoria, Melbourne; Public Library, Melbourne; University Library, Melbourne; Geological Survey of Victoria, Melbourne; Legislative Library, Adelaide; South Australian Institute, Adelaide; University Library, Adelaide; Public Library of Tasmania, Hobart Town; Royal Society of Tasmania, Hobart Town; Free Public Library, Capetown; Smithsonian Institute, Washington, D.C.; Geological Survey of U.S. Territory, Washington, D.C.; American Geographical Society, New York; American Philosophical Society, Philadelphia; American Institute of Mining Engineers, Philadelphia; Franklin Institute, Philadelphia; Academy of Natural Sciences Library, Philadelphia; Academy of Natural Sciences, Buffalo; Academy of Natural Sciences, San Francisco; Academy of Natural Sciences, Davenport, Iowa; Harvard College, Cambridge, Mass.; Royal Society of Literature and Arts of Belgium, Brussels; Royal Imperial Institute for Meteorology and Earth Magnetism, Hohe-Warte, Vienna; Jahrbuch der Kaiserlich-königlichen Geologischen Reichsanstalt, Vienna; Botanical Society of the Province of Brandenburg, Berlin; Dr. Bastian, Berlin; Imperial German Academy of Naturalists, Dresden; Physico-economic Society of Königsberg, E. Prussia; Verein für vaterländische Naturkunde in Württemberg, Stuttgart; Abhandlungen, Bremen; R. Accademia dei Lincei, Rome; Imperial Museum of Florence; Royal Geographical Society of Italy, Florence; Tuscan Natural Science Society, Pisa; Editor of Cosmos, Turin; Academy of Science, Modena; Royal Academy of Science, Stockholm. *Libraries and Societies in New Zealand.*—Library, Auckland Institute; Library, Hawke's Bay Philosophical Institute; Library, Wellington Philosophical Society; Library, Nelson Association; Library, Westland Institute; Library, Philosophical Institute of Canterbury; Library, Otago Institute; General Assembly Library; Library, New Zealand Institute. *Publishing Branch.*—Editor; Assistant Editor; Draftsman (two copies); Lithographer; Government Printer; Photo-lithographer.

MUSEUM.

The number of names entered in the Visitors' Book during the year is 12,000, but as comparatively few make use of this register, it does not give even an approximate idea of the number of persons who visit the Museum, and it is very desirable that some mechanism should be provided for recording, as done in other similar institutions. The additions to the Museum will be found in the usual report printed in pamphlet form (Sixteenth Annual Report, 1880-1).

NATURAL HISTORY COLLECTIONS.

The additions to the Natural History collections have not been very extensive, but, nevertheless, comprise some specimens of high scientific interest.

Mammalia.—The most important items under this head are (1) a very fine skeleton of the killer-whale (*Orca pacifica*), which was stranded near Wanganui, and secured for the Museum through the kindness of Mr. S. H. Drew; (2) skins of the sea-lion (*Otaria hookeri*), from the Auckland Islands; and a skeleton of the sea-elephant (*Morunga elephantina*), collected by Mr. Burton, Taxidermist to the Museum.

Aves.—Amongst the birds recently added to the collections, and specially worthy of notice, are (1) a very fine capercaillie (*Petrao urogallus*), purchased by Dr. Hector; (2) a series of gannets (*Dysporus serrator*), showing the nestling, young in first year's plumage, and the adult, obtained at Gannet Island, and presented by Captain Fairchild, of the Government steamer "Hinemoa"; (3) specimens of the merganser (*Mergus australis*), the flightless duck (*Nesonetta aucklandica*), and a series of shags, collected at the Auckland Islands by Mr. Burton.

Pisces.—(1) A cask of Australian fishes, received in exchange from the Curator of the Australian Museum; (2) a fine specimen of *Ophisurus serpens* from Mahia Lagoon, captured and presented by Mr. J. Cunningham; (3) a splendid collection, consisting of 205 specimens, illustrative of the Ichthyology of North America, presented by the United States National Museum, have been received and placed in the "stock room" until accommodation can be provided in the Museum.

Reptilia.—A magnificent collection of North American reptiles, comprising 50 species and 92 specimens, has been received from the United States National Museum, but, like the fishes, cannot be displayed for want of proper accommodation.

Invertebrata.—The additions to this section have been somewhat extensive, the most noticeable being (1) specimens of *Glaucus atlanticus* and *G. pacificus*, presented by Captain Renaut; (2) a very large specimen of the common eight-armed cuttlefish (*Octopus maorum*); (3) a fine collection, comprising 183 species of the marine invertebrata of North America, presented by the United States Fish Commission.

ETHNOLOGICAL.

Very few additions have been made under this head, but the extensive collections sent to the Sydney and Melbourne Exhibitions have been replaced in the cases, as far as space will allow; but here, as in all other parts of the Museum, the accommodation is sadly deficient.

A large collection of Indian articles, consisting of mats, baskets, earthenware, &c., has been presented by the Executive Commissioner for India at the Melbourne Exhibition.

MELBOURNE EXHIBITION

A series of physical and geological maps of the colony were exhibited, together with sections and plans illustrative of the gold and coal mines and other mineral resources. As evidence in support of these was a collection of rocks, minerals and fossils, numbering nearly 3,000 specimens, with catalogues, reports, and monographs, on the various branches of the subject. The collections were very carefully studied by a jury of scientific men, and their report will appear in the official records of the Exhibition. The collection was awarded a first-class certificate and a silver medal. The preparation of these exhibits required the expenditure of much time and labour, but this was warranted by the opportunity which it afforded of bringing prominently before the public the results of the scientific investigations which have been made of the resources of the colony.

HERBARIUM.

During the past summer the Alpine ranges west of the Wanaka Lake, which afforded so many new species of plants when first botanically explored by Dr. Hector and Mr. Buchanan, in 1862, have again been visited by the latter collector, assisted by Mr. A. McKay, who was at work on the geological survey of the same district, and the result has been the addition to the colonial Herbarium of 25,000 specimens, some of which are wholly new species, and nearly all rare and valuable for purposes of exchange. Unfortunately the arrangement in the Museum for the preservation of the Herbarium will not be satisfactory until there has been a considerable expenditure in providing proper insect-proof cabinets. Owing to the want of cabinets, the valuable collection of 28,000 specimens of plants presented by the Trustees of the British Museum, in 1876, still remains in the original packing-cases, and is not accessible for reference and study.

PALEONTOLOGY.

During the year upwards of 7,000 specimens of fossils, collected in the course of the Geological Survey, have been placed in the Museum, and a large amount of work has been done towards the critical examination of the whole collections, preparatory to their publication. The collection of foreign fossils have received extensive additions, particularly nine cases presented by the Trustees of the British Museum, which are not yet unpacked.

GEOLOGICAL SURVEY BRANCH.

During the year the following extensions of the survey have been made, the special reports on which are printed in the annual progress report of this department (Fifteenth Annual Report, 1880-1):—

On the Chrome Deposits in the vicinity of Nelson.—The discovery of several new applications of chrome salts in the arts, and notably the proposal to use it for tanning leather, having revived an interest in this ore, various lodes, some of which have recently been discovered, were carefully examined with a view of determining if they could supply the market successfully at the present prices. The result shows that there are lodes of chromic iron ore in ten different localities, containing from 36 to 64 per cent. of chromic oxide, but that many of them are in such inaccessible positions that they would not pay the expense of carriage. As to this must be added the freight to London, which is 15s. per ton, Mr. Cox is of opinion that, instead of shipping the crude ore, works should be established for the local production of the bichromate of potash. Mr. Cox also examined the further exploratory works that have been made for opening up the copper lodes in Aniseed Valley, and reports that, as a mining venture, its prospects are still somewhat speculative, as for want of capital the exploration of the lodes has not been carried on in a sufficiently satisfactory manner.

The Richmond Hill Silver Mine was also re-examined as far as possible, considering that the main shaft is full of water. It is pointed out that an expenditure of £100 should be sufficient to repair the water-race, and that the present water-wheel would be then sufficient to pump the mine, and afterwards to compress air for working rock-drills, the past failure of the mine being evidently due to the use of hand-drilling alone, which is not suitable for following patchy ore shoots in such hard ground. As besides silver varying from 21 to 179 oz. per ton, the ore contains lead, copper, antimony, bismuth, nickel, and zinc, it is certainly worth following up, but it is considered that it would not be advisable to commence with a less paid-up capital than £10,000.

The Collingwood Coal Mine was examined with the view of advising on the most judicious manner of extending the workings.

Mr. Cox spent three months in continuing the survey of the North Auckland District, and in examining certain mineral deposits at Kawau, Coromandel, and the Thames; also Drury and Waikato Coal Fields, and obtained valuable results that are detailed in his reports. Two months were next occupied by Mr. Cox in the examination of the geology of the mountains lying between the Takaka and Aorere Valleys in the north-west part of Nelson District, and, in his report, he points out the importance of the mineral deposits which occur in the Lower Devonian rocks.

From September to April, Mr. McKay was engaged in geologically mapping a section between the east coast at the mouth of the Waitaki River, and the main watershed lying west of the Wanaka Lake. In the course of this survey, he examined in detail the structure of a strip of country about 10 miles

in average width, and extending for a distance of 120 miles inland from the east coast. In the Waitaki Valley he completely cleared up the evidence on which the subdivision of the Lower Tertiary and Upper Cretaceous strata had been proposed, and obtained a large addition to the collection of fossils. He also proved the existence in the first range of mountains of the Permian and Upper Devonian formation, and refers the highly-altered slates and sandstones of the Kurow Mountains to the Lower Devonian group, identifying them with the rocks of the Walter Cecil Peaks south-west of Wakatipu Lake. He further found that the silicious rocks charged with mineral veins, at the source of the Arrow and Shotover Rivers, overlies the older schists of Central Otago, and in the higher points of the Black Peak Range, found them to be traversed by dykes of igneous rocks, and to afford other indications of their being probably intersected by rich mineral lodes. In the Devonian formation in South-east Canterbury he found a local development of white feldspathic rocks charged with auriferous pyrites, which, in their mineral character, closely approached the auriferous rocks of the Coromandel Peninsula, and which, on further examination, may prove of importance to the miner.

PUBLICATIONS.

The following publications have been issued by the department during the year: (1.) Fifteenth Annual Report of the Colonial Museum and Laboratory, together with list of additions, &c., and an Abstract of the Results of Analyses. 56 pp. 8vo. (2.) Fourteenth Progress Report of the Geological Survey of New Zealand for the Season 1879–80. By Dr. Hector, with maps and sections, including Reports on Riwaka (Cox), Mount Arthur Reefs (Cox), Rimutaka Reefs (Cox), Rodney and Marsden Counties (Cox), Southland County (McKay), Chalk in Ashley County (McKay), Selwyn County, Trelissic and Curiosity Shop Beds (McKay), Ashley and Amuri Counties (McKay), Lake County (McKay), Picton Coal (McKay), Dusky Sound Copper Lode (Rowe), Hindon Antimony Lode (Rowe), Waipori Copper Lode (Rowe), Further Report on Dusky Sound (Rowe). 200 pp. 8vo. (3.) Manual of New Zealand Coleoptera. By Captain Thomas Brown. Part II., pp. 8vo. (4.) Catalogue of New Zealand Diptera, Orthoptera and Hymenoptera. By Professor Hutton. pp. 8vo. (5.) Biological Exercises for New Zealand Students: No. 1, The Shepherd's Purse, by Professor Hutton; No. 2, The Bean, by Professor Parker. (6.) Meteorological Report for 1877–79, with abstracts of all returns prior to that date. pp. 8vo. (7.) New Zealand Palæontology Part IV., Fossil Corals, by Rev J. E. Tenison-Woods, Pres. Lin. S., N.S.W. 50 pp., 4 plates. (8.) Handbook of New Zealand. By Dr. Hector. New edition, prepared for the Melbourne Exhibition, with geological and other maps. 112 pp., 9 plates and maps.

In the Press.

(1.) Manual of New Zealand Birds, illustrated with lithographs and woodcuts, by Dr. Buller, C.M.G., F.R.S. (2.) Fifteenth Progress Report of the Geological Survey of New Zealand for 1880–81, by Dr. Hector, with maps and sections, and including Special Reports on the Chrome Deposits of New Zealand (Hector; Cox); On the Aniseed Valley Copper Mine (Cox); On the Richmond Hill Silver Mine (Cox); On the Wallsend Colliery, Collingwood (Cox); On the North Auckland District, including Thames and Coromandel Gold Fields, Island of Kawau, and Drury Coal Field (Cox); On the Aorere and Takaka Districts, Nelson (Cox); On the Waitaki Valley, Lindis, and Wanaka Lake District (McKay); Index to the Localities where Fossils have been collected in New Zealand, with their Stratigraphical Position.

METEOROLOGY.

Important changes were introduced on the 1st January in the Meteorological Department, with the view of retrenchment, in order to continue the Weather Signal Branch, the vote for which was disallowed last session of Parliament. As far as possible the recommendations of the Conference held in Sydney in 1879 have been adopted in this reorganization.

1. The number of first-class Meteorological Stations has been reduced from eighteen to the three at Auckland, Wellington, and Dunedin, but statistics are also furnished by the Director of the School of Agriculture, at Lincoln, near Christchurch.

2. Thirty-seven reporting stations are now fitted with reliable instruments, and supply information by telegraph at 9 a.m. on every day but Sunday, as to the wind, pressure, temperature, humidity, and general state of the weather. These telegrams are grouped according to the aspects decided on by the Conference, viz.: (a.) North-east, from the North Cape to the East Cape. (b.) North-west, from the North Cape to the West Cape. (c.) Southern, from the West Cape to Moeraki. (d.) South-east, from Moeraki to the East Cape. (e.) Cook Strait. From the data thus obtained, and from extra telegrams when necessary, an isobaric map is constructed for each day, and a general report for each of the above aspects is prepared, and warnings are telegraphed to any part of the coast when dangerous winds or heavy seas are apprehended. This local weather signalling is still performed as efficiently as hitherto by Captain Edwin, R.N., whose services have now been removed from the Marine to the Meteorological Department. These observations are also in part used as second-class station returns, for statistical purposes.

3. A large number of third-class stations are being established, at which Government officials and amateurs will record the rain fall, temperature, wind, and weather changes.

4. At the second meeting of the Conference, held in Melbourne in April last, a system of inter-colonial weather exchanges was agreed upon, and telegrams are exchanged daily between Sydney and Wellington in a special code, the former giving an abstract of the weather, particularly the movement of storm centres and atmospheric disturbances in Australia, and the latter the same for New Zealand. These abstracts are supplied to the Press Agencies, and are telegraphed to the morning papers throughout the colony.

The experience of two months has proved that this system will be of especial value to New Zealand, as the progress of nearly all storms appears to be from west to east, so that after the system has been more fully studied it will be capable of affording from three to five days' warning of the approach of marked atmospheric disturbances.

OBSERVATORY

The new sidereal clock has been placed in position for some months, and the chronograph having now arrived, the work of observation and distribution of correct time will be greatly facilitated as soon as the instruments have been thoroughly established.

The time-signals have been given with fair regularity, the transit observations being taken, as hitherto, by the Ven. Archdeacon Stock, B.A., who also personally superintends the setting of the local time-ball on those days for which time is notified in the morning paper; signals are also sent on those days to Lyttelton for the purpose of rating the clock which drops the time-ball at that port; but the utility and accuracy of the system might be greatly increased if it were extended to the other chief ports of the colony, and if a direct mechanical control of the local clocks were effected from the Observatory as is done in other countries.

LABORATORY.

During the past year 357 analyses have been performed in the Colonial Laboratory, so that the laboratory number now arrived at is 3,034.

These are classified as follows: Coals, 14; rocks and minerals, 50; metals and ores, 95; examination for silver and gold, 152; water, 11; miscellaneous, 35. Total 357.

The result of all analyses having any general interest are stated in full in the Laboratory Report, together with the information given by the contributions of the specimens upon which these results have been obtained.

Weights and Measures.—Only a few sets of standard weights and measures have been verified and re-issued, according to the requirements of the Act, during the past year; but the majority of the sets at present in use by the local Inspectors will have to be verified, as the statutory term for which they were issued will have terminated.

LIBRARY.

Two hundred and fifty volumes have been added to the Library of the Institute, which is now in such a crowded state as to render the provision of further accommodation absolutely necessary. Together with the Library of the Philosophical Society, it now comprises 4,000 volumes, nearly all of which are valuable works of reference.

Patent Office Library.—This Library has been arranged in the Lecture Hall, and is now accessible to the public, on application to the curator. It contains 1,420 volumes.

Public Library.—This Library, formerly the property of the Provincial Council, has been arranged and catalogued, and comprises 1,200 volumes, but unfortunately, in many cases, important works are rendered incomplete through volumes having been taken away before the collection was removed to the Museum, and, as no record appears to have been kept of persons to whom books were lent, it is now impossible to enforce their return.

Including private collections of books which are deposited in the Museum, the library available for reference and study numbers about 8,500 volumes.

20th July, 1881.

JAMES HECTOR.

