6382
Nov. 29/85

PAPERS AND PROCEEDINGS

OF THE

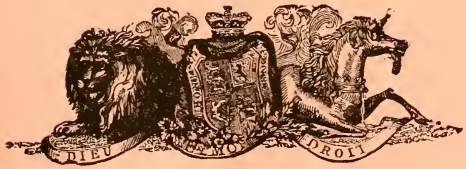
ROYAL SOCIETY

OF

TASMANIA,

FOR

1884.



TASMANIA:
PRINTED AT THE "MERCURY" STEAM PRESS OFFICE HOBART.
1885.

PAPERS AND PROCEEDINGS

OF THE

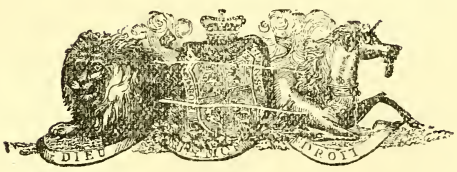
ROYAL SOCIETY

OF

TASMANIA,

FOR

1884.



TASMANIA:
PRINTED AT THE "MERCURY" STEAM PRESS OFFICE, HOBART.
1885.

The responsibility of the statements and opinions given in the following papers and discussions rests with the individual authors ; the Society as a body merely places them on record.

Contents.

PAPERS : *Page.*

ROYAL SOCIETY.

APRIL, 1884.

A monthly meeting of the society, the first of the present session, was held at the Museum on Tuesday, April 8. There was a large attendance of Fellows. Mr. Jas. Barnard, V.P., in the chair. Mr. W. J. G. Bedford, M.R.C.S., Eng., and Mr. J. Walch, Hobart, who had previously been nominated by the council, were balloted for, and declared duly elected as fellows of the society.

Mr. Thomas Hughes (England) was introduced as a visitor.

The hon. secretary (Dr. Agnew) brought forward the usual returns, viz. :—

(1.) Number of visitors to Museum, January — On Sundays, 650 ; on week days, 1,384 ; total, 2,034. Do., February—On Sundays, 1,012 ; on week days, 1,494 ; total, 2,506. Do., March—On Sundays, 1,087 ; on week days, 1,181 ; total, 2,268.

(2.) Number of visitors to Gardens—January, total 5,489 ; do., February, 4,898 ; do., March, 5,627.

(3.) Plants, etc., sent from, and received at, Gardens :—

January.—Received from Mr. Wm. Bull, new plant merchant, London, patent plant case, containing 100 Chinese chrysanthemums. From Mr. J. Latham, nurseryman, Hobart, collection imported Dutch bulbs, 28 packets. Sent to Major Jacob, Executive Engineer, Jeypore, India, 2lbs. leptospernum lœvigatum.

February.—From the Botanic Gardens, Saharampur, N.W. Provinces, India, 50 packets seeds, various. From Baron Ferd. Von Mueller, Government Botanist, Victoria, two packets of seeds. From Mr. G. Oliver, New Plymouth, New Zealand, three packets of seeds. Sent to Mr. G. Brunning, St. Kilda Nurseries, Melbourne, 36 nymphæa alba. To Mr. H. A. James, Department of Mines, Sydney, a bag of sphagnum moss.

March. — From the Chamber of Agriculture, Washington, U.S., 60 packets of assorted seed. From Miss J. Owen, Ireland, seven packets of seed. From Mr. H. A. James, Sydney, 13 packets of seed. Sent to Messrs. De Smet Freres, Ghent, Belgium, case Norfolk Island pines.

(4.) The usual monthly and other periodicals for January, February, and March.

(5.) *Meteorological Returns.*

1. From the Government Observer, Capt. Shortt, tables of observations for January, February, and March. 2. From Mr. F. Abbott, Superintendent Botanic Gardens, register of rainfall at Royal Society's Gardens for January, February, and March. 3. From Mr. C. Purdy, Registrar, register of rainfall at Strahan for February.

(6.) Time of leafing, flowering, and fruiting of a few standard plants in the Botanic Gardens during January, February, and March, 1884 :— January 4, Veronica augustifolia in full flower ; 6, first ripe apricot (royal) gathered ; 10, Grevillea robusta in full flower ; 12, Jargonelle pear commence ripening ; 22, black mulberries commencing to ripen. February 8, Windsor pear commencing to ripen ; 10, Bon chretien ditto ; 11, green gage plum ditto ; 22, ash, common, commencing to shed seed ; 25, sycamore, common, ditto. March 8, tips of hornbean turning yellow ; 10, seckle pear commencing to ripen ; 12, tips of elm turning yellow ; 15, horse chestnut leaves turning yellow ; 20, ash leaves commence falling—seeds ripe ; 21, oak leaves commence falling—acorns ripe.

(7.) *List of Additions to the Library.*

1. From the Colonial and Geological Survey Department, New Zealand, Handbook of New Zealand, by Dr. J. Hector, C.M.G., F.R.S., etc.

2. From the Tasmanian Fisheries Commissioners, 43 publications of the International Fisheries Exhibition; also two mounted photographs, views of the Tasmanian court.

3. From Mr. M. Gardiner, C.E., Brisbane, a paper on dynamics.

4. From Mr. Watts, Foraminifera of Victoria.

5. From Baron F. Von Mueller, observations on new vegetable fossils of the auriferous drifts.

6. From Dr. Von Haast, New Zealand, the progress of geology, humanism, and realism.

7. From U.S. Naval Observatory, the total eclipse, July 29, 1878.

8. From Field Naturalists' Club, Victoria, the Victorian Naturalist.

9. From Mr. R. L. Jack, Queensland, the Government geological report on tin mines of Herberton, Western, Thompson's Creek districts, and the silver mines of the Dry River, Queensland.

10. From the Linnean Society, Sydney, proceedings of Linnean Society.

11. From Mr. R. J. Ellery, Victoria, monthly record, Melbourne Observatory.

12. From Mrs. Roblin, Hobart, 26 books, viz., nine vols. Science Gossip, 1874 to 1882; 10 parts Science Gossip, January to October, 1883; Daniell's Introduction to Chemical Philosophy, Ellis' Demonstration of Anatomy, Wilson's Human Anatomy, Dublin Dissector, two vols. Carpenter's Zoology, Report of Tasmanian Fisheries.

(8.) *Presentations to the Museum.*

1. From Mr. A. Evans, Richmond, an eagle (Aquila audax).

2. From Mr. Kermode, Kangaroo Point, four flying gurnard (Trigla polyommata).

3. From Mr. Blyth, Campbell Town, a magpie (Gymnorhina organicum).

4. From Capt. Broom, caterpillars attacked by Sphæria Robertsi.

5. From Mr. J. Swan, Derwentwater, white-fronted falcon (Falco lunulatus).

6. From Mr. J. R. McLymont, a bat (Nyctophilus timoriensis).

7. From Mr. J. O. O. McArdell, Mornington, a white hawk (Leucospiza Novæ Hollandiæ).

8. From Mons. F. Ratte, Sydney, a collection of minerals, chiefly nickel ore, from New Caledonia.

9. From Mr. A. Jones, Hobart, a moth.

10. From Mr. G. Browne, two crocodile eggs from Perak, Malay.

11. From Mr. Hinsby, a flying squirrel (Belideus sciureus); a native comb, from the Sandwich Islands.

12. From Mr. T. Stephens, a more pork (Podargus cuvieri).

13. From Mr. Lodge, Sandy Bay, a moth.

14. From Mr. E. D. Swan, two shells (Cypræa argus, Mitra pontificalis).

15. From Mr. R. W. Rollings, a cockatoo parrot (Calopsitta Novæ Hollandiæ).

16. A collection of ethnological specimens, from the South Sea Islands, by Mr. A. Morton, curator.

The hon. secretary read the following papers:—

1. References to Baron C. Von Ettingshausen's recent observations on the tertiary flora of Australia, by Baron F. Von Mueller, K.C.M.G., M.D., F.R.S., etc., etc., etc.

2. Notes of spectroscopic observations of the comet "Pons," 27th January to 2nd February, 1884, by Mr. A. B. Biggs, Launceston.

3. Report of spectroscopic observations of the twilight glows during February and March, 1884, by Mr. A. B. Biggs, Launceston.

4. Mr. R. M. Johnston read a paper, "Notes regarding certain fossil shells occurring at Table Cape, supposed to be identical with living species;"

also "Notes on fossils from Maria Island" and "Notes on three species of Tasmanian fish."

FOSSILS FROM MARIA ISLAND.

Mr. Johnston presented a specimen of Pachydomus globosus, taken from cliffs near Darlington, Maria Island. A diagram was also presented showing the relations of the Pachydomus and Fenestella beds in the 300 to 500ft. of perpendicular rocks facing the sea. The lower series exposed, over 200ft. thick, is almost wholly composed of the large shells of Pachydomus globosus.

The following is a list of the more common fossils found associated with the latter by Mr. Johnston: — Aviculopecten Fittoni, Morris; ditto limæformis, ditto; Spirifera convoluta, Phill.; ditto Darwinii, Morris; ditto Tasmaniensis, ditto; Productus brachythærus, G. Sowerby; Protoretepora ampla, Lonsdale; Fenestella internata, ditto; ditto plebeia, M'Coy; Stenopora informis, Lonsdale; S. Tasmaniensis, ditto; Favosites ovata, ditto; Pleurotomaria Morrisiana, M'Coy.

Scattered here and there are to be found angular blocks of granite quietly embedded in the lower Pachydomus beds. Some of these travelled blocks are estimated to weigh over a ton. It is interesting to speculate how these erratic blocks came to be included in the lower fossiliferous mudstones. The nearest granite formation known in the neighbourhood lies fully five miles to the south. The mudstone series where the granite blocks are found is almost horizontal, and seems to have been little disturbed. The various blocks of granite seen do not appear to be waterworn. By what agency were these huge granite blocks carried to the position in which they are now found? Ice action seems to be most probable, taking all the circumstances into consideration.

Mr. JOHNSTON stated, with reference to the interesting paper contributed by Baron Von Mueller, that had he been aware of the subject of the paper to be discussed that evening he would have brought a copy of the original work for the inspection of the members of the society: a presentation copy, beautifully illustrated, having been recently kindly forwarded to him by the author, Baron Von Ettingshausen, of Vienna. Mr. Johnston stated that this society, and geologists generally, were under great obligation to Baron Von Mueller for the valuable papers he had contributed from time to time towards the elucidation of the Tertiary Flora of Australia. It was a very difficult matter to determine the exact position of vegetable organism from leaf remains only, so far as their exact position in the vegetable kingdom is concerned, and Baron Von Mueller was to be commended for the great care he had bestowed upon such investigations hitherto. Still Baron Von Ettingshausen's distinguished position in this special field of work is a guarantee that even his conclusions, drawn from the close and careful study of the neuration of leaf remains, are worthy of our highest confidence. In any case the figures are especially serviceable in proving the relative position of the various leaf beds found so abundantly throughout this island, and also in many places in Victoria and New South Wales. It is somewhat gratifying to consider that Tasmania contributes fully two-thirds of the materials of which determinations have been made by Baron Von Ettingshausen respecting the Tertiary Flora of Australia.

FISHES OF TASMANIA.

With respect to the fishes of Tasmania, Mr. JOHNSTON drew the attention of the members to several matters of interest to ichthyologists. As regards the fish recently described by him as the "Butter Fish," and doubtfully referred to the recently described Chilodactylus Mulhalli of Macleay, Mr. Johnston stated that he had since examined a large number of specimens, and found that the individuals varied considerably in the number of simple rays of pectoral and in the soft rays of anal and dorsal fins, and that the prevailing, or type form agreed in every respect with Richardson's C. nigricans hitherto supposed to be confined to King George's

Sound. The variability of individuals in Tasmanian waters covers not only the two fishes referred to, but it probably may embrace the fish recently described by Mr. Macleay (p. 439, Proc. Lin. Soc., New South Wales) as Psilocranium Coxii. It is clear, therefore, that Richardson's name—Chilodactylus nigricaus—must be retained for the "Butter Fish" of Tasmania, unless we are prepared to erect the inconstant variations of individuals into equal rank with the more constant types of species. Mr. Johnston also announced the existence in Tasmanian waters of Syngnathus curtirostris Cast. (a species of pipe fish.) He also states that the common kelp fish — Haplodactylus arctidens Rich.—is a very variable fish, and occurs in great abundance among kelp about Maria Island and towards the mouth of the Derwent, although it was formerly considered rare on account of its infrequent occurrence in the market.

NOTICES AND EXHIBITS.

The hon. secretary exhibited, on behalf of Mr. J. B. Walker, an atlas voyage of La Recherche, by La Perouse and Le. Cen. Labillardiere. The atlas contained a large collection of plates of various subjects, date 1791 and 92, and was examined with great interest.

1. On the table a fine collection of nickel ore, fossils, etc. 2. An interesting collection of ethnological specimens from the South Seas were exhibited. (As various articles in this donation presented points of peculiar interest, it was agreed that they should be specially brought under notice at next meeting with some descriptive observations by the donor.)

Mr. R. M. Johnston exhibited a specimen of a fossil shell—Pachydomus globosus.

Mr. C. H. GRANT, in moving a vote of thanks to the authors of the various interesting papers that had been read, and also to the donors of presentations, said he felt highly pleased in doing so, and was glad to see Mr. R. M. Johnston among them once again. And in a few chosen words he referred to the very high and eulogistic terms Mr. Johnston had been spoken of by such eminent authorities as Baron F. Von Mueller, and by Professor Dr. C. Baron Von Ettingshausen, of the University, Austria.

Dr. AGNEW cordially seconded the motion, observing this was by no means the first occasion on which they had to thank their good friend Baron Von Mueller for his learned and valuable contributions. It was very gratifying, too, he was sure, to them all to notice by the remarks of Baron Von Ettingshausen, how the work of Mr. Johnston was appreciated by high authorities abroad—work, too, not confined to one branch alone of Natural History. It was also a matter of congratulation that another student in the same field, a native of the colony, and who had earned the favourable notice of such an authority as Baron Von Mueller, was soon to be at work among us. He referred to Dr. Barnard, son of our excellent chairman, who he had no doubt would prove a valuable and he hoped frequent contributor to the transactions of the society.

The CHAIRMAN returned thanks for the kind mention made of his son, whose return from England was daily expected. His son had, he believed, in some degree, won his spurs in the cause of Natural History in the district of Gulgong, N.S.W., and, as he had given much attention to kindred subjects during his stay in England, he (the chairman) quite hoped he would be an occasional contributor to their evening meetings. However, if all went well, he would soon put in his appearance, and would then have the opportunity of speaking for himself.

The motion having been put and carried with applause, the proceedings terminated.

May Meeting lapsed through inclemency of the weather.

JUNE, 1884.

The monthly evening meeting of the Royal Society was held on Monday, June 9, His Honor Mr. Justice Dobson in the chair.

Rev. J. B. W. Woollnough, Mr. A. Park, V.S., and Mr. George Hinsby, Hobart, who had previously been nominated by the council, were balloted for, and declared duly elected as fellows of the society.

Mr. Fiddian, C.S., India, and Mr. Charpentier, England, were introduced as visitors.

The Hon. Secretary (Dr. Agnew) brought forward the usual returns, viz.:—

1. Number of visitors to the Museum.—April—Sundays, 620; week days, 1,206; total, 1,826. May—Sundays, 1,125; week days, 1,310; total, 2,435.

2. Number of visitors to Gardens.—April, 6,497; May, 5,596.

3. Plants, etc., received, and sent from Gardens.—April — From Mr. W. A. Thompson, Dunedin, one case of ferns; Baron Von Mueller, two bulbous plants, two packets of seeds. Sent to Messrs. Shepherd and Co., Sydney, one bag sphagnum moss.

Plants and seeds received at, and sent from, the Royal Society's Gardens during the month of May, 1884:—

From Mr. G. Brunning, nurseryman, St. Kilda, Victoria, three cases plants.

From Mons. A. Van Geert, Ghent, Belgium, five packets seeds, coniferæ.

From Baron Ferd. Von Mueller, Government Botanist, Victoria, 290 packets seeds, including several Japan coniferæ.

From Chamber of Agriculture, Washington, United States, 75 packets seeds.

From Messrs. Shepherd and Co., nurserymen, etc., Sydney, 14 packets eucalypti.

To Dr. R. Schomburgk, Botanic Gardens, Adelaide, two bags sphagnum moss.

To Messrs. Shepherd and Co., Sydney, two bags sphagnum moss.

To Acclimatisation Society, Brisbane, Queensland, two bags sphagnum moss.

To Mr. John Smith, nurseryman, etc., Riddell's Creek, Victoria, two bags sphagnum moss.

To the Botanic Gardens, Brisbane, Queensland, two bags sphagnum moss.

To Messrs. Brunning and Sons, St. Kilda, Victoria, two bags sphagnum moss.

To Messrs. Law and Somner, nurserymen, etc., Melbourne, two bags sphagnum moss.

To Mr. C. F. Cresswell, St. Kilda, Victoria, box lily bulbs.

Time of leafing, flowering, and fruiting of a few standard plants in the Royal Society's Gardens during April, 1884: — April 10, common elm leaves commence falling; 12, Coe's fine late red plum ripe; 15, Pyrus ancuparia leaves falling; 16, Chinese chrysanthemum commence to flower; 16, leaves of black mulberry commence to fall; 20, seeds of hornbeam ripe. May 20, first medlar ripe (Nottingham); 25, Photinia serrulata commencing to flower; 27, Ailanthus glandulosa leaves all fallen; 30, Calycanthus præcox commencing to flower; 31, Jasminum nudiflorum in full flower; 31, Cantua dependens in full flower.

4. The usual monthly and other periodicals for April and May.

5. Meteorological returns from the Government Meteorologist, Hobart; abstract of meteorological observations, Tasmania, for the quarter ending March, 1884; observations for April and May.

List of Additions to the Library for the month of April, 1884:—

Fauna and Flora of New Zealand, Capt. F. W. Hutton.

The Victorian Naturalist, from the Committee V.N.S.

Entomologist Tidstcrift, vols. 1, 2, 3, from the Society.

Canadian Plants Catalogue, pt. 1.

Report of Progress for 1880, 81-82, from the Geology and Natural History Survey Department of Canada.

Maps to accompany ditto.

On the development of certain worm larvæ, by A. Agassiz, F.R.S.

List of Exchanges and Presentations made by the Royal Society of N.S.W., 1883.

Proceedings of the Yorkshire Geological and Polytechnic Society, from the Society.

Journal of Science, New Zealand.

Journal of the Royal Microscopical Society, from the Society.

Annals de la Societé Royale Malacologique, from the Society.

Seventeen parts Progress Verbal, from the Society.

Societé Royale Malacologique de Belgique, from the Societé.

The Twentieth Annual Report of the Canterbury Acclimatisation Society.

Monthly Notices of the Royal Astronomical Society, from the Society, London.

Materialism Vindicated by Veni, from the author.

1. Improved facilities for the capture, economic transmission and distribution of Sea Fishes, and how these matters affect Irish Fisheries. 2. The Fisheries of Ireland. From the Tasmanian Fisheries Commissioners.

MAY.

Report of the Free Public Library, Sydney, for 1883-84, from the Trustees.

Descriptive Catalogue of Australian Fishes, vol. 1 and 2, with supplement, by the Hon. W. Macleay, from the Author.

Descriptive Atlas of the Eucalyptus of Australia and the adjoining islands, by Baron F. Von Mueller, from the Author.

Proceedings of the Academy of Natural Science of Philadelphia, part 3, November and December, 1883, from the Society.

The Midland Medical Miscellany, from the Society.

The Victorian Naturalist, from the Society.

Periodic Law, by J. A. R. Newlands, from the Author.

Two Meteorological Maps, from Meteorological Dapartment, India.

Geological Survey of India Memoirs, vol. xx., parts 1 and 2, from the Geological Survey Department of India.

Zoological and Acclimatisation Society of Victoria (20th annual report), 1883, from the Society.

Journal of Science, New Zealand, May, 1884, from the Society.

Catalogue of Birds, vol. IX., from the Trustees British Museum.

Monthly Notices of the Royal Astronomical Society, vol. XLIV., No. 5, March, 1884, from the Society.

Proceedings of the Linnean Society, Sydney, from the Society.

Phanlogamia of the Mitta Mitta Source Basin (article 2), from J. Sterling, Esq.

In reference to these presentations to the Library, the HON. SECRETARY called special attention to No. 2, as being a most valuable work of reference and calculated to supply a want which has long been experienced.

Presentation No. 2 was the ninth decade of this most valuable and elaborately illustrated work. It could have no higher recommendation than the fact that its author was Baron Von Mueller.

No. 3 was a valuable work, and the ninth volume of a series presented by the Trustees of the British Museum.

The attention of the meeting was also called to the fact that the Proceedings of the Society for 1883 were now published and ready for distribution.

List of presentations to the Museum for the month of April, 1884 :—

BIRDS.

A cockatoo parrot—Calopsitta novœ-Hollandiæ—Mr. J. Cotton, Riversdale.

Freckled duck—Anas nœvosa—Mr. J. G. Richards, Ross.

FISHES.

A velvet fish—Holoxenus cutaneus—Mrs. Bradley, Swan Island.

A fish—Macrurus Australis—Mr. Self, Hobart.

REPTILES.

Three frogs—Lymnodynastes Tasmaniensis—Miss L. Ranclauld.

FOSSILS.

A fossil bivale, Miss Hall, Huon-road.

MINERALS.

Specimen of malachite and jasper, Mrs. W. Reilly, Port Cygnet.

Pumice stone, picked up at sea, off the Straits of Sunda, September, 1883, about a month after the eruption, Mr. R. R. Rex, Hobart.

Specimens of pottery (native vessel), pumice stone, and piece of pavement, obtained from the excavations going on at Pompei, on March 12, 1884, Mr. D. Macpherson, New Zealand.

COINS.

Three Chinese coins, one Melbourne token, Mr. W. Reilly, Port Cygnet.

ANIMALS.

A skull of rabbit with a curious malformation of the teeth, Mr. J. G. Richards.

MAY.

BIRDS.

Two Ceylon hawks—Spilornis spilogaster—from Col. W. V. Legge.

Two chesnut-eared finches—Amadina castanotis—Miss M. A. Dove.

A plover—Lobivanellus lobatus — Mr. J. Whitehead.

Chesnut-faced owl—Strix castanops—Mr. J. G. Richards.

FISHES.

Two silver bream—Chrysophrys Australis—Mr. W. Reilly.

Three flatheads —Platycephalus bassensis—Mr. W. Reilly.

A rock cod—Pseudophycis barbatus—Mr. W. Reilly.

Young of the lamprey—Geotria Allportii—Mr. Read.

MOLLUSCA.

A sea hare—Aplysia sp.—Mr. S. P. Baynton.

A star fish, Mr. F. Self.

FOSSILS.

Cypris Alburyana, Mr. R. M. Johnston, F.L.S., from Geilston.

MINERALS.

A collection of minerals, chiefly tin ore, from Mount Bischoff, Mr. C. E. Davies.

A model of a penny, Mr. Wara.

The following papers by Professor R. Tate, F.G.S., F.L.S., etc., Adelaide, were read by the hon. secretary :—

1. "Notes of a critical examination of the mollusca of the older tertiary of Tasmania, allied to have living representatives."

2. "Descriptions of some new fossil mollusca from Table Cape."

3. "On the community of species of aquatic pulmonate snails between Australia and Tasmania."

Mr. R. M. Johnston, F.L.S., read the following papers :—

1. "Additions to the list of Table Cape fossils, together with further remarks upon certain fossil shells supposed to be identical with living species."

2. "Notes on a fossil (Cypris Alburyana), from Geilston.

3. "Description of a new Vitrina, from the Travertin Beds, Geilston."

A paper by Mr. T. Stephens, F.G.S., was read by the hon. secretary :— "Notes on boring operations in search of coal in Tasmania."

In the discussion which followed the reading of Mr. Stephens' paper, Mr. R. M. JOHNSTON stated that little value could be placed in conclusions formed from the partial evidence of marine organisms only as regards the position of the Southern and Eastern coal deposits of Tasmania, because he had found a considerable percentage of the species of the marine organisms common to the mudstone series immediately overlying the Mersey coal measures, also common to the mudstone series which is now being tested by the boring drill at the Cascade Brewery, and also common to the Tasmanite beds on the Mersey. Among the fossils common to these deposits are the well-known forms : — *Spirifera Tasmaniensis, Spirifera Darwinii, Productus brachythyærus, Pterinea lata, Sanguinolites Etheridgei, Pecten Fittoni, Pecten squamuliferus, Pecten Illawarra, Pecten nov. sp., Pleurotomaria Morrisiana, Protoretepora ampla, Stenopora Tasmaniensis,* and several others, and the list no doubt could be greatly increased. If, therefore, it be allowed that the Mersey and Southern and Eastern coal deposits represent different horizons, the evidences from marine organisms, taken by themselves with our present knowledge, are absolutely valueless, at any rate neutral. It is from an examination of the plant remains, associated with the respective coal measures, that we have any grounds for separating them into different groups, as representing different periods. Thus the prevailing plant remains of the coal measures of the Mersey, which are the equivalents of the Stony Creek, Anvil Creek, and other coal seams in New South Wales, are *Glossopteris Browniana* ; equisetaceous stalks, broadly and flatly ribbed, allied to the Indian genus *Schizoneura* ; a curious orbicular form allied to *Actinopteris* ; and numerous impressions of a form closely allied to *Noeggerathiopsis media.* On the other hand, the Midland, Southern, and Eastern coal measures of Tasmania have generally as prevailing forms *Pecopteris Australis, P. odontopteroides, Phyllotheca Hookeri, Phyllotheca ramosa, Sphenopteris alata, Zeugophyllites elongatus,* and *Glossopteris linearis,* and, therefore, the beds may, without doubt, as already shown by Feistmantel, Rev. W. B. Clarke, R. Etheridge, junr., and others, be regarded as the equivalents of the upper coal measures of New South Wales. Regarded from an evolutionist's point of view, Mr. Johnston stated that, with the late Rev. W. B. Clarke, he found it very difficult to recognise any break, stratagraphic, or organic, between the upper and lower mudstone series of Australia, so far as the marine organisms of undoubted palæozoic facies gave any evidence. If these subdivisions were to be classed as upper palæozoic, and the upper coal measures, according to various authorities, as permian, oolitic, dias, or mesozoic, the separation must be doubtful and purely one of local convenience. Mr. Johnston observed that while, on the whole, he fully agreed with Mr. Stephens' conclusions, he was not prepared to concur with him in regarding the sandy and calcareous fossiliferous rocks occurring in the neighbourhood of Hobart, and in other localities in the South and East, *wholly* as the equivalents of the lower marine beds of New South Wales, for it was not only conceivable but, unfortunately, probable that the Southern marine beds of Tasmania were formed in situations more remotely removed from the oscillation of the land which produced the conditions favourable to the deposits of the lower coal measures in such places as the Don, Mersey, Stony Creek, and Anvil Creek basins; that while these carbonaceous deposits intercalcating and interrupting the series of marine beds were being formed in situations adjacent to the shores of the old palæozoic main land, the marine areas, more remote from the land, still continued to deposit their marine sediments with an uninterrupted chain of marine organic life; and it is quite conceivable, and, indeed, in harmony with existing evidence, that the

Southern and Eastern marine beds of Tasmania cover in one unbroken series the whole period represented in Australia and in Northern Tasmania by the lower marine beds, lower coal measures, and upper marine beds; and that the final oscillation of land, producing conditions favourable to the deposits of the upper coal measures of Australia and Tasmania, was the only one which extended as far as the South and East of Tasmania. However, Mr. Johnston was greatly pleased that this matter was being tested, as far as possible in the, North and South, in a practical way by means of the diamond drill, and he hoped to see this most useful practical test still further employed in our important coal basins, not only to measure the value of our coal seams vertically, but also sufficiently extended to ascertain their extent horizontally.

NOTES AND EXHIBITS.

The hon. secretary exhibited a skull of a rabbit with the incisor teeth of both jaws unusually long, the lower incisors being $1\frac{1}{2}$ inch, upper ones $\frac{3}{4}$ inch in length. Similar overgrowths have been frequently reported as occuring in all of the rodent family when one or more of the incisors had been lost, but in this case, the abnormal divarication of the lower pair had led to the growth of all four teeth since they could not meet so as to wear each other down.

Colonel Legge exhibited two specimens of the Ceylonese Serpent Eagle, *Spilornis Spilogaster*, Blyth, an adult, and immature bird, and made some remarks on the genus *Spilornis*. The Serpent Eagles formed an interesting section of small, weakfooted, eagles, with an Indo-Malayan distribution, extending from the Himalayas eastwards through Burmah to Formosa, and south-eastwards through Southern India, Ceylon, the Andamans, Sumatra, Java, Borneo, to Celebes, and the Philippines. The section comprised the one genus only, which might be said to be a typical Indo-Malayan form, for it appeared only, in one case, that of the Celebes Serpent Eagle, *S. Rufipectus*, to cross the remarkable dividing line discovered by Wallace, and which passes upwards through the strait between Bali and Lombock, and thence between Borneo and Celebes to the eastward of the Philippines. The fauna and flora to the eastward of this line was Australian in character, and to the westward of it Indian. Apparently, the genus had not yet been found in Papua, but, some day, when that island was perhaps annexed to Australia, our naturalists might discover examples of it. The largest number of the genus *S. Cheela* ranged from the Himalayas to Burmah, and had been found in Formosa. Its smaller representative was *S. Melanotis* of Southern India. In Java, a very similar species to the Ceylonese existed, the *S. Bacha* of Daudin, which is also found in Sumatra. It is darker than the Ceylonese bird, and the edge surrounding the paleoculli of the lower features is scarcely darker than the surrounding colour. Another species is described from the Andamans, by Hume, as smaller than *S. Bacha*. The species ranging further to the eastward are *S. Pallidus* from Borneo, *S. Rufipectus* from Celebes, *S. Sulaensis* from the Sula Islands, and *S. Holospilus* from the Philippines. The habits of the Ceylonese Serpent Eagle were interesting. It was a denizen of gloomy forests, and one or two pairs were always to be found in the magnificent trees surrounding the grand old tanks made by the ancient kings of Ceylon. It sat on a limb overhanging the water, its crest now and then erected, and its brilliant yellow orbs glaring on the water beneath, where it watched for the appearance of some hapless frog or water snake. On the beautiful rivers of the forest regions of Ceylon, which dried up in the hot season, leaving a broad sandy bed with a limpid stream trickling down it, these eagles were also to be found, silently seated on the look-out for their prey. Now and then, in the heat of the day, these birds soared aloft, circling round and round, uttering a loud scream of three long drawn syllables, but, as a rule, they were very silent.

Mr. Morton exhibited some very beautiful photographic views of Lord

Howe Island ; also a freckled duck (*Anas. nævosa*), shot at Ross, on April 12. This species of duck is found in Victoria, South Australia, and Western Australia, but has never been reported as found in Tasmania before.

Colonel LEGGE strongly advocated the formation of a complete collection of Tasmanian bird skins carefully labelled, locality, etc. He stated he was of an opinion that there were yet one or two new species of birds in the back country, which had hitherto been over-looked by collectors and others. He trusted the Council of the Royal Society would endeavour to have air-tight cabinets made for such a collection, similar ones being used in the British Museum, and other leading museums.

The CURATOR OF THE MUSEUM said he was glad that Colonel Legge had brought the matter before the fellows, and referred to the excellent skin collection the Australian Museum, Sydney, had in their possession. He said a great deal might be done by our country friends in forwarding to the Museum specimens of animals or birds, which, if not actually wanted for the Museum collection, would be valuable for exchanges with other museums.

The CHAIRMAN (His Honor Judge Dobson) stated that he wished to bring under the notice of the meeting a subject which he was sure would be of interest to them all. He alluded to the wanton and mischievous destruction of the tree ferns at Mount Wellington. Many glens and other localities on the mountain had been utterly robbed of all their beauty and attraction by the stupid destruction of these trees, some of which he had no doubt represented a growth of fifty to a hundred years. He was sorry to say, too, that this desecration was permitted by many of whom better things might have been expected, and, in very many cases for the mere decoration of a ballroom, trees were cut down which we could never hope to see replaced in a lifetime. He thought something might be done to stop this senseless waste of beauty, as far at least as the Mount Wellington Reserve was concerned, by constituting it a people's park, and making it penal to remove ferns or other trees. If Government took the initiative in the preservation of the ferns it was probable that many private individuals, who may act rather in a spirit of thoughtlessness than otherwise, might be induced to follow the good example.

After discussion, in which almost all present joined, it was resolved that a committee be appointed in order to bring the views of the meeting under the notice of the Government.

Mr. Justice Dobson, the Mayor (Mr. Belbin), Colonel Legge, Mr. C. H. Grant, and the hon. secretary (Dr. Agnew) were appointed as the committee.

A vote of thanks to the authors of papers and donors of presentations closed the proceedings.

JULY, 1844.

The monthly evening meeting of the Royal Society was held on Monday, July 7, Mr. James Barnard, V.P., in the chair.

Mr. Wentworth Hardy, who had previously been nominated by the council, was balloted for, and declared duly elected as a Fellow of the society.

The CHAIRMAN apologised for unavoidable absence of the hon. secretary (Dr. Agnew), being away on official duties.

The following usual returns were brought forward, viz. :—

1. Number of visitors to the Museum.—June — Sundays, 930 ; week-days, 1,258. Total, 2,188.

2. Number of visitors to Gardens.—June, 5,010.

3. Plants and seeds received at the Royal Society's Gardens during the month of June, 1884 :—

From the Brisbane Botanic Gardens, 18 papers of seeds.

From Mr. J. Smith, Riddle's Creek, Victoria, case containing 46 plants.

From Messrs. Shepherd and Co., Sydney, case containing 60 plants.

From Mr. J. Harris, South Yarra, Victoria, case containing 36 plants.

From the Botanic Gardens, Saparanpur, N.W.P. India, seeds—Picea pindrow.

From Major Jacob, Jeypore, India, seeds—Picea pindrow.

From the Botanic Gardens, Calcutta, collection seeds.

From Baron Ferd. Von Mueller, 12 papers seeds.

4. Plants and seeds sent from the Royal Society's Gardens during the month of June, 1884 :—

To Mr. J. Smith, Victoria, plants and seeds.

To Mr. J. Harris, Victoria, seeds.

To Mr. J. Brunning, Victoria, plants and seeds.

To Mr. L. Purchase, Sydney, seeds.

To Messrs. Shepherd and Co., Sydney, seeds.

To Chamber Agriculture, Washington, seeds.

To Messrs. Vilmorin et Cie, Paris, seeds.

To the Royal Gardens, Kew, London, seeds.

To Baron Ferd. Von Mueller, Victoria, seeds.

To C. F. Cresswell, Victoria, seeds.

To Messrs. Heyne and Co., Adelaide, seeds.

To Messrs. Law, Somner, and Co., Victoria, seeds.

To W. R. Guilfoyle, Botanic Gardens, Melbcurne, seeds.

To Mr. Wm. Bull, London, seeds.

5. Time of leafing, flowering, and fruiting of a few standard plants in the Royal Society's Gardens during June, 1884 : — 12th, Maclaura aurantiaca leaves shedding ; 20th common privet leaves shedding ; 24th, Calcyanthus prœcox in full flower ; 26th, Crocus vernus in flower ; 28th, black mulberry leaves all shed.

6. The usual monthly and other periodicals for June.

7. List of additions to the Library for the month of June :—

Meteorolcgical reports, India, November and December, 1883, from the Meteorological Office, India.

Meteorological observations made at the Adelaide Observatory and other places in South Australia and the Northern Territory, Mr. C. Todd, Government Astronomer.

Monthly weather report of the Meteorological Office, London, for January, 1884, from Meteorological Office, London.

Meteorological report of the Meteorological Council to the Royal Society for the year ending 31st March, 1883, from the Society.

Monthly record of results of observations, etc., by R. L. J. Ellery, F.R.S., Victoria, from the author.

Journal of the Royal Microscopical Society, London (April number), from the Society.

Journal of the Society of Arts (May), (April), from the Society.

Journal of Science (May), from the Society.

Report on the Progress and Condition of the Botanic Gardens and Government Plantations (Adelaide), by R. Schomburgh, F.R.S., and Director, from the author.

Records of the Geological Surveyof India, vol. xvii., part 2, 1884, from the Registrar's Geological Survey Office, India.

Report of the Canadian Observations of the Transit of Venus, December 6, 1882, from the Observatory, Toronto.

Report of the Australian Museum, Sydney, for the year 1883, from the Trustees.

Report of the Chief Inspector of Mines, Victoria, 1883, from the Mines Department.

Reports of the Mining Surveyors and Registrars, quarter ending 31st March, 1884 (Victoria), from the Mines Departmenent.

Report of the Department of Mines, N.S.W., for the year 1883, from the Department.

Gardener's Chronicle, April 26, May 3 and 10, from the Society.

Geological Magazine (May), from the Society.

Agricultural Gazette, April 28, May 12, 5, from the Society.

Annals and Magazines of Natural History, May, from the Society.

The Athenæum, April, from the Society.

Annual report of the American Museum of Natural History, March, 1884, from the Trustees.

Agricultural Statistics, Victoria, 1883-84, Victoria, from the Government Statist, Melbourne.

American Agriculturist, May, 1884, from Messrs. Walch and Co.

Catalogues of the Exhibits in the New South Wales Court Fisheries Exhibition, London, from E. P. Ramsay, F.L.S., etc.

Census of Victoria, 1881, part 7, occupation of the people ; part 8, sickness and infirmity, from the Government Statist, Melbourne.

Crime in New South Wales, by H. H. Hayter, C.M.G., from the Author.

A Barometer Manual for the Use of Seamen, from the Meteorological Office, London.

Bulletin of the American Museum of Natural History, vol. 1, No. 5, February 13, 1884, from the Trustees.

The Victorian Naturalist, May, 1884, from the Society.

Statistical Register of the Colony of Victoria for the year 1883.

Blue Book of Victoria, from the Government Statist.

Monthly Notices of the Royal Astronomical Society, vol 44, No 6, April, 1884, from the Society.

Mineral Statistics of Victoria, from the Mines Department.

Proceedings of the Royal Society, Queensland, vol. 1, part 1, 1884, from the Trustees.

Florist and Pomologist, from the Society.

Nature, from the Society.

8. List of Presentations to the Museum for the month of June, 1884 :—

BIRDS.

Chesnut-faced owl—Strix castanops, Mr. N. H. Propsting.

FISHES.

A Blenny—Cristiceps Australis, Mr. W.Boyes.

MOLLUSCA.

Soft mollusks—Philine aperta, Mr. W. Boyes.

A land shell — Bulimus sp., from New Zealand, Master A. Clarke.

ECHINODERMATA.

Two sea eggs—Salmacis sp. (?), Mr. J. McCance.

A sea urchin—Maretia sp., Mr. W. Boyes.

OOLOGY.

Two eggs, sooty oyster catcher — Hæmatopus fuliginosus ; four eggs, silver gull—Larus Jamesonii ; two eggs, Pacific gull—Larus pacificus. Mr. J. McLymont.

ETHNOLOGY.

Two bags, made by Tasmanian aboriginals ; piece of rope, ditto. Miss Buckland.

COINS.

A small collection of coins, Miss Buckland.

Medal of the Duke of Wellington, 1814, Miss Buckland.

A bronze medal, struck in commemoration of the cessation of transportation to Tasmania, 1853, Master A. Clarke.

A fourteen rupee, Mr. J. L. Oakley.

MINERALS.

Specimen of fossil wood, Miss Buckland.

The following papers by Professor R. Tate, F.G.S., F.L,S., etc., Adelaide, were read by Mr. R. M. Johnston, F.L.S.:—

1. Description of new species of mollusca of the upper eocene beds at Table Cape.

2. Notes and description on a new species of Odax, by R. M. Johnston, F.L.S., etc.

3. Description of a new fossil shell, from the Eocene Beds, Table Cape, by R. M. Johnston, F.L.S., etc.

NOTES AND EXHIBITS.

Colonel Legge presented two specimens of birds to the Society—one an owl (the brown fish owl, *Ketupa Ceylonensis*), and the other a kite (the Indian pariah kite, *Milvus govinda.)* He would not advocate the acquisition of birds from all parts of the world for this necessary adjunct, but thought that a complete collection from the ornithological region, embracing India and the Malayan Archipelago, and terminating in New Guinea, would be valuable here for comparison. There were three species of this large owl—one inhabiting Ceylon; another coming from the Malayan Archipelago; and the third from the Himalays and China. Curiously enough, no large owls were found in Australia, excepting a variety of the barn owl known in England. The present specimen was brought from the jungles of Ceylon. The species lives chiefly on fish, but also on vermin of different kinds and small birds. It is a very ravenous bird, and forms rather a formidable looking object when seen in the gloom of the forest. The specimen under notice was a female. The kite shown was found chiefly in Ceylon and India. It was allied to our Australian kite *(Milvus affinis)* found along the eastern coast and up as far as Timor, the Malayan Archipelago, and extending to the Andaman Isles and to India. There were two allied species of this kite — *Milvus govinda*, to which the present specimen belonged, and *Milvus affinis*. *Milvus govinda* ran up to 19in. in breadth of wings, whilst the Australian kite was never larger than 16½in. The Australian kite, of which there was no specimen at present in the Museum, was darker than the other, and showed an unmistakable difference. It was curious that no species of kite was found in Tasmania; that, though it was found in Victoria, South Australia, and Western Australia, it had not crossed the Straits. The bird was well known in India, where it frequently flew about the streets, and attacked boys carrying provisions: it was also a great attendant in the fishing nets in the morning. He would like to see a specimen of the *Milvus affinis* found in this country. While speaking of birds, he would throw out a suggestion to members fond of ornithology, viz., that a specimen of the osprey was wanted for the Museum. He knew that the bird was found on the eastern coast of Australia. The common fish-hawk or grey back sea eagle *(Haliœtus leucogaster)*, was also wanted. It was found in the Himalayas, and extended down to this country, where specimens were supposed to be larger than elsewhere. (Applause.)

Mr. Stephens directed attention to an interesting rock specimen from the Upper Huon district, discovered and presented to the Museum by Mr. Clarles Glover, who was well known as the pioneer in mineral explorations in the South-west, and whose labours in that field for many years past had rivalled those of Mr. James Smith in the North, though they had not resulted in the discovery of another Mount Bischoff. This rock had attracted much notice, and, until carefully examined, had led many persons to suppose that it was allied to the well known Carrara marble. Mr. F. M. Krausé, of Ballarat, had kindly analysed a specimen of the rock, and furnished the following description: — Rock specimen from Weld River, Upper Huon.

Amorphous—Under the microscope cryptocrystalline; optically negative; H=5·5; G=2·98.
Lustre vitreous to pearly. Opaque-white; in thin splinters sub-translucent; tough; fracture even.
Comp.—Silicate of alumina and soda, with traces of lime and ammonia.

"Before blowpipe fuses at 3 with intumescence to a blebby glass. From the unequal distribution of free silica, and the presence of ammonia, it is probable that the substance is the product of transmutation of a felsitic or kaolinitic rock. If it can be shown from its mode of occurrence that it is not merely an altered rock, then it is undoubtedly a new mineral species to which the appropriate name of Weldite might be given."

Mr. Krausé had also furnished the following note on a specimen of the altered sandstone at Campania, which was sometimes mistaken for a quartz reef. Ferrugineus quartzite (so called "auriferous sandstone"), Campania. No trace of gold.

There was no reason to doubt, he (Mr. Stephens) thought, that the specimen from the Weld River was from an altered rock allied to those described by Strzelecki under the general term of silicious slates, the outcrops of which might be seen at various points on the North coast to the West of the River Leven. If more accessible, it might probably be utilised in the manufacture of the finer kinds of pottery, but he feared that the remoteness of its situation would prevent it from being turned to any profitable account.

Mr. C. H. Grant believed that the rock under notice was the result of decomposition of granite in some form or other. It was no doubt granite freed from its mica, and probably altered by electrical action, and would not be found in any quantity. It was nodular in its character.

Mr. Stephens did not think that the rock was at all nodular in the sense spoken of by Mr. Grant. It might be described as a massive band interstratified with bands of quartzite and other altered rocks, and Mr. Glover had traced it for a mile in the direction of its strike.

The Chairman intimated that Mr. W. H. Charpentier had kindly consented to become honorary draughtsman to the Society.

Mr. Charpentier presented a cabinet of zoophytes, which, he stated, might form the nucleus of a fine collection if any of the members desired to take up the study, which was a favourite one in Victoria and the other colonies. A great many specimens could be found on the Tasmanian coasts. There were only three varieties missing from the collection to make it perfect, and it included a great number of *Diatomaceæ*. There was one matter he would like to mention, though he did it with diffidence. In Manchester microscopical societies were formed in connection with such institutions as this, and worked with a great amount of success. By the aid of the microscope they were not only able to see a great deal more of fossils, etc., but sections of rocks were made for examination. Any gentleman desiring to take up the study could provide himself with a microscope similar to that on the table (one of Field's), for £4 4s., and if required he would be only too delighted to instruct any one in its use. They would be astonished at the beauty which these zoophytes assumed in various forms under the microscope.

Mr. R. M. Johnston was very glad that Mr. Charpentier had brought the matter forward, and trusted the remarks made would encourage the study of a branch which had been greatly neglected. Mr. Harrop, of Launceston, was well known in England as the contributor of many peculiar forms of *Diatomaceæ*, in which Tasmania was very rich; and Mr. Petterd, of the same place, was also working up a fine and well-classified collection.

Mr. CHARPENTIER added that in Manchester the artisans had been foremost in scientific research, and their studies had done a vast amount of good.

The CHAIRMAN, on behalf of the Society, thanked Mr. Charpentier for his donations to the Museum.

Mr. J. SWAN proposed a vote of thanks to the donors and authors of the various papers read before the meeting.

Several members examined the zoophytes shown by Mr. Charpentier by means of the microscope, and the meeting closed.

Mr. CHARPENTIER added that in Manchester the artisans had been foremost in scientific research, and their studies had done a vast amount of good.

The CHAIRMAN, on behalf of the Society, thanked Mr. Charpentier for his donations to the Museum.

Mr. J. SWAN proposed a vote of thanks to the donors and authors of the various papers read before the meeting.

Several members examined the zoophytes shown by Mr. Charpentier by means of the microscope, and the meeting closed.

AUGUST, 1884.

The monthly meeting of the Royal Society of Tasmania was held on Monday evening, 11th August. Mr. James Barnard, V. P., occupied the chair. Mr. J. McAlpin, F.L.S., Edinburgh, was introduced as a visitor. A very large number of Fellows were present.

The following were duly elected as Fellows of the Society:—Miss Mary Lodder, the Hon. John Lord, M.L.C., Rev. John Vansittart Buckland, B.A., Messrs. Crawford John Maxwell, J. R. McClymont, M.A., W. Saville Kent, F.L.S., F.G.S., etc., W. Harvey Buckland, B.A., H. C. Kingsmill, B.A., J. McCance, F.R.A.S., R. Sydney Milles, C.E., Chas. Ellis Davies, J. G. Davies, Philip Seager, Henry Cook, jun., T. C. Just, W. H. Charpentier, Frederick Pedder, Alex. North.

The HON. SECRETARY (Dr. Agnew) stated that the society was to be congratulated on the election of such a large number of Fellows, a far greater number than had hitherto been elected in one evening.

RETURNS, ETC.

The HON. SECRETARY brought forward the usual returns, viz.:—

1. Number of visitors to the Museum:—July—Week days, 1,289; Sundays, 870; total, 2,159.
2. Number of visitors to Gardens—4,999.
3 and 4. Plants and seeds received at and sent from the Royal Society's Gardens during the month of July:—

From Mr. Joseph Harris, South Yarra, bundle of fruit trees, etc. (30).
From Messrs. Law, Somner, Melbourne—Case, containing 74 plants.
From Mrs. S. Purchase, Parramatta—Case, containing 30 plants.
From the Botanic Gardens, Brisbane—Case, containing 15 ferns.
From Messrs. Heyne Co., Adelaide—31 packets seeds.
From the Colonial Museum, Wellington—17 packets seeds.
To the Botanic Gardens, Rome—36 packets seeds.
To Mr. Joseph Harris, South Yarra—Case seedling plants.
To Messrs. Law, Somner, Melbourne—Box seedling plants.
To Mr. C. F. Creswell, Melbourne—Box seedling plants.

5. Time of leafing, flowering, and fruiting of a few standard plants in the Royal Society's Gardens during the month of July:—

15th. Paper almond commencing to flower.
18th. Cytisus leucanthus commencing to flower.
25th. Winter aconite commencing to flower.
25th. Arbutus unedo commencing to flower.

28th. Garrya elliptica, commencing to flower.
31st. Snowflake commencing to flower.
31st. White mulberry commencing to break.
28th. Crocus aurces in full flower.

LIBRARY.

6. The usual monthly and other periodicals for July.
7. List of additions to the library for the month of July.

The following books and pamphlets weae presented from the author. Mr. W. Saville Kent, F.L.S., F.G.S.

(1) On an existing coral closely allied to the Palæozoic Genus Favosites.
(2) On the Madreporaria, or Stony Corals.
(3) On a new genus of the Madreporaria, or Stony Corals.
(4) Hackel, on the relationship of the sponges to the coral.
(5) On a new species of Sagitta from the S. Pacific.
(6) Notes on the Embryology of Sponges.
(7) Observations upon Prof. E. Haeckel's Group of the Physemaria and on the affinity of the Sponges.
(8) The Foraminiferal nature of Haliphysema Tumanowiczii.
(9) On the Hexactinellidœ or Hexradiate Spiculed Sponges.
(10) Notes on Prof. J. Clark's Flagellate Infusoria, with description of new species
(11) On a new Anchoring Sponge "Dorvillia Agariciformis."
(12) On the Calcareous Spicula of the Gorgonaceæ.
(13) On some new and little known species of Madrepores or Stony Corals, in the British Museum collection.
(14) Report upon the sponges of the Bahama Islands, etc.
(15) A further communication upon certain Gigantic Cephalopods recently encountered off the coast of Newfoundland.
(16) On two new Genera of Alcyonoid Corals.
(17) Notes on Appendicularia and the Larval condition of an Acanthocephaloid Scolecid from the coast of Portugal.
(18) On a new genus of Sponges from North Australia.
(19) On a new British Nudibranch (Embletonia Grayi.)
(20) British marine and fresh water fishes.
(21) Infusoria: What are they? Their collection and investigation.
(22) A Manual of the Infusoria, pts. 1, 2, 3, 4, 5, 6.

8. Transactions of the Asiatic Society of Japan, vol. 2, pt. 2, from the Society.
9. The Victorian Naturalist, vol. 1, No. 6 (June), from the Society.
10. Transactions of the Royal Historical Society, vol. 2, pt. 1, from the Society.
11. Monthly Notices of the Royal Astronomical Society, vol. 44, No. 7 (May), from the Society.
12. On the Bingera Meteorite, New South Wales.
13. Rocks from New Britain and New Ireland.
14. On the Chemical Compositions of certain Rocks, New South Wales.
15. The Deniliquin or Baratta Meteorite, by Professor A. Liversidge, F.R.S., from the author.
16. Vegetable Moulds and Earth Worms, by Chas. Darwin, from Mr. J. McCance, F.R.A.S.
17. List of books relating to Tasmania, compiled by J. B. Walker, from the author.
18. The New Zealand Journal of Science, No. 4, vol. 2 (July), from the Society.
19. Proceedings of the Academy of Natural Sciences, part 1, from the Society.
20. Journal of the Royal Microscopical Society, vol. iv., part 3 (June), from the Society.

21. Meteorological Observations, India (January), from the Meteorological Office, India.
22. *Agricultural Gazette*, June 9th, 16th, 23rd, 30th.
23. *Gardeners' Chronicle.*
24. The *Athenæum* (June).
25. The *Nature* (June).
26. Journal of Science (July).
27. Annals and Magazines of Natural History.
28. Journal of the Society of Arts (May and June).
29. The *Florist and Pomologist* (July).
30. Census of Victoria, from the Victorian Government.
31. Vital and Meteorological Statistics of Tasmania, from the Government Statistician.

MUSEUM.

List of Presentations to the Museum :—

Mammals :

A Tasmanian Tiger—(Thylacinus cynocephalus), Mr. Dunbabin.
Two Native Cats—Dasyurus viverrinus, Mr. C. E. Davies.

Birds :

Chestnut-faced Owl—Strix castanops, Mr. F. Weston.
Collared Sparrow Hawk—Accipiter torquatus, Mr. Geo. Howe.
Head and Feet of Wedge-tailed Eagle—Aquila audax, Mr. H. Gatty.

Fishes :

A Tasmanian Red Perch—Anthias rasor, Mr. Boyes.

Reptiles :

A Diamond Snake—Hoplocephalus superbus, Mr. W. F. Petterd.

Mollusca :

A Pecten—Pecten fumatus—Mactra cretacea, Mr. E. D. Swan.
A Mussel—Mytilus, sp., Mr. W. Saville-Kent.

Fossils :

Fossil Wood, Mrs. Justin McC. Browne.
Fossil Shells, Mr. C. E. Davies.

Ethnology :

Bows and Arrows, etc., from the Andaman Islands, presented by Mr. T. C. Just.
A Water Colour Painting of Tasmanian Fish, Mrs. L. Meredith.

FERNS ON THE MOUNTAIN.

The Hon. Secretary said the Fellows would recollect that the destruction of the ferns at the Bower had been brought under the notice of the last meeting by Mr. Justice Dobson ; and, as a result, a deputation consisting of himself, Colonel Legge, and Mr. C. H. Grant, had waited on the Minister for Lands to make representations to him on the subject. A few days afterwards he received a reply from the hon. gentleman saying that he (the Minister of Lands) entered heartily into the matter, and would do all that lay in his power to carry out the objects of the deputation. Arrangements were being made to define the boundaries of the private property in the locality, and, as soon as this was done, boards would be erected warning people not to cut ferns on the Crown land, and the bailiff would be instructed to see that the notices were respected.

THE DEATH RATE.

Mr. R. M. Johnston, F.L.S., read a paper entitled—"Remarks on the observed periodicity of the death-rate, with suggestions as to its

possible relation with the periodicity of solar and other super-terrestrial phenomena."

The object of the paper was to show that there is a marked rise and fall of the death-rate in Europe and Australasia, as ascertained from the records of various countries during the last 39 years, the periodicity of which closely corresponds with the maxima and minima of sun-spots, and with the movements of Jupiter in his orbit from aphelion to perihelion. In the colonies of Australasia, especially during the last 25 years, there is such a close agreement with each other in the rise and fall of their respective death-rates that it is not easily accounted for unless it be referred to some superterrestrial influence of a variable character. Local causes appear in conjunction with this obscure powerful influence as mere ripples on the swell of a great wave. Although the several states of Europe do not correspond with each other so closely as do the widely separated colonies of Australia it is considered significant that the mean of the death-rate of Europe corresponds in a remarkable way with that of Australasia. Mr. Johnston considers that the greater agreement of the Australasian colonies is due more or less to the absence of artificial evils, such as pestilence of war and excessive density of population, and therefore it is conceivable that the death-rate of the Australasian colonies is a more reliable index of the mediate or immediate effect of super-terrestrial causes. The paper was illustrated with diagrams.

CANCER IN CATTLE.

Dr. H. A. PERKINS, M.D., read a paper on *Osteosarcoma*, or so-called cancer of the jaw in cattle; and added that since writing the paper he had found that there had not been an undue number of deaths from cancer in man during the last few years, but only in a corresponding degree to the increase of population. Accompanying the paper were specimens of tumorous bones illustrated by comparison with the bones of healthy animals taken from similar parts, which in reality was not cancer at all, but a growth of scrofulous or tuberculosis origin. The paper was accompanied with a post mortem report of the examination of 12 beasts, suffering from the disease, made by Mr. Park.

The ACTING CHIEF JUSTICE (Hon. W. L. Dobson): Cannot you absolutely destroy tuberculosis?

Dr. PERKINS: In many cases only by destroying the entire animal.

The ACTING CHIEF JUSTICE: Would there be no harm in eating it after it was well cooked?

Dr. PERKINS: That would depend upon how it was boiled or roasted, and on the extent of ravages of the disease. Many people put meat into the water before it is boiling, and let it, as it were, simmer for a time, and so make a decoction. The better plan is to wait until the water has reached boiling point before placing the meat in it.

Mr. BELSTEAD: For the purpose of destroying the disease?

Dr. PERKINS: Partly so, and partly for ordinary cooking to be done well. At the same time it was true that the disease might be killed in the parts contiguous to the water.

Mr. JOHN SWAN said he had received a letter written by a person who was in the habit of purchasing cattle for slaughter in one of the mining districts. The writer observed that he seldom or never bought a lot of cattle without getting one or more with swollen jaws. As he would not be likely to purchase more than 15 or 20 at a time, this would give a higher percentage than he should have suspected to exist. It was much more general in many parts than was supposed, and in the early stages of the disease the beast suffering from it would, in his opinion, be passed by the inspector of stock, who would not, on account of the ailment, condemn it as unfit for human food.

The Hon. Secretary said these cases, though commonly said to be cancerous in character, were in fact truly tuberculosi; cancer was a complete misnomer.

Mr. Swan: Until lately he had always heard the term cancer applied to the disease.

The Acting Chief Justice said in reference to a remark in the paper about rabbits not drinking, he had often, when out shooting, seen rabbits come down in the evening to drink at a water hole.

Dr. Perkins: In very dry weather?

The Acting Chief Justice: Yes.

Dr. Perkins: There was no succulent food about for them.

Mr. Swan said the disease was as common amongst kangaroos as cattle.

Dr. Perkins: In Germany 20 per cent. of the cattle suffered in that way.

Mr. Belstead: We may consider ourselves well off, then.

OTHER PAPERS.

The following papers were also read:—

Notes on a Sapphirina and a Salpa, caught off the Cape of Good Hope. By John McCance, F.R.A.S. Accompanying the above paper were two beautiful drawings of the above specimens.

Notes on the discovery of two rare species of Ferns, new to Tasmania. By R. M. Johnston, F.L.S., etc.

Description of a new species of Crepidula, from the Eocene beds, Table Cape. By R. M. Johnston, F.L.S., etc.

NOTES AND EXHIBITS.

Mr. Stephens called attention to three specimens placed on the table for inspection.

1. Core of Silurian limestone from the diamond drill at Tarleton, proving, he regretted to say, the correctness of his previous remarks in regard to the position of the Mersey coal measures. The search for coal at that particular spot was therefore at an end.

2. A specimen of *Orthoceras* s.p. from the Silurian limestone near Redwater Creek, Mersey, forwarded by Mr. Hainsworth. A portion had been sent to Mr. Wilkinson, Government Geologist, Sydney, for comparison with similar fossils from New South Wales, but it had not yet been identified.

3. Part of small boulder with casts of *Orthis* and crinoidal stems, etc. This, as he had ascertained from information kindly furnished by Mr. Thureau, was found in sinking a shaft near Lisle at a depth of 30 feet, and was interesting in connection with the Silurian fossils found under somewhat similar conditions near Table Cape. Perhaps some day they might trace it back to the parent rock from which it was broken off.

Mr. R. M. Johnston stated that, with regard to the results of boring at Latrobe, although unfortunate as regards the prospects for coal, the discovery that the lower coal measures of that district rested immediately upon the silurian limestone was of particular interest to him, inasmuch as the position of the Tasmanite beds could now be more satisfactorily determined. When he (Mr. Johnston) examined the Tasmanite beds some years ago, he found waterworn fragments of the silurian limestone included among them. Recently he discerned in the lower portion of the core from the Mersey boring-rod a dark close-grained sandstone identical in character with certain bands occurring in the Tasmanite series, and he therefore had every reason to believe that the latter and their equivalents formed the lower members of the Mersey coal measures.

Mr. J. McC. Browne laid on the table an extract from the *Australasian Shipping News*, in which, under the heading "A Travelled Whale" it was stated that in a late issue of the *John o' Groat Journal*, Scotland, an account was given of the capture in Behring's Straits in June, 1883, of an enormous whale, 62ft. long, and weighing 72 tons, which was found on being cut up to contain embedded in its blubber a harpoon with the words "Henty, L. 1838," branded on it. It is well known that that old colonial family, the Hentys, had in the year above given a whaling establishment at Portland, Victoria, and that they had a number of harpoons for that establishment made for them at Launceston, for which town probably the initial L stands.

Mr. Browne stated that the Hentys had no whaling vessels, but whaled from the shore at Portland Bay, after some years they sold off all their whaling plant which was bought by owners of whaling vessels, some of these vessels are known to have fished in the Northern Hemisphere, where the whale was probably struck, and carried away the harpoon.

Mr. Stephens said he had drawn the attention of Baron Von Müeller to a beautiful light purple fungus which had been found on the slopes of Mount Wellington. The fungus being too fragile to bring into town, a drawing made by Miss Walker, of Rhodes, N.S.W., had been forwarded to the Baron, who had identified it as a species of *Clavaria* and had since sent the following note on the subject:—"I sent the drawing to the great specialist, Dr. Cooke, pointing out that the fungus was near *Clavaria Amethystina*, but differed somewhat in colour, and suggested the name *C. lilarina*. He, however, regards it as the real species of Fries. It is new to Tasmania, indeed to Australia, so perhaps it is worthy of notice at your Royal Society, if it was only to show that fungi need yet much to be studied there."

THE CALCUTTA EXHIBITION.

Mr. Just said he had presented the Society with a collection of ethnological specimens, consisting of bows and arrows, dresses, and ornaments worn and used by the natives of the Andaman Islands, which he had been fortunate in obtaining through the instrumentality of Mr. V. Portman, assistant superintendent at the Andaman and Nicobar Islands. While the exhibition was going on the Government of India took steps to have casts taken of some of the native races and wild tribes of India, representatives of which were present in Calcutta at the time. He applied for duplicates of some of the casts before he left, and if the hon. secretary would follow up his action there would be no difficulty in obtaining the casts, and Dr. Watt, the curator of the Economical Museum in Calcutta would take care that proper dresses were supplied for them. The Lieut.-Governor of Bengal had written to him, promising him a complete set of the economic products of India, and other interesting specimens which he hoped to see presented to the society for the museum. He had further handed over to Mr. Morton for the Museum 111 specimens of the diets of India, and a collection of fishes, which were presented by Doctor Kanny Loll Dey, the principal Hindoo native physician in Calcutta, and also a box containing rocks of various kinds, presented by Dr. Anderson, curator of the Imperial Museum, Calcutta. A valuable box of books had been forwarded through by the Government of India to the Tasmanian Government, and, as in all probability many of them would be of special interest to the Fellows of the Society, he would endeavour to have a selection made, and with the approval of the Chief Secretary, add them to the Royal Society's library. He might also state that Dr. King, curator of the Botanical Gardens at Calcutta would be happy to exchange specimens with the Hobart Botanical Gardens.

VOTE OF THANKS.

Mr. J. McC. BROWNE moved a vote of thanks to the donors of the various presentations, and the gentlemen who had contributed papers; and said he had it as the opinion of a person in Melbourne, who was used to cattle generally, that the so-called cancer was not prejudicial to human life and health, nor was it regarded with so much apprehension as pleuro-pneumonia.

The ACTING CHIEF JUSTICE seconded the motion, for the purpose of saying that the Minister of Lands was entitled to some recognition from the society for the promptness with which he had shown his regard for the opinion of the society, as to what should be done for the preservation of ferns on the mountain. One remark he wished to add was that in Hobart they had two great advantages, the mountain and the river—the mountain on the one side, which they could enjoy at will, and the river on the other, which they could enjoy also, but which they could not enter to have a bath without paying for it. It seemed to him as if it was throwing away one of the greatest advantages which nature had given them. He saw the Minister was in favour of granting a new boating club a site for a shed, and he trusted the hon. gentleman would add to that another shed or hoarding, so that a swim or a wash could be had at any time free of charge, as the possession of such an advantage would be the means of adding to the health and manliness of the rising generation.

The motion was carried by acclamation, and the proceedings terminated.

SEPTEMBER, 1884.

The monthly meeting of the Royal Society of Tasmania was held on Monday evening, September 8. His Honor, the Acting Chief Justice, Mr. Justice Dobson, F.L.S., occupied the chair. There was an unusually large attendance of Fellows and visitors, the latter, including about 20 ladies, the Premier (the Hon. Adye Douglas), the Minister of Lands the (Hon. N. J. Brown), and other prominent gentlemen.

The following gentlemen having been previously nominated by the council, were duly elected as Fellows of the Society:—Rev. Geo. Clarke, Messrs. T. R. Atkinson, Leonard Rodway, P. Oakley Fysh, jun., Alfred Mault, Geo. P. Fitzgerald, W. P. Little, W. L. Boyes.

RETURNS, ETC.

The Hon. Secretary brought forward the usual returns, viz.:—

1. Number of visitors to the Museum.—August—Week days, 1,140; Sundays, 1,065. Total, 2,205.

2. Number of visitors to Gardens, 4,851.

3. Plants and seeds received at the Royal Society's Gardens during the month of August.

From the Botanic Gardens, Wellington, N.Z., 17 packets seed.

From Messrs. Heyne, Adelaide, 36 packets seeds.

From Baron Ferd. Von. Mueller, Victoria, roots Nymphœa Gigantea, etc.

From the Botanic Gardens, Rome (Lady Dry), 46 packets seeds.

From Mr. James Grant, Queensland, 18 packets seeds.

From Mr. J. Smith, Riddell's Creek, Victoria, 20 plants.

From the Botanic Gardens, Melbourne, 39 plants, 30 packets seeds.

4. Time of leafing, flowering, and fruiting of a few standard plants in the Royal Society's Gardens during August, 1884.

Library.

5. List of additions to the Library for the month of September.

Official introduction to Bahamas Fisheries, with a description of the Islands, by "Rebus."

Fishing and hunting on Russian waters, by Dr. C. Grimm.—From the Tasmanian Fisheries Commission.

Special catalogue of the Chinese collection exhibits for the International Fisheries Exhibition, London, 1883.—From the Tasmanian Fisheries Commission.

New Zealand Meteorological Report, 1883, including returns for 1880-81-82.—New Zealand Meteorological Observations. From James Hector, M.D.C.M.G.

Melbourne monthly record Meteorological Observations. From the Government Astronomer.

Statistical Register of the colony of Victoria for the year 1883, part ii. (Population). From the Government Statistician.

Results of Rain and River Observations made in New South Wales, by H. C. Russell, from the author.

New South Wales Physical Geography and Climate, by H. C. Russell, B.A., from the author.

The Victorian Naturalist, July, from the Society.

Tasmanian Statutes, Vols. 1 and 2.

Tasmanian House of Assembly Journals, Vols. 44, 45, from the Government Printer.

Tasmanian House of Assembly Papers, from Mr. F. A. Packer.

The *Gardeners' Chronicle.*

The *Agriculturist.*

The *American Agriculturist.*

The History of Tasmania, by J. Fenton.

An illustrated introduction to Lamarck's Conchology, London, 1827, by the author, E. A. Crouch, F.L.S.

Proceedings of the Linnean Society of New South Wales, Vol. IX., part 2nd, August, 1884, from the Society.

Catalogues.

Dulau and Co.'s catalogue of French books.
Dulau and Co.'s catalogue of medical works.
Dulau and Co.'s catalogue of botanical works.
Dulau and Co.'s Tourists' Guide Book.
Bibliotheca Geographica et Historia.
Catalogue of the library of the late Hon. John Macgregor, Melbourne.

Museum.

List of presentations to the Museum :—

Mammals.

A Tasmanian Tiger, Thylacinus cynocephalus, Mr. Wm. Turvey.
A Tasmanian Tiger, Thylacinus cynocephalus, Mr. J. R. Green.

Fishes.

A Parrot Fish, Labrichthys sp., Mr. W. L. Boyes.
Allport's Perch, Callanthias Allportii, Mr. W. L. Boyes.
N.S.W. and N. Z. Trumpeter, Latris ciliaris, Mr. W. L. Boyes.

Birds.

1 Jameson's Gull. Larus Jamesoni.
2 Brush Wattle Birds, Anellobia lunulata.
2 Diamond Bird Pardalotus punctatus.
2 Acanthiza diemenensis.
1 Striated Calamanthus, Calamanthus fuliginosus

1 Ephthianura albifrons.
1 Meliornis novæ-hollandiæ.
1 Selby's Thrush, Colluricincla Selbii, by Mr. H. L. Swift.
1 Firetail Finch, Estrelda bellus.
1 Striated Calamanthus, Calamanthus fuliginosus.
1 Yellow-throated honeyeater, Ptilotis flavigula.
1 Dusky Robin, Petroica fusca.
1 Pink breasted Robin, Erythrodryas rhodinogaster.
1 Flame breasted Robin, Petrœca phœnicea.
1 Blackcapped honeyeater, melithreptus melanocephalus, by Mr. F. P. Wilson.
A collection of Tasmanian Birds' Nests, Mr. J. R. McClymont, M.A.

Mollusca.

Tasmanian Shells, Mr. E. D. Swan.

Ethnology.

A Fijian Native Basket, Mr. E. D. Swan.

SUBMARINE CABLES.

The Hon. Secretary (Hon. Dr. Agnew) announced that Mr. Robt. Henry, jun., Superintendent of Telegraphs in Tasmania, had promised to deliver a lecture on "Submarine Cables," giving a practical illustration of the means by which the localities of breaks or faults in the cable are determined.

Mr. Henry prefaced his remarks by describing the manner in which cables are constructed and the materials and process used to ensure complete insulation, not forgetting the spiral covering of brass which is sometimes necessary in Indian seas to protect the cable from the ravages of a specie of Teredo, which bore through the gutta-percha covering till the copper case is reached, then destroying the insulation. To illustrate his remarks on the preservation of cables, he exhibited a small section of cable cut from the break which recently occurred between Tasmania and Victoria, about 70 miles from Low Head. The present cable had been down about 15 years, and this was about the only serious break that had occurred. There had been one or two breaks previously, but they had been nearer the shore, and the causes had been apparent. At the Victorian end a reef of rock ran across the cable, and could not be avoided, and the result was that in time the cable was fretted away by the continual action of the waves. About five years ago, however, a heavier cable had been laid at the shore ends, and no trouble from that quarter had arisen since. The lecturer then proceeded to explain the different conducting properties and resisting powers of the various metals, and showed a small coil of German silver— a very bad conductor—which had a resistance equal to 50 miles of cable. He entered at length into a description of the means by which a current of electricity may be used to measure lengths of wire. There were two units of measurements, called "ohms," in general use; one, the "British Association unit," might be roughly represented by a mile of copper wire about one-quarter of an inch in diameter, and the other, "Siemen's unit," represented by a column of pure mercury about forty inches in length and 1-40th of an inch in diameter. The "ohm" must be understood to represent a standard of comparison, in the same manner as an inch in length or an ounce in weight, and it was evident that having once fixed a standard it was easy to compare results with other lengths and description of wires, and therefore made it possible to determine the resistance of any length of cable. In the resistance-box shown were a number of small coils of wire, which, though they appeared to be of the same size, represented very different values, one of them being one "ohm," and

another 4,000 "ohms." Before a cable was laid down, it was tested to find the resistance, and discover any leakage of the current, and these tests were kept for future reference. A good cable would improve in its insulation after being down a short time, and should show about the same amount of resistance and insulation as when out of the water. A certain length of cable with a conductor of a certain size should give a certain number of "ohms" of resistance to the mile. It would show no current so long as the further end of the cable was insulated, but if there were any leakage a portion of the current would come back to the station, and the resistance would, of course, be proportionately decreased. The lecturer exhibited a galvanometer, used to detect the presence of weak currents of electricity, and of so delicate a character, that it would be possible by it to read signals transmitted through the Atlantic cable from a battery, the size of an ordinary gun cap. Having described, in detail, the construction of the galvanometer, which consisted mainly of a very light and small glass mirror, having attached to the back of it a magnet, made of a piece of watch spring, and the whole suspended by a fibre of raw silk between two coils of wire; he then proceeded to give a practical illustration of the manner in which the locality of a break in the cable may be determined. Having a coil of insulated wire some 1,500 yards in length submerged in a bath of salt water, he connected it with the galvanometer and box of resistance coils, technically called a "Wheatstone bridge," and showed the resistance of the cable to be 293 "ohms." Some of the insulating covering was now removed to make a fault in the cable, and tests were again applied from either end of the cable, the resistance being in the one case 273, and in the other, 23 "ohms," making a total of 296, which showed the fault to be making nearly "dead earth," as nearly the whole of the current passed through it to earth. It was therefore apparent, supposing an "ohm" in this instance to represent a mile of cable, that the fault had occurred at a distance of about 273 miles from one station, or 23 miles from the other. Lastly, Mr. Henry described minutely the various processes required to secure an accurate test, and the elaborate calculations that have to be made to ensure any degree of certainty.

In reply to the Chairman, Mr. HENRY said it was much easier to determine the locality of a break in a cable than on land lines, the insulation in the latter case being so much more imperfect, rendering a complete test very difficult. He had recently made a test on the line between Hobart and Launceston, where a break had occurred, but he proved to be several miles out in his calculation.

The Hon. Dr. AGNEW proposed that the best thanks of the meeting be passed to Mr. Henry for the extremely interesting lecture he had given. The subject was an intricate one, and required a certain amount of preliminary knowledge before it was possible to grasp all its details as presented in the course of a single lecture. He was sure, however, everyone present felt obliged for the practical and scientific exposition of the matter with which Mr. Henry had favoured them.

The CHAIRMAN, in putting the vote, said the subject was of more than scientific interest, for it was one in which all people must take an interest. They liked to have the news of the world at their breakfast table, and were disappointed if they did not get it; and they were therefore deeply interested in the question of how a break may be found, and how it may then be mended.

The vote was carried with acclamation, and Mr. Henry briefly returned thanks.

A vote of thanks was passed to those who had forwarded donations to the library and museums, and the meeting terminated.

OCTOBER, 1884.

The monthly meeting of the Royal Society of Tasmania was held on Monday, October 13. Mr. James Barnard, vice-president, occupied the chair. A large number of Fellows were present.

Mr. J. W. Clunies Ross, B. Sc., F.G.S., Etc., Etc., London, was introduced as a visitor.

NEW FELLOWS.

The following gentlemen having been previously nominated by the Council, were duly elected as Fellows of the Society :—Messrs. A. Giblin, A. J. Robertson, A. I. Clark, and A. Morton.

RETURNS, ETC.

The hon. secretary brought forward the usual returns, viz.:—

1. Number of visitors to the Museum, September—Week days, 1,330; Sundays, 740; total, 2,070.

2. Number of visitors to Gardens, 6,220.

3. Plants and seeds received at the Royal Society's Gardens during the month of September. From the Botanic Gardens, Port Natal, 38 packets of seed. From Mr. James Grant, Sydney, 30 do. do.

4. Time of leafing, flowering, and fruiting of a few standard plants in the Royal Society Gardens during September, 1884.

15. Common ash, commencing to break.
15. Grape vines commencing to break.
16. Oaks generally commencing to break.
21. Moutan pœony in full flower.
22. Horse chestnut, commencing to flower.
23. Robinia pseudo acacia commencing to break.
20. Sycamore commencing to break.
30. Common plane tree commencing to break.

List of additions to the library, September, 1884 :—

The sixty-fourth report of the Council of the Leeds Philosophical and Literary Society. From the Society.

Le Congo Depuis L'Equateur Jusqu'a L'Ocean. From the Institut National De Geographie, Bruxelles.

Records of the Geological Survey of India, vol. xvii., pt. 3, 1884. From the Geological Survey Office, Calcutta.

Bombay Magnetical and Meteorological Observations, 1879 to 1882. From the Meteorological Office, Bombay.

Appendix to the above. From the Meteorological Office, Bombay.

Nature, vol. 30, July, 1884.

Athenæum, July, 1884.

Florist and Pomologist, August 11.

Journal of the Society of Arts, July 4, 11, 18, 25, August 1.

Geological Magazine, August, 1884.

Journal of Science, August, 1884.

Annals Magazines of Natural History, August 4, 1884.

Agricultural Gazette, August 4, 1884.

Gardeners' Chronicle, August 9, 1884.

1. Extract from the proceedings of the Victoria Institute. Annual meeting, 1884. Speech of Sir J. Lefroy, K.C.M.G., F.R.S.

2. Address to the geographical section of the British Association, by Sir J. H. Lefroy, K.C.M.G., F.R.S. From Sir J. H. Lefroy, K.C.M.G., etc.

Monthly notices of the Royal Astronomical Society. Vol. XLIV., No. 8, June 1884. From the Society.

Monthly record meteorological observations, May, Melbourne Observatory. From R. L. J. Ellery, Government Astronomer.

S. Mullen's *Monthly Circular*, September.

The *Gardeners' Chronicle*, August 16, 23, 30, 1884.
The *Agricultural Gazette*, August 16, 25, 1884.
The *New Zealand Journal of Science*, September. From the society.
Bibliography III., Æcalephs. By J. Walter Fewkes. From Prof. A. Agassiz.
Two Papers. Problems of Nature. New York.
American Agriculturist, September.
Transactions of the Royal Historical Society, Vol. II., Pt. 2, 1884. From the society.
Journal and Proceedings of the Royal Society of N.S.W. From the society.
Meteorological Table, India, March, 1884. From the Meteorological Office, Calcutta.
Agricultural Gazette, August 18, 1884.
Monthly Record Meteorological Observations, Melbourne, June. From Mr. R. L. J. Ellery.
The Monthly Weather Report of the Meteorological Office for March, 1834, London. From the Meteorological Office.
Vital and Meteorological Statistics of Hobart and Launceston for the month of September. From the Government Statistician.
Meteorological Observations of Tasmania for September. From the Meteorological Observer.

List of presentations to the Museum :—

Mammals.

A Tasmanian Tiger, and four young ones, Thylacinus cyanocephalus, Mr. Wm. Turvey.
Two Tasmanian Devils, Sarcocephalus ursinus, Mr. Flexmore.
A Water Rat, Hydromys chrysogaster, Mr. Propsting.
Three Wallabys, Halmaturus penicillata; Halmaturus thetidis; Halmaturus dorsalis, The Trustees Brisbane Museum.

Birds.

Laughing Jackass, Dacelo gigas, Dacelo leachii, Cracticus robustus, Strepera graculina, Carpophaga magnifica.
Flinders Cuckoo, Eudynamys flindersii, Orthonyx spaldingi.
Australian Egret, Herodias alba, The Trustees Brisbane Museum.
Pallid Cuckoo, Cuculus inornatus, Mr. E. D. Swan.
Summer Bird, Graucalus parvirostris, Mr. Hissey.
2 Black-headed Honeyeater, Melithreptus melanocephalus.
1 Forty-spotted Diamond Bird, Pardalotus quadragintus, Mr. Geo. Hinsby.
Wedge-tailed Eagle, Aquila audax, Mr. Webster.
Sooty Oyster Catcher, Hœmatopus fuliginosus.
White-breasted Oyster Catcher, Hœmatopus longirostris.
2 Moreporks, Podargus cuvierii.
Jameson's Gull, Larus Jamesonii.
Fire-tail Finch, Estrelda bellus, Mr. H. L. Swift.
Chestnut-faced Owl, Strix castanops, Mr. J. G. Davies.
Tabuan Water Crake, Porzana tabuencis, Mr. R. Bayless

Fishes.

Dules Haswelli, Mugil dolula, Pristopoma hasta, Ostracion cornutus, Ostracion cubicus, Caranx hippos, Scorpæna cruenta, The Trustees Brisbane Museum.
The Velvet Fish, Holoxenus cutaneus, Mr. F. P. Wilson, Derwent.
The Parrot Fish, Labrichthys Mortonii, Mr. W. L. Boyes.
Flying Gurnard, Trigla sp.
Fresh-water Flathead, Aphritis urvillii, Mr. Seal.

Queensland Reptiles.

Grammatophora sp., Grammatophora barbata.
Iguana, Hydrosaurus varius. The Trustees Brisbane Museum.

Mollusca.

Tasmanian Shells, Mr. H. L. Swift.
A collection of Macroshisma tasmanica, Mr. J. McCance.

Crustacea.

A Hermit Crab, Pagurus sp., Mr. E. D. Swan.

Minerals.

A collection of cores, by the diamond drill from the Cascades, the hon. the Minister of Lands through Mr. B. Shaw.
A collection of Sulphur, etc., from the Hot Lakes of New Zealand, with photo. of Hot Springs, Mr. Howard Haywood.

PAPERS.

A paper, entitled "The River Derwent: note upon the flood of 23rd September, 1884," by Mr. A. Mault, was read by the hon secretary, Dr. Agnew. The paper was written with the object of placing upon record a remarkable variation in the quantity of water passing in the river; calculations of the mean quantity being also given from observations taken during the past two years.

Mr. R. M. Johnston, F.L.S., read a paper, "Observations on six rare fishes, recently captured in Tasmanian waters:—Callanthias Allportiis Latris ciliaris, Erythrichthys nitidus, Centriscus scolopax, Labrichthys Mortonii nov. sp., Oligorus gigas." Mr. Johnston stated that during the last two months several new or rare species of fish had come under his notice, which he had thought desirable to bring under the notice of the society. He said he might mention that Mr. Morton, the curator of the Museum, had been praiseworthy in arousing the interest of local observers in various parts of the island, and it was to him that he was chiefly indebted for three of these interesting forms. The fishes on the western, northern, and north-eastern parts of the island are, as yet, imperfectly known. The recent discovery of the snipe or trumpet fish (centriscus scolopax) at Port Sorell, by Miss Lodder, and the capture of the "Hapuka" Oligorus gigas, and the "Moki" Latris ciliaris, so common in New Zealand, at George's Bay, by Mr. W. L. Boyes, leads one to hope that many new forms from these imperfectly investigated regions will soon be added to our list of Tasmanian fishes.

Dr. Agnew said the Council had a sum of money which was intended to be set apart for a memorial to the late Mr. Morton Allport. The Council had some difficulty in which way the money should be laid out, but it was thought that a small library, including all the latest works on fishes, to be called the Morton Allport Library, would be an appropriate and fitting memorial to the memory of their late friend. (Hear, hear.)

Mr. J. R. McClymont, M.A., read a paper entitled, "Tentative list of Navigators who visited Van Diemen's Land prior to September, 1803." Mr. McClymont stated his object in bringing this paper before the society was mainly to call attention to the paucity of information within our reach regarding geographical discovery in Tasmania—a defect which, he stated, it is increasingly difficult to remedy, seeing that the works which contain such information are being eagerly bought up for the libraries of Europe, America, and the other colonies.

Mr. J. B. Walker said they were under an obligation to Mr. McClymont for his carefully prepared and well considered paper,

since the history of early voyages to the colony was of great interest not only to the Society but to the public generally. Mr. McClymont had called attention to the dearth of books relating to the colony in our public libraries, and this was a fact which certainly was not creditable to Tasmania, there being very few printed records of its discovery, settlement, and history to be found in the whole country. Not long ago when the French man-of-war, the Finisterre, called at Hobart, some of her officers went to the Public Library to obtain information respecting the discoveries in Tasmania of the earlier French navigators Dentrecasteaux, Baudin, and others, but to their great astonishment the Public Library had not a single one of the books for which they sought. It was discreditable to Tasmania. It was a strange thing that Tasmania possessed fewer books about its own history than other countries did; it was an astonishing state of affairs. In regard to the nature of the paper which had just been read, he thought it would be well if the members of the society would oftener take up subjects relating to the geography, and early history of the colony. The Royal Society was the only society which could be called a literary or learned society in the colony, and although the two subjects he referred to were not particularly provided for in the rules and constitution of the society, he did not see why papers dealing with them should not be read; or that a Geographical and Historical Section should not be formed, the members of which might write papers embodying the results of their researches which could be read at meetings of the Section and not at the monthly meetings. There would be one advantage in Sections, as it would enable the members belonging to it to work together systematically towards preserving those materials for the future history of the colony, which were fast passing away. He suggested that a committee should be appointed to confer with the trustees of the Public Library and the Parliamentary Library Committee, with the view of obtaining a complete set of works relating to the early discovery and history of Tasmania.

The CHAIRMAN said it might not be generally known that it was the special object of Sir John Franklin, 40 years ago, to collect together all the works relating to the Australasian colonies, and a library was established in Lady Franklin's Museum. The ultimate intention was to form a library in the then projected college, but he did not know what had become of the collection now.

Mr. WALKER: There are a few such books in Christ's College Library.

The CHAIRMAN said the trustees of the College might be willing to hand these books over to the society, as their library was the suitable place for their reception. At all events these books were lost in a measure to the public at present, and he thought they should be set apart for the special object for which they were collected.

Mr. E. D. SWAN did not think the trustees would like to dispose of these books.

Mr. WALKER said there were not many books of this description in the college library, and that the college trustees certainly could not part with any of them.

Mr. A. MORTON said the Royal Society of Sydney have geographical and historical sections, and he did not think there was anything in the society's rules which debarred them from forming similar separate sections.

Dr. AGNEW pointed out that separate sections had been tried, but they did not prove a success, probably because of the small

number of members in the society. He thought it would be better if the members who took an interest in these subjects met together, and then laid the result of their investigations before the society at their monthly meetings.

Mr. JUSTIN BROWNE thought there should be an arrangement between the libraries about buying such books so as to obtain at least one complete series of all works relating to the colony. There was no necessity for each library buying copies of the same works, many of which were very expensive, but they might so arrange as to make a complete set amongst them. He thought Mr. Walker should put his suggestion in the shape of a formal motion.

Mr. WALKER then moved,—"That the Council be requested to communicate with the trustees of the Public Library and the committee of the Parliamentary Library with the view of making arrangements for the purchase of books, dealing with voyages to the island, and the history of the colony."

Dr. PERKINS seconded the motion.

Mr. T. STEPHENS, while sympathising with the general principles of the motion, asked: Where are the available funds of the Royal Society to purchase these books? That was the awkward point, but he hoped there would be some way found out of the difficulty. They must not expect to do too much at first, and by patience the object in view might be achieved. He could tell them at one time there was a much larger collection of works in the public libraries, and the reason of their diminution was not far to seek. He did not wish to find fault with any one, but there had been a great deal of culpable carelessness in lending out books.

Mr. WALKER thought there was sufficient scope for the action of the society. They were supposed to be a learned body—let them provide the learning and zeal, and the other richer libraries could provide the money. (Laughter.)

The motion was then agreed to.

Mr. A. MORTON, Curator of the Museum, read a few notes on the "Œstrus ovis, or gad-fly of the sheep." This fly deposits its eggs in the nostril of the sheep, where they are soon hatched, and then crawl up the nostril and frontal sinuses of the sheep, giving great annoyance to the animal so afflicted. Accompanying this paper was one of the grubs, taken from the head of a recently introduced sheep from the neighbouring colonies. The butchers of Hobart state that they have not hitherto noticed the grub in any of the Tasmanian sheep. It is, however, well-known in Europe and the colonies.

Mr. E. D. SWAN said the insect had been heard of in Tasmania before.

Mr. MORTON said it was not until that evening that he had learned that the gad-fly had been previously heard of in Tasmania.

Mr. PARK said he had never heard of many cases, though he had seen sheep protecting themselves from it by boring their noses into the sand.

VOTES OF THANKS.

Mr. JUSTIN BROWNE proposed a vote of thanks to the gentlemen for their able papers.

Mr. E. D. SWAN, in seconding, moved that a special vote of thanks be awarded to Mr. Morton for preparing the specimens which had been presented to the society.

The motions were unanimously agreed to.

The proceedings then terminated.

NOVEMBER, 1884.

The monthly meeting of the Royal Society of Tasmania, the last of the present session, was held on Monday, November 17, His Honor the Deputy Governor (Hon. W. L. Dobson, F.L.S.) in the chair. The Chairman apologised for the absence of the hon. secretary (Hon. Dr. Agnew), who had been called away to Melbourne. The Curator of the Museum, in his absence, brought forward the usual returns. The following were then duly elected as Fellows of the Society :—Miss E. C. Poynter, Signor A. G. D. Bernacchi ; Messrs. H. L. Swift, J. W. C. Ross, B.Sc., F.G.S., W.A. Weymouth, E. Wallack, J.P., J. Andrew, J. W. Syme, R. A. Bastow, H. I. Rooke, M.H.A.

Number of visitors to the Museum, October, week days, 1,273 ; Sundays, 710 ; total, 1,983. Number of visitors to gardens, 6,000.

Seeds received at the Royal Society's Gardens during the month of October, 1884. From Mr. Wm. Bull, London, 5 packets seeds. From Messrs. Pilmorin, Andrieaux, et Cie, Paris, 104 packets seeds.

Time of leafing, flowering, and fruiting of a few standard plants in the Royal Society's Gardens, during October, 1884 :—

October 7.—Carpinus betulus commence to break.
October 12.—Ailanthus glandulosus ditto ditto.
October 18.—Tilia europea commencing to ditto.
October 19.—Morus higer ditto ditto
October 24.—Ulmus campestris ditto ditto fall.
October 25.—Melia azederach ditto ditto break.

LIST OF ADDITIONS TO THE LIBRARY, MONTH OF OCTOBER.

Journal of the Royal Microscopical Society, London, August, 1884, from the Society.

Journal of Science, September and October.

Journal of the Society of Arts, August 8, 15, 22, 29, September 5, 12, 19, 26.

Proceedings of the Royal Society of London, 5 parts, Vols. 35, 36, No. 227 to 231, from the Society.

Proceedings of the Philosophical Society of Glasgow, 1883-4, from the Society.

Meteorological Observations, monthly record, July, 1884, Melbourne Observatory, from R. J. Ellery, Esq., F.R.S.

Meteorological Observations for April, 1884, from the Meteorological Office, India.

Meteorological Report, 1883, for New Zealand, from J. Hector, Esq., M.D., F.R.S.

Meteorological Report, Tasmania, from Commander Shortt, Meteoro logical Observer.

Vital and Meteorological Statistics of Tasmania for the months of October and November, from R. M. Johnston, Esq., Government Statistician.

Quarterly Weather report of the Meteorological Office, London, Part III., July and September, 1876, from the Meteorological Office, London.

New Zealand Geological Report, 1883-84, from James Hector, Esq., F.R.L.

The Botany of Bermuda, two parts, part 2, by Sir J. H. Lefroy, from the U.S. National Museum.

The Midland Medical Miscellany, from the society.

The Victorian Naturalist, from the society.

Report on the Zoological collections made in the Indo-Pacific Ocean during the voyage of H.M.S. Alert, 1881-2, from the trustees British Museum

Proceedings and Transactions of the Royal Society of Canada, vol. 1, 1882-83, from the society.
Gardeners' Chronicle, September 6, 13, 20, 27, October 4.
Agriculturist Gazette, September 15, 22, 29.
The Athenæum, August and September.
Nature, August and September.
Geological Magazine, September.
Annals and Magazines of Natural History, September and October.
Florist and Pomologist, September and October.
Statistics of the Colony of New Zealand, parts 4 and 5, for the year 1883, from the Government Statistician.
The Monthly Weather Report of the Meteorological Office, London, February, 1884, from the Meteorological Office.
Uber Rinige Afrikanische, Reptilien Amphibien, und Fische des Naturlastorischen Museum, Von Dr. J. G. Fischer, Hamburg, from Prof. Dr. H. A. Pagenitecher.
Report of Naturlistorisches Museum zu Hamburg, for 1883, from Prof. Dr. H. A. Pagenitecher.
Tasmanian Statutes, vol. 3, M.R., 1337 to 1944, from the Government.
Tasmanian House of Assembly Papers, from Mr. F. A. Packer.

A collection of Australian and Foreign Animals received from the Trustees of the Australian Museum, Sydney, in exchange for some fishes kindly presented by the Tasmanian Fisheries Commission to the Royal Society.

Foreign.

Macacus radiatus.
Assamenese Monkey, Macacus assamensis.
A Monkey, Macacus sp.
Squirrel Monkey, Chrysothrix sciurea
Patas Monkey, Cercopithecus ruber.
Long-armed Monkey, Macacus sp.
The Ruffled Lemur, Varecia varius.
The Racoon, Procyon lotor.
The Badger, Meles texas.
The Mungous, Herpestes griseus.
The Stoat, Mustela ermenia.
The English Mole, Talpa Europea.
The Chevrotain Tragulus javanicus.
The English Hare, Lepus timidus.
The English Squirrel, Sciurus Europœus.
The Plantain Squirrel, Sciurus plantani.
The American Chipping Squirrel, Tamias striatus.

Fish.

An English Salmon, Salmo salar.

Australian.

An Australian Water Rat, Hydromys chrysogaster.
An Australian Porcupine, Echidna hystrix.
Platypus, Ornithorhynchus anatinus.
Great Flying Squirrel, Petauraist taguanoides.
Grey Opossum, Phalangista vulpina.
Small Headed Squirrel, Belideus breviceps.
Australian Bear, Phascolarctos cinereus.
Queensland Ringtailed Opossum, Phalangista cookii.
Native Cat, Dasyurus viverrinus.
Tiger Cat, Dasyurus maculatus.
Brush-tailed Kangaroo, Petrogale penicillata.

Two Black Wallaby, Halmaturus ualabatus.
One Rufous-necked Wallaby, Halmaturus ruficollis.
One Black-gloved Wallaby, Halmaturus manicatus.
Two Bennett's Wallaby, Halmaturus bennetti.
One Black Wallaroo, Osphranter robustus.
One Great Grey Kangaroo, Macropus major.

List of presentations to the Museum :

Mammals.

A Porcupine or Ant-eater, Echidna setosa, Mr. W. A. Martin.
A Porcupine or Ant-eater, Echidna setosa, Mr. T. P. H. Jones.
Tasmanian Wallaby, Halmaturus billardieri, Mr. T. Stephens.

Birds.

Chestnut-faced Owl, Strix castanops, Mr. Graves.
Spotted Owl, Athene maculata.
Two Wood Swallows, Artamus sordidus, Mr. Geo. Hinsby.
Musk Duck, Biziura lobata, Mr. Lucas.
A Water Crake, Porzana fluminea, Mr. McCluskey.
Dusky Robin, Petroica fusca.
Cuckoo, Cuculus ornatus, Mr. J. McCance.
Nest and Eggs of Dusky Robin, Petroica fusca, Mr. C. H. Stewart.
Nest and Egg of a Black Cap Honeyeater, Melithrephtus melanocephalus, Miss A. Brent.

Fishes.

Two Hand Fish, Brachionichthys hirsutus, Miss Gertrude Swan.
Apogon guntheri, Mr. John Martin.
Two Native Salmon, Arripis truttaceus, Mr. J. Arnold.
Parrot Fish, Labrichthys mortoni, Mr. W. L. Boyes.
Seahorse, Hippocamphus abdominalis.

Reptiles :

A Diamond Snake, Hoplocephalus superbus, Mr. Geo. A. Power.
A collection of Lizards, Hinulia sp., Master E. Hull.
A collection of Lizards, Hinulia sp.
A Whip Snake, Hoplocephalus coronoides, Mr. H. L. Swift.
A Lizard, Hinulia sp. Mr. Geo. Hinsby.

Insects :

2 Spiders, Mr. E. B. Gawne.
1 Spider, Mr. J. McCance.
3 Eurymela Speculum, Mr. J. McCance.
1 Beetle, Longicorn sp., Mr. Hissey.
1 Ichneumon Fly, Pimpla entricator, Mrs. Jones.

Shells etc. :

Mutton Fish Shell, Haliotis nœvosa, Mr. J. R. McClymont.
Comminella Tasmanica, Chiton petholatus, Mr. J. McCance.
Land Shell, Bulimus dufresmi, Mr. H. L. Swift.

Minerals, etc. :

A collection of cores with tabulated report of strata passed through in boring for coal at Tarleton in the Mersey District, from the Hon. N. J. Brown, Minister of Lands and Works.

A block of wood from Queensland showing the boring of the white ant. Mr. J. E. Baynton.

A collection of Marsupial bones and pumice stone, etc., from Deal Island, Kent's Group, Mr. Johnston.

Fossil Wood, Mr. Chas. Headlam.

PAPERS.

The following papers were read :—

"Notes on the Infusorial Parasites of the Tasmanian White Ants," by Mr. Saville-Kent, F.L.S., etc., etc.

"On the Determination of a True Meridian," a problem of interest to surveyors, by Mr. H. C. Kingsmill, M.A.

After discussing the various methods usually adopted, and making remarks on the advantages and disadvantages of each, the writer proceeded to describe a method, which, he said, so far as he was aware, was as yet untried. The novelty consisted in a modification of the well-known method of elongations, which rendered a knowledge of the latitude unnecessary for the calculations. It was theoretically simple, but as some unforeseen difficulties might occur in actual work, he hoped that practical surveyors would give an opinion on its merits.

"Observations on Mr. R. M. Johnston's Vital Statistics," by Mr. A. B. Biggs.

Mr. R. M. Johnston, F.L.S., read a paper in reply to Mr. A. B. Biggs' paper entitled, "A rejoinder to Mr. A. B. Biggs' criticism of observations made in respect of the observed periodicity of the death-rate, etc."

In Mr. Johnston's investigations into matters bearing upon the inexplicable wave-like rise and fall of the Australian death-rate, he found that a searching analysis of the ordinary local causes afforded no satisfactory explanation, but appeared to him most probably to be caused by some obscure powerful influence lying beyond and acting strongly through the local causes at regular periods. Having compared their periodicity with the sun-spot period, and with the position of Jupiter in his orbit, he found such a wonderful agreement between the three that with many eminent observers he was inclined to believe that it could hardly be due to a mere chance series of coincidences; although the fact of an underlying causal relation could not be demonstrated owing to the complexity and obscurity of the matters involved. Mr. Biggs agrees with Mr. Johnston in supposing that there may be some causal connection with the sun-spot magnetic declination and death-rate periods, but denies that Jupiter can have any influence whatever upon the several matters referred to. He attempted to show this by a simple comparison of the respective periods of Jupiter's orbit and of Wolf's sun-spot minima and maxima deduced from a mean of observed cycles dating from early in the seventeenth century. Mr. Johnston, however, showed that Wolf's sun-spot observations were not of strict scientific value prior to the time when Schwabe improved the system of sun-spot observations in 1832, *i.e.* just one year prior to the series represented in his (Mr. Johnston's) diagrams, and quoted Balfour Stewart to prove that no exact value can be placed as yet upon the sun-spot periodicity over long periods, and hence any conclusions, positive or negative, based upon a supposed known periodicity of sun-spots for a long period are apt to be fallacious.

Mr. Johnston also stated that even a difference occuring between the periodicity of Jupiter and mean periodicity of the maxima and minima of sun-spot would not be of much value in demonstrating that Jupiter had no influence whatever, direct or indirect upon the development of the sun-spot phenomena; for the problem was a most complex one, and Jupiter was only one of the many supposed factors in the complex problem, which, as yet, is too obscure to admit of proof or demonstration, either negatively or positively. The language of suggestion is, as yet, all that can be admitted scientifically.

Commander Shortt, R.N., Meteorological Observer, read a paper, entitled "Earthquake shocks in Tasmania during the years 1883-1884."

This paper contained a list of the various shocks felt and noticed at the various stations throughout the island during the years 1883-1884. The object of the paper was to afford the member's

of the Royal Society an opportunity of learning the way in which the earthquake shocks were recorded at the meteorological office, and to furnish a summary of the information to be deduced from a study of the records as a whole. It was pointed out that a very large number of shocks (over 1,000) had been felt, but that none of them were severe, and that the reports are tabulated with the time, etc., of each shock, and an attempt was made to demonstrate the probable centre of disturbance. It was found that there were discrepancies in the reported times of various shocks, but, on consideration of a considerable number of shocks, it is shown that the slighter shocks were only felt in the N.E. part of Tasmania and adjacent islands, while the severer ones, which were felt over a wider area, affected St. Mary's, Gould's Country, Kent's Group, etc., before they did Launceston, Hobart later still, and South Victoria, with Gabo Island, afterwards. Various sources of error were pointed out as liable to cause discrepancies, and the various subjects for investigation in reference to the shocks were also alluded to. Finally, a short reference was made to the various theories in connection with earthquake phenomena, and it was strongly urged that further and more careful observation was required before any theory could be satisfactorily established.

A further explanatory paper on the same subject by Mr. J. C. Ross, B.Sc., F.G.S., illustrated by models and diagrams, showing various rough forms of seismometer, by the use of which the tremors or shocks might be more accurately recorded. The forms described were such as from simplicity of construction were suitable for use by untrained observers, such as blocks of wood of various sizes to be displaced by the shocks, basins containing treacle or other viscid liquids, etc.

A complete census of the flora of Deal Island, in Kent's Group, was laid on the table by His Honor Mr. Justice Dobson, who had enlisted the services of the superintendent of the lighthouse on the island, Mr. Johnston, to collect and send him specimens of all plants growing there. These were forwarded to Baron F. Von Mueller, who prepared the census. One plant, and orchid, Pterostylis vittata, was new to Tasmania, but was common to the continent of Australia.

NOTES AND EXHIBITS.

Mr. E. D. SWAN drew attention to an extremely rare nest and egg of the common blackcap (Melithreptus melanocephalus), which had been taken at Austin's Ferry, Bridgewater, and presented to the museum by Miss A. Brent, Roseneath. Although the bird was one of our commonest, and various rewards offered for the eggs, Mr. Swan stated this had been the first egg as yet obtained. The nest taken in November is composed almost entirely of wool, though a few pieces of moss, stringy bark, and cobwebs are also used. It is cup-shaped, two inches in depth, and two in breadth on the inside, while externally the measurements are one inch more each way. It is suspended by the rim to the small branches of a lofty gum tree (Eucalyptus), where, from its situation, it is very difficult of detection. The eggs are either two or three in number. Their ground color is pink or buff, spotted and streaked at the larger end with deep reddish brown, with fainter markings appearing beneath the surface of the shell. They differ from the well-known eggs of the M. lunulatus of the mainland in not having the clouded markings of bluish grey, and in being free from spots towards the smaller end.

Mr. T. STEPHENS exhibited a black wallaby. He stated that he was indebted to the kindness of the Rev. E. H. Thompson, of the Franklin, for the specimen which he had been able to present to the Museum, which was distinct, so far as colour went, from any hitherto described in

Tasmania. The nearest approach to it was the common wallaby (Halmaturus Billardieri). Waterhouse says, referring to this species :—"It is readily distinguished from other small species of its group by its short ears, long dark-coloured fur, and the rufous and sometimes yellow tint of the under parts of the body." Gould connects the warmer and more sombre-coloured coat of this species with the dense and humid vegetation of the forests which it frequents, where the sun sometimes does not penetrate at all. He speaks of much diversity of colour, but only on the throat and under surface of the body, which in some specimens are of a deep reddish buff, while others have the same parts much lighter.

A POPULAR DELUSION.

The Curator drew attention to a small lizard (Hinulia S. sp.) which he produced alive before the fellows, and handled in their presence, saying that it had the reputation of being poisonous, but it was not really so, and if death had ever occurred from a bite from the reptile it must have been caused by sheer fright. Because it had a blue tongue, and was fond of putting it out, the lizard had got a bad reputation, and was called the death adder, but it did not deserve it.

CLOSE OF THE YEAR.

Mr. James Barnard, V.P., said:—In moving a vote of thanks to the authors of the papers which have been read to us, and to the numerous contributors to our Museum, I desire to congratulate the meeting upon the success of the session of 1884, which has just terminated as shown by the uninterrupted regularity of our evening meetings, and by the number and variety of the papers possessing scientific interest which have been brought forward. During the past year we have had the return among us of our highly-esteemed vice-president and hon. secretary, the Hon. Dr. Agnew—(applause)—whose increasing interest in, and exertions on behalf of, the society we are all prepared to acknowledge and appreciate. (Applause.) We have also had the good fortune to secure the services of a gentleman remarkable for zeal, intelligence, and industry, combined with experience, in the person of Mr. Alexander Morton—(applause)—the curator of the Museum. Full evidence is afforded of the value of that appointment by the improvements which he has already effected in the Museum. (Hear, hear.) I also congratulate the meeting on the large accession of members to the roll of fellows during the past year. Several of those recently elected gentlemen have already contributed papers, possessing scientific merit, and I think there is reason to hope that the session of 1885 will result in unabated interest being shown in the proceedings of the society, and to increase and maintain the advancement of its objects. I have great pleasure in making the usual formal motion—formal, but real—that our thanks be given to the readers of papers, and also to the donors of gifts to the museum. (Applause.)

Dr. Perkins seconded the motion.

The Chairman said that before putting it to the meeting, he should like to call attention to the splendid collection of animals which they had just received from Sydney, and which was in itself almost enough to stock a museum. It was a collection of Foreign animals and the marsupials of Australia, which it would be especially interesting to compare with the marsupials of Tasmania. They had also had a salmon sent to them, so that actually, instead of breeding salmon they were importing stuffed fish from New South Wales. Still it was a very noble fish, and would be useful for purposes of comparison. They had gained 50 new members, and he would also mention that they had no less than 28 papers read before them during the last

session, many of them being of very great interest and value. Those of the fellows who were not themselves able to produce papers, and he included himself among the number, fully appreciated the advantage of being able to benefit by the knowledge possessed by others, and he hoped that fact would compensate them in some small degree for the trouble which was given them.

The motion was unanimously agreed to.

The meeting then terminated.

LIST OF PRESENTATIONS TO THE MUSEUM FOR THE MONTH OF NOVEMBER AND DECEMBER.

Mammals.

A Porcupine, Echidna, setosa, Mr. H. L. Swift.
A Kangaroo Rat, Hypsiprymnus apicalis, Mr. W. H. Charpentier.

Birds.

A More Pork, Podargus cuvieri (albino), Master A. Brown.
Fulvous fronted Honeyeater, Glyciphila fulvifrons, Mr. G. Hinsby.
A Pelican, Pelecanus conspicillatus, Mr. Parker.
Diamond Bird, Pardalotus punctatus, Master A. Murphy.
Freckled Duck, Anas nævosa.

Bird's Nest and Eggs.

A Collection of Bird's Eggs (16 species), Mr. George Hinsby.
A Collection of Bird's Eggs and Nests, Mr. A. Brent.
Nest of Spine-billed Honeyeater, Acanthorhynchus tenuirostris, Mr. J. R. McClymont, M.A.

Fishes.

An Elephant Fish, Callorhynchus antarcticus.
4 Mackerel, Trachurus trachurus.
3 Native Salmon, Arripis salar.
4 Soilder, Pentaroge marmorata.
2 Bastard Trumpeter, Latris forsteri.
3 Silver Travally, Caranx georgianus, Mr. F. Self.

Crustacean.

A Crab, Nectocarcinus tuberculosus, Mr. C. Turner.

Insects.

1 Brown Moth, Dasypodia silenophora.
1 Moth, Ardices fulvorhita.
1 Beetle, Metriorhynchus sp.
1 Beetle, Lagria grandis, Mr. J. R. McClymont, M.A.

Ethnology.

A Peruvian God, Lieut. Gilmore, U.S.S. Iroquois.

Coins.

4 American Coins, Mr. McCarthy, U.S.S. Iroquois.
Peruvian Paper Money "Un Sol," Mr. Bailey, U.S.S. Iroquois.
Peruvian Paper Money, 2 "Dos Soles," ditto.
Confederate One Dollar, Crew of the U.S.S. Iroquois.

Attendance at the Museum.

November, Week Days	1213.	Sundays,	835.
December, „ „	1325.	„	950.
	2538		1785

Gardens, November, 6000 ; December, 5800.

PAPERS.

NOTES REGARDING CERTAIN FOSSIL SHELLS OCCURRING AT TABLE CAPE, SUPPOSED TO BE IDENTICAL WITH LIVING SPECIES.

By R. M. Johnston, F.L.S., etc.

[*Read April* 8, 1884.]

In a paper prepared by me for this Society in the year 1879, I drew attention to the fact that the per-centage of living to extinct species was becoming smaller the more the beds were investigated, and I then ventured to state that on the basis of the per-centage method the fauna indicated the age of the Table Cape beds to be rather eocene than miocene. Recently Prof. Tate has taken up the investigation of the supposed living species, and he informs me that a considerable proportion of them have been compared with original types and have been found to be new species. I need not anticipate him in this matter, however, as he intends to communicate a paper on the subject to this Society. For the present I bring under notice that I have recently compared the living *Pectunculus laticostatus*, of New Zealand, with the fossil shell supposed to be identical with it occurring abundantly in the Table Cape beds, and, as anticipated by me five years ago, I find that the latter form is quite distinct. Splendid specimens of the living species were kindly forwarded to me from New Zealand by Prof. Hutton. I submit a full description of the Table Cape species as follows :—

Pectunculus M'Coyi, Johnston.—*Pectunculus laticostatus* of Tenison Woods and Prof. M'Coy.

Shell orbicular, convex, slightly broader than long, somewhat flattened towards beak, subtrigonal when young. Surface with 29 to 31 regular radiating convex ribs separated by somewhat narrower interspaces; ribs broadening and becoming less convex towards the margin; marginal extremities of ribs rarely obsolete in old specimens; whole surface finely shaply, striated concentrically; hinge teeth, generally 10 on each side the three nearest beak smaller and frequently obsolete on one or both sides in old specimens; inside of margin sharply denticulated; ligamental area depressedly triangular with close V shaped striae,—in young specimens, 6—7—in specimens of about $2\frac{1}{2}$ inches long, 8—9, the anterior side of beak having generally one stria more than the posterior side.

Mature specimens $2\frac{1}{2}$ to 3 inches long. This shell, hitherto, has erroneously been referred to *P. laticostatus*, Quoy.

It is very abundant in the Table Cape beds and is identical in every respect with specimens of the same age received from Cape Schanck. A specimen sent by Professor Tate from South Australia is also identical in every respect. The species described approaches more closely in most respects to the existing

P. flabellata, Tenison Woods, of our own coast, than to *P. laticostatus*, Quoy, of New Zealand. The latter differs from P. M'Coyi in being much more solid, and in having invariably 10 more ribs; the length also, generally exceeds the breadth and the convexity is greater than P. M'Coyi towards margin. With *P. flabellata*, Tenison Woods, it differs in being less solid and in having invariably 7 more ribs; *P. flabellata* having invariably 24. The teeth on the latter are generally 10 as in P. M'Coyi, and in this respect and in ligamental area show a closer correspondence with the latter than with *P. laticostatus*. *P. flabellata*, in Tasmania, moreover, is invariably exactly as broad as it is long. It would appear therefore that the characteristic shell of Table Cape is not identical with living species, and that it seems to be an intermediate form between *P. flabellata*, Tenison Woods, and *P. laticostatus*, Quoy, although showing a closer alliance with the former.

From the appearance of the fossil *P. laticostatus*, figured (Pl. xix., Decade ii.) by Professor M'Coy, and from the circumstance that all the Australian fossil forms examined by me are identical with the Table Cape form, it appears to me to be doubtful whether, on closer examination, the bird rock form referred to by Professor M'Coy will prove to be identical with the living *P. laticostatus*, Quoy, in all respects. This however can be easily set at rest.

NOTES OF SPECTROSCOPIC OBSERVATIONS OF COMET "PONS," 27TH JANUARY TO 2ND FEBRUARY, 1884.

By A. B. Biggs.

[*Read April* 8, 1884.]

The spectroscope used was a small direct-vision compound prism by Browning, the telescope being a refractor of 3-inch aperture. After some difficulty in getting the object focussed upon the slit of the spectroscope there flashed out three bright bands. They appeared somewhat pyramidal in form, the base being on the south side of the telescopic image. The relative spaces between them I judged to be about as 2 to 3. I could not distinguish any difference, or even any trace, of colour; they appeared rather to resemble a phosphorescent glow. I had not the means, at the time, of determining their relative positions in the spectrum. On subsequent evenings, however, I took every precaution for determining this point.

On the evening of 29th January I succeeded in getting the spectrum of a gas flame (common coal gas) turned down to a minute point of blue flame, in juxtaposition with the spectrum of the comet, when, to my surprise and gratification, I found that the three comet lines coincided perfectly with the three conspicuous lines shown in the gas spectrum; the principal difference between the two spectra being, that the gas showed a faint continuous spectrum through all the colours, whilst that of the comet had perfectly dark spaces between the lines, and, so far as I could discern, *no* colour. I cannot say, however, that I might not have obtained a continuous spectrum from the comet had I been able to grasp more of its light. Such seemed to be suggested by the fact that the lines were broadened out towards the violet end, gradually fading away on that side, but were pretty sharp and decided on the side next to the red.

By a contrivance of my own, specially designed for double star measurement, I was enabled to project a dark-field " ghost " scale into the field of the spectroscope, and thereby got the relative positions of the lines from the sodium line D. This line I obtained by sprinkling a little salt in the gas flame. The mean of several observations gave the following results (the readings of my scale being reduced to that of Roscoe's frontispiece), for comparison :—The line D being at 50, the comet lines stood at 59·3, 72·2, and 99·5. Roscoe's carbon lines stand at 60, 76, and 100; also another group at 123 to 128. This latter, however, I did not detect. I think this agreement very close, and what little difference there is may well be accounted for by a difference of material of the prisms and the difficulty of measuring. I may mention that I took the precaution of scaling the principal solar lines during the preceding afternoon for the purpose of comparison. It was evidently chiefly, if not entirely, the *nucleus* that gave the lines, as, on the briefest stoppage of the driving clock, the lines instantly disappeared.

I have contented myself with describing, as carefully as possible, my observation, leaving to others more competent than myself the interpretation of the record. I would venture to remark, however, that my failure to detect continuity in the spectrum would, as I read it, indicate that the self luminosity of the comet must greatly overpower whatever sunlight it reflects.

REPORT OF SPECTROSCOPIC OBSERVATION OF THE TWILIGHT GLOWS DURING FEBRUARY AND MARCH, 1884.

By A. B. Biggs.

[*Read April* 8, 1884.]

In venturing to submit the following notes to the Fellows of the Royal Society, I would observe that I commenced the observations only in the beginning of February. I much regret that I had not the opportunity of conducting observations from an earlier period when the "glow" was in all its grandeur.

Referring to the diagram, the regular solar lines are distinguished as usual—A, B, C, etc. The features to which I wish to draw particular attention are distinguished by numerals—1, 2, 3, etc.—1 and 2 being the most remarkable. I have adopted Roscoe's frontispiece scale—A being at 20, B at 28, C at 34, and D at 50, etc.

The diagram gives, as nearly as I can show it, the appearance of the spectrum near the horizon when the "glow" is moderately strong. By far the most prominent feature in this spectrum is the line or band (2) at scale 41. I have noticed that the deeper the glow the broader and deeper does this band become. The line (1) at 37 also comes into great prominence at such times, fully equalling, and sometimes exceeding C in intensity. This line (1) is, however, very persistent, continuing more or less conspicuous throughout the day. (3) At about 44 is a faint line, which is scarcely perceptible in the twilight. (4) Is a well-known vapour-band, always more or less conspicuous about the horizon. (5) On the edge of the green is a very broad band, shading off a good way into the green and somewhat resembling a shadow.

I noted, on the evening of 26th March, when the air was filled with smoke from bush fires that C and 1 were very intense; 2 was as usual at times of pretty deep glow. The sunset sky was very red on that occasion, evidently from smoke.

On 31st March (evening), after rain, I noted "C and 1 very strong; 2 much lighter than usual, being only a little stronger than D." As an instance of the variability of these lines, I noted on 6th inst., at 3 p.m.—"Glow lines all indistinguishable except 1, which was very distinct—Bar., 30·25; fine."

On the evening of 31st March, by means of the gas flame turned down to blueness, I got the spectrum of calcium into the spectroscope with the "glow" spectrum, and found the line 2 nearly, if not quite, coincident with the edge of the principal calcium band towards the red end.

The positions of 1 and 2 I obtained by careful micrometer measurement, the other numbered lines I estimated.

The spectra I have given for comparison (atmospheric and calcium) are the only ones I can find mapped in Roscoe's work that can at all compare with the "glow" spectrum; that of calcium, especially *Bunsen's*, appearing to me to have the most resemblance.

In recording these observations I do so in the position of a *witness*, and not that of a *judge*, hoping that the evidence I have to offer may, in connection with that contributed by others, help in some measure to elucidate the mystery of the phenomenon that has excited so much interest. I dare not venture to offer an opinion upon these observations, only, I would remark, that the idea of calcium vapour being in the air at this time is perhaps not very absurd, considering the vast quantity of limestone that must have been in contact with volcanic heat.

I am not yet prepared to offer a definite opinion upon the deposit which I collected from the January rains. I have submitted it to a partial examination in the microscope, and found the heavier portion, obtained by precipitation in water, to consist, apparently, chiefly of silicious particles, intermixed with insect exuviæ, etc.; also a few particles of magnetic substance, somewhat pear-shaped, evincing, in proximity of a magnet, decided polarity. The lighter washing exhibited, microscopically, a marked resemblance to a specimen of volcanic dust with which I compared it.

This volcanic dust specimen was given me by Mr. Dean, sen., of Launceston, who obtained it, I believe, from the captain of the ship upon which it fell in the vicinity of Sunda.

REFERENCES TO BARON CONSTANTIN VON ETTINGSHAUSEN'S RECENT OBSERVATIONS ON THE TERTIARY FLORA OF AUSTRALIA,

By Baron Ferd. Von Mueller, K.C.M.G., M.D., F.R.S., F.G.S., Etc.

[*Read April* 8, 1884.]

The 47th volume of the Imperial Academy of Science, Vienna, issued this year, contains an important essay on tertiary vegetable fossils of Australia, the results of original

researches by Baron Von Ettingshausen, who has been engaged for fully 30 years in endeavours of systematising on the often enigmatic relics of vegetations of former geological periods. Tasmania is also largely interested in these new enquiries of a palæontologist, who, in the fields of fossil-plants, has gained experience rivalled only by those of Goeppert, Heer, Saporta, and Lesquereux, after the founders of vegetable palæontology, Sternberg, and Brogniart, and some of its earliest promoters, leadingly Unger, have passed away. Baron Von Ettingshausen, on this present occasion, alludes extensively to leaf impressions obtained by Dr. R. McCormick (one of the surgeons of Sir James Ross' antarctic expeditions during the stay of the Erebus and Terror at Hobart) in the travertin of the country adjacent to the entrance of the Derwent; and this distinguished palaeontologist had likewise an opportunity, through the authorities of the British Museum, to examine the specimens of fossils collected in the same region by Mr. R. M. Johnston,—the very material, of which the last-mentioned zealous and circumspect observer gave already some general accounts, accompanied by lithographic drawings in the proceedings of the Royal Society of Tasmania, 1873, 1874, 1879, and 1881, determining at the same time the precise geologic age of these tertiary layers. From these united Tasmanian collections Baron Von Ettingshausen has defined 33 species, which he assorts into 21 genera, pertaining to 16 natural orders. As the "Denkschriften der Wiener Akademie" may not reach many of those who, locally, are interested in these enquiries, it may not be out of the way to give a list of the fossils thus named and diagnosed; excellent lithograms enrich this treatise, so that no difficulty should arise to trace out the now described species under their present designation at the places of discovery; this is still further facilitated by citations of Mr. Johnston's illustrations for 20 of the species.

Myrica Eyrei (Johnston f. 5).
Betula Derwentensis (Johnston f. 10.)
Alnus Muelleri (obtained at Risdon.)
Quercus Tasmanii (obtained at Risdon.)
Fagus Risdoniana (obtained at Risdon.)
Salix Cormickii.
Cinnamomum Woodwardii (obtained at Shoebridge.)
Cinnamomum Hobartianum.
Lomatia prae-longifolia (Johnston f. 16.)
Dryandroides Johnstonii (Johnston f. 29.)
Coprosma prae-cuspidifolia.
Apocynophyllum travertinum (Johnston f. 14.)
Apocynophyllum microphyllum (Johnston f. 8.)
Echitonium obscurum.

Cordia Tasmanica (obtained at Risdon.)
Premna Drummondi (Johnston f. 2, 25, 26.)
Sapotacites oligoneuris (Johnston f. 1, 30.)
Sapotacites achrasoides.
Ceratopetalum Woodii.
Ceratopetalum prae-arbutoides (Johnston f. 35.)
Sapindus Tasmanicus.
Elaeocarpus Bassii (Johnston f. 57, 60; obtained at Beaconsfield.)
Cassia Flindersi (Johnston f. 13.)
Phyllites populiformis (Johnston f. 20.)
Phyllites ficiformis (Johnston f. 11.)
Phyllites juglandiformis (Johnston f. 28.)
Phyllites ligustroides (Johnston f. 22.)
Phyllites pyriformis (Johnston f. 23.)
Phyllites phaseolites (Johnston f. 4.)
Phyllites sophoræformis (Johnston f. 9.)
Phyllites mimosæformis (Johnston f. 31.)
Carpolithes gaertnerioides (Johnston f. 34; obtained from Pipeclay Bluff.)
Carpolithes Risdonianus (from Risdon.)

From this list it will be observed that Baron Von Ettingshausen refers unhesitatingly fully half the plants, the leaf impressions of which he had from near Hobart before him, to genera of the existing vegetable world; some, however, he places into genera solely established for the systematic reception of vegetable relics of former ages, while Phyllites also, here as elsewhere, becomes the generic receptacle for fossil leaf—remnants not readily referable to any defined generic group of plants, whether living or extinct—whereas Carpolithes serves for keeping together by prevalent palaeontographic usage some fruits of obscure affinity, generally regarded as gymnospermous, but not always congeneric, and sometimes, perhaps, not even co-ordinal.

Were I to be allowed to offer a suggestion on a subject, which from its very nature must be perplexing, it would be to recommend a preference of new generic names for all such organic remnants as cannot be put with any degree of certainty along with generic forms now living, nor can safely be placed into clearly defined fossil genera, as this would not commit us to fix the exact systematic position of any organism, known only from fragments quite insufficient for that strict generic recognition which, for instance, would be expected from dealing with Laurineae, in the sense of living genera of that order, the corresponding exact circumscription of which for fossils, even if flowers and fruits were always or finally obtained, would ever remain an impossibility. Thus only in such cases would the generic name of living organisms become adopted for

fossils, when direct certainty or far-reaching circumstantial evidence existed, as, for instance, in the case of Araucaria Johnstoni, alluded to by Baron Von Ettingshausen, which Conifer, though its cone is as yet known only in a young state, was placed in that genus, not because the carpologic characteristics were conclusive, but because the genus Araucaria has been traced elsewhere from living forms successively through several geologic epochs. There may, however, exist in many localities a consociation of vegetable fossils to such an extent, and of such a similarity, as to justify from the mere presence of some peculiar foliage, not absolutely characteristic by itself for any particular genus, our systematising on mere leaf forms, especially if such an intimate and extensive anatomic knowledge, as Baron Von Ettingshausen displays, is brought to bear on such fossils; nevertheless, the almost infinite forms, some of which not rarely reiterative in various genera and even different orders of plants, assumed by leaves throughout the whole wide creation, would render identification, unaided by floral and fructifying organs, often hazardous in the extreme, even to the most experienced scrutator.

Incidentally it should perhaps here be mentioned, that we owe the earliest records of tertiary Tasmanian plants to Sir Paul de Strzelecki, who in his valuable volume "Physical description of New South Wales and Van Diemen's Land," 254 (1845), offered a note by Professor J. Morris on two leaf impressions and a branchlet fossil in the travertine near Hobart, all three delineated on plate vii. of his work, and he adds that the celebrated Charles Darwin, whose death we had lately to deplore did notice already the occurrence of leaves of a supposed Palm in the same deposit.

The essay presented to us by the celebrated Austrian palaeontologist, is, independent of its special local interest, also of general importance, inasmuch as he enunciates his opinion that the whole existing vegetation of the world can in its development be traced to an universal original flora of bygone geologic ages, a conclusion from palaeontologic data first drawn distinctly by Baron Von Ettingshausen, although foreshadowed by other observers and indicated already by D'Archiac in the wording quoted by Schimper, "Le présent de la terre n'est que la consèquence de son passé." This enunciation, it need hardly be said, supports the theory of organic beings having gradually ascended in the scale of development.

One of the most interesting forms of pliocene plants, rendered known by this new essay, is the Alder, with which Baron Von Ettingshausen has generously connected the name of the writer of these lines, no species of Alnus occurring in the

existing vegetation of Australia, nor any having been found in a fossil state previously in this part of the globe, although South-Eastern Australia and New Zealand possess—as well-known—the co-ordinal genus Fagus. This announcement of the occurrence of an Alder in the Tasmanian Travertin is all the more to be appreciated, as Mr. Johnston was fortunate enough to detect a fruit, amentum of this plant; a fact like this should encourage Tasmanian geologists to persevere in further searches after carpologic specimens in the rich and very accessible beds of fossils in their island. Schimper in 1872 enumerated 30 fossil species of Alnus, but only seven of these were any amenta procured by the several finders, the rest were described from leaves alone, and must therefore remain doubtful as regards generic and specific limits.

The prospect of Dr. Barnard settling professionally in his native city, holds out much additional hope for revelations in the fossil flora of the vicinity, after that talented gentleman has aided already so much in elucidating the pliocene vegetation of Gulgong.

It remains to confirm the systematic position now given to the above-mentioned Tasmanian pliocene plants by searching for fruit traces, irrespective of the likelihood of future investigations, proving that in Tasmania, as in many other parts of the world, the pliocene vegetation to which Alders were immixed, was also one of great richness in specific forms, few of them as yet known to us.

NOTES OF A CRITICAL EXAMINATION OF THE MOLLUSCA OF THE OLDER TERTIARY OF TASMANIA, ALLEGED TO HAVE LIVING REPRESENTATIVES.

By Professor Ralph Tate, F.G.S., F.L.S., Etc., Corr. Memb.

[*Read June* 9, 1884.]

Mr. R. M. Johnston, in Proc. Roy. Soc., Tasmania, 1880, p. 31, gives a list of Table Cape fossils, which have been referred to existing species. As I think that some of them have been incorrectly identified I am desirous to give explanatory reasons for the adoption of other names. Before doing so, I may remark that in my presidential address to the Royal Society of South Australia, vol. ii., p. lvi., 1879, I gave a list of 24 living species of various classes which existed in the Australian

seas during Eocene and Miocene times, five of the molluscs are included in Mr. Johnston's list; moreover, I stated that "other fossils have been referred to living species—to *Trivia Europœa*, *Leiostraca subulata*, *Lima subauriculata*, *Liotia lamellosa*, etc., but competent authorities have not confirmed these identifications." The references in the above quotation chiefly concern the Tasmanian geologist, and, as regards the first three species, I have the testimony of Mr. Gwyn Jeffreys, F.R.S.,—a specialist in European conchology—that the Tasmanian fossils do not belong to the existing species to which they have respectively been referred. He writes, "I have carefully compared these fossil specimens with recent ones bearing similar names from different parts of the European seas. I regret that I cannot acquiesce with Mr. Woods' identifications."

In the accompanying table I have set side by side the Table Cape fossil species and the recent forms with which some of them have been confounded; the names of the fossil species represented in living creation are printed in italic. It must not be supposed that seven species only are in common between the older tertiary fauna of Australia and the recent one, as a much greater amount of material awaits elaboration than has already been scrutinised, and which may presumably yield a few species having living identities.

FOSSIL SPECIES.	RECENT SPECIES WITH WHICH THEY HAVE BEEN CONFOUNDED.
1. Ancillaria mucronata—*Sow.*	Ancillaria australis—*Quoy.*
2. Triviaa vellanoides—*McCoy.*	Trivia Europœa—*Mont.*
3. Leiostraca Johnstoniana—*Tate.*	Leiostraca subulata —*Donov.* sp.
4. *Syrnola bifasciata—Woods.*	
5. *Crossea labiata—Woods. (?)*	
6. Liotia lamellosa—*Woods.*	Liotia subquadrata—*Woods.*
7. Liotia Roblini—*Johnston.*	
8. Natica polita—*Woods.*	Natica Beddomei—Johnston.
9. Fissurellidæ malleata—*Tate.*	Fissurella concatenata—*Crosse.*
10. Cylichna Woodsii—*Tate.*	Bulla arachis—*Quoy.*
11. *Dentalium lacteum — Deshayes.*	
12. Lima Jeffreysiana—*Tate.*	Lima subauriculata—*Mont.*
13. *Limopsis aurita.*	
14. *Limopsis Belcheri.*	
15. *Pectunculus laticostatus—Quoy.*	
16. Cucullaea Corioensis—*McCoy.*	Cucullaea concamerata—*Reeve.*
17. Corbula ephamilla—*Tate.*	Corbula sulcata—*Lamarck.*
18. *Rhynchonella squamosa—Hutton.*	

Ancillaria australis.

A. australis of Tenison-Woods, from the Table Cape beds, is certainly not Sowerby's species of that name. It should bear the cognomen *A. mucronata*, under which it is catalogued as a Table Cape fossil, by Tenison-Woods, in Proc. Roy. Soc., Tasmania, for 1875, p. 17, and as "one of the very few forms surviving in the present series," but in his census of the Marine Shells of Tasmania, loc. cit., 1878, p. 30, he corrects that statement, remarking that "*A. mucronata*, Sowerby, in Thes. Conch., Anc., p. 63, t. 211, fig. 11, is believed to have been described from the Lower Cainozoic beds at Table Cape. . . . Mr. Legrand informs me that he has never found it but as a fossil."

The differences between *A. australis* and *A. mucronata* are apparently trifling, but they are constant. Comparing them at the size represented by a length of about 25 millimetres:—*A. mucronata* has an ovate outline of an uniform width throughout, gradually tapering to a subtruncate mammillary apex; the pullus is concentrically costate-granulate. In *A. australis* the outline is ovate-fusiform, rapidly tapering to a subacute apex; the last whorl is relatively much enlarged. With a length of about 40 millimetres the differences are not so obvious, though *A. mucronata* is a narrower shell and shows traces of a mucronate apex.

Here are the various dimensions in millimetres of a large example of each species:—

	A. mucronata.	*A. australis.*
Total length	38	39
Length of aperture	20	25
Breadth of aperture	8	8
Greatest breadth...	18	19
Length of spire	19	17

Localities.—Table Cape, *R. M. Johnston.* Muddy Creek, near Hamilton, Victoria; and "Gastropod-bed" in the River Murray Cliffs, near Morgan, South Australia, *R. Tate.*

Trivia Europæa,

Believed by Tenison-Woods to occur at Table Cape as a fossil (loc. cit., 1877). This identification is based upon young or dwarfed examples of the widely distributed Australian fossil, *T. avellanoides, McCoy*—the distinctive characters of which have been fully pointed out by the author of the species in his definition of it. Most particularly are the ribs sharper in this fossil cowry than in *T. Europæa.*

Tenison-Woods figures an early stage of growth of this species as *T. minima* in Proc. Linn. Soc., N.S.W., vol. iv., t. 1, f. 8, 1879, relying for a differential character on the absence of a dorsal division between the ridges. He judged, more-

over, the shell to be an adult because of the thickened lips, overlooking the fact that *Trivia*, unlike *Cyprœa*, exhibits no shell-metamorphosis.

An examination of many small examples of *T. avellanoides* permits me to state that the smooth dorsal area does not begin to develope until the shell has reached a length of about eight millimetres.

Localities.—Table Cape, *Johnston.* Balcombe Bay and Muddy Creek, Victoria; River Murray Cliffs, near Morgan; Aldinga Cliffs; and bore-hole at Adelaide, *R. Tate.*

Syrnola bifasciata.

Reference.—Tenison-Woods, Proc. Roy. Soc., Tasmania, 1875, p. 145.

This recent Tasmanian gastropod-shell has been identified by the author of the species as a fossil in the Table Cape beds (loc. cit., 1876, p. 99). The species is unknown to me.

Eulimella subulata.

This name was applied by Tenison-Woods to a fossil from the Table Cape beds, an example of which, received from Mr. R. M. Johnston, I forwarded to Mr. Gwyn Jeffreys for comparison, who most authoritatively states it to be a different species, and which I propose to name *Leiostraca Johnstoniana.*

Natica polita.

Reference.—Tenison-Woods, Proc. Roy. Soc., Tasmania, 1875, p. 23.

Originally described as a Table Cape fossil. It has since been found living off the Tasmanian coast (loc. cit., 1877, p. 32). I have not seen recent examples of this species.

Crossea labiata.

Reference.—Tenison-Woods, Proc. Roy. Soc., Tasmania, 1875, p. 151.

This living Tasmanian shell has been recognised as a Table Cape fossil by Mr. R. M. Johnston (op. cit., 1880, p. 41). I have not seen a fossil specimen, but an allied species occurs fossilised at Adelaide, River Murray Cliffs, and Muddy Creek; it is much larger and the outer lip is simple, not varicosed as in *C. labiata.* If the Table Cape specimen be immature, or have a mutilated aperture, its identification cannot be reliable.

Liotia lamellosa.

Reference.—Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876, p. 96.

This species was described from a Table Cape fossil, but the author appended a note, that a living example had been dredged off the Tasmanian coast.

Having had the opportunity of comparing recent and fossil specimens I found differential characters to obtain such as are set forth in Proc. Linn. Soc., N.S.W., 1878, p. 236, wherein Mr. Woods has applied the name of *L. subquadrata* to the living species.

Liotia discoidea.

The species so named by Reeve is living on the coast of the Philippines, and extends to Tasmania. It has been quoted by Tenison-Woods as a Table Cape fossil, but Mr. Johnston gives valid reasons for rejecting that identification and has described the fossil under the name of *L. Roblini* in Proc. Roy. Soc., Tasmania, 1880, p. 39.

L. Roblini is abundant in the Muddy Creek beds, and a few examples have been collected by me from the "gastropod-bed" in the River Murray Cliffs, near Morgan.

Imperator (Australium) imperialis.

This recent New Zealand species is included, with a doubt, in the list of Table Cape fossils, by Mr. R. M. Johnston, in Proc. Roy. Soc., Tasmania, 1876, p. 90.

Fissurella concatenata.

The Rev. Tenison-Woods referred a Table Cape fossil to Crosse's species from South Australian waters, but which appears to be conspecific with *Fissurellidœa malleata*, mihi, in Trans. Roy. Soc., S. Aust., vol. v., p. 146, 1882.

Dentalium lacteum.

"Living in the Indian Seas. This is a doubtful identification. The fossil is very common, and may be a variety only." Tenison-Woods in Proc. Roy. Soc., Tasmania, 1875, p. 17.

I have not seen a Table Cape specimen of this species, but a Dentalium common in the Muddy Creek beds agrees well with the figure, measurements, and description given by Deshayes in his monograph of the genus.

Cylichna arachis.

"Still living in Tasmania and Australia, and not uncommon in the Table Cape beds." Tenison-Woods in Proc. Roy. Soc., Tasmania, 1876, p. 102. The same author, in dealing with another species from the Miocene deposits at Muddy Creek, refers to it as "one of those specimens which may, perhaps, be identified with Quoy and Gaimard's shell," and then pro-

ceeds to compare the one with the other, designating the Muddy Creek fossil as *C. exigua*. But the Table Cape fossil is neither *C. exigua* nor *C. arachis*, and for it I propose the name of *C. Woodsii*.

Arca trapezia.

This living species, which is so abundantly fossilised in the Pleistocene deposits on the coast of South Australia and on the islands in Bass' Straits, is included by Mr. R. M. Johnston in his list of Table Cape fossils (Proc. Roy. Soc., Tasmania, 1879, p. 41).

Judging from Mr. Johnston's unpublished drawing of the only specimen said to have been found in the Older Tertiary deposits, I think there cannot be a doubt as to the correctness of the identification, but grave suspicions attach to the habitat, which cannot now be cleared up by an appeal to the condition of the fossil, or to the nature of the matrix, as the specimen has been lost. Mr. Johnston writes me: "I am in doubt whether the specimen may not have been taken from some of the fallen masses in which possibly an old worn living shell had got mixed up. . . . We must consider this shell doubtful for the present."

Cucullæa concamerata

Is quoted by Tenison-Woods, *loc. cit.*, 1875, p. 15, and by Johnston, *id.*, 1879, p. 31, as a Table Cape fossil, yet the latter author, in a former paper, refers frequently to *C. Corioensis*, making no mention of *C. concamerata*. It is true that McCoy, in his earlier reports, gives *C. concamerata* as a fossil in the Older Tertiary of Victoria, but the name was subsequently abandoned for *C. Corioensis*, which is described by him as a new species, closely related to the living one. The two names have doubtlessly been used interchangeably by the Tasmanian geologists, especially as Mr. Johnston informs me that there is only one form at Table Cape.

Limopsis aurita.

This living species has been identified in the Victorian tertiary deposits by McCoy; but I very much question, if the large, thick, and smooth shell, which is so characteristic of the oldest of the Australian tertiary series at Adelaide and Aldinga in South Australia and which can be traced up from the smaller shells figured by McCoy, can find a compeer among the European examples of *L. aurita*, either living or fossil. For it Sowerby's name of *L. insolita* should be used until conclusive evidence is adduced of the applicability of Sacchi's name to our fossil. Sowerby described his *L.*

insolita in Darwin's "Geology of South America," wherein it is reported from the Eocene of Chili. Zittel records it from the Eocene of New Zealand. The Tasmanian fossil agrees with *L. aurita* as figured and described by McCoy.

Limopsis belcheri.

This living species was originally scientifically made known from specimens taken off Cape of Good Hope, but it is now known in Australian waters from St. Vincent Gulf to Portland, and has been recognised as an Older Tertiary shell by McCoy and by Tenison-Woods in the Table Cape beds.

Pectunculus laticostatus.

I do not acquiesce in Mr. R. M. Johnston's rejection of the above name for the species so common in the Table Cape deposits, which he names *P. McCoyii.* (Proc. Roy. Soc., Tasmania, for 1879, p. 41.) An allied species is plentiful in the River Murray Cliffs, near Morgan, but it has more resemblance to the Australian species, *P. flabellatus* of Tenison-Woods, than to the New Zealand *P. laticostatus.*

Corbula sulcata.

"This species is still living on the west coast of Africa as Prof. McCoy (Ann. Mag. Nat. Hist., 1866) has pointed out. It is very characteristic of the Australian Lower Cainozoic," so writes Tenison-Woods in Proc. Roy. Soc., Tasmania, 1874, p. 16. I have no means of ascertaining what amount of reliance is to be placed on McCoy's determination; but so far as regards the Table Cape shell, which has been quoted under the above name, I find that it bears no resemblance to any of the figures of the Lamarckian species that I have been able to compare it with. It seems, however, to be closely related to *C. fortisulcata* (Smith in Proc. Zool. Soc., 1878, t. 50, f. 23, p. 819), from Port Essington, and for it I propose the specific name of *ephamilla.*

Limatula subauriculata.

"This shell is a common fossil at Table Cape, at least I can discover no difference in size, shape, markings," etc. Tenison-Woods in Proc. Roy. Soc., Tasmania, 1876, p. 113.

Specimens of the fossil species from Table Cape and some South Australian localities were forwarded to Mr. Gwyn Jeffreys for comparison with the European shell. He not only alleged its specific distinction, but forwarded me examples of *L. subauriculata* and other allied living species. The differences justify a distinct appellation for our fossil, and I have pleasure in associating Mr. Jeffrey's name with it.

Trigonia acuticostata.

This, the earliest discovered of the Tertiary species of the genus, was described by McCoy from specimens obtained from the Muddy Creek beds in Victoria, probably on the same geological horizon as those at Table Cape in which it has not yet been found. It has, however, in latter years, been reported by McCoy as living on the south-eastern coast of Australia, and it also occurs in Newer Tertiary strata at Mordialloc; Hobson's Bay; River Murray Cliffs, at the Nor'-West Bend; and at Aldinga Bay, St. Vincent's Gulf.

Rhynchonella squamosa.

This palliobranch, common to the Older Tertiary of South Australia, Victoria, Tasmania and New Zealand, must now be catalogued among recent species, as I have no doubt that *R. nigricans, var. pixydata*, Davidson, in "Brachiopoda of the Challenger Expedition, t. 4, f. 14, p. 59, 1880," is its living representative.

The differential characters of the so-called variety *pixydata* are the more numerous scaly ribs (40 to 46), and the less transverse and comparatively more convex shell, characters upon which Hutton founded the species *R. squamosa* As the differences are not mere individual variations, they must be regarded as of specific value, so largely supported by the facts of the present and past distribution of the two species.

R. squamosa, as an existing species, is known only in deep water off south of Kerguelen Island, and as a fossil in the Older Tertiary of South Australia, Victoria, Tasmania and New Zealand. *R. nigricans* extends in time from the oldest Tertiary formation to the recent epoch in New Zealand, and has not been found in association with *R. squamosa*, except in the Oamaru formation in New Zealand.

ON THE COMMUNITY OF SPECIES OF AQUATIC PULMONATE SNAILS BETWEEN AUSTRALIA AND TASMANIA.

By Professor Ralph Tate, F.E.S., F.L.S., Corr. Memb., Etc.

[*Read June* 9, 1884.]

Limnaea Huonensis *(Tenison-Woods)*.

Tenison-Woods, in his paper on the freshwater shells of Tasmania (Proc. Roy. Soc., Tasmania, for 1875), describes four species of the genus *Limnaea;* but, subsequently (loc. cit., 1878, p. 72), he writes that "*L. Hobartensis* of my monograph, I find, on comparison, to be quite undistinguishable

from *L. peregra*;" and in the same volume, at p. 27, Mr. Johnston expresses the opinion that *L. Hobartensis* and *L. Launcestonensis* are merely varieties of the same species, while finally Mr. Petterd has stated that *L. Huonensis* is identical with *H. Launcestonensis* and that *L. Tasmanica* is the European *L. stagnalis*. Thus the four species of Tenison-Woods are reduced to two, considered to be identical to European forms, and at the same time the genus is erased from the Tasmanian fauna.

So far as regards one of the species, I protest against its absorption in *L. peregra*. Without a comparison with specimens named from the types, I am not sure of my identification, but the species, which I claim to be indigenous, is probably *L. Huonensis*.

Some years since I received from Mr. R. M. Johnston a few examples of a Limnaea, which fairly agree with the diagnosis of *L. Huonensis*, but when the validity of the species came to be challenged, I compared them with actual specimens of *L. peregra*, and though I could not concur with the opinion that they were identical, yet as my examples of *L. Huonensis* were few and imperfect, I could not assert with confidence an opinion to the contrary, and thus in my catalogue of Australian freshwater shells (Proc. Linn. Soc., N.S.W., vol. v., p. 552), *L. Huonensis* and the three other Tasmanian species are expunged from the list of endemic species. Since then, the question has been reopened by the discovery of the same species on our Continent in a locality that precludes the possibility of accidental introduction; to the better identification of the continental shell, Mr. R. M. Johnston has lately forwarded a sufficient number of examples of what is doubtlessly *L. Huonensis*, and the result of my comparison is that they are identical with that species and specifically distinct from *L. peregra*.

The new locality for *L. Huonensis* is on marshy ground, produced by the issue of freshwater from beneath the sand-dunes which line the margins of the backwaters of the estuary of the River Glenelg.

At this station, *L. Huonensis* has much the habit of *L. truncatula* of Europe, living at the water's edge or amidst the damp herbage; it is profusely abundant.

The very large number of examples examined permits to say that *L. Huonensis* is constant in its characters, which do not fall within the limits of variability of *L. peregra*. The European analogue of *L. Huonensis* is *L. peregra*, from which it may be distinguished by the almost obsolete fold of the columella, concealed by one thin and broad expansion; in the less oblique revolution of the whorls and in the more regularly pointed spire; also by the simple margin of its

aperture in front of the columella, which in *L. peregra* is slightly expanded and reflected.

Amphipeplea papyracea.

Reference.—*Limnæa papyracea*—Tate, Trans. Roy. Soc., S. Aust., vol. iii., p. 103, t. 4, f. 5, 1880. *Amphipeplea papyracea*—Tate, id., vol. iv., p. 140, 1881.

Among examples of *Limnæa Huonensis*, recently received from Mr. R. M. Johnston, I find three specimens of *Amphipeplea papyracea*. The association of the two species may serve to fix the station and locality of this addition to the fauna of Tasmania.

A. papyracea was originally described from dead shells obtained from a dried pool at Penola, S. Australia, but a year later it was taken alive in the Reedbeds, near Adelaide, and a study of the animal brought about the new generic appellation.

The species is now known to me, from samples sent by Mr. J. F. Bailey, to inhabit at Merrigum, Victoria.

Gundlachia Petterdi (*Johnston*).

This freshwater limpet, originally described from Tasmanian specimens, inhabits the hill-streams of the Mount Lofty Range, near Adelaide.

These are the first records of continental species of aquatic pulmonate snails living in Tasmania, and it is surprising that no other specific points of contact have been recognised. As regards the land snails, whose means of dispersal are limited, the distribution of whose species is so restricted, and correlatively presenting constant characters so much so that they are valuable factors in defining zoological provinces, there are seven or nine species in common between Tasmania and Australia. (See Tate, Trans. Roy. Soc., S. Aust., vol. iv., p. 73, 1881.) On the other hand, the aquatic pulmonate snails are in comparison easily dispersed, and their species exhibit great morphological variability, so much so that, as regards the commoner sorts, each hydrographic basin has its own *races*. There is, therefore, much reason to anticipate a larger community of aquatic species between Australia and Tasmania than we have, at present, knowledge of.

My personal experience of the limits of the continental species is most perplexing, and the difficulty of elaborating species increases as the area of observation is extended and the number of specimens is multiplied. Many so-called species, which have been defined on a few examples taken from local colonies, break down when the work of collecting and comparison has been carried out with due regard to

those embarrassing facts touching the mutability of species which have been gained by a wider experience.

A revision of the nomenclature of the freshwater shells of Australia is urgent, and I venture to offer my help in instituting a critical comparison of the Tasmanian species, *inter se* and with continental forms. For this purpose it is absolutely necessary that the collections submitted for examination be large and varied.

NOTES ON BORING OPERATIONS IN SEARCH OF COAL IN TASMANIA.

By T. Stephens, F.G.S., Etc.

[*Read June* 9, 1884.]

The attempt which is being made, by means of the diamond drill, to test the question of the existence of deep lying seams of coal at Tarleton, on the Mersey, and near the Cascades Brewery, at Hobart, calls for some notice. The work is not yet so far advanced as to demand more than a brief statement of the circumstances under which it has been undertaken. It is probably pretty generally known now that the seam of coal which has been worked for many years past, in the Mersey district invariably underlies certain marine calcareous beds, the presence of which was formerly supposed to indicate that the base of the coal measures had been reached. This feature is absent from the coal measures of the Eastern and Southern districts, and all such evidence as is forthcoming leads one to suppose that the latter belong to a later epoch than those of the Mersey and other districts bordering on the North Coast.

To go fully into this question would require more time than I can command, and no definite conclusion can be arrived at until a reasonably complete series of specimens of the plant remains of the several formations is available for comparison and examination. For the basis of a provisional classification I will take the succession of rocks composing or associated with the coal measures of New South Wales, with which Tasmania has more in common than with any of the other Australian Colonies. The following is a rough outline of the order in which they occur:—

Triassic (?)	Wianamatta shales. Hawkesbury rocks.
Permian (?).....	Upper coal measures (Newcastle coal).
Carboniferous	Upper marine beds. Lower coal measures (Anvil Creek, Greta, and Stony Creek coals). Lower marine beds. Lower carboniferous, Port Stephens, etc. Plant and marine beds (without coal).

Premising that the evidence is very incomplete, I may say that the coal measures of the South and East of Tasmania may probably be roughly classed with the upper coal measures; the marine beds of the Mersey with the upper marine; the Mersey coal with the lower coal measures; and the sandy and calcareous rocks with marine fossils, which occur near Hobart and in numerous localities on the South and East, as well as in the interior, with the lower marine beds of New South Wales.

In a paper read before the Royal Society, on the 8th July, 1873, I mentioned some of the circumstances which made it improbable that any lower seams would be found in the Mersey coalfield. Nothing, however, had been disclosed by mining operations which could be taken as conclusive evidence on this point, and, to set the question at rest, it was necessary to have recourse to other than private enterprise. The boring at Tarleton has not yet, so far as I can judge from casual reports, yielded any encouraging results; but this is no more than might have been expected, and the object for which the work was undertaken by the Government will not have been attained until a greater depth than 200 or 300ft. has been reached.

The first suggestion in reference to exploration for coal near the Cascades Brewery came from abroad. At a meeting of the Royal Society of New South Wales, Mr. C. S. Wilkinson, the Government Geologist, drew attention to a collection of fossils from the above locality, and remarked that as seams of bituminous coal and kerosene shale occur in formations containing these fossils in New South Wales, it was probable that coal might be found associated with them in Tasmania. An opinion from so eminent an authority necessarily carries great weight, but it is right to say that Mr. Wilkinson spoke from an examination of the fossils alone, and had nothing before him to show whether they came from rocks corresponding with the upper marine, or with the lower marine beds of New South Wales.

The Government having been urged to test the question of the existence of seams of coal near Hobart, at a greater depth than had been reached in the workings at New Town, Mr. F. M. Krausè, F.G.S., of Ballarat, was engaged to report on the subject. After carefully examining the New Town coalfield, and ascertaining that the lower part of the series was already exposed in natural sections, Mr. Krausè selected two spots in the underlying marine formation, at one of which the diamond drill has been at work for some months. Supposing that Mr. Krausè's theory as to the age of the New Town coal measures, and that of the marine beds, which latter he classes as *dyas*, is correct, there are reasonable

grounds for expecting that true coal measures may be met with below, though at an unknown depth. If, on the other hand, I am right in classing our Southern marine formations with the lower marine beds of New South Wales, the probability is that no coal will be found underneath them, and I am inclined to think that their thickness is to be measured by thousands rather than hundreds of feet.

The Minister of Lands (the Hon. N. J. Brown) has kindly promised to present to the Museum a complete series of specimens obtained from the borings at Tarleton, and the Cascades, when the whole question can be more fully discussed.

DESCRIPTION OF A NEW SPECIES OF VITRINA FROM THE TRAVERTIN BEDS, GEILSTON.

By Robt. M. Johnston, F.L.S., Etc.

[*Read June* 9, 1884.]

Vitrina Barnardii (*n. s.*).

Shell minute, depressed, auriform; whorls $2\frac{1}{4}$, rapidly increasing; surface irregularly rugosely striate towards peristome; peristome simple, right margin slightly dilated forward; columella concealed, but, evidently, resembles the living *V. Verreauxi* in this as in other general characteristics. Greatest dia., 8mil.; least, $5\frac{1}{2}$mil.; depth, 3mil. Travertin Beds, Geilston (one specimen).

The above fossil shell differs from *V. Verreauxi* in being much smaller and in being more depressed. The whorls, relatively, increase more rapidly, and the surface markings are more rugose. It is associated with *Helix Tasmaniensis*, *H. Huxleyana*, *H. Geilstonensis*, *H. Sinclairi*, and *Bulimus Gunnii* in the lower beds of the Travertin.

I have named this shell in honour of our worthy vice-president, Mr. Barnard, who, for many long years, has taken a most active interest in all matters relating to the progress of the natural history of this island.

It is somewhat singular that remains of freshwater shells should not have been discovered hitherto in these freshwater deposits. It would seem that the waters, during the time the lower Travertin beds were being formed, were unfavourable to animal life*; and that the remains of land animals, found hitherto in such abundance, were carried to their present position by a stream draining the land slopes in the immediate neighbourhood.

*See "Discovery of Entomostraca in the upper members," in following paper, as proof that the upper members of the deposit were at least favourable to the life of a species of cypris. R. M. J.

ADDITIONS TO THE LIST OF TABLE CAPE FOSSILS, TOGETHER WITH FURTHER REMARKS UPON CERTAIN FOSSIL SHELLS SUPPOSED TO BE IDENTICAL WITH LIVING SPECIES.

By Robt. M. Johnston, F.L.S., Etc.

[*Read June* 9, 1884.]

On the last occasion on which we met I intimated to this Society that Professor Tate was energetically engaged upon the important work of thoroughly determining and settling some of the more difficult points of classification with regard to the fossil species of the Australian Marine Tertiaries which were supposed to be identical with living forms.

On that occasion, also, I pointed out that the fossil shell, formerly referred to the living *Pectunculus laticostatus*, was a very distinct species not identical with any known living form, and accordingly I proposed for it the name of *P. McCoyi*. Since that time I have received three important communications from Prof. Tate prepared for this Society. In one of them I am gratified to find that this distinguished naturalist concurs with my determination in respect of *P. McCoyi*. He also, among other suggestions, desired me to re-examine and compare carefully the fossil forms hereafter referred to with the living types supposed to be identical with them, as he had doubts regarding the correctness of their determination. Through the kindness of Captain Beddome, who placed his valuable collection of the living types at my disposal, I was enabled to carry out his wishes, and as there was not sufficient time since then to allow of the results of my examination to be communicated to Prof. Tate, and afterwards included in his communication to this Society, I have thought it best to prepare a separate note upon the matters referred to me.

The fossil forms more particularly referred to me for re-examination and comparison with living types are the following :—

1. *Crossea labiata*—Ten.-Woods. Fossil form, originally determined by the writer.
2. *Natica polita*—Ten.-Woods. Fossil form, originally determined by Rev. J. E. Tenison-Woods.
3. *Trivia Europea.*—Fossil form, originally determined by Rev. J. E. Tenison-Woods.
4. *Trigonia acuticostata*—McCoy. Fossil form, originally determined by Prof. McCoy.
5. *Syrnola bifasciata.* Fossil form, originally determined by Rev. J. E. Tenison-Woods.

Crossea labiata (*Tenison-Woods*).

The fossil shells, originally referred to the living species described by Rev. J. E. Tenison-Woods, were again submitted by me to a most careful comparison with a fine collection of living forms. As the result of this examination, I still find that, although the fossil representatives are decidedly larger than the living ones, there are no characteristic differences between them, so far as the tests are concerned, if we except the fact that in the living form the varix bordering the aperture is generally sharper and more decidedly reflexed. This character is constant in all the individuals—nine or ten—examined by me. In the fossil representatives the striae upon the varix are almost obsolete, and, consequently, the latter has not that appearance which Mr. Woods describes as "fringe-like." It must be confessed, therefore, that it would be difficult to separate the living from the fossil so far as absolute differences are concerned. Still, so far as the trifling differences go, I must admit that they are sufficiently constant to enable a careful classifier to recognise the living from among the fossil representatives with a considerable degree of confidence, and, perhaps, for these reasons, it might be well to recognise the constant differences, slight though they may be, as of specific value. I hesitate myself to decide in such a case, until I learn how far the Table Cape fossil form agrees with the fossil forms discovered in the same horizon in the South Australian and Victorian formations, which have now been so fully investigated by Professor Tate.

Natica polita (*Tenison-Woods*).

Curiously enough, of the two representatives—the fossil and living—hitherto known as *N. polita*, the fossil was the first known to science. The living form was discovered almost immediately after the fossil form was described, and was determined by Mr. Woods to be conspecific with the latter. On comparing a large series of living and fossil forms together, however, I find the following differences to be constantly maintained. In the living form the spire is more depressed, and the whorls increase more rapidly in size. In the fossil form the nucleus is invariably smaller than in the living representative, and the number of whorls in mature specimens is $4\frac{1}{2}$. In the living mature form the number of whorls is invariably $3\frac{1}{2}$. The aperture in both does not present any marked difference, if we except the fact that, in the fossil state, the inner margin is almost vertical. In the living form, the same feature is more decidedly angled relative to a central line drawn through the nucleus. If anything the

fossil shell is larger and more solid, although it must be stated that, if an immature fossil shell be selected for comparison with only the same number of whorls developed as in the mature living form, the latter seems to be the broader of the two. As these differences are constant I am convinced that the living form, although identical with the fossil form in other important respects, is quite a distinct species, and I propose, with the concurrence of Professor Tate, that it should be named *N. Beddomei*, in honour of my friend Captain Beddome, who, by his dredging operations, has so largely added to our knowledge of the marine fauna of Tasmania.

Trivia Europea.

The small or dwarfed fossil specimens collected by me at Table Cape were originally referred to—*T. Europea*, by Mr. Woods. In his "Notes on the Fossils" of Table Cape, p. 91, Proc. Roy. Soc. of Tas, 1876, he states: "*Trivia Europea* and *Eulimella subulata* are European forms, which, I believe, occur at Table Cape as fossils." I am satisfied now, however, from examination of a larger number of specimens, that all the specimens of the former so determined by Mr. Woods are dwarfed or young representatives of *Trivia avellanoides*, McCoy. This fossil also occurs in the turritella limestone of Flinders' Island. Fragments of this rock are abundant on the beaches on Barren, Badger, Clarke, and Swan Islands in Bass' Straits. The fragments are usually drifted ashore attached to seaweed, and in one collected by me on Swan Island I disclosed the cast of a small perfectly characterised *T. avellanoides*, associated with fragments of fossils too imperfect for specific identification belonging to the following genera, viz., *Cylichna*, *Voluta*, *Pectunculus*, *Lima*, *Tellina*.

Trigonia acuticostata (*McCoy*).

Although this species was included in my "Comparative Table showing Distribution of Australian Marine Tertiary Shells," etc., pp. 90a., 90f., Proc. Roy. Soc., Tas., 1876, I did not refer it to the Table Cape beds as supposed by Professor Tate. Up to the present time I have neither seen nor heard of this species being discovered in Tasmanian tertiary deposits. I may also mention that I cannot altogether concur with Professor McCoy when he states that the acute nodose squamæ are characters which separate *T. acuticostata* from all living species. As regards the living *T. Margaretacea*, it may be confidently affirmed that fresh or unworn shells do not show blunt lamellose squamæ until the individuals are well

advanced in size, and even then the blunted costate lamellæ are all closely crowded at the extreme margin of valves.

SYRNOLA BIFASCIATA.

I have in vain searched for a fossil representative of this shell in my type collection, nor can I trace any in the collection belonging to this Society. I am therefore of opinion that a very distinct fossil species, named by me *Odostomia*, has been mistaken for *S. bifasciata*. *Odostomia microlirata*, mihi, somehow was omitted to be published by me. I now give the description :—

Odostomia microlirata (*n.s.*)—Shell minute, white, shining, elongately conoid, turriculate; spire acute; nucleus exerted, twisted sinistrally; whorls $8\frac{1}{2}$, flattened, surface finely obsoletely striated concentrically, crossed by very fine wavy microscopic liræ; suture distinct; aperture sub-auriform; outer lip thin; columella uniplicate. Length, 8mil.; great. dia., 2mil.

This fossil shell somewhat resembles the living *Syrnola bifasciata*, but it is easily distinguished from it by the twisted nucleus, its greater size, and the fine obsolete liræ. Two or three specimens discovered by me in the Table Cape beds.

From the excellent figures and descriptions contained in Professor Tate's monograph "On the Australian Tertiary Palliobranchs," Trans. Phil. Soc., Adelaide, 1880, I have also been enabled to identify a number of previously undetermined specimens of Brachiopods in my collection originally derived from the Table Cape beds. The following is a complete list of the Brachiopods now known to me as occurring at Table Cape, viz. :—

Terebratula vitreoides—Woods
Waldheimia Garibaldiana—Davidson
„ *furcata*—Tate
„ *grandis*—Woods
„ *Johnstoniana*—Tate
„ *Tateana*—Woods
„ *Corioensis*—McCoy
„ *pectoralis (?)*—Tate
Terebratulina Scoulari (?)—Tate
„ *lenticularis*—Tate
„ *triangularis (?)*—Tate
Terebratella Tepperi—Tate
„ *Woodsii*—Tate
Rhynchonella squamosa—Hutton.

Those marked (?) are determined from imperfect specimens and require verification.

The result of these re-determinations, taken together with those referred to in Professor Tate's communication, leave only two out of nearly 300 known species in the Table Cape

beds, which, as yet, are free from doubt as regards their identification with living species. The two exceptions are *Limopsis Belcheri* (Adams and Reeve) and *L. aurita* (Brocchi). But these two, certainly, do not represent one per cent. of the species determined to be extinct, and, consequently, if we are not prepared to reject the *per-centage* method in the determination of the great divisions of the tertiary period, we must assuredly refer the Table Cape beds not to the *miocene* but to the *eocene*, or "early dawn," of the tertiary period in Australia. It is now five years ago (pp. 86-87, Proc. Roy. Soc. of Tas.) since I made use of the following statement before the members of this Society:—"This continual lessening of the per-centage of living to extinct forms as our knowledge increases is most significant. According to the principle which has been adopted by Mr. Lyell, and through him by nearly all English geologists, this low per-centage of living representatives indicate rather more an *eocene* than a *miocene* age for our marine beds at Table Cape." The investigations carried on by Professor Tate and other indefatigable workers, since that time, have placed this matter beyond all reasonable doubt, and now there is every reason to believe that the Table Cape beds, with their Australian equivalents, mark the earliest dawn of the eocene period in Australia. In conclusion, I may venture to prophecy, notwithstanding the gap between the cretaceous rocks of Maryborough, Queensland, and the eocene beds of Table Cape, that the day is not far distant when passage beds will be discovered connecting these systems more closely together, if not completely merging the one insensibly into the other.

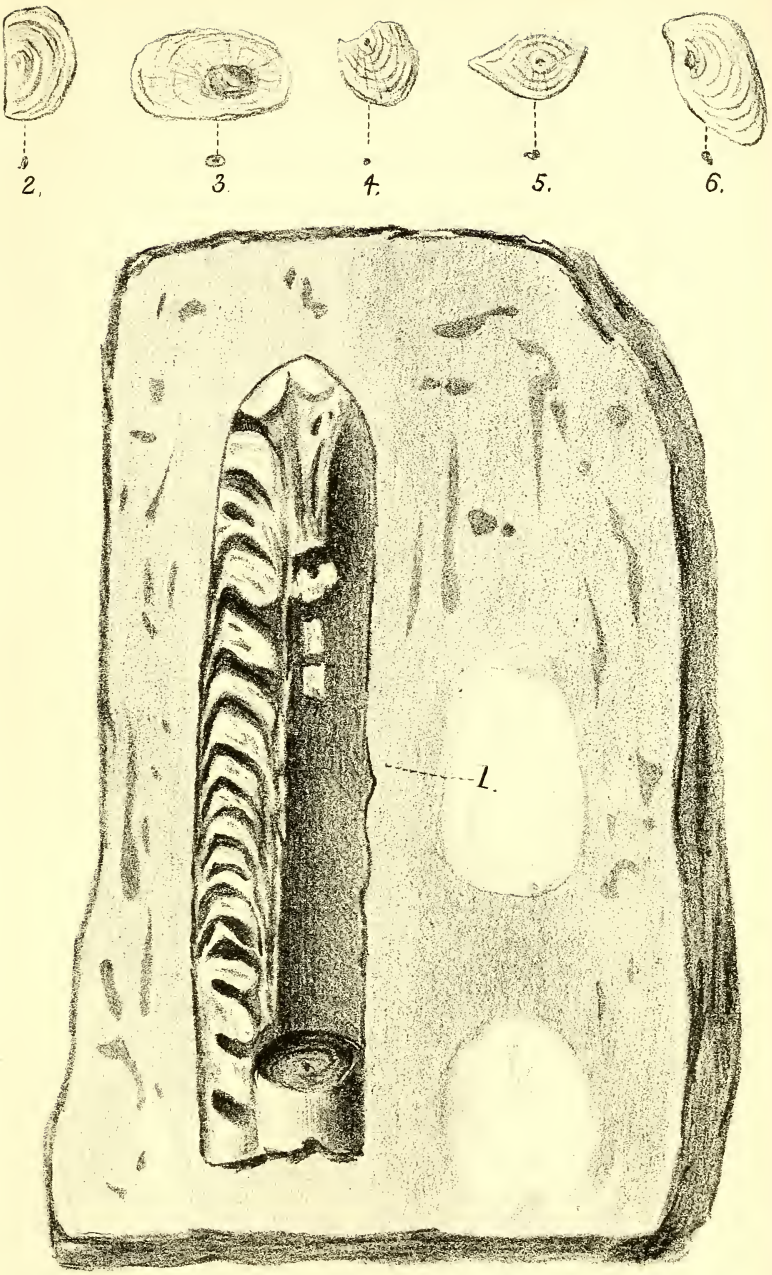
DISCOVERY OF ENTOMOSTRACA IN THE UPPER MEMBERS OF THE TRAVERTIN BEDS, GEILSTON, AND A DESCRIPTION OF A NEW SPECIES OF CYPRIS.

By Robt. M. Johnston, F.L.S., Etc.

[*Read June* 9, 1884.]

Cypris Alburyana (*n. s.*).

Carapace oblong-oval, somewhat flattened on one side; valves convex, smooth, shining, white; breadth contained in length two-and-a-half times; length usually $\frac{3}{4}$mil. Gregarious in the altered opalescent rock overlying the basalt in the Travertin Limestone Quarry at Geilston.



1.—*Lepidostrobus Mluelleri*, Johnston.
From Coal Measures Sandstone Campania.

2–6. *Minute Scale, like impressions in Shale, associated with L. Mluelleri*

Specimens of this freshwater entomostracan were collected by me some two or three years ago in abundance at Geilston. It is an interesting form, as it affords us valuable information regarding the condition under which opal-like rock was formed prior to the peculiar change in its structure.

DISCOVERY OF A CONE, PROBABLY OF A SPECIES OF LEPIDOSTROBUS, IN THE SANDSTONES OF CAMPANIA.

By Robt. M. Johnston, F.L.S., Etc.

[*Read June* 13, 1882; *accidentally omitted from Proceedings of the year* 1882.]

The very interesting impression in the block of sandstone appears to be the remains of a narrow, oblong, cylindrical strobilus, or cone, of a species of *Lepidostrobus*. It measures about $4\frac{1}{4}$ inches long and $\frac{7}{8}$ inch in diameter. The strobilus agrees with general characters of the genus *Lepidostrobus*, having a central axis throughout its whole length, which is longitudinally striated, from whence radiate upwards and outwards narrow chambers, which evidently contained the sporangia. These chambers narrow and bend downwards abruptly towards the outer edge, where, if a section could be seen, it would, no doubt, show an imbricated appearance. So far as I can learn this is the first strobilus or fruit of a form of Lepidodendron discovered in Australia. Associated with the fruit, in a layer of shale, I discovered impressions of numerous microscopic wing-like seedlets, some of which I have magnified; these latter are frequently depressed near the centre and are almost invariably concentrically striated Impressions of *Zeugophyllites* are also abundant in the shales associated with the sandstone, which I believe to be of the same horizon as the Jerusalem coal. I propose for this fruit the name of *Lepidostrobus Muelleri*, in honour of Baron von Müeller, K.C.M.G., F.R.S., etc. (See Figure.)

DESCRIPTION OF NEW SPECIES OF MOLLUSCA OF THE UPPER EOCENE BEDS AT TABLE CAPE.

By Professor Ralph Tate, F.G.S., F.L.S., etc., Corr. Memb.

[*Read July* 7, 1884.]

Potamides pyramidale.

The generic position, assigned to this very striking species, is not unassailable inasmuch as the aperture of the only specimen obtained is broken away; however, its strong resemblance to *P. ebeninium* will justify the congeneric reference. As in *P. ebeninium*, the last whorl of the fossil is distorted and there is a posterior groove within the aperture.

Spire acute, apical angle about 30°, of upwards of 10 flattened whorls; body whorl, with the outer lip slightly ascending. Surface ornamented with about 10 flat regularly disposed spiral ribs, crossed by obsolete obtuse sigmoid lines, and on the anterior half with large subacute nodulations, about 12 on the penultimate whorl; on the posterior whorls the nodulations are replaced by transverse ridges; the flat spiral ribs are about as wide as the interspaces, in each of which there is a thread. The last whorl has an asymetrical variciform nodulation above the columella and anterior to the periphery, the space between it and the posterior angle of the aperture is without tubercles as in *P. ebeninium*. The inner lip is much thickened and reflected on the columella.

Length, less that of the canal, 85; *breadth* of last whorl, 40 millimetres.

Locality.—Table Cape. R. M. Johnston *(one ex.)*.

This species differs from the living *P. ebeninium* in its relatively much greater width, in the nodulations being on the anterior half of the whorl instead of medial, and in its coarser spiral ornament.

Potamides semicostatum.

Spire acute, apical angle about 15°, of upwards of 12 flattened whorls; body whorl, with outer lip not or only slightly ascending. Surface ornamented with 10 or 12 spiral threads crossed by sigmoid rugæ which give rise to a reticulation beneath the posterior suture. The lower half of the anterior whorls with about 10 thick elevated nodulose ridges abrupt on the posterior side; on the posterior whorls the nodulations are replaced by transverse ridges. In other respects, this species resembles. *P. pyramidale.*

Length, 67; *breadth* of last whorl, 22 millimetres.

Locality.—Table Cape, R. M. Johnston (*six exs.*).

Torcula Murrayana

Spire acute, apical angle about 15°, of upwards of 12 flattish whorls, medially depressed and acutely elevated at about the anterior fourth; suture distinct, thread-like, or somewhat grooved. Surface ornamented by about 24 spiral threads with or without smaller intermediary ones, crossed by close-set sigmoid striæ, the latter on the anterior whorls thinly squamose. Last whorl bluntly truncated on the periphery; base with spiral threads and transverse striæ as on the upper part of the whorl. Aperture quadrately-oval, continuous; outer lip with a deepish subtriangular median sinus.

Total length, 60; *breadth* of last whorl, 17; *height* of last whorl, 12 millimetres.

The species varies in the shape of its whorls, from flat or slightly concave to somewhat quadrate, and corresponding thereto in the depth of the suture; the keel-like elevation is sometimes obsolete, but the median depression is always present.

Localities.—Table Cape. R. M. Johnston (*six exs.*). Very abundant in the middle and lower beds of the River Murray Cliffs from Overland Corner to Blanchetown; also at Muddy Creek, Corio Bay, and Schnapper Point (R.T.).

The Table Cape specimens have flattish or slightly concave whorls with or without the anterior keel, and fall within the limits of variation exhibited by the Murray examples, though they are usually broader in proportion the apical angle being as much as 18°.

Turritella tristira.

Shell acuminately turreted; apical angle about 15° of upwards of 12 slightly convex whorls; suture linear. Surface ornamented with three conspicuous, spiral, acute ribs, and spiral and transverse striæ; the sulci on each side of the central rib are of equal breadth, but the anterior rib is separated from the suture by a distance less than that which separates one rib from the next, whilst the posterior rib is separated from its corresponding suture by a distance greater than the breadth of the medial sulci. Last whorl truncately angular at the periphery; base spirally ribbed and striated. Aperture quadrate; outer lip imperfect.

Length, 45; *breadth*, 12 millimetres.

Locality.—Table Cape. R. M. Johnston (*one example*).

This species is distinct from the few living species, which are conspicuously three-ribbed, by shape, ornament, and the unsymmetrical position of the revolving keels.

Leiostraca Johnstoniana.

Syn.—Eulimella subulata, Tenison-Woods (*non* Mont.).

Species named after Mr. R. M. Johnston, its discoverer and author of many papers on the Tertiary Geology of Tasmania.

Shell acuminate, thin, smooth, and shining; whorls 12, nearly flat, suture distinct; spire sharply acuminate; aperture elongately-ovate, slightly effuse in front; outer lip acute and simple; columella callous and slightly twisted.

Length, 9·0; *breadth*, 1·5 millimetres.

Localities.—Table Cape. R. M. Johnston. River Murray Cliffs, near Morgan, S. Aust.; Muddy Creek, Victoria. R. Tate.

This species has been confounded by the Rev. J. Tenison-Woods with the recent *L. subulata* of Western Europe, from which it differs in shape and suture; but it has a nearer relative in *L. acutissima*, Sowerby, living off the coasts of Eastern and South-Eastern Australia. It differs from that species by its smaller size and slender proportions. *L. acutissima* with 12 whorls has a length of 15·5 mm. by a breadth of 3 mm.; whilst *L. Johnstoniana* with 12 whorls has a length of 9·0 mm. by a breadth of 1·5 mm.

Cylichna Woodsii.

Syn.—C. arachis. Tenison-Woods (*non* Quoy).

Shell solid, elongately ovate, imperforate; regularly spirally sulcated, the intervening ridges flat and much broader, transversely ornamented with very fine close-set lines, which give the appearance of punctures within the sulci. Apex perforated; aperture narrow above, wider in front; outer lip thin, simple; columella thick, slightly expanded, a little twisted and abruptly truncate in front.

Length, 13·5; *breadth*, 5·5 millimetres.

The above definition is drawn from a Table Cape specimen identical with that which Tenison-Woods referred to the living species *C. arachis* of Quoy. *C. Woodsii* differs, however, in its more ovate outline, in its aperture and ornament, and in its truncated columella. The material at my command is not sufficient to warrant its generic separation which is suggested by the truncated columella.

Chamostrea crassa.

Left valve rhomboidal, somewhat convex, very thick; pallial line and margins of adductor impressions crenulated, not striated, as in *C. albida*. Attached valve unknown.

Diameters.—40 and 36 millimetres.

Locality.—Table Cape. R. M. Johnston (*two examples*).

This determination adds to the Australian tertiary fauna, a genus hitherto only known by one species (*C. albida*) inhabiting the seas of Southern and Eastern Australia. Comparing samples of equal size of the two species, the fossil is dis-

tinguished by the great thickness of the test, the convexity of the valve and the crenulation of the pallial line—characters sufficiently striking to warrant specific appellation. The outline of the fossil shell falls within the limits of variation exhibited by the living species, and the external ornamentation is same.

Corbula ephamilla.

Shell solid, very inequivalve, inequilateral, ovately-triangular, rounded anteriorly, beaked posteriorly. Right valve with more than 20 very thick, rounded prominent concentric ridges, the whole surface striated concentrically. The ventral margin is outward-curved medially, and the ridges have a corresponding flexure. The posterior margin is obliquely truncated, carinated from the umbo to the post-ventral margin ; posterior to the carina is a somewhat concave area on which the concentric folds are continued as multiplied lamellæ. The umbo is in the anterior third, flat, incurved, and with small ridges. Left valve ovately triangular, nearly flat, pointed behind, carinated from the umbo to the post-ventral margin ; surface irregularly striated by lines of growth. Umbo flattish, from below which two distinct ridges radiate to the ventral margin, one or two additional but shorter ones sometimes occur. Right valve with an anterior pointed tooth ; left valve with a stout posterior tooth, flattened and sulcated on its upper surface. Pallial sinus indistinct.

Length, 21 ; *breadth*, 16 ; *thickness* through both valves, 10 millimetres.

Localities.—Table Cape. R. M. Johnston. Abundant in the calciferous sand-rock of the River Murray Cliffs, near Morgan, and in the cotemporaneous deposits at Muddy Creek. (R.T.)

From the living *C. sulcata*, Lamarck, to which it has been referred, our fossil species differs in being less inequilateral, more pointed posteriorly, less gibbous, etc. A nearer ally among existing species is *C. fortisulcata*, E. Smith, from which it differs particularly in its truncated posterior margin.

Lucina planatella.

Left valve orbicular-ovate, equivalve, moderately thin, nearly flat. Surface ornamented with regularly disposed, concentric, erect, lamelliform ridges of growth, crossed by equidistant radial threads, producing on the dorsal-half an open reticulated appearance ; towards the front the concentric ridges are coarser and the descending striæ finer and nearly obsolete. Umbo depressed, acute ; interior margin smooth.

Length, 33 ; *breadth*, 31 millimetres.

The fossil has no close ally among living congeners.

Chione (Timoclea) hormophora.

Shell solid, ovate-oblong, inflated; truncately rounded in front, truncated behind, ventral margin arched, post-dorsal margin strongly arched, antero-dorsal margin straight, surface ornamented with numerous concentric lamellae thickened and recurved, becoming erect and thin towards the posterior and anterior margins; the interstitial spaces with numerous flattish radial ridges, about equal in breadth to the intervening sulci, which are continued on to the bases of the concentric folds and to the free margin of the frills on their undersides. Lunule cordate, not much impressed under the umbo and indistinctly margined. Umbo is in the anterior fifth, large incurved and directed forwards. Inner margin of valves, excepting that of the post-dorsal region, is minutely crenulated. Posterior cardinal tooth in left valve is quadrate and bituberculated on the crown.

Greatest length, 65; *greatest breadth* at about 15 mm. behind the umbo, 57; *thickness*, 48 millimetres.

Locality.—Table Cape. R. M. Johnston *(a left valve).*

C. hormophora has a closely allied species in a common fossil at Muddy Creek, and near Morgan, which I name.

Chione (Timoclea) dimorphophylla,

Which differs in its more regularly rounded front-margin, in the less inflated and more posteriorly placed umbo; in the more impressed and concave lunule, and in the relatively different dimensions.

Length, 58; *breadth*, 45; *thickness*, 32 millimetres.

Lima Jeffreysiana.

Syn.—Lima subauriculata, Tenison-Woods (*non* Mont.). Species dedicated to Mr. Gwyn Jeffreys, F.R.S., the eminent conchologist, in acknowledgment of his assistance in its elaboration.

Shell thin, elongate-ovate with nearly straight sides, subequilateral by the slight obliquity of the hinge line, ventricose. Surface ornamented with distant, acute, longitudinal ribs and close-set, undulate, concentric striæ; the rays are very conspicuous on the middle and anterior parts, but become indistinct towards the posterior border; the intercrossing of the medial ribs and the concentric striæ form blunt imbricating serratures; the concentric striæ merge into strong folds towards the anterior border. Auricles of moderate size, equal, sharply angular. Umbos elevately and acutely produced.

Length, 23; *breadth*, 15; *thickness*, 16 millimetres.

Localities.—Table Cape. R. M. Johnston. Yorke Peninsula, Aldinga, River Murray Cliffs, Muddy Creek and Schnapper Point, Hobson's Bay. R. Tate.

L. subauriculata and *L. elliptica* differ from *L. Jeffreysiana* by their ribs, smooth sides, medial furrows, and more inflated umbos. Among recent Australian shells the fossil species approaches *L. Strangei*, from which it differs by its straighter sides, by its more numerous and acute ribs, and by being more ventricose.

The majority of the new species have considerable analogy with recent congeners; but especial interest attaches to the existence in a fossil state of the genus *Chamostrea*, hitherto represented by a single species proper to South-eastern and Southern Australia and to Tasmania. The presence of *Potamides* is also noteworthy; one of the fossil species is much larger than any known recent form. A few Table Cape species, in my hands, await elaboration; but as it is imperative that the fossils should be studied in comparison with living forms, it is obvious, unless the necessary material be readily available, that an immediate and satisfactory answer cannot be given to the question:—Which of them are now known to be living, and which of them are supposed to be extinct?

I shall be happy to work out any material, that the Society or other possessors of Table Cape fossils may entrust to me, and I may add that my very rich collection of tertiary fossils enables me to institute a comparison of the Tasmanian fossils with those from continental and other localities.

DESCRIPTION OF A NEW SPECIES OF ODAX.

By Robt. M. Johnston, F.L.S., Etc.

[*Read July* 7, 1884.]

The following is a description of a new species of Odax, caught in the waters of the Derwent, and presented to me by Captain Beddome.

Odax Beddomei (*Nov. sp.*).

$D\frac{20}{12}$, $A\frac{3}{9}$, P12-14.
L. lat. 40. L. tr. $\frac{3}{8\cdot9}$.

Body elongate. Praeoperculum entire. Snout much produced and finely pointed. Eye rather large. Height of body one-tenth of the total length, and length of head contained in the latter three and one-third times. Upper posterior margin of operculum produced into a flaccid membrane having a rayed appearance. Colour of body and fins reddish, becoming lighter below lateral line. There is a singular well

marked black elongate streak, margined with a scarcely perceptible yellow border extending over five of the upper rays of caudal fin, which latter is somewhat rounded terminally.

Total length	$4\frac{3}{4}$	inches
Length of body	4	„
„ „ head	$1\frac{1}{3}$	„
„ „ snout	$\frac{8}{12}$	„
Dia. of eye	6	mil.
Greatest depth of body...	$\frac{11}{24}$	inches
Least „ „	$\frac{1}{4}$	„

DESCRIPTION OF A NEW FOSSIL SHELL FROM THE EOCENE BEDS, TABLE CAPE.

By Robt. M. Johnston, F.L.S., Etc.

[*Read July* 7, 1884.]

Genus Crepidula (*Lam.*)

Shell oval, limpet-like, with a posterior oblique, marginal apex; interior polished, with a shelly partition covering its posterior half. They are sedentary on stones and shells, in shallow water, and are sometimes found adhering to one another in groups of many successive generations. The specimens which live inside empty spiral shells are very thin, nearly flat, and colourless. *Distribution.*—West Indies, Honduras, Mediterranean, West Africa, Cape, India, Australia, West America. *Fossil.*—Eocene. France, North America, and Patagonia. (Woodward's Manual of Mollusca, p. 277.)

Crepidula umbilicata (*Nov. sp.*).

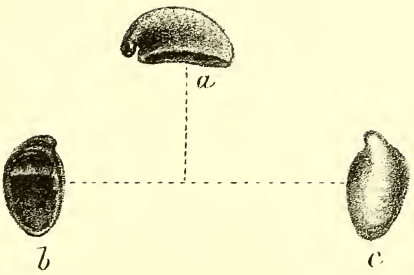
Shell somewhat roundly ovate, convex above, with nucleus submarginal and exserted. Whorls, three, rapidly increasing. Upper surface somewhat rugose, with three or four fine spiral ridges, which are here and there interrupted, the whole crossed with fine lines of growth. The internal ledge, occupying nearly the posterior half of shell, is concave with a somewhat wide and profound umbilicus; aperture deltoid; labrum thin, and obtusely angled anteriorly.

Length, 8 lines; breadth, 7 lines; depth, $3\frac{1}{2}$ lines.

Only one example from the eocene beds, Table Cape, associated with one or two species of the same genus not yet described.

Crepidula umbilicata Johnston.

FOSSIL, *Eocene Beds, Table Cape.*



Crepidula Hainsworthii JOHNSTON.

DESCRIPTION OF A NEW SPECIES OF CREPIDULA FROM THE EOCENE BEDS, TABLE CAPE.

By Robt. M. Johnston, F.L.S., Etc.

[*Read August* 11*th*, 1884.]

In addition to the three representatives of the family *Calyptraeidae* already described from the Table Cape beds, viz:—*Infundibulum calyptraeformis*, Desh. *Crepidula turbinata*, Woods, and *C. umbilicata*, Johnston, I have now the pleasure to announce the existence of a fourth species of this interesting family from the same formation. The following is a description giving the specific characters of the new form:—

Crepidula Hainsworthii, nov. sp.

Shell, thin, ovate, narrowly and abruptly arched laterally, and gently rounded longitudinally, dorsal surface finely striated with lines of growth; whorls one and a half rapidly and laxly expanding; nucleus minute, of one turn, exserted on posterior margin, slightly beaked and incurved. Inner shelf concave, transversely striate, deeply sunk and partly dividing the cavity leading to exserted nucleus; the shelf scarcely occupies one-third of the posterior part of the shell. Aperture narrowly ovate.

Length, 14mil.; breadth, 8mil.; height, 5½mil.

The younger examples differ very much in appearance from the mature form, being relatively shallower and scarcely beaked.

I have much pleasure in associating this shell with the name of Mr. Thomas Hainsworth, of Latrobe, who has largely contributed to our knowledge of the geology of the North-West Coast of Tasmania.

NOTES ON THE DISCOVERY OF TWO RARE SPECIES OF FERNS, NEW TO TASMANIA.

By Robt. M. Johnston, F.L.S., Etc.

[*Read August* 11, 1884.]

Thanks to the distinguished labours of Robt. Brown, J. D. Hooker, Gunn, Stuart, and other naturalists, the extent and distribution of our Tasmanian ferns, in nearly all parts of the island, have been so thoroughly investigated that it would seem little now remains to be done. Still there are certain Alpine regions in the North-Western and in the extreme South of this island which, being densely covered with an

almost impenetrable scrub and being very remote from centres of population, have never been thoroughly explored by botanists. Mining enterprise, however, is now ramifying these hitherto inaccessible regions with roads and forest tracks to such extent that the facilities now available to naturalists for the investigation of the flora of such parts are wonderfully improved and may probably lead to important botanical discoveries. As an encouragement to further local observation, I may mention that it is only a year or two ago since Mr. Justice Dobson reported the discovery by Mr. Geo. Lefroy of a new fern to Tasmania (*Aspidium hispidum*—Swartz) in the neighbourhood of Mount Heemskirk. This fern, prior to Mr. Lefroy's discovery, was supposed to be confined to the Cape Otway Ranges, Victoria, and to New Zealand, and its existence in Tasmania was of great botanical interest. And recently, through the instrumentality of Mr. T. B. Moore, who is at present surveying tracks in the neighbourhood of the Queen's River and Huxley Ranges on the West Coast, I have obtained several interesting geological and botanical novelties. Mr. Moore's praiseworthy observations and example might be followed with advantage to science by all surveyors and other persons who have similar opportunities in new districts; for among the specimens submitted to me by Mr. Moore were two remarkable species of ferns which I at once recognised were new to Tasmania. One of them upon diagnosis I determined to be the rare *Hymenophyllum marginatum* (Hook and Grev.), one of the smallest of the filmy ferns, hitherto only known from localities in the neighbourhood of Port Jackson, New South Wales. The other was so novel and so densely covered on all sides with a coating of tomentum that I could not readily assign its position, no *sori* being visible on any of the fronds examined by me. I immediately submitted the two species to our illustrious honorary member—Baron Von Mueller—who was extremely interested in the discovery. He at once wrote to me confirming the correctness of my determination as regards *H. marginatum*, and on subsequent reference to his type specimens as regards the other he afterwards wrote me to the following effect:—"I have carefully examined the tomentose little fern which Mr. T. B. Moore discovered near the Huxley Range. It is precisely identical with *Hymenophyllum malingii*, of Metteuius (*Trichomanes malingii*, Hooker), which species was hitherto only known from New Zealand. The associating of it with *H. marginatum*, one so rare in New South Wales, and there only found as yet, leads to the anticipation that both will yet be found in many other places. . . . I trust that this gathering of two ferns new for the flora of Tasmania will convince your fellow colonists

that yet much remains to be done for perfecting the elucidation of the flora there. I hope that particularly the North-Western regions will be well searched this season." Mr. Moore may well be complimented for these two interesting discoveries, and I hope they will encourage him to still farther prosecute his meritorious observations in that interesting part of the island. Tasmania has only one species of fern peculiar to the island, the remaining fifty-two species are common to one or other of the Australian colonies. Queensland and New Zealand possess by far the largest number of species. Out of the 201 species of ferns found in Australia and Tasmania, only 53 of them, or about one-fourth, are as yet known to exist in Tasmania. This is a small proportion when we recognise what peculiarly favourable conditions exist in this island for the growth of this most interesting order of plants.

The following is a description of the two species referred to :—

Hymenophyllum marginatum (Hook and Grev.), p. 705, Flora Austral., vol. vii. ; p. 57, Hook and Bak., syn.

Fronds on short filiform stipes, $\frac{1}{2}$ to 1 inch long ; linear and entire, or once or twice forked, with a central nerve and nerve-like margins not toothed. Sori solitary and terminal. Indusium about $\frac{1}{2}$ line long and broad, divided nearly to the base into obovoid-orbicular valves.

On mossy rocks and on trunks of honeysuckle.

Honeysuckle Hill, Queen River, Tas., T. B. Moore ; Port Jackson, N.S.W.

Hymenophyllum malingii, Mett. ; *Trichomanes malingii*, Hook, p. 66. Hook and Bak., syn.

Stipes 1-3 in l., slender, naked ; fronds pendent 4-6 in l., 1-1$\frac{1}{2}$ br., linear-oblong, bi-or tri-pinnatifid ; main rachis densely clothed with close tomentum, free throughout ; pinnæ $\frac{1}{2}$-$\frac{3}{4}$ long, oblong or ovato-rhomboidal, cut down to a rounded rachis ; pinnules deeply flabellately and sub-pinnatifidly cut ; ultimate segments linear-filiform, 1-3 long ; the substance coriaceous and soft with a dense coating of tomentum, a single vein only in each segment ; sori 2 to 12 to a pinnæ terminal on the segments ; involucre divided about half-way down ; valves denticulate at the apex, and shaggy like the frond.

Honeysuckle Hill, Queen River, Tas., T. B. Moore. New Zealand.

REMARKS ON THE OBSERVED PERIODICITY OF THE DEATH-RATE, WITH SUGGESTIONS AS TO ITS POSSIBLE RELATION WITH THE PERIODICITY OF SOLAR AND OTHER SUPER-TERRESTRIAL PHENOMENA.

By Robt. M. Johnston, F.L.S., Etc.

[*Read August 11th*, 1884.]

The remarkable curves which determine the maxima and minima of sunspots, auroral and magnetic phenomena, earth-tremors, earthquakes, barometric, magnetic, and other secular disturbances, have again and again attracted the attention of many skilled observers; and while it is generally admitted that the limits of time and space within which records of such matters have been carefully tabulated are, as yet, too circumscribed to throw light upon many anomalies, it is almost conclusive that the movements of the larger of the planets, notably Jupiter, exercise a very powerful influence mediately or immediately upon the several matters referred to. In the March number of the journal of the Statistical Society of London for 1879, there is an interesting paper by Mr. B. G. Jenkins, F.R.A.S., in which it is attempted to be shown that there is a probable connection between the yearly death-rate of England and the position of the planet Jupiter in his orbit. He states that on representing by diagram the deaths in England for the last thirty-nine years he was not a little surprised to find, as he had already expected, that there was a marked difference in the number of deaths every six years; in the majority of cases a low death-rate being succeeded by a very high one. On mapping out the curve for Jupiter's course for the last thirty-nine years ending in 1880, he found, so far as England was concerned, that the perihelion and aphelion of Jupiter corresponded in a very remarkable manner with the periods of low death-rate occurring in the years 1839, 1845, 1851, 1856, 1862, 1868, and 1874, and he accordingly, from his observation, predicted for England in the year 1880 a lower death-rate than during any former period in the history of that country.

Although this prediction was not verified exactly as regards 1880 it is somewhat interesting to note that in the two following years, 1881 and 1882, the death-rate was actually lower than in any former period in which record has been preserved.

There is, however, a serious objection to Mr. Jenkins' conclusions, inasmuch as he has based them on the fluctuations of the English death-rate only, and a comparison which I have made of the mean death-rate of thirteen of the principal States of Europe during the last 22 years does not confirm his conclusions.

On the other hand if we turn to the colonies of Australasia it will be found that there is such a close agreement with each other in the general rise and fall of their respective death rates during the last 25 years that it is not easily accounted for unless it be referred to some super-terrestrial influence of a variable character, which has the effect of intensifying or modifying the death-rate to such an extent that the local causes appear as mere ripples on the swell of a great wave in conjunction with it. Such is the effect of the minor variations of local death-rates that the significance of this common rise and fall can only be fully appreciated when shown in a diagraphical form as in the accompanying plate. It is remarkable to observe how closely the maxima of death-rate agree with Jupiter's movement from aphelion to perihelion, and with the minima of sunspots; and conversely it is still more surprising to find a corresponding agreement between the minima of the death-rate in the four colonies, viz :—Tasmania, Victoria, New South Wales, and South Australia, the maxima of sunspots, and the movement of Jupiter from perihelion to aphelion. Surely such a widely based agreement cannot be a mere coincidence ; and although it must be confessed that if we take the death-rates of the thirteen principal countries of Europe separately, the results are often conflicting or anomalous, yet it is significant that the mean of all these for the period 1861 to 1882 corresponds in a remarkable way with the movements forming the curves of periodic minima and maxima of the mean of the death-rates of the various colonies of Australasia.

Should the same curve maintain its regular course it would appear probable that the death-rate in Australasia would attain its next maximum period about the years 1885 to 1887.

Still, notwithstanding the confidence with which Wolf, Sabine, Balfour Stewart, Meldrum, and other eminent investigators maintain the coincidence of the periodicity of solar and other terrestrial phenomena, it is clear that the death-rate coincidences are not sufficiently broad and regular to justify prediction, although there is a presumption in favour of a relatively low death-rate in Australasia during years of sunspot maxima, and a more or less relatively high death-rate during years of sunspot minima. Although the several thinly populated Australian colonies are as widely separate as the various States of Europe, it is interesting to observe how much more closely the rise and fall of the death-rates of the former correspond to each other, than do the death-rates of the densely populated States of Europe.

It is also noteworthy that the mean death-rate of the Colonies of Australia, for the last twenty years, is lower than the mean death-rate of Europe by about 10 per 1,000 persons

living, and that owing to the absence of a dense population the former is comparatively unaffected by those artificial evils attendant upon crowded centres of population.

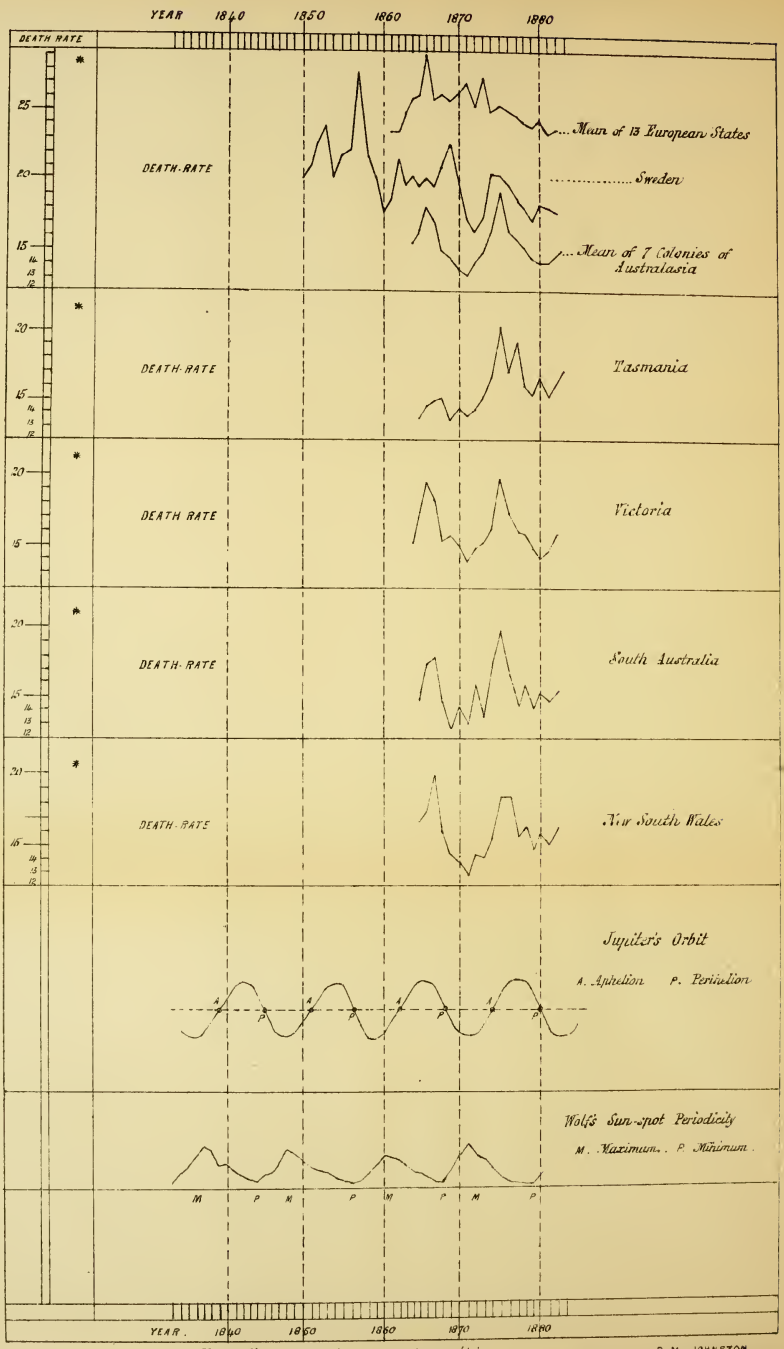
These considerations, together with our fortunate immunity from the pestilence of war, help us in some measure to explain the greater extent of agreement which has been demonstrated to exist between the several death-rates of the various colonies as contrasted with the death-rate variations of the European States, and it is also conceivable that a greater freedom from the artificial disturbances referred to makes the death-rate of Australasia a more sensitive index of complex super-terrestrial influences.

These observations together with the accompanying tables, it is hoped, will serve to excite greater interest in this important subject. I desire in conclusion to repeat that at present the coincidences pointed out by me are more suggestive than conclusive as regards the relations commented upon. I have not ventured to tabulate the death-rate of Australasia prior to 1864, as, owing to the absence of proper records of migration, the estimates of population during the earlier years are not trustworthy. There is sufficient evidence however to conclude that in the years 1853-1856 the death-rates in Tasmania and Victoria, at least, were unusually high. This period also corresponds with the position of Jupiter in his orbit between perihelion and aphelion, and also with the minimum sunspot period.

Doubtless there are other complex relations which obscure the question under consideration, but the independent observations now carried on in all parts of the world by so many skilled investigators will sooner or later enable us to understand them more thoroughly than we do at the present time.

Comparative table showing the suggested coincidence between the death-rate and certain super-terrestrial phenomena :—

DEATH-RATE AND SUN-SPOT PERIODICITY COMPARED



ANNUAL DEATH-RATE OF VARIOUS COUNTRIES.

—	Europe.		Australasia.							Mean of Thirteen Principal States of Europe.	Mean of the Seven Colonies of Australasia.	Sun Spot Numbers (Wolf's).	Relative position of Jupiter in his orbit. *A* Aphelion. *P* Perihelion.
	England.	Sweden.	Victoria.	New South Wales.	South Australia.	Queensland.	Western Australia	New Zealand.	Tasmania.				
1804	..	...	...	..	...	...	...	..	...	...	...	73·1*	—
1810	...	..	...	...	..	...	..	..	...	...	...	0·0†	—
1816	...	...	...	...	...	...	...	...	...	...	...	46·4*	—
1823	...	..	...	..	...	..	..	...	...	...	..	1·8†	—
1830	...	..	...	...	...	...	...	...	...	...	...	70·7*	—
1833	...	...	...	..	..	...	..	...	..	..	...	8·5†	—
1837	...	...	...	..	...	..	...	...	...	...	..	138·2*	—
1839	21·8	...	...	...	...	...	...	..	..	..	...	...	*A*
1843	21·2	..	...	...	...	..	..	...	...	...	..	10·7†	—
1845	20·9	...	..	...	...	...	...	..	..	..	...	...	*P*
1848	24·7	...	..	..	...	..	..	...	..	..	...	124·3*	—
1851	22·0	20·8	..	...	...	..	...	...	..	..	...	..	*A*
1853	22·9	23·7	...	..	..	...	...	...	..	...	...	...	—
1856	20·5	21·8	...	...	...	...	...	..	17·80	...	..	4·3†	*P*
1857	21·8	23.7	...	...	...	..	...	...	17·10	...	..	...	—
1860	21·2	17·6	...	...	..	..	...	...	19·92	...	...	95·7*	—
1861	21·6	18·5	..	..	..	...	...	..	16·36	23·4	...	77·2	—
1862	21·4	21·4	...	...	...	...	...	..	15·01	23·1	...	59·1	*A*
1863	23·0	19·3	...	..	..	..	..	...	15·49	24·4	...	44·0	—
1864	23·7	20·2	...	..	..	...	...	...	15·34	25·5	...	46·9	—
1865	23·2	19·4	16·97	16·41	14·30	21·42	..	15·13	13·40	26·0	16·3	30·5	—
1866	23·4	20·0	19·37	17·47	17·20	25·67	..	12·86	14·19	28·8 *	17·7*	16·3	—
1867	21·7	19·6	18·06	19·64	17·48	17·80	...	12·78	14·44	25·5	16·7	7·3†	—
1868	21·8	21·0	15·00	15·83	14·41	17·36	...	11·94	14·75	25·9	14·9	37·3	*P*
1869	22·3	22·3	15·47	14·05	12·37	16·20	..	11·73	13·24	25·4 †	13·8	73·9	—
1870	22·9	19·8	14·61	13·27	13·94	14·59	...	11·13	14·08	26·1	13·6	139·1*	—
1871	22·6	17·2	13·46	12·54	12·87	14·83	...	10·13	13·46	27·0	12·9†	111·2	—
1872	21·3	16·3	14·38	14·11	15·33	14·97	14·02	11·68	13·83	25·4	14·0	101·7	—
1873	21·0	17·2	15·02	13·84	13·48	16·06	16·24	12·67	14·60	27·4 *	14·6	66·3	—
1874	22·2	20·3	15·72	15·12	17·05	17·98	18·74	13·05	16·22	25·0	16·3	44·6	*A*
1875	22·7	20·2	19·42	18·09	19·45	23·80	17·88	15·92	20·01	25·4	19·2*	17·1	—
1876	20·9	19·5	17·02	18·11	16·28	18·82	14·18	12·66	16·57	24·3	16·2	11·3	—
1877	20·3	18·5	15·80	15·28	13·99	17·29	15·70	11·47	19·19	23·9	15·5	12·3	—
1878	21·6	18·0	15·46	15·88	15·44	20·41	14·07	11·01	15·67	24·2	15·4	3·4	—
1879	20·7	16·9	14·53	14·29	14·09	14·97	14·46	12·46	15·18	23·7	14·3	6·0	—
1880	20·6	18·1	13·70	15·57	14·85	13·59	13·24	11·46	16·12	24·29	14·0†	32·3	*P*
1881	18·9	17·7	14·16	15·12	14·49	15·02	13·80	11·13	14·77	23·30†	14·0†	54·2	—
1882	19·6	17·4	15·31	16·03	15·15	17·99	14·16	11·19	15·82	23·51	15·2	..	—
1883	..	...	...	..	...	...	..	...	17·06	...	...	...	—

* Maximum period. † Minimum period.

NOTES ON A SAPPHIRINA AND A SALPA CAUGHT OFF THE CAPE OF GOOD HOPE.

By John McCance, F.R.A.S.

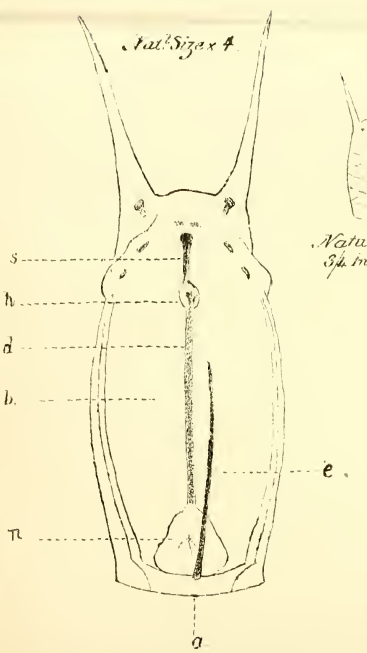
[*Read August 11th*, 1884.]

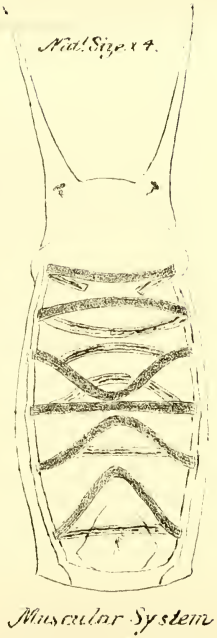
In offering the following notes to the Royal Society of Tasmania, I must apologise for the paucity of original observation which will be apparent, and plead as my excuse my hope that they may arouse a little interest in the less conspicuous forms of oceanic life, of which I believe the seas round Tasmania contain a number of interesting species.

When I captured these animals I was a passenger on board the ship Invercargill, Captain John Muir, then on a voyage from London to Port Chalmers, N.Z. At noon on January 26, 1883, the ship's position was 40° 38′ S., and 17° 30′ E., and from the following day's run and position, I calculate we were in 40° 40′ S., and 17° 35′ E., at the time when I obtained these specimens. The day was dull, but not cold, and the temperature of the sea, as taken by the mate, was higher than on preceding days. Unfortunately, I did not make a note of the exact temperature, but I imagine we were passing through one of those patches of warmer water which have been remarked to the southward of the Cape of Good Hope. Nothing unusual was noticed in the appearance of the sea, which was calm, until the afternoon, when the water was filled with brilliant blue stars, floating past the ship in great numbers. With a small canvas bag I succeeded in fishing up several of the blue stars, which were a species of *Sapphirina*, and two or three other animals, non-luminous, one of which was a *Salpa democratica*. I kept them in a glass of sea water till the 29th, when an unfortunate accident killed them, and having only a small magnifying glass, I was prevented from making a full examination of all. I preserved the sketches I was able to make, and through the kindness of Mr. Morton, of the Royal Society's Museum, I lately received from Mr. Haswell, of Sydney, information as to the species and construction of the animals depicted.

The two small crustaceans correspond so closely with the descriptions and drawings of the male and female of *Sapphirina gemma*, as given by J. D. Dana ("Crustacea," Part II., pp. 1252-3 ; Atlas, Plate 88, figs. 1 and 2), that I am very confident that they are individuals of that species. Dana's specimens were caught on the Agulhas Bank, South of the Cape of Good Hope, in 1842, April 11 and 12, and he notes that a *Sapphirina* of probably the same species was caught 12 miles N.E. of New Zealand. He specially notes the brilliant blue reflections of the male, the water on the Agulhas Bank being spangled with them for several hours. The male is about $\frac{1}{8}$ of an inch long, and $\frac{1}{16}$ of

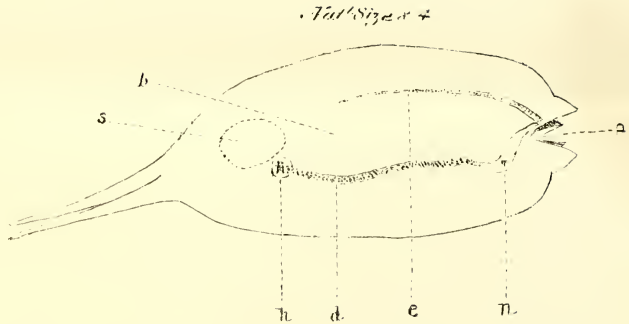
Salpa democratica

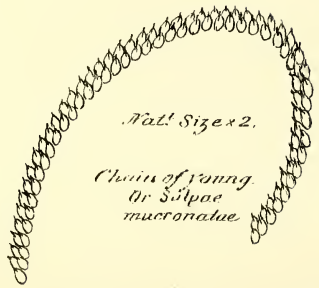




Muscular System

One of the Posterior Processes



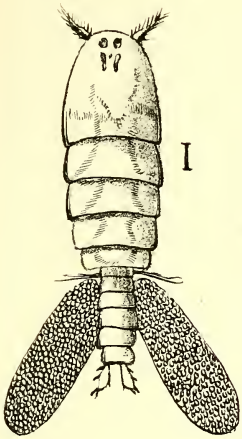


S: Democratica Caught 1883 Jan. 26.th about 3. P.M.
In 40.° 40' S. 17.° 35' E. S. mucronatae
Expelled from S. dem.r by 9 a.m. following day

a ..... Anterior opening
b ..... Branchial or Pharyngeal Cavity
d ..... Dorsal Bloodvessel
s ..... Place of the Nucleus containing digestive organs
e ..... Endostyle
h ..... Heart
n ..... Nerve ganglion - eye spot.

♀

♂



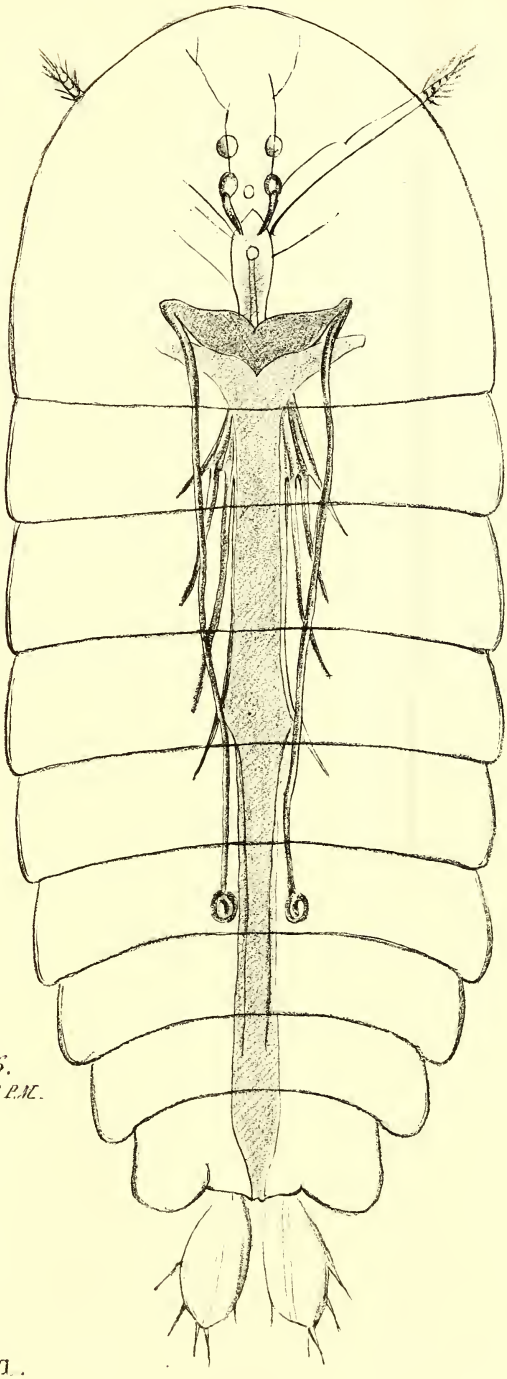
I

Natural Size × 8.

Natl Size × 8.

Sapphirinae *Caught 1883, Jan. 26.*
In 40° 40′ S & 17° 35′ E. about 3 P.M.

I



Sapphirina Gemma.

J. D. Dana.

Crustacea, Pt. ii. P. 1252.
Atlas Pl. 88. Figs 1 & 2.

an inch broad, and its body is composed of ten segments, the last being almost absorbed in the ninth, which again is much smaller than the eighth. Its activity was remarkable, and its motion sinuous, like that of the Sole. The female is about $\frac{1}{8}$ of an inch long, and $\frac{1}{24}$ of an inch broad; its cephalothorax has five joints, and its abdomen six. On either side of the abdomen, and springing from the junction of abdomen and thorax is a bag of very numerous small eggs, about $\frac{1}{24}$ of an inch long, and $\frac{1}{60}$ of an inch broad, of an elongated egg-shape. The female, like the male, was extremely nimble and active, and swam swiftly round and round the glass. The eggsacs, while the animal was in motion, were made to rapidly approach and recede from one another, thus appearing more like organs of locomotion. Both sexes appeared to me to have a finely granulated exterior, and a uniform dull lavender colour. In the head of each were a pair of elongated bronze red specks, the eyes according to Dana.

The other animal which I examined was one of those very curious Tunicates, the *Salpae democraticae*. This Salpa, Mr. Haswell writes me, "develops no sexual glands, but give origin by budding to a chain of young"—*Salpae mucronatae*—each differing considerably from *Salpa democratica*. These remain, through life, united in a chain, and "each when adult develops a single egg from which a *Salpa democratica* is developed." The solitary Salpa which I had the good fortune to capture, contained, when caught, a chain of young which were distinctly visible through the transparent body of the Salpa, curled round at the posterior end of the internal cavity. Next morning, when daylight permitted a more detailed examination. I found the chain of 80-90 minute *S. micronatae* just escaping from the *S. democratica*, the last pair of the chain becoming detached a few moments after I got them under observation. This chain consisted of a double row of animals, so small that with my inferior magnifier I could only see them as egg-shaped transparent masses, about $\frac{1}{24}$ of an inch long, with a purple knob at one end and a purple streak in the interior. The chain was about $1\frac{2}{3}$ of an inch long, and floated with the purple knobs uppermost, in a curved shape, which varied as the individuals performed their occasional simultaneous contractions.

The *Salpa democratica* was about $\frac{1}{2}$ an inch long, or $\frac{3}{4}$ of an inch, if the tapering conical processes at the posterior end are included. Its breadth was about $\frac{1}{4}$ of an inch, and its shape that of a barrel, or square-ended egg. The tunic was perfectly transparent, and the whole animal colourless, except the main parts of the nervous system, which were of a beautiful purple, and a few spots of a similar purple, which were, I believe, parts of the digestive and reproductive organs. The

integument of the body, as viewed from above, below, or one side, appeared distinctly to be composed of several layers, caused, as Mr. Haswell informs me, by the outer covering being of quite different substance and consistency from the rest. A series of six narrow ribbons, finely striated longitudinally, and lying apparently in one of the inner layers of the integument, formed an efficient muscular system. About once in five seconds, as far as I recollect, they were slowly contracted and more rapidly expanded, the resulting expulsion of the water in the interior cavity producing a forward jump of about an inch. The sixth band, or ribbon—that nearest the processes at the posterior end—did not completely encircle the body, but was interrupted for a space of about one-sixth of its length, on the dorsal side of the animal—by that I mean the side which was generally uppermost as the Salpa floated, and is opposite to that from which the posterior processes spring. The fifth and fourth bands touched on the dorsal side; the fourth, third, and second similarly lay in close juxtaposition on the ventral side.

The water which is ejected by these muscular bands is admitted by a wide orifice, with projecting thick lips, situated in the middle of the anterior end of the Salpa, and these lips were continually and regularly opening and shutting. I was able to make a sketch of the orifice, but did not arrive at an examination of the posterior one, which lay somewhere about the long processes. Just behind the anterior orifice, and making an angle of about 45° with the plane dividing the dorsal and ventral halves of the animal, was a roughly triangular purple vein or thread, having in the centre of the space enclosed a purple dot, with a few fine radiating purple lines. These, according to Mr. Haswell's letter, are the nerve ganglion and eye spot. From the centre of the base of the triangular nerve, and running along the dorsal side of the internal cavity of the Salpa is the endostyle, which is purple in colour, and about $\frac{3}{10}$ of an inch in length, or $\frac{3}{5}$ of the length of the Salpa's body. From the apex of the triangular nerve is a similar purple vessel, running in an irregular curve back to the posterior end of the animal. This is the main blood-vessel, and close to its further end lies the heart. The heart struck me as very remarkable, and I spent some time in watching it, and noticed that the membranes in it flapped for a period, then paused, then flapped differently, then paused, then flapped as before. I did not then know that these Tunicates have a heart which first drives the blood forward for a certain number of beats, and then backward for a corresponding number. I further noticed a number of globules in the blood thus driven to and fro. This was all of the interior that I had the opportunity of observing and drawing.

The two posterior processes to which I have referred were apparently of the same substance as the outer tunic. They were broadly conical at the base, which was about $\frac{1}{3}$ of their total length; the outer $\frac{2}{3}$ were very much finer and narrower, and covered with minute dots, which, Mr. Haswell says, were probably minute spines. In the interior of the base of each was a very strange mushroom-shaped object, of which Mr. Haswell says he does not know its precise nature, though he knows it to be as I described in my letter to him. When I sketched the process, or horn, I noted the mushroom-shaped object as coloured metallic green, but if I recollect right it was of the same bright purple as the nerve ganglion, etc., when the animal was first caught.

I have not been able to find any detailed account of the Salpae in the Society's Library, but in the Proceedings of the Boston Society of Natural History, Vol. XI., p. 17, is a detailed description, with woodcuts, of *Salpa Cabotti*, by Alexr. Agassiz. This is found south of Cape Cod, and very closely resembles the one I caught, and the description and investigation into the connection of the chain forms are highly interesting.

CANCER IN CATTLE.

[Paper read before the Royal Society of Tasmania August 11th 1884,

By H. A. Perkins M.D., Edin.]

The subject of disease in cattle is one which cannot fail to interest all sections of the community, as well the stockowner who provides for the market as the inhabitants of towns who consume the meat, and to whose advantage it must be to obtain the most wholesome supply of food. At a time when cancer among human beings has *been said to be on the increase, the nature of such disease among cattle not only merits attention at the hands of veterinary surgeons, but furnishes material for speculation to medical men. For in these days of minute organic life, of micrococci and bacilli, at a time when so many diseases find advocates for their origin and development in the theory of contagious living organisms, it might be a fair deduction to draw that the disease in man derived its prevalence and potency from living spores transmitted from the diseased meat which we colonists so unsparingly consume. The more especially as specimens of such disease called cancer in cattle areneither few nor hard to find, and the description of Osteo Sarcoma which I am about to give, is based on examples obtained in Tasmania. "The time has

[*Statistics of last 14 years show that though there has been an increase in the number of deaths from this cause, yet that the population has increased in nearly the same ratio.]

passed for the question of germ genesis and propagation to be considered as matter fitting only for the diversion of scientists," (*Lancet* June 21 1884.) Osteo-Sarcoma, or what is called cancer in cattle, is a disease affecting the lower jaw in most cases, and on very rare occasions the upper jaw, is most frequently met with in steers, cows, and bulls in the order named between the age of two and six years The favourite side of origin of the disease is at the second or third molar teeth.

When first presenting itself, it causes an apparent thickening of the bone, attended later on with a globular or ovoid swelling gradually enlarging beneath the skin. The swelling is most prominent on the inner surface of the jaw. At first the skin moves freely over the tumour, but in advanced stages it becomes adherent to the bone, and is with some little difficulty removed or scraped, off. Should the parts be struck and inflammation ensue, ulceration of the skin takes place, exposing a raw surface, and at later stages, openings or fistulae are formed, leading to cavities within the medulla of the bone ; through these openings, a discharge of more or less pus is continually taking place. Eventually, great pain is felt on mastication, and as the bones become further involved, the teeth drop out, ultimately, if not slaughtered, the beast perishes from exhaustion and emaciation. These tumours occupy months, and even years in their development, the soft tissues become changed into a dense mass of fibrous tissue, and the bone is converted into a porous-body, large cavities enclosing thin bony plates. In order to obtain a section of the bone, removal of one or two teeth is necessary, and then it will be seen at once on sawing through the bone, that the appearances presented are very different from those of healthy bone.

The specimens shown were one of the lower jaw, and two of the superior maxilla, the disease in the last extending from the orbit, and showing well the honey-combed appearance of the eroded bone. In a healthy jaw, the boundary lines of compact or hard tissue and soft spongy bone are well marked. In the diseased bone, the soft spongy tissue at the root of the tooth, or in other words, the marrow is broken up and subdivided by numerous trabeculæ of bone which surround cavities containing a soft, red pulp ; the outer hard casing of bone is so expanded and invaded by these deposits, that the landmarks of hard and soft are obliterated, and the substance of the bone is partitioned into divisions or islets of various shapes, and marrow and bone, or rather soft material and bone become intimately intermixed. The effects of this disease may be seen in other organs and parts of the body. In the lungs soft circumscribed masses varying in size from a pea to a mandarin orange may be seen. On dissection these yield a green soft pulp like substance. In the liver white umbilicated deposits may be found of a triangular shape.

In the intestines traces also may be found. A gland attached to the intestine beneath the peritoneum yielded the same soft green substance, which exuded after its envelope was cut into. In the canal itself, just under the mucous membrane, and projecting into the canal were several small nodosities larger than a pea causing ulceration of the mucous membrane, and disclosing on section the green caseous material, spoken of before. Glands also in the vicinity of the jaw have been found to be enlarged, and their contents would

in all probability resemble those of deposits found elsewhere. The muscular tissueadjacent to the diseased jaw, has been examined by me, but I failed to discover any indications of morbid deposit.

The brain and eye I have not yet had an opportunity of examining.

A microscopic demonstration of the diseased bone, may be obtained by cutting as fine a section of bone as possible with an ordinary saw, further obtaining a thinner section than the first by means of a fret saw machine, and lastly filing this down to an extreme degree of tenuity.

A section obtained in this way is seen under the microscope on the table together with a specimen of bone obtained from a healthy animal In the diseased or osteosarcomatous section, the lacunœ are enlarged and irregularly distributed in relation to the Haversian canals which are twisted and thrown across one another in different directions. It must be mentioned here that there are two sections of the bone one parallel with the ramus of the jaw and the other directly transverse, these different directons were taken with a view of showing the different relations of the lacunœ to the Haversian canals.

It is interesting in one of the morbid specimens to note the presence of triangular cells apparently occupying the mouth of the lacunœ, for these appearances are to be seen also in the soft green material of enlarged glands, where too may be seen ovoid cells with triple nuclei floating over the field in abundance.

The microscopic examination of the green material contained in one of the subperitoneal glands shewed numerous round cells containing two or three nuclei, the granular cell substance becoming clear on the addition of acetic acid, the appearances being identical with those of a section of tuberculous lung. Several large three-cornered cells containing nuclei were also noticed, and a dumb bell shaped cell like that of a crystal of oxalate of lime. The soft yellow matter from a secondary abscess in the jaw contained many thousands of round cells with multiple nuclei and all densely packed, showing activity of growth.

The cause of this disease has been attributed to a blow or to external violence. This cannot, however, be the real underlying cause, because in the first place where a blow is struck on healthy bone, the result, if any, would be ostitis or periostitis or simple inflammation of the bone, which after a while would subside, or would only leave behind some innocent thickening.

Some explanation of the choice of site for the manifestation of the disease, may be found in these considerations :—

1. The head and jaws of horned cattle are more exposed to injury than other portions of their bodies—obstacles being often brushed aside by the heads or horns of beasts, and danger first confronted by the same parts. Further, it is well-known that when the disease breaks out in the upper jaw, it very often arises from the fact that a briar or thorn has scratched the upper or lower eyelid, given rise to subsequent irritation—provoked an open sore—and developed into a scrofulous growth by the continued irritation and rubbing which the beast has sought to relieve itself with.

2. Again, just as in man, the favourite site of manifestation of scrofulous disease is in the hip, so in cattle, it is quite probable that

the jawbone may be the favourite site selected, the more so, as it is a peculiarity of scrofulous diseases in cattle, that only one site is chosen as an external diseased centre from which the concomitant* disorders slowly spread.

We shall, I believe, more rightly attribute the cause to some unhealthy taint in the constitution, such as scrofula or tuberculosis—tubercle has already been found in the matrix of specimens and both Gangee and Williams attribute this disease to a tubercular diathesis. The Tuberculosis Board of Inquiry in Victoria state as one of the results of their investigationsthat the so-called "cancer" of the jaw "is in the great majority of instances a purely scrofulous affection."

Further in the neighbourhood of the growth, may be found examples of tuberculous nodules in the tissues adherent to the bone.

Again the microscopic appearances of the glands adjacent and of the tumours in the lung and liver found in cases of osteosarcoma coincide with the appearances seen in the same organs, when an animal is suffering from tuberculosis. Though I have examined several specimens, I have not yet come upon cells which in any way resemble those of cancer. Moreover tho' in advanced stages of osteo-sarcoma the soft parts are adherent to the bone, there is no general brawniness and adhesion of surrounding parts to the extent met with in cases of confirmed cancer. The presence of calcareous particles in the deposit is just what we might expect in cases of tubercle though not often, if ever, seen in cases of cancer.

* Willows Report.

Colour and Sex.	Age in years.	Time affected.	External manifestation.	Internal manifestation.	Condition.	Remarks. How disposed of.
No. 1.						
Red cow. ...	4 years.	unknown.	Osseous tumour on right lower jaw.	Slight caseous deposit in liver.	Good.	Was used as food in Hobart. This was the animal I procured specimen of Bone.
No. 2.						
Red and white steer.	6 years.	2 years.	Tumour on both upper jaws.	Osseous deposit on liver, lungs, & mesenteric glands.	Fair.	Used for pig's food.
No. 3.—Red steer....	4 years.	4 months.	Small tumour on left under jaw.	Slight caseous deposit on liver and fluke.	Good.	Used for dog's food.
No. 4.						
Red and white cow..	5 years.	2 years.	Large tumour on left jaw, ulcerated.	All the internal organs more or less infiltrated.	Medium.	Used for pigs.
No. 5.						
Red and white steer.	5 years.	2 years.	Very large tumour on both under jaws.	Extensive infiltration of liver, lungs & mesenteric glands.	Fair.	Used for pigs.
No. 6.—Red steer...	5 years.	3 years.	See No. 5.	Very little internal deposit of caseous material.	Fair.	Destroyed.
No. 7.—Red steer....	5 years.	2 years.	See No. 5 and 6.	See No. 6.	Fair.	For dogs.
No. 8.—Red steer....	6 years.	3 years.	Large tumour on left upper jaw.	Deposit on liver, lungs, & mesenteric glands, & fluke in liver.	Very good.	Used for pig's food.
No. 9.—White bull..	3 years.	1½ years.	Tumour on right under jaw.	Extensive infiltration in all internal organs. Flukes and parasites in mesenteric glands.	Medium.	Burned.
No. 10.						
Red steer. ...	aged.	about 2 years.	Both lower jaws affected.	Hydatids in liver and lungs, general manifestation similar to No. 9.	Medium.	Burned.
No. 11.						
Red steer. ...	aged.	3 years.	Both jaws affected.	In liver, lungs, and kidneys were found calcareous deposits.	Very poor.	Unknown.
No. 12.						
White and red cow..	5 years.	unknown.	Right upper jaw.	Portion of liver, lungs, and intestines, examined by myself.	Medium.	For food in Hobart.

One conclusion is very clear after reading the result of Mr Park's *post mortem* examination, and that is, that the larger the tumour on the jaw and the more ulcerated it is, the more extensively are the internal organs affected.

It is probable that the deposits in the internal organs are secondary deposits and that the primary seat of disease is in the jaw. But it is easy to obtain many specimens of tuberculosis in lungs and other organs, in animals in which there is no outward manifestation of the disease.

Mr. Willows, in his report on Tuberculosis, printed by the N.S.W. Government, is inclined to attribute the existence of this pest in rabbits to the prevalence of tuberculosis, and in a minor degree of osteosarcoma in Tasmanian cattle. It is conceivable that in rare instances rabbits may have ingested some tuberculous matter, voided from cattle ; but as rabbits are not carnivorous and living on succulent food, are not often seen to drink, this explanation does not appear to me to afford a sufficiently open channel for the dissemination of the virus.

It may be asked again, Whence did the cattle obtain their germs of the disease ? Is it not more likely that the rabbits in their turn infected the cattle. We know that the disease exists among kangaroo. It is impossible, I believe, to say which order of animals first infected the other. Rather do we know that both among men and animals the germs of scrofula exist in abundance, that the disease has been handed down from time immemorial, and arising primarily we may surmise from a degeneration of healthy cells has been perpetuated by in-breeding, by over-feeding, and in some climates by the close confinement of cattle during the winter months, and that it is always ready to declare itself at certain critical periods in weakly animals, as for instance during the eruption of the molar teeth.

The evidence of Mr. Kendall, given before the Tuberculosis Board in Victoria is so important that I quote it in full from *Australasian*, Feb 1884, and will discuss some of his conclusions and recommendations. "Mr. Kendall considered the disease to be commonest among shorthorns. He had seen several cases of tuberculosis of brain and he differed from others, in considering ulceration of intestines to be comparatively common at least in calves, and in holding that the udder was affected in many cases. He saw little of this disease till about 3 years ago, but last year, 1883, he estimated that he had seen about 100 diseased animals living and dead. Had found it once in a native bear and in a baboon at the Zoo, but had not observed the disease in sheep, pigs, or rabbits. True cancer in cattle was rare, most supposed cases being really scrofulous diseases of the glands about the head and neck. The duration of the disease was very uncertain, and might be rapidly fatal or might last for years, an animal, perhaps, being fat even after a year. He thought the disease widely spread, and prevalent in the colony. The animals most frequently affected were Shorthorns and Ayrshires, and he lately saw a very marked case in an Ayrshire bull, which was being used for stud purposes. He considered that the scrofulous disease of glands was most common among animals of two to four years, while in calves the joints often were diseased. The disease called "foul" affecting the feet in old cattle, he considered to be

tuberculous, and had found it associated with tubercle in the internal organs. The disease was commonest of all among dairy cows. It was hereditary, and he had satisfied himself of this by tracing cases, and he had seen instances of congenital tuberculosis. This latter point he had verified by examining calves which had been dead born, and he had also found the liver and lungs affected, not more than a week after birth. Calves of tuberculous cows did better if put to a healthy foster mother, and he had known one do well whose mother died of the disease very soon after its birth. Tuberculosis was contagious and he had full knowledge in England of a herd in which the disease broke out and proved very fatal after a tuberculous bull was introduced into it. When questioned further, he stated that in that case, animals had all been constantly housed and under decidedly unhealthy conditions. He had seen calves and pigs previously healthy injured by consuming the milk of tuberculous cows, even when supplied with other good food, and he was satisfied that they acquired tubercle. He was not of opinion that there was much risk of contagion when animals lived in the open air, and had been puzzled to account for the prevalence of the disease in this country where stock generally lived under natural conditions. There was no connection between pleuro-pneumonia and tuberculosis, other than the possible production of a predisposition." He was of opinion that the disease might sometimes be spread by inoculation by mistake for pleuro-pneumonia by incompetent persons, but had known no cases. The chief cause of the prevalence of the disease in this country he thought to be hereditary transmission from affected imported stock. He had not had much experience among dairy cows but had seen cases and thought the disease must be common in the Melbourne dairies from casual observation of animals feeding in the parks and other places. He has not seen any authenticated case of children injured by the use of milk nor of adults from consuming tuberculous meat, but he had seen tuberculous glands still attached to meat exposed for sale. As to precautions to be taken he would have dairies inspected and all diseased cows slaughtered, as he believed there was risk from using the milk, even when the udder was not affected. The sale of meat need not be absolutely prohibited if the disease was slight. Even though the animal was in fair condition, if there were large cavities in the lungs from softened tuberculosis the meat should be condemned, and if the animal was in bad condition, whatever the stage of disease, it should also be condemned. There should be some freedom given to a competent inspector. Tuberculosis should be added to the list in the schedule of contagious diseases. All abattoirs should be inspected, and the expense need not be great as a constable or other non-professional person might be instructed, so as to be able to detect the disease. In large towns, the inspector might be and ought to be stricter. If the disease was to be checked, it could only be by killing off affected animals, this should be done at once when the signs are unmistakable, and the doubtful might be kept separate for a time and breeding from them prevented. Regular inspection of all stock he admitted to be impracticable, but he considered that all stud bulls ought to be kept under inspection. He believed that the introduction of fresh stock into the colony was desirable, but all animals should be inspected on arrival, and if necessary kept in quarantine till the absence of disease was estab-

lished. He would be prepared to recommend quarantine for 4 months in all cases as he did not think that very much value would be attached to certificates from the breeder or previous owner. If the animal was suffering in any way, quarantine might be prolonged with the right of appeal by the owner for consultation with a duly qualified veterinary surgeon. The question of compensation was a difficult one, but the witness thought that none need be given to the owners of home-bred animals having the disease in unmistakeable form. With reference to inspection at the border, Mr. Kendall said that it ought to be strict, as many tuberculous cattle came from N.S.W. and Queensland. He was not acquainted with the present system, and if all the colonies could agree on some uniform legislation, inspection would not be necessary."

It will be noticed that Mr. Kendall attributes the prevalence of the disease to hereditary transmision as one of the chief causes. In Tasmania where there is so much in breeding, it is quite possible that constitutional diseases may be handed down from one herd to another until in a country of limited area like this island, we find after the lapse of years that the whole of the stock is more or less affected. Hence, the recommendation which all who are conversant with the subject make, is the introduction of fresh stock of hardier breed such as the Polled Angus into Tasmania from time to time, and this is all the more necessary when we come to consider that it is only at intervals during the last 25 years that fresh stock has been imported and then only in very small numbers.

2. Considering the prevalence of scrofulous and tuberculous diseases in dairy cows, it is desirable that all dairies should be regularly inspected, for we know also that no food affords such pabulum for the germs of typhoid and scarlet fever as milk.

3. In remote districts weakly cattle may continue to exist for a long period without interference. The prevalence of disease in such districts could be certified by a constable who could send for a qualified veterinary surgeon to inspect the herd.

4. It is undesirable that weakly or suspected animals should continue to breed or be at large amongst breeding stock. Hence the recommendation of Mr. Kendall's is a good one, viz. that they should be killed off. Further, the inspection of stud bulls has never been attempted in Tasmania, though every one will allow the necessity of it. A license is objectionable for an owner might be willing to pay a license for an unhealthy, though well-bred animal.

5th. Quarantine is of too short a duration to determine the existence of tuberculosis and scrofulous diseases. As it might take a year or more to develop such —and as other diseases, such as foot and mouth, and pleuro pneumonia make their appearance at most under three months, and the former much earlier, no good can be gained by prolonging quarantine over three months. Animals in quarantine who are manifestly labouring under some constitutional disease should be slaughtered at once.

5th. In all large cattle markets beasts are inspected by a competent veterinary surgeon. This is the case at Glasgow, and also at Deptford, where often at both places 2,000 cattle are put up for sale in one day. At these places cattle are inspected beast

by beast before being landed. Cattle are not examined by a veterinary surgeon before being put on board the intercolonial steamers, but they are inspected on arrival. It is often taken for granted in Tasmania that all beasts bred in the Island, and brought to the abattoirs are fit for human food, whether they have been inspected or not.

6th. That the milk of affected cows is prejudicial, seems beyond a doubt, for witnesses again and again attribute the death of calves to sucking the milk of such mothers ; and it is absolutely certain that when the udder is tuberculous that the milk must contain the germs of disease in abundance. There can be no question that similar milk, even though diluted, must be fraught with danger to infantile life. We hear much of using the milk from one cow for children, but little care is taken to see that this cow is a healthy one ; if the cow be unhealthy, the victimised infant will have a daily increasing dose of noxious food unvaryingly poured into its system. On other grounds such as the periodical occurrence of rut or heat in cows, more frequently in scrofulous cows, the milk of one cow only is undesirable, for at such periods the milk is deficient in nutritive elements, and would not be so good as milk obtained at regular intervals from two or three cows. As a precaution in dealing with suspected cases, milk ought to be well boiled before using. We may, however, be assured that did those who have the charge of infants know that the milk was likelyto possess such characters, they would not use it at all. Some veterinary surgeons assert that they have seen evidence of tubercle in muscular tissue. It is with the muscles or beef that we are mostly concerned as forming the staple of our food. If an animal is in good condition, and the meat be well roasted or cooked before eating, there can be no danger of using it for food, provided there were no extensive marks of disease in an advanced stage present in the viscera. The raw meat and viscera of osteosarcomatous or tuberculous cattle should never be thrown to dogs or pigs There are he same objections to this as to the general inoculation of rabbits with tubercle, as the raw meat ingested must present every facility for the escape of tubercle bacilli into the blood of pigs and dogs, and aid to disseminate tubercle far and wide. Though Mr. Kendall has not seen tubercle in sheep and rabbits, it has been observed in these animals by others.

SLAUGHTER YARDS.

Another recommendation to be made is the removal and improvement in the working of the slaughteryards or abattoirs. The choice of a more fitting site has already occupied the attention of the City Council. The chief requisites are besides being at a sufficient distance from town that there should be a good fall for drainage and abundant water supply.

Too much stress cannot be laid on cleanliness, and to this end it is desirable that the blood of slaughtered beasts should be caught in dishes or receptacles ; at present the blood offal, etc., are allowed to stream on the floor and are washed away by water, but not by a sufficient force to carry all the refuse away, the consequence is that drains are choked and in warm weather decomposition from putrid remains is set up. All meat should be conveyed from the yards under proper cover.

Dogs may sometimes be seen wandering about when slaughtering is going on. When we can point out numerous cases of large hydatids of hard cartilaginous flukes and of tubercle spread thro' many of the viscera in the carcases of slaughtered animals ready for human consumption, it is needless to say that no good can result from allowing dogs or other animals to appropriate morsels of the same. Though every expedition is made in the slaughtering of animals after arrival, it is desirable that they should be well fed, and if possible, allowed to graze in the interval. At present they are not well enough fed. In making these remarks I desire to say that the Superintendent uses every means in his power to enforce cleanliness, ventilation, etc., but until new yards are constructed, satisfactory results will not follow.

A suggestion I may make is the establishment of a hulk or floating sheds in the river as an abattoir, where drainage and cleanliness could be perfectly maintained. Animals should be yarded or enclosed on shore prior to slaughtering, and all diseased viscera and condemned meat burnt.

Lastly, all cases of diseased cattle within the city boundary should be reported to the Municipal authorities, or to a Government Stock Office ; and inspection should thereupon take place by a competent veterinary surgeon.

OBSERVATIONS ON SIX RARE FISHES RECENTLY CAPTURED IN TASMANIAN WATERS.

By Robt. M. Johnston, F.L.S., Etc.

[*Read October* 13, 1884.]

During the last two months several new or rare species of fish have come under my observation, which I have thought desirable to bring specially under the notice of this Society. Mr. Morton has been praiseworthily arousing the interest of local observers in various parts of the island, and it is to him I am chiefly indebted for three of the interesting forms examined and hereafter referred to. The Fishes on the Western, Northern, and North-Eastern parts of the Island are as yet imperfectly known. The recent discovery of the Snipe, or Trumpet Fish (*Centriscus scolopax*), at Port Sorell, by Miss Lodder, and the capture of the Moki (*Latris ciliaris*), so common in New Zealand, at George's Bay, by Mr. W. L. Boyes, lead me to hope that many new forms from these imperfectly investigated regions will soon be added to our list of Tasmanian Fishes. The following are the Fishes particularly referred to :—

Family Percidæ—Genus *Oligorus.*

Seven branchiostegals ; dorsal with eleven spines ; anal

with three; operculum with one point; scales small. Australasia.

Oligorus gigas. Owen.

Hapuka. Hutton's Fishes of New Zealand, p. 1; Gunth. Cat. I., 251.

B. 7; D. $\frac{11}{12}$; A. $\frac{3}{8}$.

Length equals three times that of the head; height of body rather less than the length of the head, which is three and one-third times that of the snout; spinous part of the dorsal lower than the soft part but two and a-half times its length; ventrals under the pectorals, which are short; præoperculum obtusely serrated; scales cycloid. Color, dark greyish above lighter below.

A very large representative of this species was recently captured near the mouth of the Derwent. Unfortunately I had no opportunity for examining the fish personally, but on several occasions I have learned from fishermen of the capture of the "Hapuka" in our waters, and from enquiries made of several intelligent observers I am satisfied that the reference to *O. gigas* is correct Any doubts existing, however, will be soon removed. This fish is closely allied to the fresh-water "Murray cod" (*Oligorus Macquariensis*), and therefore is of more than usual interest seeing the great difference in habit of the two fishes. Dr. Hector states (p. 102, Fishes of New Zealand) that the "Hapuka" fishing in New Zealand "is excellent sport, the average weight of the fish being about 45lb., but occasionally large specimens reaching to 130lb. weight are caught. The head and shoulder cut of this fish is most dainty food, but the flesh of remainder is rather coarse and stringy."

Family Pristipomatidæ—Genus *Erythrichthys.*

Rather elongate; mouth protractile; two dorsals with several isolated spines between; caudal forked; no teeth in the jaws nor on the palate (*præoperculum entire?*); scales rather small, ctenoid.

Molucca sea, Sunda sea, Australasian seas, Pacific.

Erythrichthys nitidus. Rich.

B. 7; D. $\frac{13}{10}$; A. $\frac{3}{10}$; P. 21; L. lat. 96; L. tr. $\frac{8}{20}$.

Body of a handsome elongate shape. Length rather more than three and a-quarter times that of the head, which is about equal to the height of the body. Whole of the head, base of the pectorals, lower half of anal and soft dorsal and outside of the ventrals covered with ctenoid scales. Caudal with small scales almost to the tip; small scales also intermixed with the normal-sized body scales; angle of præopercular rounded. In the specimen examined, however, the

P.O. is not quite entire, as its margin as well as that of the sub-operculum is very minutely dentate. Color of body uniformly steel-blue above with silvery sides, having, in one aspect, a decidedly pinkish shade. The finer subordinate shades of color on the sides, however, are more or less iridescent, and vary with the position of the observer. The fins are all tinged with pink towards roots and extremities; the pinkish pectoral fin is particularly noticeable. Mr. Charpentier has succeeded very fairly in catching the characteristic colors of this handsome little fish, which, in other respects, is most faithfully described and figured by Dr. Richardson. (Voyage of the Erebus and Terror, p. 47.) My attention was first drawn to this specimen by Mr. Morton, who obtained it in one of the fish-stalls. It was captured with flounders in shallow water near Sorell in the estuary of the Derwent on 18th August This is the first representative of the species seen by me during a residence of 14 years in Tasmania. I have reason to believe, however, that it is seen by fishermen occasionally in the neighborhood of Swansea.

Family Cirrhitidæ.

Latris ciliaris. Forst.

Locally known as "Moki," in New Zealand. Gunth. II., 86.

B. 6; D. $\frac{17}{39}$; A. $\frac{3}{32}$; P. $\frac{9}{6\text{-}8}$; L. lat. 84.

Length four times that of the head, or three times the height of the body; six to eight simple pectoral rays; no vomerine teeth; above plumbous; below silvery white with small brown dots; fins blackish.

Port Jackson and Tasmania, not common; New Zealand, abundant.

Mr. Morton obtained a fine specimen of the above species from Mr. W. L. Boyes, who captured it in George's Bay. In my catalogue I stated that it was doubtful whether this species really existed in Tasmanian waters, because the Common Bastard Trumpeter (*L. Forsteri*) had been often wrongfully referred to *L. ciliaris.* This matter is now fortunately set at rest.

Family Centriscidæ.

Centriscus scolopax, L.

The *Snipe, Bugler*, or *Trumpet Fish.*

B. 4; D. $\frac{5}{12}$; A. 20; P. 16; V. 5; C. 6 x 4 x 5 x 7.

Gunth. Cat. III., p. 518; Johnston's Cat., p. 123.

The height of the body is contained once and three-fourths to twice and one-third in the distance of the operculum from the base of the caudal.

The second dorsal spine is very strong, *and serrated posteriorly,* its length being contained once and two-thirds to twice and two-thirds in the distance of the opercle from the caudal.

Atlantic, South Coast of England, Mediterranean, Tasmania.

I was fortunate in obtaining a fine specimen of this fish from Miss Lodder, who informs me that she has captured two or three specimens near the Leven. The specimen sent to me was captured at Port Sorell. It corresponds in every particular with Gunther's description. All my doubts about its existence in Tasmania are now set at rest. It is very probable, however, that the two closely allied species *C. gracilis* and *C. humerosus* also exist in Tasmanian waters.

The following are the dimensions of the specimen sent by Miss Lodder :—

Total length	100	milimetres
Length of head	$41\frac{1}{2}$	„
„ „ snout...	$27\frac{1}{2}$	„
Greatest depth	25	„
Least „	5	„
Longest spine	35	„
Greatest dia. of eye	8	„

Family Labridæ.

Cossyphus unimaculatus. Gunth.

" Pig Fish" of Sydney Fishermen (Macleay).

Gunth. Cat. IV., p. 109 ; Macleay's Cat., p. No. 692.

D. $\frac{12}{11}$; A. $\frac{3}{12}$; L. lat. 36; L. tran. $\frac{6}{12}$.

Snout pointed, its length being more than one-third of the head ; head longer than high ; præoperculum minutely serrated ; pectoral fin obliquely rounded, more than half the length of the head ; the ventral longer, the first ray produced. The dorsal fin increases gradually in height from the first spine to the seventh soft ray ; the last spine is twice as long as the first and equal to the ventral spine. The anal spines are exceedingly strong, the third longest, nearly as long as the twelfth dorsal spine ; the longest ray is shorter than the base of the fin. Caudal fin emarginate with the lobes produced. Color uniformly bright vermilion ; extremities of fins with an orange tinge. There are no black spots at the base of the sixth and eighth dorsal spines, nor a small black speck on the fifth and ninth, as in the original description of the species ; but Mr. Morton informs me that these features are frequently absent in the Port Jackson specimens, and are therefore not reliable characteristics.

This specimen was obtained recently by Mr. Morton from one of the fish-stalls. Its capture in Tasmanian waters is of great interest. No doubt, like the Schnapper, it is a straggler, otherwise it would be captured more frequently on our trumpeter fishing grounds.

Labrichthys Mortonii, n.s.

D. $\frac{9}{11}$; A. $\frac{3}{10}$; L. lat. 23.

Head contained $3\frac{2}{3}$ times in total length. A posterior canine tooth; cheek with four rows of minute scales; præoperculum entire. The caudal fin is slightly forked. The muciferous channels of the scales of lateral line are bi- and tri-furcate anterior to peduncle; where the lateral line suddenly descends below posterior of soft dorsal these tubes are all disposed on the upper side and become simply furcate. Color yellowish purple with longitudinal streaks of lighter yellow between each row of scales below lateral line. Dorsal, anal, ventral, and pectoral fins of a lighter shade; the two former fins have the membrane interspaces marbled with yellow spots; there is a longitudinal streak of lighter purple along the base. Extremities of caudal fin of a brighter yellow. *There is a distinct black blotch on the body at root of the last two soft rays of dorsal.*

Total length, 9 inches; length of head, $2\frac{1}{2}$ inches; greatest depth, $2\frac{1}{4}$ inches.

Mouth of Derwent: Found occasionally at a depth of 40 to 50 fathoms.

THE RIVER DERWENT: NOTE UPON THE FLOOD OF 23RD SEPTEMBER, 1884.

By A. Mault.

[*Read October* 13, 1884.]

It may be useful to put upon record a few observations upon the late flood in the River Derwent.

I should premise that during the past two years I have had occasion, in connexion with the survey of the Derwent Valley Railway, to take various measurements across the river at several places above New Norfolk; and at these places I have noted the volume of water, and the rate of flow at different seasons. From these observations I inferred that the average flow of water in the Derwent would be equal to that of a river 360 feet wide and 4 feet deep running at the rate of two miles an hour, giving a daily quantity of $13\frac{1}{2}$ million cubic yards, or $10\frac{1}{3}$ million tons of water. The

average fall of the river along so much of its course as I am acquainted with above tidal influence is rather more than 4 feet to the mile, representing 2,000 horse-power to the mile, much of which could be made available or transformed into electric dynamic force.

Again, as far as can be judged from the Government charts, the area of the basin drained by the Derwent above New Norfolk is about 3,200 square miles, or a little more than two million acres. If it be assumed that there is a mean yearly rainfall of 36 inches over this area, of which one-half is taken up by evaporation and plant nourishment, and the other half drained off by the river, the river at New Norfolk would have to carry off a mean daily quantity of $13\frac{1}{4}$ million cubic yards, or $10\frac{1}{4}$ million tons of water—a quantity about equal to that of the foregoing calculation of what is actually carried off.

Residents in the valley above New Norfolk say that the flood of the 23rd of last month was higher than any seen since the great flood of 1863. Below New Norfolk the water is said to have risen higher about four years ago, when perhaps the flood coincided with exceptionally high tides in the river. But both above and below the town mentioned the flood of 1863 was much higher. At Valleyfield they say that it was about 4 feet higher than that of last month, at Mr. Inge's about 3 feet, and at the mouth of the Plenty River about $2\frac{1}{2}$ feet.

I did not see the river when the flood was at its highest on the 23rd September; but on the 24th, when I examined it, the water had gone down several feet, still the marks of its greatest height were easily to be seen. At the mouth of the Dry Creek rivulet this greatest height was about $17\frac{1}{2}$ feet above the mean level of my former observations, and at the mouth of the Plenty River nearly 20 feet. This variation is to be accounted for by the difference in the conformation of the river at these two points as regards direction, inclination, and obstructions. I had not the opportunity of observing the flood higher up the river.

Although possessed of the sectional area of the flood-water and many other elements necessary for calculating the quantity of it that was passing, it is quite impossible to make anything but a mere approximation as to this quantity. There are so many eddies and swirls, so much still water, so much back-draft and under-draft, that only a guess can be made as to the mean hydraulic depth and the rate of the real downward current of water. If a calculation be permissible in such circumstances I should say that at the height of the flood on the 23rd September about nine million tons of water were passing every hour, about 21 times the mean hourly flow of 430,000 tons.

ŒSTRUS OVIS, OR GADFLY OF THE SHEEP.

By A. Morton, Curator Royal Society's Museum.

[*Read October* 13, 1884.]

A few notes on the introduction of what I am led to believe to be a new grub or fly to Tasmania, may be of some use to the Fellows of the Royal Society. The above insect, I find, is not of any recent date, but is spoken of by a learned physician, Alexander Trallien, in the year 560. They are well-known in Europe, and have been met with at times in the Australian colonies.

About 10 days ago Mr. Maddox, who is connected with a butchering establishment in this city, brought me in a grub that is on the table, saying that in cutting open a sheep's head, near the brain, he found this grub. The sheep it was taken from was one recently introduced from the neighbouring colonies; in none of the Tasmanian sheep, he states, has he found anything like this. Several other gentlemen connected with sheep in this colony have also expressed similar opinions. On examination, and referring to some works on the disease of sheep, I find it to be the *Œstrus ovis*, or Gadfly of the sheep, belonging to the Diptera order, so named from its larvæ inhabiting the nostrils or frontal sinuses of sheep in particular, although it has occasionally been found in goats and deer. In Europe, it assumes its perfect winged form in some uncertain period from May to July; it then becomes an intolerable nuisance to the sheep, especially in woody countries and in the neighbourhood of copses; so much so that if only one fly appears, the whole flock is in the greatest agitation. The larvæ or grub is composed of 10 or 11 rings; when young it is perfectly white, with the exception of two small brown patches by the side of each other at its tail. At some time between the middle of July these larvæ have attained their full growth and seek to escape from their prison. While this is taking place great annoyance is caused to the sheep, continually stamping their feet and sneezing violently. It is stated that the exit of the grub is seldom seen, owing probably to the impatience of the sheep. Very rarely are more than three of these lots found in a sheep's head; some instances have, however, been quoted where a head has contained nearly a dozen. M. Valisnieri, a French naturalist, states that a worm which he took on July the 5th underwent its final change at the expiration of 40 days, but 63 days passed before one which he found in April became a perfect fly. The fly is considerably smaller than the size of the larva would indicate, the length of the wings being nearly equal to that of the body, which they almost entirely cover; they are described as being prettily

striped and marked. It is a singular fact that the fly has never been seen to eat. M. Valisnieri repeatedly offered these insects sugar and syrup but they could not be induced to touch it, although he kept one of them more than two months. The flies, both male and female, seem to be inert and sleepy things, and are generally to be seen on the rails and walls in the neighbourhood of some flock of sheep. Both French and English writers give a fearful account of the mischief which the larva effects in its dark abode. Gasparian (Manuel d'Art Veterinarie, p. 468) speaks of frequent convulsions, giddiness, and half unconsciousness, distinguished from turn sick by the violent sneezing with which it is accompanied. I have been unable to find out in any of the works on the disease of sheep whether the insect causes death.

TENTATIVE LIST OF THE NAVIGATORS WHO VISITED VAN DIEMEN'S LAND PRIOR TO SEPTEMBER 1803.

By James Roxburgh McClymont, M.A.

[*Read October* 13, 1884.]

My object in reading this list of early navigators is mainly to call attention to the paucity of information within our reach regarding geographical discovery in Tasmania—a defect which it is increasingly difficult to remedy, seeing that the works which contain such information are being eagerly bought up for the libraries of Europe, America, and the other colonies. For this reason the list I now submit is purely tentative. I trust that steps may be taken to supply the deficiency and that, meanwhile, those who possess works in this department of research in their private collections will make the fact known.

I choose September 1803 as a limit, partly because it is the date of arrival of the first colonization party* and is therefore a convenient historical landmark, partly because it approximates the period at which finality in the delineation of the Tasmanian coast-line was attained by the determination of the peninsular character of the *Ile d'Abel-Tasman* of Dentrecasteaux, and by the discovery of *Géographe*

* Rusden's *History of Australia*. i. p. 336.

Strait—finality, at least, so far as explorers from without the colony were concerned. Further corrections, due to the discovery of new harbours on the West Coast, originated with explorers within the colony.

I have restricted this list to those navigators who actually landed or at least anchored off the coast, appending the names of one or two who only sighted it. Following the names are the dates of their visits, from the day on which land was sighted to that on which they lost it inclusive, so far as I have been able to ascertain, and the bibliographical description of the most complete known record of the voyage.

The list is as follows:—

Abel Janssen Tasman. Nov. 24—Dec. 5, 1642.
Tasman (Abel Janz). *Journal van de Reis naar het onbekende Zuidland in den Jare* 1642. *Medegedeeld door Jacob Swaart.* 8° Amsterdam. 1860.

Marion. March 3—10, 1772.
Crozet. *Nouveau voyage à la Mer du Sud commencé sous les ordres de M. Marion et achevé sous ceux de M. le Cher: Duchesmeur. Redigée d'après les plaus et journaux de M C[rozet. By A. M. de Rochon*]. 8° Paris. 1783.

Tobias Furneaux. March 9—19, 1773.
Cook (James). *A voyage towards the South Pole and round the world performed in His Majesty's Ships the Resolution and Adventure.* 2 vols. 4° Lond. 1777.

James Cook. Jan. 24—30, 1777.
Cook (James) and King (James). *A voyage to the Pacific Ocean in His Majesty's Ships the Resolution and Discovery.* 3 vols. 4° and atlas fol. Lond. 1784.

William Bligh. Aug. 19—Sept. 4, 1788.
Bligh (William). *A voyage to the South Sea.* 4° Lond. 1792.

The same. February 1792.
"Plusieurs inscriptions gravées sur des pieds d'arbres nous firent connaître que le Capitaine Bligh avoit mouillé dans cette baie (Adventure Bay) au mois de février 1792." (Labillardiére. *Relation du voyage à la recherche de la Pérouse.* ii. p. 77.)

John Henry Cox. July 1789.
Mortimer (George). *Observations and remarks during a voyage to the Island of Teneriffe, Amsterdam, Maria's Islands.* 4° Lond. 1791.

Bruny Dentrecasteaux. April 21—May 28, 1792, and Jan. 18—Feb. 27, 1793.

Rossel (N. de). *Voyage de M. Dentrecasteaux envoyé à la recherche de la Pérouse.* 2 vol. 4° et atlas fol. Paris. 1808.

John Hayes. 1794.

On the authority of Low and other writers.

Matthew Flinders (and George Bass). Oct. 18, 1798—Jan. 8, 1799.

Flinders (Matthew). *A voyage to Terra Australis in the Investigator, the Porpoise, and the Cumberland.* 2 vols. 4° and atlas fol. Lond. 1814.

Nicolas Baudin. Several visits between January and June 1802.

Péron (François). *Voyage de découvertes aux terres australes. Historique. Continué par M. L. Freycinet.* 2 vol. 4° et 2 atlas. Paris. 1807-16.
Freycinet (Louis). *Le même. Navigation et Géographie.* 4° et atlas fol. Paris. 1815.

William Raven. Prior to June 1802.

"Mr. Raven on his return to England in the *Buffalo*, putting into Adventure Bay, cut off some undoubted wool from the head of a native that he fell in with there." (Collins' *Account of the English Colony in New South Wales.* ii. p. 188. note.) *

The tender *Supply* of Phillip's 'first fleet' sighted Van Diemen's Land about half-past ten on 3rd January, 1788. (*The voyage of Governor Phillip to Botany Bay.* App. p. x.) Flinders embarked in the schooner *Francis* when she went to bring off the cargo of the *Sydney Cove* (wrecked between Preservation and Rum Islands), in order to make such discoveries as circumstances might admit of, and sighted the North-east Coast on Feb. 25, 1798. (*Terra Australis.* i.pp. cxxxvi-cxxxvii.)

The journal of Tasman was first published *in full* by the firm of Van Keulen, Amsterdam, in 1860, under the editorship of Jacob Swaart, who discovered a MS. of it in the collection belonging to that firm. There is no copy of this work in any of the public libraries of the colony; the library of this Society

* According to Collins, H.M.S. *Buffalo* arrived from England on May 3, 1799. (ii. p. 208.) Raven, who had been in command of this ship, left for England as a passenger by the whaler *Britannia* on Dec. 2 of the same year. (p. 273.) The *Buffalo*, having meanwhile made a trip to the Cape of Good Hope, left for England on Oct. 21, 1800, (p. 306.) and arrived there May 24, 1801, (p. 306. note.) Collins' Dedication is signed June 26, 1802. It may be presumed that the author of the note quoted wrote *Buffalo* for *Britannia*.

possesses Burney's *Chronological History of the Voyages and Discoveries in the South Sea.* 4 pts in 2 vols. 4° Lond. 1803-16, the third part of which contains a brief abridgement of Tasman's Journal, taken from a translation of an old but defective MS. which, at the time of publication, was in the possession of Sir Joseph Banks.

The visits of Furneaux and Cook are recorded in *Cook's Voyages*, which are in one or two Tasmanian libraries, but the above-mentioned works of Crozet, Bligh and Mortimer are still awanting.

The only work regarding the important discoveries of Dentrecasteaux and his assistants which is available to inquirers is that of Labillardière; a translation is in the Royal Society's library. This is a personal narrative of the voyage varied with a few botanical and zoological descriptions, but omitting the reports of the various exploring and surveying parties which were despatched from the ships. These are supplied by De Rossel along with the resulting charts in the above-cited volumes which are not obtainable here.

There are several copies of Flinders' *Terra Australis* in Hobart libraries, but they are defective as regards the atlas published to illustrate the text. The volumes of Péron and Freycinet are still desiderata in any library available to the public.

The draughtsman who accompanied Tasman's expedition has left us sketch-maps of *Stoorm Bay*, *Frederik Hendriks Bay* and *Anthony Van Diemens Landt* and several coast-views. The sketch-maps are reproduced in Burney's abridgement,* but not the coast-views, and as they possess great historical interest as the oldest views of Tasmania, it is most desirable that copies of them should be procured for the colony. They are to be found in Valentyn's (François) *Oud en nieuw Oost-Indien.* 5 tom. fol. Dordrecht. 1724-26,† republished at the same place in 1824-26, a work which contains a fund of information regarding early Asiatic and Polynesian discoveries. The next map with which I am acquainted, that contains an outline of the Tasmanian coast, is one executed in 1644 by command of Van Diemen. It delineates as much as was then known to the Dutch of Australia including New Guinea *(Compagnis Niev Nederlandt* and *Noua Guina)*, New Zealand *(Staetelandt)*, Tasmania (*Anthonio Vandiemenslandt*), and the islands of the South Pacific, and shows the course of Tasman in the voyages of 1642 and 1644. There is a copy of this map in the edition of the journal by Swaart. The third map known to me, which introduces Van

* iii. pp. 67 and 70.
† iii. p. 48.
§ i. p. 50.

Diemen's Land, is one published in the *Relation de divers voyages curieux.* 4 parties en 2 vol. fol. Paris. 1663-96.§ This work, edited by Melchisedech Thévenot, contains a portion of what is known as the Stadthouse Map, which consisted of two projections of the terrestrial and one of the celestial sphere carved in stone on the floor of the great hall of the Amsterdam Stadthouse, which was built in the year 1648. The portions relating to New Guinea (here separated from Australia), *Hollandia Nova, Zeelandia Nova,* and *Anthoni Van Diemens Landt* are evidently based upon the two earlier charts, and have been preserved by Thévenot and reproduced by Harris in his *Navigantium atque Itinerantium Bibliotheca,* 2 vols. fol. Lond. 1744-48. Marion, Furneaux, Cook, Dentrecasteaux, Flinders, and Baudin, have left charts which are to be found in the works abovementioned.

There is a chart of the Derwent emanating from the expedition of Hayes; but that, along with the memoirs of the expedition was captured by a French man-of-war, and transferred to a public institution in Paris. (v. Low's *History of Indian Navy,* i. p. 200.)

SUMMARY OF OBSERVATIONS ON EARTHQUAKE PHENOMENA MADE IN TASMANIA DURING 1883 AND 1884.

By Commander Shortt, R.N., Meteorological Observer, Hobart.

[*Read November* 17, 1884.]

During the last eighteen months Tasmania has been visited by so many earthquake shocks, that general interest has been excited and favourable opportunities afforded for studying some of the phenomena connected with them.

Unfortunately for scientific purposes we have not yet experienced a really serious and destructive shock, such as would have rendered the island famous, and perhaps have afforded the survivors opportunities of adding largely to what is known about earthquakes. Some of the shocks, however, have been sufficiently pronounced to be readily felt over large areas, and a number of intelligent observers have carefully recorded what they observed, and the reports received

C About centre of disturbance
Numbers represent localities
Shocks felt on curves nearly contemporaneously

Inside dotted line from 0 to 200 fathoms
" the blue trough 2000 to 5000 fathoms

Photo-lithographed at the Crown Lands Department Hobart

TABLE GIVING DATE AND FORCE OF THE SEVEREST EARTHQUAKE SHOCKS FELT IN TASMANIA DURING THE YEAR 1884.

S=Very severe. *s*=Severe. *R*=Long and loud rumblings. *r*=Rumblings. *l*=Slight. A.=A.M. P.=P.M. *T*=Twin shocks.

Month.	*Date.*	1 *Falmouth.*	2 *George's Bay.*	3 *St. Mary's.*	4 *Fingal.*	5 *Gould's Country.*	6 *Moorina.*	8 *Swan Island.*	9 *Cape Barren Island.*	10 *Goose Island.*	11 *Kent's Group.*	12 *Ross.*	13 *Launcestan.*	14 *Hobart.*	15 *Circular Head.*
January	4	11 A. *s*	..	10·55 A. *l*	..	..	10·40 A. *s*	..	..	..	..	..	..	10·51 A. *l*	
February....	8	9·10 A. *s*	..	8·40 A. *S*	..	..	9 A. *s*	..	..	..	..	..	..	8·57 A. *l*	
Ditto ..	14	9·55 P. *s*	..	9·30 P. *S*, 9·45 P. *s*	..	..	9·40 P. *S*	..	..	..	9·20 P. *S* 60″	..	..	..	
Ditto ..	17	3·30 P. *s*	..	3·35 P.	3·40 P. *R*	..	3·37 P. *s*	..	..	..	3·25 P. *S*	..	..	..	
Ditto ..	28	..	..	..	..	..	3·20 A. *s*	..	..	..	3·50 A. *s*	..	..	4 A. *s*	
March	26	..	..	..	..	11·55 P. *S*	11·12 P. *S*	..	..	11·20 P. *s*	11·40 P. *s*	..	11·36 P. *S*	11·45 P. *s*	
Ditto ..	5	7·45 P. *s r*	..	7·35 P. *s*	..	..	..	..	..	..	7·45 P. *s*	..	..	..	
April	12	7 A. *s*	..	7 A. *s*	..	..	6·58 A. *s*	..	..	..	..	..	7 A. *l*	7 A. *s*	
Ditto ..	22	8·45 P. *s*	..	8·30 P. *s*	..	..	8·48 P. *s*	..	..	..	..	..	8·35 P. *s*	..	
May	10	10·30 P. *s*	10·50 P. *s*	10·45 P. *s*	..	10·55 P. *S r* 20″	10·54 P. *s* 60″	..	..	10·45 P. *s r*	10·40 P. *s*	10·35 P. *s r*	10·42 P. *s R*	10·43 P. *s r*	
Ditto ..	11	7·30 A. *s*	..	7·30 A. *S*	7·35 A. *s r*	7 55 A. *S r* 30″	7·46 A. *s R T*	..	..	8 A. *s r*	7·35 A. *s*	7·37 A. *S*	7·36 A. *s R*	7·40 A. *s*	8 A. *l*
Ditto ..	27	..	..	8·30 P. *s*	..	..	8·22 P. *S T*	..	..	8·30 P. *s r*	8·25 P. *S* 60″	..	8·25 P. *s*	8·28 P. *s*	
June	9	..	..	7·45 P. *S*	..	..	7·35 P. *S*	7·30 P. *s*	7·45 P. *s*	7·40 P. *s R*	7·30 P. *s*	..	7·38 P. *s*	7·40 P. *l*	
Ditto ..	17	8·30 P. *s*	..	8·30 P. *s R*	..	..	8·35 P. *s T*	8·26 P. *s*	8·20 P. *S*	8·25 P. *s r*	8·17 P. *S*	..	8·25 P. *s*	8·28 P. *l*	
Ditto ..	23	..	..	..	6·50 A. *s*	..	6·45 A. *s*	..	..	..	6·50 A. *S*	..	6·56 A. *S*	7 A. *s*	
July	12	1·40 P. *s*	1·40 P. *s*	1·30 P. *S R*	1·45 P. *l*	1·50 P. *s R*. 60″	1·40 P. *s R*	1·35 P. *s*	..	1·40 P. *S*	..	..	1·42 P. *s*	1·45 P. *l*	
Ditto ..	13	1·55 P. *S*	1·55 P. *R S*	1·50 P. *S*	2 P. *s*	2 P. *S*	1·55 P. *S R*	1·20 P. *S R*	..	1·50 P. *S*	1·35 P. *S*	..	1·56 P. *S*	1·57 P. *S R*	8·35 P. *l*
August.....	11	2·45 P. *s*	..	..	..	2·40 P. 30″	2·30 P.	..	..	2·37 P.	..	..	2·43 P.	2·45 P.	
Ditto ..	15	7·48 P. *l*, 7·32 P. *l*	..	7·30 P. *s R*, 7·35 & 7·40 P. *l*	7·40 P. *s*	..	7·35 P. *s*, 7·50 P. *l*	7·30 P. *s R*	..	..	..	..	7·40 P. *s*	7·42 P. *s*	
Ditto ..	29	11·15 A. *S*	..	11 A. *S*	11·15 A. *S* 20″	11·10 A. *s R*	11·5 A. *S R*	10·55 A. *s R*	..	..	11 A. *S* 60″	..	11·5 A. *s*	11·6 A. *s*	
September ..	19	8·50 P. *S*	8·35 P *S*	8·35 P. *S*, 60″	8·30 P. *S* 90″	8·35 P. *S*	8·40 P. *S*	8·39 P. *S R*	..	8·40 P. *S*	8·27 P. *S* 40″	..	8·38 P. *S* 30″	8·40 P. *S* 30″	8·40 P. *l*
October ..	31	..	..	10 P. *s*	10 P. *s*	..	10·5 P. *s T*	10·10 P. *s*	..	10·15 P. *l*	..	..	9·56 P. *s R*	..	
November ..	3	..	..	..	10·50 P. *l*	..	..	10·50 P. *l r*	..	..	..	..	10·46 P. *l*	10·45 P. *l*	
December ..	..	..	..	..	..	..	11·3 P. *l*	..	..	..	..	..	..	10·59 P. *l*	

have been tabulated and arranged. Although it would be useless to attempt to reproduce all the reports, yet it seems desirable to bring a short abstract of them before the Royal Society as the chief scientific body in Tasmania, so that members and others may be put in possession of what has really happened, and of the results which may be fairly deduced from the observations. It is hoped that interest in these observations may be thus stimulated, so that any shocks which occur in the future may be more carefully observed and recorded, and we may hope that in time many of the questions which remain for solution may be satisfactorily answered, and others on which one has to speak with great caution may be completely established.

Before discussing reports received it may be well to state briefly the direction in which our enquiries and observations should be made, and what we may fairly hope to learn by careful observation.

In the first place we can hope to learn little as to the causes of earthquakes. With these, although a fertile field of controversy for those who delight in it, we, as observers, have little to do, and therefore they will only be alluded to briefly at the end of the paper.

But there are many problems awaiting solution to which we may devote our attention. Thus we ought to try and find the point directly above the disturbance which causes the earthquake, and from which the "seismic vertical" passes down to that centre. Then to find the directions in which the shock travels out from the centre, and the places at which it arrives simultaneously, so as to determine the coseismic lines, and whether they are circles, ellipses, or quite irregular. To observe the rate at which the wave of disturbance travels; whether the rate varies in passing through different descriptions of rock, and if so, by how much.

If it is ever reflected or thrown back at the junction of dissimilar rocks,

To determine, if possible, the angle at which the vibration reaches the surface of the ground at different places, and thence to calculate the depth of the disturbance and length of the seismic vertical.

Then the exceedingly important and difficult problem whether any change in the level of the ground has accompanied or followed the earthquake, and if so, whether the change, either elevation or depression, is permanent. Again, whether the shock has been felt equally at all places in the same neighbourhood, and if not, what determines the difference.

These are some of the points on which we may hope to obtain information, but there are others which can be

obtained in particular places, or under special circumstances, such as the effect produced on the waters of the sea, or of lakes, and if any alteration is observed in the flow of rivers and streams, how far the shock was felt in mines, and in what way, etc.

Now, let us see what can be gathered from the observations which have already been made in Tasmania.

Unfortunately, as already mentioned, the shocks have been too slight for us to hope for any information on many of the points enumerated, while the reports do not agree sufficiently as a rule to enable us to speak with much confidence on others.

The first thing that strikes one on looking over the tabulated reports is the enormous number of shocks which have been felt. Thus, in the month of February, 1884, nearly one hundred shocks and tremors were felt at St. Mary's, and in some months of 1883 and 1884 this number has been exceeded. Similarly numerous are the reports from Gould's Country and Moorina, so that since April 12, 1883, when the first shock was recorded at Gould's Country, over one thousand distinct shocks have been felt, besides many which must have passed unnoticed. Of course a very large number of these were mere tremors, and such as would be likely to pass unnoticed by most people. Indeed, one doubts whether they would be felt at all were not their attention attracted by the noise which so often appears to *precede* the shock.

Any one who has lived in the vicinity of a railway, especially one on which heavy luggage-trains pass at a high rate of speed, will know what very slight tremors may be felt at a comparatively long distance from the source of vibration. Although every shock reported is carefully tabulated at the Meteorological Office, with the date, alleged time, whether severe, slight, etc., it will only be desirable to allude individually to a few of those which, from their severity and the wide area over which they were felt, are of special importance and interest.

The great majority of the slight shocks do not seem to have been felt beyond the N.E. parts of Tasmania, so that the centre from which they originated would seem to be not very far off, although probably under the sea. As to the severer shocks, I have prepared a table showing the places where some of them were felt, and the reported time of occurrence. Before discussing the table it may be well to state briefly what is to be learned from it.

It is, of course, known that the shocks are supposed to originate at about the same place; and if we find that the same shock is felt at certain places at the same time, we

can draw through those places on a map a co-seismic line, and if the shocks travel at an equal rate in all directions, the co-seismic lines will be circles, and of course places near the centre of disturbance will feel the shock earlier than those more remote. Further, if we can show that two places are on the same line drawn from about the centre of disturbance we ought to be able to demonstrate the rate at which the vibration travels between the places.

The times reported for the different shocks do not agree very well, so that it is difficult to base any reliable conclusions upon them. Something, however, may be done by comparing the reports of several shocks. Thus, if we take a few dates, and arrange the places in the order of the time at which the shocks are said to have occurred, we find :—

November 14, 1883.—Kent's Group, 2·45 p.m.; St. Mary's, 2·50; Swansea, 2·52; Launceston, 2·55; Gould's Country, 2·55; Falmouth, 3; George's Bay, 3; Moorina, 3·5; Hobart, 3·10.

December 12.—Kent's Group, 6·45 p.m.; Gould's Country, 6·48; Launceston, 6·59; Falmouth, 7; St. Mary's, 7.

March 28, 1884.—Goose Island, 11·28 p.m.; Launceston, 11·36; Kent's Group, 11·40; Hobart, 11·45.

On May 10 and 11 the shocks were severe, and we find—

10.—Falmouth, 10·30 p.m.; Ross, 10·35; Kent's Group, 10·40; Launceston, 10·42; Hobart, 10·43; Goose Island, 10·45; St. Mary's, 10·45.

11.—St. Mary's, 7·30 a.m.; Falmouth, 7·30; Kent's Group, 7·35; Fingal, 7·35; Launceston, 7·36; Ross, 7·37; Hobart, 7·40; Goose Island, 8; Circular Head, 8.

Then, June 17.—Kent's Group, 8·17 p.m.; Cape Barren Island, 8·20; Goose Island, 8·25; Swan Island, 8·26; Launceston, 8·26; St. Mary's, 8·30; Falmouth, 8·30; Hobart, 8·30; Gabo Island, 8·55.

July 13.—Swan Island, 1·20 p.m.; Kent's Group, 1·35; Goose Island, 1·50; St. Mary's, 1·50; Falmouth, 1·55; Moorina, 1·55; George's Bay, 1·55; Upper Ringarooma, 1·55; Launceston, 1·56; Hobart, 1·57; Gould's Country, 2 p.m.; Wilson's Promontory, 1·43; Eden, 2 p.m.; Gabo, 2·20.

August 29.—Swan Island, 10·55 a.m.; St. Mary's, 11; Kent's Group, 11; Moorina, 11·5; Launceston, 11·5; Hobart, 11·6; Gould's Country, 11·10; Falmouth, 11·15; Fingal, 11·15.

The severe shock on September 19 is reported as—Kent's Group, 8·27; Fingal, 8·30; St. Mary's, 8·35; Gould's Country, 8·35; George's Bay, 8·35; Launceston, 8·38; Swan Island, 8·39; Hobart, 8·40; Circular Head, 8·40.

These observations may help to fix the centre of disturbance. Thus the slight shocks, as mentioned, are confined to N.E. Tasmania, while the severer shocks may reach the West Coast of Tasmania, South Victoria, and New South Wales. The places which appear to feel the shocks earliest are Kent's Group, St. Mary's, Swan Island, and places round, later, Launceston, and afterwards, Hobart, Circular Head, etc., and later still, Gabo, and places on the Continent.

Some time since an opinion was published by me that the disturbances originate under the sea to the E. of Barren Island, and this is confirmed by a consideration of subsequent observations, some of which are given above, as well as by reports from ships at sea in that neighbourhood.

It may be admitted, however, that there are serious discrepancies in the times reported for many of the shocks, and this is what we might expect, as such may arise from various causes. For instance, it is almost certain that the correct time is not in all cases reported. Clocks and watches are often out of time, and again, many persons would forget to look at the clock at the time of shock, and afterwards guess it approximately. As one cannot tell how often such mistakes occur, it is only by comparing the reports of a considerable number of shocks that one can speak with any confidence. Another explanation of the discrepancies would be to suppose that the shocks emanate from different centres. This is possible, but must be used with great caution in reasoning, as, unless we suppose the shocks originate about the same place, the value of the observations made as yet would be very small indeed. At the same time, it is very possible that the centre of disturbance is not at a point, but may be along a line. It is also possible that all the shocks do not travel at the same rate. As to this, although a subject of great interest, we cannot say anything at present.

As to the direction from which the shock seems to come, few reliable reports have been received, and even those which have come to hand are little more than rough approximations. In many cases, too, observers appear clearly to have reported the shock as travelling in exactly an opposite direction to the real one, *e.g.*, S. to N. instead of N. to S. However, the reports which seem to be tolerably reliable give a direction such as we might expect if they originate about the place stated.

Of the angle of emergence of the vibration scarcely anything is known, as the shocks are generally much too slight to leave permanent traces, such as cracks in buildings, from which evidence might be obtained on the point, so that we are not yet in a position to calculate the depth at which the disturbance takes place. Similarly we have no direct

evidence of alteration in the level of the land. This, however, is always very difficult to determine even on the sea shore, while inland it is very unlikely indeed to be noticed if slight. It may be well to allude here to the idea that the source of disturbance was or is near New Zealand. This seems to be very unlikely, as most of the shocks are only felt over a small area, and in the case of the severer ones in which there are discrepancies in time, besides the sources of error already mentioned, it must be remembered that the "coseismic lines" are not likely to be true circles, since, in the case of earthquakes in Europe, a shock has been known to travel twice as fast in one direction as it does in the opposite, and it is well known that in South America most of the earthquakes are felt over much longer distances parallel to the chain of the Andes than transverse to that line. Besides this, we have reports from New Zealand that few shocks or tremors have been felt there recently.

It is probably known to most here that Tasmania is united to Australia by a submarine plateau, and that the water is never deeper than 100 fathoms. Beyond the East Coast of Tasmania and Australia the sea bottom rapidly sinks to a depth of over 2,000 fathoms, and continues deep until approaching the coast of New Zealand, so that a deep trough divides us from New Zealand, and earthquake shocks originating there would have to be at a considerable depth to be strongly felt here.

We may therefore claim, I think, to produce our own earthquakes, and not to be dependent for the supply on New Zealand.

As to whether we shall be favoured with a really serious and interesting shock, of course no one can say. But while it would be foolish to deny the possibility of its occurrence here, as it would be in any other part of the world, it would be equally unphilosophical to imagine that, because we have had many slight shocks, we shall therefore have a great one, since it is well known that really severe shocks, which are never common, while they are sometimes preceded by slight ones, in many cases occur without any warning at all. The great earthquake of Lisbon of 1755 is a case in point, and many others might be mentioned. Many places also, such as Comrie, in Perthshire, Scotland, have very many slight shocks, but have never been known to experience a serious one.

The great interest, indeed, of our earthquakes, in a scientific point of view, is the occurrence of such a large number of slight shocks close together in a country where they were previously very rare.

About the causes which produce earthquakes, but little

need be said. It is admitted by the best authorities that we know but little of the condition of the interior of the earth, or how the forces with which we are familiar at the surface, act within the earth so as to produce earthquake and volcanic phenomena.

We know that many, perhaps most, rocks even near the surface, are in a state of strain, and that if at any time they yield to this strain a vibration will result which will be propagated through the earth as a tremor or shock. We know also that at a short distance from the surface of the earth in most parts of the world a very high temperature prevails. Also that water is present in most rocks, and that either in the liquid or gaseous state it appears to play a great part in all volcanic eruptions, and to have been present during the formation of most granite and other crystalline rocks. But when we have said this we have to admit that almost all the rest is still in the region of theory or hypothesis.

Of course it is easy to shew that, if the temperature goes on increasing at the rate of about 1° F. for 65ft. of depth, as it does near the surface, we should have at a depth of a few miles an enormous heat. But then we are not sure that it does go on thus increasing, and even if it does we don't know the materials which exist within the earth, or how thew would behave at temperatures, and under pressure of which we have no experience at the surface. It is tolerably clear also that volcanoes are allied to severe earthquakes, but whether all earthquakes are due to similar causes is not so clear.

We know that vast masses of molten rocks must exist within the earth in some places and at some times, since they are poured out at the surface, but we are not, therefore, justified in assuming that the whole interior of the earth is liquid.

Under these circumstances it is far better for those who desire to advance the cause of science to confine themselves to observing rather than to propounding theories.

From what has been said it will be seen the directions in which observations of earthquake phenomena are wanted, and any intelligent person may be placed in a position where careful and judicious observation will lead to valuable results. The time of shocks should be noted with especial care, and if an observer is not sure of the exact time, that should be stated, so that it may be tabulated accordingly. Again, some rough form of seismometer may be devised to determine approximately the direction of the wave. A basin of mercury or treacle, a few pieces of wood, or similar arrangement may furnish a good result if carefully attended to, as an elaborate seismograph or seismometer which may be out of order at the very time it is wanted. If clocks are

stopped by a shock, it may possibly be found that those only stop whose pendulums vibrate in a particular plane. This should be noted.

In conclusion, it is only right to acknowledge the large amount of trouble which has been taken by many observers in all parts of the island in recording and forwarding reports of the shocks they have felt. Especial mention may be made of:—

Mr. J. R. Hurst, District Surveyor, Moorina,
Mr. A. Campbell, of St. Mary's,
Mr. O. C. Heiden, Gould's Conntry,

owing to the very large number of shocks which they have had to record.

NOTES ON THE INFUSORIAL PARASITES OF THE TASMANIAN WHITE ANT.

By W. Saville-Kent, F.L.S., F.Z.S., Superintendent and Inspector of Fisheries, Tasmania.

[*Read, November* 17, 1884].

So long since as the year 1856, Mr. C. Lespes, in a memoir devoted to the organisation of the European White Ant (*Termes lucifugus*), recorded the fact that the contents of the intestine of this insect is represented by a brown pulp consisting chiefly of a living agglomeration of Infusoria. No specific description of these Infusoria has been published up to the present date, and it is only so recently as the year 1881, that a detailed account, with illustrations, of the analagous parasites of the American White Ant (*Termes flavipes*), has been contributed by Dr. Joseph Leidy to the "Proceedings of the Academy of Natural Sciences," Philadelphia. Through the kind courtsey of Dr. Leidy, I was enabled to include re-prints of his drawings of these parasitic animalcules in my monograph of the Infusoria then in course of publication, and subsequently received from him while residing in London, a supply of the White Ant with its accompanying parasites for personal examination.

It was with much interest that I discovered soon after my arrival in Tasmania, that a species of White Ant (specific name at present undetermined) abounds in this colony, feeding after the manner of the North-American type upon decaying timber, and having its intestine similarly laden with parasitic Infusoria. On making a close examination of these Infusoria I ascertained furthermore that they agreed with

the American types in being referable to no less than three distinct varieties, two of which may be included in the generic groups instituted for the American species by Dr. Leidy, while the third form is entirely distinct. As species none of the series are precisely identical with any that have hitherto been described and have consequently to be recorded as new to science.

The largest and most abundantly developed form to which I will draw attention on this occasion is referable to Dr. Leidy's genus *Trichonympha*. It is an elongate or pyriform animalcule, having normally a smooth, somewhat inflated posterior region, and an acuminately pointed, highly flexible anterior portion, which is more or less distinctly striated in a longitudinal direction. From Dr. Leidy's species *Trichonympha agilis*, it differs most distinctly in the relative shortness of the hair-like cilia which clothe the entire surface of the body. In the last-named species a portion of these cilia are as long, or longer than the body, and exhibit under certain conditions, a remarkable plume-like aspect. In the Tasmanian species, which, by way of compliment to the talented discoverer of the genus, I propose to distinguish by the title of *Trichonympha Leidyi*, the length of the cilia but little exceeds that of many of the Opalinidæ and other previously known endoparasitic Infusoria. It is furthermore not so easy to recognise in the present species that the cilia, with respect to their length, form three or four more or less distinct series as obtains in the American variety, for while those that clothe the equatorial region of the body are somewhat the longer, the entire series merge into one another by almost imperceptible gradations. In this respect the species here introduced may be said to resemble an immature stage of the American type. The great flexibility of the anterior portion of the body is a feature common to the American and Tasmanian species, both exhibiting in a like manner a tendency to roll this region upon itself in the form of a helix.

An important point that was left undetermined by Dr. Leidy respecting the structure of *Trichonympha* relates to the precise position of the oral aperture. The bodies of the animalcules are almost invariably filled with fragments of the woody debris devoured by their hosts the White Ants, which shows that their sustenance is taken into their body in a solid state and is not simply absorbed in the fluid form as occurs with the group of the Opalinidæ. A prolonged observation of living examples of the American species remitted me by Dr. Leidy, and likewise of the Tasmanian type here introduced has resulted in my determining that a distinct oral aperture is developed upon one side of the body at a short

distance only from the apical extremity. This orifice takes the form of a transverse slit, and is followed by a narrow œsophageal track which opens into the capacious digestive cavity that occupies one-half or two-thirds of the posterior region of the body. The plan recommended by Dr. Leidy for observing the vital phenomena of these animalcules is to empty out the intestine of the White Ant containing them into a little white of egg. I also have found this material favourable for their observation, but have gained an additional insight into their life history by employing in a like manner thinly diluted milk. In this medium they not only live for a considerable time, but meet with abundant nutriment, their pharynx and digestive cavity being frequently found densely packed with its component corpuscles after their immersion in this fluid for a short interval.

As with the American species *Trichonympha Leidyi* is represented in its earlier and immature conditions by a host of polymorphic forms that differ greatly in aspect from the adults. The youngest observed are of an ovate contour, and clothed throughout with cilia of even length. These young individuals gradually increase in length until their long diameter may equal or even exceed four or five times their greatest breadth, the cilia in the more advanced phases being longest posteriorly, while the surface may be obliquely furrowed in opposite directions. It is in connection with this transitory condition that I have observed the phenomena of propagation not hitherto recorded. This is effected by a process of transverse fission, division taking place towards the anterior region of the body along two intersecting furrows. The anterior of the two separated moieties assumes a pyriform outline, and grows speedily to the parent shape, while the posterior one retains its primitive attenuate fusiform contour, and may continue to multiply by fission.

When placed in diluted milk the animalcules of both the American and Tasmanian species of *Trichonympha* have been observed by me to assume a fixed condition that has not hitherto been described. An attachment to the surface of organic substances or other convenient fulcra, is then accomplished through the medium of the long fascicle of hair-like cilia that are produced from their posterior extremity. These cilia intersecting one another at a short distance from the body form a sort of hollow cone, the expanded base of which grasps the selected fulcrum of support after the manner of an acetabulum. This habit of, as it were, anchoring themselves by their long caudal cilia was observed of both the adult and immature animalcules. No trace of the structure common to all higher Infusoria known as the contractile vesicle has been detected in connection with *Triconympha*

agilis, and in the species now introduced it is, so far as I have been able to ascertain, as conspicuously absent. In this absence of a contractile vesicle *Triconympha* assimilates itself to many Opalinidæ. While commenting upon the apparent position of *Triconympha*, with relation to other Infusorial forms (Manual of Infusoria, Vol. II., p. 553), it was suggested by me that, with respect to the great length of its cilia and characteristic movements, it to some extent resembled the multiflagellate genus *Hexamita*. Though the more abundant evidence since adduced has sufficed to demonstrate that it belongs essentially to the Holotrichous Ciliata, the great length of the cilia, the manner in which they are employed, and the habits the animalcules exhibit of anchoring themselves to foreign substances by their long posterior cilia, is suggestive of the remote derivation of these White Ant parasites from a flagelliferous type allied to *Hexamita*.

Of the two remaining Infusoria found by me in the Tasmanian White Ant the one is apparently referable to Dr. Leidy's genus *Pyrsonympha*, while the other belongs to Stein's multiflagellate genus *Lophomonas*, so far recorded as a parasite only of the Orthopterous insects *Blatta* and *Gryllotalpa*. Several important points in their organisation not having yet been clearly ascertained, descriptive details of these two new forms are reserved for a future communication.

Reprinted in Ann. & Mag. Nat. Hist. (5) Vol. 15. (1885) p. 450–53. (No. 90. June 1885)

ON A METHOD OF DETERMINING THE TRUE MERIDIAN.

By H. C. Kingsmill, M.A.

[*Read November* 17, 1884.]

I propose to describe a method of obtaining the true meridian by observation, which, so far as I am aware, has not been tried in this colony. The method is theoretically simple, but many ideas which are simple in theory, are found to have practical difficulties which render them useless in actual work.

I do not think that this objection will apply to the case in question, but I shall be glad to have the opinion of some one who has had experience in taking observations.

Public attention was called to the meridian question some time ago by Mr. McIntyre, a New Zealand surveyor, who gave much valuable information in a paper which he read before this Society.

He pointed out that magnetic bearings were not suffi-

ciently accurate to form the basis of a permanent survey; that numerous errors had been caused by depending on the compass; and that the true meridian ought to be the datum line, from which all the bearings of a survey should be reckoned.

These views have been generally accepted as correct, and it becomes a matter of interest to know, what means a surveyor has at his disposal for ascertaining the true bearing of his lines.

No doubt the best and easiest way is to connect with some line, the bearing of which has been ascertained with accuracy. But such a line is not always accessible, and a surveyor should have it in his power to establish his bearings by independent observation. This can be done, within a very small limit of error, in fact as near as the theodolite can be read, which is sufficiently accurate.

Observations to ascertain the variation of the compass are being constantly taken at sea, but the same degree of accuracy is not required as in a survey on land. The altitude of the sun or a star is used in most of these methods. In using altitudes we are liable to error from refraction; moreover the theodolite, the land surveyor's instrument, is better suited for measuring horizontal angles or azimuths than altitudes. For these reasons it is desirable to use a method, equally good, in which altitudes are not required. Again, it will be well if we can dispense with a knowledge of the latitude.

It is not a very difficult problem to find the latitude; still there is advantage in having one problem to solve instead of two, and if the surveyor can find the meridian without first finding the latitude, so much the better.

There is another point to be considered in estimating the values of different methods; that is the amount of time consumed in observing. At an observatory this is a secondary consideration. The main point is to obtain perfect accuracy, and for this purpose transits are observed, day after day, and corrections made by the help of the clock. But a surveyor requires something more expeditious.

There are three well-known methods available for him, and I propose to consider them, with reference to the tests already mentioned; and then to apply the same tests to a fourth method, which is the subject of my paper.

The first method is by a single observation of the sun or a star. For this an altitude is required, also a knowledge of the latitude. It is, therefore, open to objection on both accounts.

The second method is by equal altitudes. This requires two observations at an interval of several hours, and is therefore inconvenient in point of time. It often happens, more-

over, that when you have taken the first observation, you cannot get a favourable opportunity for the second.

The third method is by observing a single circumpolar star at its greatest elongation. This is a very accurate method and recognised as one of the best, still it requires a knowledge of the latitude.

The fourth method is by observing two circumpolar stars at their greatest elongation, and taking the difference of their azimuths at the time of observation. From the observed difference of azimuths of the two stars, and their declinations as given in the almanac, the azimuth of each star can be obtained. From either azimuth the position of the true meridian can be ascertained at once.

Two stars can be selected which do not differ much in the time of their elongations, consequently there need not be much time spent in observing.

A knowledge of the latitude is not required, and as the only angle observed is horizontal, there is no error from refractions, and the method suits the theodolite.

The formula to be used is given below, and an example is worked out, but I shall not trespass further on your time by reading them.

Let the stars observed be X and Y, X at its greatest eastern elongation, and Y at its greatest western elongation.

Let the azimuth of X be A
,, azimuth of Y ,, B
Declination of X ,, D
Declination of Y ,, E.

Then it may be proved that—

Tan. $\frac{1}{2}$ (A—B) = — Tan. $\frac{1}{2}$ (D + E) Tan. $\frac{1}{2}$ (D—E) Tan. $\frac{1}{2}$ (A + B), which is a formula adapted to logarithmic computation from which A—B can be obtained.

A + B is the difference of readings of the theodolite obtained by directing the telescope first to the star X, and then turning it round to Y, supposing X to come into position first.

When we know A + B and A — B, it is easy to determine the separate values of A and B.

If the stars X and Y are both on the same side of the meridian, the observed angle is A—B, and the same formula may be used by making A + B and A—B change places as follows :—

Tan. $\frac{1}{2}$ (A+B) = Tan. $\frac{1}{2}$ (A—B) Cot. $\frac{1}{2}$ (D+E) Cot. $\frac{1}{2}$ (D—E)

To illustrate this formula an example is added, which has been worked out by Mr. A. G. Tofft :—

The following stars were observed at their greatest elongation on the evening of October 11, 1884 :—A Trianguli over its western elongation at

8h. 4′ 57″ p.m., and Achernar at its eastern elongation at 8h. 49′ 40″ p.m., and the differenee of their readings was 76° 10′ 34″. To find their azimuths A and B.

Tan. $\frac{1}{2}$ (A—B) = Tan. $\frac{1}{2}$ (A+B) Tan. $\frac{1}{2}$ (D+E) Tan. $\frac{1}{2}$ (D—E)

Log. Tan. $\frac{1}{2}$ (A—B) = Log. Tan. $\frac{1}{2}$ (A+B) + Log. Tan. $\frac{1}{2}$ (D+E) + Log. Tan. $\frac{1}{2}$ (D—E)

= Log. Tan. (38° 5′ 17″) + Log. Tan. (63° 19′ 10″) + Log. Tan. (5° 29′ 35″)

= 9·8941851 + 10·2987972 + 8·9830243

= 9·1760066

Tan. $\frac{1}{2}$ (A—B) = 8° 31′ 45″

$\frac{1}{2}$ (A+B) = 38° 5′ 17″ as observed

$\frac{1}{2}$ (A—B) = 8° 31′ 45″ as above.

Therefore by adding and subtracting these equations we get—

A = 46° 37′ 2″ and B = 29° 33′ 32″

A REJOINDER TO MR. A. B. BIGGS'S CRITICISM ON OBSERVATIONS MADE IN RESPECT OF THE "OBSERVED PERIODICITY OF THE DEATH RATE," Etc.

By R. M. Johnston, F.L.S., Etc.

[*Read November* 17, 1884.]

I am glad to see that so able a critic as Mr. Biggs has taken up the important subject of the "Death rate in its observed coincident relation to super-terrestrial phenomena," which was recently introduced by me in a paper read before this Society; although, at the same time, it is to be regretted that he has based his remarks upon a brief abstract from a newspaper rather than upon the paper itself, for it has greatly misled him as regards the nature and scope of my argument.

It appears to me to be very clear that Mr. Biggs's difficulty is caused chiefly by erroneously assuming that the relations commented upon are *simple* instead of *complex*, and that belief in a more or less striking observed *coincidence* seems to be regarded by him as synonymous with a like belief in a corresponding *mutual inter-dependence* between the matters which have been observed to coincide.

Now there is a very wide difference between the conception or conviction of a known agreement or *coincidence* and the conception of an underlying causal relation. We can fairly conceive and admit of identity of movement or action between several phenomena for a limited space of time without prejudice, even when we assume that such coincidence is not uninterrupted for a longer period, or that it may be due (1) to mutual inter-dependence alone; (2) to causes

unknown acting independently; (3) to causes unknown acting together; (4) to certain causes known and unknown, or imperfectly known, acting in combination.

Mr. Biggs, therefore, has somehow failed to grasp the scope of my argument when he sets himself to the task to prove that the movements of Jupiter have no appreciable "influence whatever, direct or indirect," upon the coincident phenomena, simply because the variable cycles of the maxima and minima of sun-spots, death rate, magnetic inclination, rainfall, etc., are not *solely* influenced by the movements of Jupiter primarily. This is proving a negative in reference to a complex problem, by ignoring all the factors necessary to arrive at a correct conclusion, save one—viz., the supposed value of Jupiter's influence. Even this influence seems to be unnecessarily restricted by him to the mere point when Jupiter is exactly *in perihelion*.

Mr. Biggs, by demanding proof and demonstration sufficient to produce conviction, again fails to grasp the object of my paper, which so far as the causal aspect of the phenomena discussed is concerned, is most guardedly restricted by me to *mere suggestion*. Now, had he studied my paper closely instead of the brief abstract referred to, he would find that I pointed out that the "coincidences observed are not sufficiently broad and regular to justify prediction;" that, at present, inferences drawn from them are "more suggestive than conclusive," and in consideration of many unexplained anomalies due to unknown and complex relations, I could only hazard from them "*presumption*" in favour of a relatively low death rate in Australasia during years of sun-spot maxima, and a more or less relatively high death rate during years of sun-spot minima. In this last respect it is a pleasure to me to find that I am in accord with Mr. Biggs, who also, with Young, Scott and others, admits that there seems to be a well established connection between "solar disturbances and the electrical condition of our globe."

Professor Balfour Stewart, the celebrated physicist and author of the profound work "On the Conservation of Energy" (Inter. Series, 1874), in a paper read by him on "Magnetic Declination" (See *Nature*, April, p. 592), states that, although Professor Rudolph Wolf's list of sun-spot observations "extends back into the seventeenth century, and is unquestionably of much value. Nevertheless, it must be borne in mind that we possess no sun-spot data sufficiently accurate for a discussion of questions relating to solar periodicity before the time when Schwabe had finally matured his system of solar observations, which was not until the year 1832." Curiously enough that is just one year prior to the period from which my diagram records the

8h. 4′ 57″ p.m., and Achernar at its eastern elongation at 8h. 49′ 40″ p.m. and the difference of their readings was 76° 10′ 34″. To find their azimuths A and B.

Tan. $\frac{1}{2}$ (A—B) = Tan. $\frac{1}{2}$ (A+B) Tan. $\frac{1}{2}$ (D+E) Tan. $\frac{1}{2}$ (D—E)

Log. Tan. $\frac{1}{2}$ (A—B) = Log. Tan. $\frac{1}{2}$ (A+B) + Log. Tan. $\frac{1}{2}$ (D+E) + Log. Tan. $\frac{1}{2}$ (D—E)

= Log. Tan. (38° 5′ 17″) + Log. Tan. (63° 19′ 10″) + Log. Tan. (5° 29′ 35″)

= 9·8941851 + 10·2987972 + 8·9830243

= 9·1760066

Tan. $\frac{1}{2}$ (A—B) = 8° 31′ 45″

$\frac{1}{2}$ (A+B) = 38° 5′ 17″ as observed

$\frac{1}{2}$ (A—B) = 8° 31′ 45″ as above.

Therefore by adding and subtracting these equations we get—

A = 46° 37′ 2″ and B = 29° 33′ 32″

OBSERVATIONS ON MR. R. M. JOHNSTON'S VITAL STATISTICS.

By A. B. Biggs.

[*Read November* 17, 1884.]

It would be presumptuous in me to discuss in detail the interesting and ably-compiled Vital Statistics issued by Mr. Johnston for the year 1883. There is one branch of the subject, however, to which my attention was drawn by a sub-leader in the *Mercury* of 10th September, upon which, as it comes somewhat within my own line of study, I think I may, without impertinence, make a few observations. I quote from the article referred to :—" The course of investigation has led to the discovery that there is a coincidence between the minimum and maximum *sun-spot periods* and the death-rates, and again, with the *position of the planet Jupiter* in his orbit. The *maximum* sun-spot period appears to be when Jupiter is between aphelion and perihelion ; and this corresponds with the *lowest* death-rate, that is, when the depression in the diagram is greatest. On the other hand, the *minimum* sun-spot period appears to be when Jupiter is at perihelion, and this corresponds with the *highest* point of the diagram of the death-rate, etc." This appears to me to fairly represent the conclusion at which Mr. Johnston has arrived, and which his diagram, so far as it goes, appears to show. Now, the point that immediately struck me on reading this was, that the fluctuations of the death-rate

curve might correspond with and be dependent upon *either* the sun-spot periodicity *or* the position of Jupiter in his orbit. But we are not at liberty to couple the two phenomena of Jupiter and sun-spots, inasmuch as the periods, although very nearly equal, are not quite so. The accepted average sun-spot period is 11·11 years, whilst the period of Jupiter is 11·86. There is, therefore, a difference of three-quarters of a year. It follows then, that, starting from an epoch of coincidence, the sun-spot period will gain three-quarters of a year on every revolution of Jupiter, passing all through Jupiter's period in about 166 years. In half that time then, or 83 years, the sun-spot maximum, from being coincident with Jupiter's *perihelion*, will come to coincide with his *aphelion*. It must, therefore, be evident that the sun-spot period has no relation to Jupiter's movements. I am aware that some eminent authorities have favoured the notion that the periods are connected, but it could only have been on the assumption of a different sun-spot period from that which more extended observation has established.

The sun-spot maximum and Jupiter's perihelion are now approaching coincidence, which will probably occur at Jupiter's next perihelion in 1892. Their present near coincidence may very likely have suggested the idea of their being mutually concerned in affecting our death-rate.

There seems to be a disposition in many quarters to attribute some special influence to the planetary positions, especially their perihelia. Jupiter, in particular, being the nearest of the giant planets, as well as by far the largest, would, on both accounts, have immensely more influence than all the others put together; that is, on the supposition that any influence at all could be exercised by any of them on account of orbital position. The idea implies, of course, not a *direct* influence upon the earth itself, but an *indirect* one, exerted through the planet's influence primarily upon the sun. Now, notwithstanding Jupiter's vast bulk, relatively to the other planets, his mass is less than one-thousandth part of that of the sun, and his mean distance 480 millions of miles. At this vast distance it is difficult to conceive of any particular influence that he could exert upon the sun under any circumstances. His relative distances at perihelion and aphelion are as 10 to 11 (very nearly), surely not sufficient difference for the sun to trouble himself about.

Now, why should so much importance be attached to the *perihelion* position, as if it were some critical point, perfectly distinct from every other part of the orbit? The planet is approaching it from the time it leaves its aphelion, and as gradually recedes from it until it reaches aphelion again.

If any influence could be supposed to be exerted by Jupiter

upon our affairs, one would think it were more reasonable to look for something direct, as, for instance, when he is in opposition to the sun. He is then, of course, much nearer the earth than when in conjunction, very nearly in the proportion of 10 to 15, or as 1 to $1\frac{1}{2}$. This occurs at intervals of slightly over 13 months. On such a supposition, then, we should have some marked disturbance occurring about a month later every year. But, is it so? I leave this for statisticians to answer.

For my part, I may say that it would require most conclusive argument, backed up by a considerable amount of statistical evidence, to convince me that Jupiter can have any influence upon us whatever, either direct or indirect; that is, of course, apart from the question of gravitational perturbation, an astronomical nicety that does not at present concern us. The question of physical changes in the sun (as the increase or diminution of sun-spots, by whatever cause produced) affecting the conditions of life in our planet, stands, I think, on quite another footing. As the great *heart* of the system, any physical commotion there might well be supposed to affect, more or less, the whole planetary family. That there *is* some connection between such solar disturbances and the electrical condition of our globe seems to be well established. I think it, therefore, not unreasonable to expect that our mortality curve should be affected from this cause.

Unfortunately, our statistics do not extend sufficiently far back to either establish or disprove that any relationship exists between *them* and either sun-spots or Jupiter's position. Moreover, I think that a careful examination of those we have tends rather to discountenance the notion that any such relationship exists.

In the following tables I take the mortality maxima and minima from Mr. Johnston's columns, and the sun-spot periods from Professor Newcombe.

DATES OF JUPITER'S PERIH.	DATES OF JUPITER'S APH.	YEARS OF SUN-SPOT. MAXA.	YEARS OF SUN-SPOT. MINA.	YEARS OF DEATH-RATE. MAX.	YEARS OF DEATH-RATE. MINA.
1797·71	1791·78	1793 ?	1810	1848	1845
1809·58	1803·64	1804	1823	1866	1851
1821·44	1815·51	1816	1833	1873 to 1875	1860
1833·30	1827·37	1829	1844		1862
1845·16	1839·23	1837	1856		1869
1857·03	1851·09	1848	1867		1879
1868·89	1862·96	1860	(1878)		
1880·75	1874·82	1870	1889 ?		
1892·61	1886·68	1882			
		1893 ?			

Table showing the approximate coincidences of death-rate *maxima or minima, with Jupiter's perihelion or aphelion positions, and with epochs of sun-spot maxima or minima :

DEATH-RATE YEARS OF MINIMA.	JUPITER'S PERHN OR APHN.	SUN-SPOT MAXA OR MINA.
1845, England only	P. 1845·2	Min. 1844
1851, Eng'd with Sweden	A. 1851·1	—between—
1860, „ „ „	—between—	M. 1860
1862, Europe with Tas.	A. 1862·96	—between—
1869, „ „ Australia	P. 1868·9	M. 1870
1879-81 „ „ „	P. 1880·75	—between—
MAXIMA.		
1848, England only	—between—	M. 1848
1866, Europe & Australia	„	Min. 1867
1873-5, General.	A. 1874·8	—between—

The above tables show, with regard to *Jupiter's positions*, 3 perihelia and 2 aphelia to death-rate min.; also, 1 aphelion to death-rate max. Sun-spots, 2 max. and 1 min., to death-rate min.; also, 1 max. and 1 min. to death-rate max. Nothing very conclusive about this, anyway.

To sum up the foregoing observations, I may say, firstly, that, theoretically, it is highly improbable that Jupiter can have any influence upon us whatever, and that statistics, so far as they go, fail to show that he has.

Secondly, that it is, theoretically, more probable that physical changes in the sun, such as variation in spottedness, should have some such influence, but that solar observations and vital statistics have not run together long enough to establish the fact of any connection between them.

It is interesting to note that Mr. Johnston's death-rate curves all show an upward tendency during the past year or two, corresponding in time with a period of abnormal telluric disturbance, and also with abnormal atmospheric conditions, as shown by our recent *sunset glows*. Considering the intimate relationship that exists between the air we breathe, and our very existence, is it too much to suppose that the circumstance referred to may have something to do with the present upward tendency of our death-rate curves ?

In connection with this enquiry it is much to be regretted that our vital statistics do not reach farther back. However, the question opened up by Mr. Johnston is of sufficient interest to merit special consideration in the future, although the phe-

*Abbreviations—"M.," maximum ; "Min.," minimum ; "P." perihelion; "A.," aphelion.

nomena in question, unlike the sanitary arrangements which are supposed to engage the attention of our municipal authorities, are absolutely beyond our control.

A REJOINDER TO MR. A. B. BIGGS'S CRITICISM ON OBSERVATIONS MADE IN RESPECT OF THE "OBSERVED PERIODICITY OF THE DEATH RATE." Etc.

By R. M. Johnston, F.L.S., Etc.

[*Read November* 17, 1884.]

I am glad to see that so able a critic as Mr. Biggs has taken up the important subject of the "Death rate in its observed coincident relation to super-terrestrial phenomena," which was recently introduced by me in a paper read before this Society; although, at the same time, it is to be regretted that he has based his remarks upon a brief abstract from a newspaper rather than upon the paper itself, for it has greatly misled him as regards the nature and scope of my argument.

It appears to me to be very clear that Mr. Biggs' difficulty is caused chiefly by erroneously assuming that the relations commented upon are *simple* instead of *complex*, and that belief in a more or less striking observed *coincidence* seems to be regarded by him as synonymous with a like belief in a corresponding *mutual inter-dependence* between the matters which have been observed to coincide.

Now there is a very wide difference between the conception or conviction of a known agreement or *coincidence* and the conception of an underlying casual relation. We can fairly conceive and admit of identity of movement or action between several phenomena for a limited space of time without prejudice, even when we assume that such coincidence is not uninterrupted for a longer period, or that it may be due (1) to mutual inter-dependence alone; (2) to causes unknown acting independently; (3) to causes unknown acting together; (4) to certain causes known and unknown, or imperfectly known, acting in combination.

Mr. Biggs, therefore, has somehow failed to grasp the scope of my argument when he sets himself to the task to prove that the movements of Jupiter have no appreciable "influence whatever, direct or indirect," upon the coincident phenomena, simply because the variable cycles of the maxima and minima of sun-spots, death rate, magnetic inclination, rainfall, etc., are not *solely* influenced by the movements of Jupiter primarily. This is proving a negative in reference to a complex problem, by ignoring all the factors necessary to arrive at a correct conclusion, save one—viz., the supposed value of Jupiter's influence. Even this influence seems to be unnecessarily restricted by him to the mere point when Jupiter is exactly in *perihelion*.

Mr. Biggs, by demanding proof and demonstration sufficient to produce conviction, again fails to grasp the object of my paper, which so far as the casual aspect of the phenomena discussed is concerned, is most guardedly restricted by me to *mere suggestion*. Now, had he studied my paper closely instead of the brief abstract referred to, he would find that I pointed out that the "coincidences observed are not sufficiently broad and regular to justify prediction;" that, at present, inferences drawn from them are "more suggestive than conclusive," and in consideration of many unexplained anomalies due to unknown and complex relations, I could only hazard from them "*presumption*" in favour of a relatively low death rate in Australasia during years of sun-spot maxima, and a more or less relatively high death rate during years of sun-spot minima. In this last respect it is a pleasure to me to find that I am in accord with Mr. Biggs, who also, with Young, Scott, and others, admits that there seems to be a well-established connection between "solar disturbances and the electrical condition of our globe."

Professor Balfour Stewart, the celebrated physicist and author of the profound work "On the Conservation of Energy" (Inter Series, 1874), in a paper read by him on "Magnetic Declination" (See *Nature*, April, p. 592), states that, although Professor Rudolph Wolf's list of sun-spot observations "extends back into the seventeenth century, and is unquestionably of much value, nevertheless, it must be borne in mind that we possess no sun-spot data sufficiently accurate for a discussion of questions relating to solar periodicity before the time when Schwabe had finally matured his system of solar observations, which was not until the year 1832." Curiously enough that is just one year prior to the period from which my diagram records the coincidences between the solar and planetary phenomena. This being so, it follows, as stated by R. H. Scott (p. 392, Elementary Meteorology, Inter. Series, 1883), that apart

from the last four or five sun-spot cycles which have actually varied from seven years to 14 years, "the data at present available are insufficient to establish satisfactorily" "the precise duration" of extended sun-spot periodicity, and hence Mr. Biggs's argument against the supposed influence of Jupiter, based upon the small differences of the mean of sun-spot periodicity as compared with the period of Jupiter, is not of much force, although in other respects his argument is well sustained and of considerable value.

Although, with Mr. R. H. Scott, I am fully convinced that as yet "it can scarcely be said that the close relation between solar and terrestrial phenomena is capable of accurate demonstration," still, with Tyndall, I am impressed with the feeling that "these guesses and conjectures are by no means leaps in the dark, for knowledge once gained casts a faint light beyond its own immediate boundaries. There is no discovery so limited as not to illuminate something beyond itself." (Scientific Materialism, p. 77.)

DEAL ISLAND.

The following census of the flora of Deal Island, in Kent's Group, was laid on the table by Mr. Justice Dobson, who had enlisted the services of the Superintendent of the Lighthouse on the Island, Mr. Johnstone, to collect and send him specimens of all plants growing there. These were forwarded to Sir F. Von Mueller, who prepared the census. One plant, an orchid, "Pterostylis vittata," is new to Tasmania, but is common to the Continent of Australia:—

Clematis microphylla, De Candolle.
Bursaria spinosa, Cavandolle.
Comesperma volubile, Libillardiere.
Geranium pilosum, Forster.
Zieria Smithii, Andrews.
Correa speciosa, Andrews.
Beyera opava, F. V. Mueller.
Phyllanthus Gunnii, J. Hooker.
Casuarina distyla, Vent.
Tetragonia implexicoma, J. Hooker.
Mesembrianthemum aequilaterale, Haworth.
Stackhousia linarifolia, Cunningham.
Pomaderris apetala, Labillardiere.
Pultenæa daphnoides, Smith.
Goodia latifolia, Salisbury.

Swainsona lessertifolia, De Candolle.
Acacia longifolia, Willdenow.
var mucronata et var Sophorae.
Acacia verticillata, Willdenow.
Acæna sanginsorbæ, Vahl.
Calycothrix tetragona, Labillardiere.
Leptospermum scoparium, Forster.
lævigatum, F. V. Mueller.
Eucalyptus obliqua, L'Hert.
Melaleuca ericifolia, Smith.
Kunzea corifolia, Reichenbach:
Pimelia linifolia, Smith.
Banksia marginata, Canamilles.
Aster argophyllus, Labillardiere.
„ stellulatus „
Helichrysum ferrugineum, Less.
„ cinereum, F. V. Mueller.
„ apiculatum, De Candolle.
Senecio lautus, Forster.
Styphelia Richei, Labillardiere.
„ oxycedrus, „
Epacris impressa, „
Candollea oerruloto, „
Goodenia ovata, Smith.
Alyxia buxifolia, R. Brown.
Myoporum insulare, „
Callitris cupressiformis, Butomat.
Caladenia latifolia, R. Brown.
Pterostylis vittata, Lindley.
Cyrtostylis reniformis, R. Brown.
Corysanthes pruinosa, Cunningham.
Dianella revoluta, R. Brown.
Typha agustifolia, Limme.
Juncus pallidus, R. Brown.
Luzula campestris, Candolle.
Lepidosperma gladiatum, Labillardiere.
Cladium trifidum, F. V. Mueller.
Festuca litoralis, Labillardiere.
Spinifex hirsutus, „
Polypodium pustulatum, Forster.
Asplenium marinum, Linne.
Pteris falcata, R. Brown.
„ aquilina, Linne.
Brachycome diversifolia, Fischer and Meyer.
var Maritima, Beath.

REPORT

OF THE

ROYAL SOCIETY

OF

TASMANIA

FOR THE YEAR

1884.

Tasmania:
WILLIAM THOMAS STRUTT, GOVERNMENT PRINTER, HOBART.

1885.

ROYAL SOCIETY OF TASMANIA.

Patron:
HER MAJESTY THE QUEEN.

President:
HIS EXCELLENCY MAJOR SIR GEORGE CUMINE STRAHAN, R.A., K.C.M.G.

Vice-Presidents:
HON. J. W. AGNEW, M.D., M.L.C.
JAMES BARNARD, ESQ.,
HIS HONOR MR. CHIEF JUSTICE DOBSON, M.E.C., F.L.S.
THOMAS STEPHENS, ESQ., M.A., F.G.S.

Council:
*JOHN SWAN, ESQ.
*JUSTIN M'C. BROWNE, ESQ.
*A. G. WEBSTER, ESQ.
*H. A. PERKINS, ESQ., M.D.
C. T. BELSTEAD, ESQ.
T. STEPHENS, ESQ., M.A., F.G.S.
THE RIGHT REV. BISHOP SANDFORD, LL.D.
J. BARNARD, ESQ.
HIS HONOR MR. CHIEF JUSTICE DOBSON, M.E.C., F.L.S.
C. H. GRANT, ESQ.
RUSSELL YOUNG, ESQ.
HON. J. W. AGNEW, M.D., M.L.C.

Treasurer:
C. J. BARCLAY, ESQ.

Hon. Secretary:
HON. J. W. AGNEW, M.D., M.L.C.

Auditors of Annual Accounts:
FRANCIS BUTLER, ESQ.
JOHN MACFARLANE, ESQ.

Auditors of Monthly Accounts:
JUSTIN M'C. BROWNE, ESQ.
C. T. BELSTEAD, ESQ.

Curator of Museum:
MR. ALEXANDER MORTON.

Superintendent of Gardens:
MR. FRANCIS ABBOTT.

* Members who retire next in rotation.

Honorary Members.

* Baron F. Von Müeller, K.C.M.G., M.D., F.R.S., F.L.S., &c., Government Botanist, Melbourne, Victoria.
* Rev. J. E. Tenison-Woods, F.L.S., F.G.S., F.R.G.S., Sydney.
Mrs. Charles Meredith, Malunnah, Orford.

Corresponding Members.

* Members who have contributed Papers which have been published in the Society's Transactions.

Professor John Agardh, M.D., University of Lund, Sweden.
W. H. Archer, Esq., Melbourne.
* Frederick M. Bayley, F.L.S., Brisbane, Queensland.
* G. Bennett, Esq., M.D., F.Z.S., Sydney, New South Wales.
William Tompson Bednall, Esq., Adelaide, South Australia.
John Brazier, Esq., C.M.Z.S., Sydney.
Rev. J. J. Bleasdale, D.D., F.G.S.
Rev. George Brown, C.M.Z.S., Sydney.
R. J. L. Ellery, Esq., F.R.S., F.R.A.S., Government Astronomer, Melbourne.
* Robert Etheridge, jun., Esq., F.G.S., British Museum.
Dr. Julius Haast, F.R.S., F.G.S., Director of Museum, Christchurch, New Zealand.
Professor W. Harkness, U.S.N., United States Naval Observatory, Washington.
Henry Heylyn Hayter, Esq., C.M.G., Government Statist, Melbourne.
Sir Joseph Dalton Hooker, C.B., K.C.S.I., &c., &c., London.
* F. W. Hutton, Esq., F.G.S., C.M.Z.S., Professor of Biology, Canterbury College, Christchurch, New Zealand.
James Hector, Esq., M.D., C.M.G., F.R.S., F.G.S., Director Geological Survey of New Zealand, Wellington.
* Colonel W. V. Legge, R.A., F.Z.S., M.R.A.S., Hobart
Archibald Liversidge, Esq., F.R.S., F.C.S., F.G.S., F.L.S., F.R.G.S., &c., &c., Professor of Chemistry and Mineralogy, University of Sydney.
Hon. W. M'Leay, F.L.S., Sydney.
* G. McIntyre, Esq., Christchurch, New Zealand.

Professor F. M'Coy, F.R.S., F.G.S., University of Melbourne.
Professor G. Neumayer, Munich.
E. P. Ramsay, Esq., F.L.S., Curator of Australian Museum, Sydney.
Rev. Charles Rogers, LL.D., Secretary Royal Historical Society, London.
Dr. W. O. Sonder, Foreign Hon. Sec. Society of Naturalists, Hamburg.
Richard Schomburg, Ph.D., C.M.Z.S., Director of Botanic Gardens, Adelaide.
* Ralph Tate, Esq., F.L.S., F.G.S., Professor of Natural History, University of Adelaide.
C. Tomlinson, Esq., F.R.S., F.C.S., &c., Highgate, near London.
Professor G. F. H. Ulrich, F.G.S., Melbourne.
Mons. J. N. Verschaffelt, Ghent, Belgium.

List of Fellows.

* Fellows who have contributed Papers which have been published in the Society's Transactions. † Denotes Life Membership.

The addresses of Fellows residing in Hobart are omitted.

Andrew, James.
* Abbott, Francis.
Adams, G. Patten.
Adams, R. Patten.
* Agnew, Hon. J. W., M.D., M.L.C., Fellow of the Linnean Society of New South Wales.
Aikenhead, Hon. J., M.L.C., Launceston.
Allport, Morton John Cecil.
Archer, W. Henry D., M.H.A., Brickendon, Longford.
Atkins, Charles J.
Atkinson, Thomas R.

Barclay, C. J.
* Barnard, James.
Barnard, C. E., M.D., F.L.S.
Barnes, William, Trevallyn, Launceston.
Bastow, Richard A.
* Beddome, C. E.
Bedford, W. J. Guthrie, M.R.C.S., Waratah, New Town.
Belstead, C. T.
Belbin, W., M.H.A.
Bernacchi, Diego A. G., Maria Island.
Bethune, John C., Dunrobin.
Bidencope, J.
* Biggs, A. B., Launceston.
Bilton, H., Glenorchy.
Boyes, W. L., George's Bay.
Bright, R. S., M.R.C.S.
Brock, H. J., Campania.
Browne, Justin M'C.
Brown, Hon. Nicholas J., M.H.A., Meadow Bank, Glenora.
Buckland, Rev. John Vansittart.
Buckland, W. Harvey, B.A.
Butler, Francis.
Butler, Henry, F.R.C.S.
Burgess, Hon. W. H., M.H.A.

Charpentier, W. H.
Clarke, Rev. George, New Town.
Clark, A. I.
Cook, Henry.
Cook, Henry, jun.
Cowle, Anne Caroline, Miss.
Crawford, Lieut-Colonel, Andrew, Hamilton-on-Forth.
Crosby, Richard.
Crowther, E. L., M.D.
Crouch, E. J., M.R.C.S.
Crosby, William.

Davies, J. George, M.H.A., Mayor of Hobart.
Davies, Charles Ellis.
Dobson, Hon. Alfred, M.H.A.
Dobson, His Honor William Lambert, M.E.C., F.L.S.
Dobson, Henry.
Dodds, the Hon. J. S., M.H.A.
Dowdell, Charles.

Elliston, C. H.
Evans, T. M.

Fincham, James.
Fitzgerald, George P.
Fysh, Hon. P. O., M.E.C.
Fysh, P. Oakley.

Gawne, E. B.
† Gellibrand, Hon. W. A. B., M.L.C., Hon. Member Leeds Institute, River Ouse.
Giblin, Edward O., M.D.
Giblin, Arthur.
Goldsboro, Dr., New Zealand.
Graham, Albert W., L.S.A., M.R.C.S., Franklin
Grant, C. H.
Grant, James.

Hamilton, John.
Hardy, Wentworth.
Harris, Rev. R. D Poulett, M.A.
Henry, Robert, jun.
Hickling, Wyatt.
Hinsby George.
Holden, Lonsdale A., M.R.C.S.
Hookey, Vernon W.

Hunter, Henry.
Huybers, James Alfred.

Jeffrey, Molesworth, Bournbank, Lachlan.
* Johnston, R. M., F.L.S.
Just, T. C.

* Kent, W. Saville, F.L.S.
Kermode, W. A., Mona Vale.
* Kingsmill, C. H., M.A.
Knight, William J., M.A.

Latham, G. H.
Legge, W. V., Colonel, R.A.
Little, W. P.
Lodder, Miss Mary, Lonah, Leven, N. W. Coast.
Lord, Hon. John, M.L.C.
Lovett, William.

Mace, Frederick, Buckland.
Macfarlane, W. H., M.B., New Norfolk.
Macfarlane, James.
Macfarlane, John.
* M'Clymont, James R., M.A., Cascades, Tasman's Peninsula.
* M'Cance, John, F.R.A.S.
Mackay, Patrick.
Macmichael, John C.
Maddox, Wm. Gordon, M.R.C.S., Launceston.
Marsh, H. J.
Mather, J. B.
* Mault, Alfred, New Norfolk.
Maxwell, C. M.
Maxwell, J. Crawford.
Milles, R. Sydney.
Morton, Alexander.
Murphy, Most Rev. D., Bishop of Hobart.

* Nairn, C. C., New Town.
Napier, G. R.
Nicholas, Wm., Nant, Bothwell.
Nicholas, Geo. C., Mill Brook, Ouse.
North, A.
* Nowell, E. C.

Park, Archibald, M.R.C.V.S.

Parsons, Cecil J.
Pedder, Frederick.
Perkins, H. A., M.D., M.R.C.S.
* Petterd, W. F., C.M.Z.S., Launceston.
Pillinger, John, Antill Ponds.
Poynter, Miss E. C., Sandy Bay.

Read, R. Cartwright, Redlands, New Norfolk.
Reynolds, W. J. J.
Riddoch, Alexander.
Robertson, Arthur J.
Roberts, H. L.
Rodway, Leonard.
Rooke, H. I., M.H.A., Launceston.
* Ross, J. Clunies, B.S.C., F.G.S., &c.

Salier, Frederick J.
Sandford, Right Rev. D. F., LL.D., Bishop of Tasmania.
Seal, Matthew.
Seager, Philip.
Sharp, John.
Shaw, Bernard.
* Shoobridge, W. E., New Norfolk.
Shoobridge, R. W. G., New Norfolk.
* Shortt, J., Capt. R.N.
Simmons, Rev. J. Wilkes.
* Simson, Augustus, Launceston.
Smith, Hon. Sir Francis Villeneuve, Knt. M.E.C., London.
Smith, C. H., Launceston.
† Solomon, Joseph.
Sprent, Charles P.
* Stephens, Thomas, M.A., F.G.S.
Story, Dr. G. F., Swanport.
* Swan, John.
* Swan, Edward D.
Swift, H. L., German Town.
Syme, J. Wymyss.

Thureau, G., F.G.S., Launceston.
* Travers, S. Smith.

Wagenknicht, A., George's Bay.
Walch, James H. B.
Walch, J. W. Henry.
Waller, G. Arthur, M.A., Cangort, New Town.

Walker, James Backhouse.
Wallack, E., Cascades, Tasman's Peninsula.
Ward, W. F.
Weaver, George.
* Webster, Alex. Geo.
Westbrook, G. C.
Weymouth, W. A.
Wilson, Edward P.
Wilson, Fleetwood P.
Wise, Fred. H.
Woollnough, Rev. J. B. Williams, M.A.
Wright, Stephen P. H., The Grove, Glenorchy.

Young, Russell.

Obituary.

Joseph Milligan, born in Dumfrieshire, 1807, died in London, 1884. Obtained Diploma of the R.C.S., Edinburgh, 1829. Appointed Surgeon, in 1830, to the Van Diemen's Land Company at Surrey Hills, where he remained 10 or 12 years. Was then, by Sir John Franklin, appointed Inspector of Convict Discipline, and subsequently Superintendent of the Aborigines, which position he held from 1843 to 1855, with the interval of one year, 1846-7, when he proceeded to Macquarie Harbour in charge of a large party of convicts. He was Secretary to the Royal Society from about 1847 to 1859, when he returned to England, where he acted as Commissioner for Tasmania at the Exhibition of 1862. During his long rule over the Aborigines he compiled a valuable Vocabulary of their language, which was published by the Royal Society.

Other Members who had died during the year were the Hon. Thomas Daniel Chapman, M.E.C., President of the Legislative Council, and Mr. Henry John Buckland.

MINUTES of the Annual General Meeting of the ROYAL SOCIETY OF TASMANIA, *held at the Museum on Monday evening, 26th January*, 1885,—JAMES BARNARD, *Esquire, Vice-President, in the Chair.*

THERE was a fair attendance of Fellows. Professor Lucas, M.A., and Mr. H. R. Brookes, of Melbourne, were present as visitors.

The under-mentioned gentlemen were duly elected Fellows of the Society ; viz., Rev. F. Shann and Geo. Richardson, Esquire.

The Chairman called upon the Hon. Secretary, the Hon. Dr. Agnew, M.D., to read the Annual Report.

The Report for 1884 was then read.

Colonel W. V. Legge moved, and Mr. Leonard Rodway seconded, the adoption of the Report. Carried unanimously.

VOTES OF THANKS.

Mr. T. Stephens, M.A., Chief Inspector of Schools, said the reading of the Report had suggested something to him—a duty which they ought not to separate that night without performing. The motion he was about to propose was of a character which was usually made in a formal way, but in connection with the Royal Society it was not to be taken as a mere form, but as expressing the heartfelt thanks and gratitude of the Fellows to one who had always been their helper, patron, supporter, and valued officer. The only difficulty in dealing with the subject was that the Fellow to whom he referred was one who objected most strongly to any enconiums being passed upon him in his presence. For that reason he did not intend to say much about it, but simply that the Society owed a hearty debt of gratitude to Dr. Agnew (applause) for having so kindly, at a time, too, when he might have retired on his laurels, reassumed the work which he had so long discharged as Honorary Secretary of the Society, and for his having been at its head during what he had himself spoken of as the most successful session or campaign since it was founded, whether they

regarded the donations which had been received, the accession of new Fellows, or the work done in the Museum with the aid of their energetic Curator. (Applause.) The Society was now more prosperous than it had ever been on any previous occasion ; and they could not think of its prosperity without remembering how much of it they owed to their Honorary Secretary. He begged to move a vote of thanks to that gentleman for his valuable services as Secretary during the past 12 months. (Applause.)

Mr. C. H. Grant seconded the motion. Having been a constant attendant at the meetings of the Society, he could bear testimony to the great zeal which Dr. Agnew had always shown in its proceedings. To that gentleman's generosity the Society was greatly indebted ; and he (Mr. Grant) congratulated him on having been assisted during the past year by such an able Curator as Mr. Morton, who had metamorphosed the Society altogether by the energy of his exertions. They had no doubt the best officers that any scientific society could possess, and it was impossible, therefore, but that it should go on and prosper.

The Chairman said he was sure he had only to put the motion to secure it a most cordial and enthusiastic reception.

The motion was carried by acclamation.

Dr. Agnew said he had returned thanks on previous occasions to similar votes of approval, and he could hardly add anything to what he had said previously in so doing. He did feel highly gratified, and he was sure it must be a source of satisfaction to every Fellow present, to see the fresh start which the Society had taken during the past year. For the first time the papers and proceedings had been laid on the table at the annual meeting, which was altogether unprecedented, and marked a considerable amount of energy in their officer who was responsible for it. Though the papers for 1884 had been very valuable, he believed they might fairly assume that those of the ensuing year would be equal to them. A great deal of energy had been thrown into every branch of the Society, and this was to a great extent due to the valuable exertions of their Curator, Mr. Morton. (Hear, hear.) The Society had a great acquisition in that gentleman ; and his labours had been well supplemented by those of Mr. Johnston and other Fellows who had contributed papers on various subjects. He

hoped that this year and all subsequent years would bring as much success to the Society as the last one had done. (Applause.)

Mr. Morton proposed, and Mr. Johnston seconded, a vote of thanks to the Press, and especially to the *Mercury*, for the valuable assistance rendered in the reporting of their proceedings in a way which was far beyond the ordinary course of business. The motion was carried with applause.

Election of Officers.

On the motion of Mr. E. D. Swan, seconded by Mr. R. M. Johnston, the following gentlemen were re-elected Members of the Council :—Mr. Justice Dobson, Messrs. J. W. Agnew, M.D., C. H. Grant, and Russell Young.

On the motion of Mr. E. D. Swan, seconded by Colonel Legge, Messrs. John Macfarlane and Frank Butler were re-elected Auditors of the Society.

Papers and Proceedings.

The Hon. Secretary said he desired to mention that the Papers and Proceedings of the Society for the year 1884 had been already printed. Copies were now on the table, and were ready for circulation. This was the first time such a thing had been done since the Society first commenced publishing its proceedings. (Applause.) The book this year contained several valuable and interesting papers.

Contributions.

The Chairman drew attention to a large collection of books and pamphlets which had been received from America and Canada from different learned Societies that day, and which were then on the table before members.

Mr. Stephens suggested that those Fellows who were members of Parliament should try to get a vote of money for the extension of the building, or otherwise they would soon have no room for their possessions.

Catalogue of Birds.

Colonel Legge intimated his intention of preparing a catalogue of the birds of the Colony during the next year, and hoped the Society would accept it as part of its proceedings.

The Chairman (on behalf of the Council), Dr. Agnew, and Mr. Johnston spoke in favour of the necessity of such a compilation, and of the value it would be in spreading the science of ornithology in the Colony.

Colonel Legge also commented on the absence of a proper collection of skins in the Museum, and expressed the hope that residents in the country districts would send in contributions, as there was no fear now of anything being thrown away.

Mr. Morton spoke in favour of the proposed catalogue, believing it would be the means of doing away with the practice of giving local names to specimens which had no meaning perhaps beyond their present owners.

The proceedings then terminated.

REPORT.

THROUGHOUT the Session of 1884 the attendance of Fellows at the evening meetings has been larger, and the papers brought forward have been more numerous than in any previous period. The papers were:—"References to Baron C. Von Ettingshausen's recent observations on the Tertiary Flora of Australia; also "A complete Census of the Flora of Deal Island in Kent's Group:" by Baron F. Von Müeller, K C.M G., M.D., F.R.S., &c.—"Notes of spectroscopic observations of the comet Pons, 27th January to 2nd February, 1884;" "Report of spectroscopic observations of the Twilight Glows during February and March, 1884;" "Observations on Mr. R. M. Johnston's Vital Statistics:" by A. B. Biggs.—"Notes regarding certain Fossil Shells occurring at Table Cape, supposed to be identical with living species;" "Notes on Fossils from Maria Island;" "Notes on three Tasmanian Fish;" "Additions to the list of Table Cape Fossils, together with further remarks upon certain fossil shells supposed to be identical with living species;" "Notes on a fossil Cypris alburyana;" "Description of a new Vitrina from the Travertin beds, Geilston;" "Notes on description of a new species of Odax;" "Description of a new Fossil Shell from the Eocene beds, Table Cape;" "Remarks on the observed periodicity of the Death-rate, with suggestions as to its possible relation with the periodicity of solar and other super-terrestrial phenomena;" "Notes on the discovery of two rare species of Ferns new to Tasmania;" "Description of a new species of Crepidula, from the Eocene beds, Table Cape;" "Observations on six rare Fishes recently captured in Tasmanian waters;" "A rejoinder to Mr. A. B. Biggs' criticism of observations made in respect of the observed periodicity of the Death-rate,"

&c.: by R. M. Johnston, F.L.S.—"Results of a certain critical examination of the Mollusca of the older Tertiary of Tasmania allied to some living representatives;" "Description of some new Fossil Mollusca from Table Cape;" "On the community of species of aquatic pulmonate Snails between Australia and Tasmania;" "Description of new species of Mollusca of the Upper Eocene beds at Table Cape:" by Professor R. Tate, F.L.S., F.G.S.—"Notes on boring operations in search of coal in Tasmania:" by T. Stephens, M.A., F.G.S., &c.—"Osteosarcoma, or so-called Cancer of the Jaw in Cattle:" by H. A. Perkins, M.D.—"Notes on a Sapphirina and a Salpa, caught off the Cape of Good Hope:" by J. M'Cance, F.R.A.S.—"The River Derwent; Note upon the flood of September 23, 1884:" by A. Mault.—"Tentative list of Navigators who visited Van Diemen's Land prior to September, 1803:" by J. R. M'Clymont, M.A.—"Notes on the Œstrus Ovis, or Gadfly of the Sheep:" by A. Morton.—"Notes on the Infusorial Parasites of the Tasmanian White Ants:" by W. Saville Kent, F.L.S, &c.—"On the determination of a true Meridian:" by H. C. Kingsmill, M.A.—"Earthquake Shocks in Tasmania during the year 1883-84: by Commander Shortt, R.N.

At the evening meeting of September, Mr. Robert Henry, jun., Superintendent of Telegraphs, delivered a lecture on "Submarine Cables," giving a practical illustration of means by which the localities of breaks or faults in the cable are determined.

Library.

The Library, in addition to the ordinary periodicals, has been enriched by valuable donations from the Hon. W. Macleay, of Sydney, the Trustees of the British Museum, the Royal Society of Canada, and other scientific bodies. The Curator has done excellent work in properly classifying all the books and pamphlets, and compiling a complete catalogue. This compilation has long been a desideratum, and it is very gratifying to be able to record its accomplishment. The manuscript of the catalogue is now in the hands of the Government Printer.

Domain.

The Domain Improvement Committee has not been idle. A considerable length of new road has been made, and tree planting has been carried on. It is unpleasant to have to report that a few of the young trees have been wantonly destroyed, but, generally speaking, the trees are doing well.

Fellows.

Fifty new Fellows, an unprecedented number, have been elected, and six have been lost through death or resignation. One of these deaths, that of Mr. Joseph Milligan, claims special notice. If Sir John Franklin must be called the first, Mr. Milligan may certainly be reckoned as the second founder of the society. It was entirely owing to his exertions that the present building was erected, and it was chiefly due to his great abilities and fostering care that at one period the society was safely carried through difficulties which threatened its existence. The number of Fellows is 150.

Meteorology.

Meteorological observations have been carried on as in last year.

Council.

One death, that of Mr. H. J. Buckland, an old and valued member of the Council, took place. The vacancy was filled by the appointment of the Right Rev. Dr. Sandford, Bishop of Tasmania.

Finance.

The income has been:—Government grant-in-aid to Museum, £200; grant to Gardens, £600; annual subscriptions to Royal Society, £196 10*s.*; sale of plants, £128 3*s.* 2*d.*; making, with balance from 1883, £1199 11*s.* 2*d.* The expenditure amounted to £1169 1*s.* 5*d.*, leaving a balance to credit £30 9*s.* 9*d.*

It is a matter of deep satisfaction that the grant for 1885 to the Museum has been augumented by £100, and that to the Gardens by £200. These additions have been long and urgently needed.

Museum.

In the early part of the year some cases and jars which had been used at the Fisheries Exhibition in London were offered to the Society on the condition in the first place that certain claims upon them should be paid. Subsequently, however, Government courteously waived all claims on the cases, and they are now utilised in the Museum. We have to acknowledge with best thanks our indebtedness to Mr. E. P. Ramsay, F.R.S.E., F.L.S., and the authorities of the Sydney Museum, for the very great liberality they have shown in presenting to us the numerous and valuable specimens, the names of which appear in the list of donations. The Queensland Museum is also a liberal donor.

On the part of the public, a marked increase of interest in the Museum has been shown by the unusually large number of donations from divers parts of the colony. In the collection special to Tasmania, the objects have been re-arranged according to their natural orders, and many new ones have been prepared and mounted by the Curator, Mr. A. Morton, whose zeal, energy, and ability demand special recognition.

The collection is thus gradually approaching to that condition, so much to be desired, in which it will fairly represent the geology, the flora, and the fauna of Tasmania.

To the donors of plants and seeds, and to the owners and captains of vessels and others who have gratuitously assisted in making the usual exchange, the best thanks of the Society are due.

Gardens.

Many of the plants suffered severely from the drought during the early part of the year, and some apparently acclimatised were quite destroyed. Dahlias, Asters, Stocks, Phloxes, and other autumn flowering plants, either did not flower at all, or did so in a very imperfect manner. The want of an adequate supply of water was never more severely felt. Included in the plants introduced during the year are many of great interest. Seedlings have been raised of the following choice coniferæ:—Abies ajanensis, polita, concolor, grandis, noblis, sechalinensis,

Veitchii, and Albertiana; also of helesia tetraptera (the Caroline snowdrop tree), Parkinsonia aculeata (the Jerusalem thorn), Adansonia digitata (Monkey bread or Baobob), a tree remarkable for its great size of trunk, sometimes measuring 80ft. in circumference, Nyssa aquatica and capilata, and several species of American forest trees, including Sycamores, Ashes, Betulas, etc. Hitherto the greater number of the introduced plants have been procured by exchange, effected by sending Norfolk Island pines and Tree ferns (Dicksonia antartica) to Europe. By late advices, however, we learn that the Tree Fern can now be purchased in London for less than the freight from Tasmania, and that the Norfolk Island pine is propagated by cuttings, in France, to such an extent as to keep the Home market fully supplied. So few Tasmanian plants would now be accepted as exchanges that we shall have to depend principally on purchases for any future acquisitions to our collection. The North American cranberry, Paccinium racrœarpum, which has been in the Garden for some time, has this year "set" several dozen fruit. This valuable plant, which is suited for growing in bogs unsuited for any other culture, is very prolific when properly cultivated. It is worthy of a careful trial in our lake districts, where it would probably thrive. Cones have been produced on Cedrus deodara and Auricaria Bidwilii for the first time, and from the former several dozen seedlings have been raised. The printed labels, first used upwards of two years ago, have stood fairly well.

The estimated number of visitors to the Gardens was 67,000.

STATEMENT of the Funds of the Royal Society of Tasmania for the Year 1884.

Receipts.	£	s.	d.	£	s.	d.
Balance as per Statement for 1883.....		..		74	18	0
Royal Society.						
Annual Subscriptions and arrears from former years	192	0	0			
Subscriptions from last year as cash in hands of Acting Curator, 31 Dec., 1883, placed in Bank, February, 1884.	4	10	0			
				196	10	0
Museum.						
Grant in aid from Treasury		..		200	0	0
Botanic Gardens.						
Grant in aid from Treasury	600	0	0			
Proceeds of sale of Plants, Fruits, &c..	128	3	2			
				728	3	2

Expenditure.	£	s.	d.	£	s.	d.
Royal Society.						
Printing and Advertising	82	19	0			
Postage and Parcels	2	8	6			
Collector's Commission	8	14	0			
Messenger	2	17	0			
Furniture, Fittings, &c.....	25	1	0			
Library, Books, Stationery, &c....	36	3	1			
Sundries	2	17	5			
Water rate	4	15	0			
Sweeping chimneys	0	9	0			
Insurance	3	5	0			
Interest on overdrawn account	0	9	10			
				169	18	10
Museum.						
Salary of Curator (10 months)	166	13	4			
Ditto Museum Attendant	64	0	0			
Ditto ditto (Sunday duty)	13	5	0			
Gas.....	1	1	0			
Water rate	1	18	4			
Purchase of Specimens, &c.....	1	7	0			
Fuel and Light.....	7	4	0			
Sundries and Petty Cash	3	2	10			
Ironmonery and Brushware	8	7	2			
Freight and Carriage of Specimens.	2	6	9			
Repairs to Buildings, Fittings, &c...	10	7	6			
Chemicals	7	16	9			
Stationery	1	6	0			
Telegrams	0	6	9			
				289	2	5

Gardens.						
Salary of Superintendent	200	0	0			
Wages of Labourers	341	15	0			
Tools and Repairs	16	3	1			
Freight and Carriage of Plants	5	6	1			
Stationery and Stamps	5	9	10			
Forage	10	5	5			
Horse hire	8	16	0			
Ironmongery and Fittings, &c.	45	11	4			
Plants and Seeds	13	14	2			
Sundries	15	19	1			
Water rate	3	3	4			
Flower Pots and Drain Pipes	22	13	1			
Cartage	3	18	3			
Sand, Earth, Ashes, &c.	17	5	6			
				710	0	2
				£1169	1	5
Balance as per Statement for 1883	74	18	0			
Receipts	1124	13	2			
Expenditure		..		1169	1	5
Balance to credit		..		30	9	9
£1199 11 2	£1199	11	2	1199	11	2

Examined and found correct.

FRANCIS BUTLER.
JOHN MACFARLANE.

17*th February*, 1885.

STATEMENT of the MORTON ALLPORT *Memorial Fund*, 1884.

Dr.		£	s.	d.
Jan. 1, 1885.	To balance as per Statement for 1883	45	18	0
	By Cheque, A. G. Webster, Esq. ...	12	0	0
	Interest Savings Bank ... £0 18 9			
	Less cost of bank book... 0 0 6	0	18	3
		£58	16	3

Cr.		£	s.	d.
Jan. 1, 1885.	By Balance in Savings Bank to Credit of Fund	58	16	3
		£58	16	3

Examined with Savings Bank Book and found correct.

FRANCIS BUTLER.

JOHN MACFARLANE.

ADDITIONS to the Library, 1884.

Annals de la Société Royale Malacologique.
Annual (Twentieth) Report of the Canterbury Acclimatisation Society.
Agricultural Gazette, current numbers.
Annals of Magazines of Natural History, current numbers.
Athenæum, The, current numbers.
Annual Report of the American Museum of Natural History, March, 1884.
Agricultural Statistics, Victoria, 1883-4.
American Agriculturist, current numbers.
Address to the Geographical Section of the British Association, by Sir J. H. Lefroy, K.C.M.G.
Australian Statistics, Melbourne, 1883.
Barometer Manual for the use of Seamen.
Bulletin of the American Museum of Natural History of, Vol. 1, No. 5.
Blue Book of Victoria.
Bibliotheca Geographica et Historia.
Bombay Magnetical and Meteorological Observatory, 1879 to 1882, with Appendix.
Bibliography, III. "Œcalephs," by J. W. Fewkes.
Botany of Bermuda, 2 parts—part 2. By Sir J. H. Lefroy.
Carpenter's Zoology.
Canadian Plants Catalogue.
Catalogue of Birds in the British Museum, vol. 9.
Catalogue of the Exhibits in the N.S.W. Court Fisheries Exhibition, London.
Census of Victoria, 1881, parts 7-8.
Crime in New South Wales. By H. H. Hayter, C.M.G.
Catalogue of the Library of the late Hon. J. M'Gregor.
Catalogue of Exhibits in the Raffles Museum, Singapore.
Dynamics. By W. M. Gardiner.
Daniell's Introduction to Chemical Philosophy.
Dublin Dissector, 2 vols.
Descriptive Catalogue of Australian Fishes, vols. 1, 2, with Supplement. By the Hon. W. Macleay, F.L.S.
Descriptive Atlas of the Eucalyptus of Australia and the adjoining Islands. By Baron F. Von Müeller, K.C.M.G.
Denliquin or Baratta Meteorite. By Prof. Liversidge.

Dulau & Co.'s Catalogue of French books.
———————— Medical books.
———————— Botanical books.
———————— Tourist's Guide Book.
Entomologist Tidscrift, vols. 1, 2, 3.
Exchanges and Presentations, List of, made by the Royal Society of New South Wales, 1883.
Extract from the Proceedings of the Victorian Institute, Annual Meeting, 1884. Speech by Sir J. Lefroy, K.C.M.G.
Foraminifera of Victoria.
Fauna and Flora of New Zealand. By Prof. F. W. Hutton, F.L.S.
Fisheries of Ireland, The.
Florist and Pomologist, current numbers.
Fishing and Hunting in Russian Waters, by Dr. C. Grimm.
Geology, Humanism, and Realism. By Dr. Von Haast.
Government Geological Report on the Mines of Herberton, Western Thompson's Creek Districts, and the Silver Mines of the Dry River, Queensland.
Geological Survey of India, vol. 20. parts 1-12. From the Society.
Gardener's Chronicle, current numbers.
Geological Magazine, current numbers.
Handbook of New Zealand. By J. Hector, F.R.S., M.D. &c. From the Survey Department, New Zealand.
History of Tasmania, The. By J. Fenton.
Hourly Readings, part 2, 1882. Meteorlogical Office, London.
International Fisheries, 43 publications. From the Tasmania Fisheries Commission.
Improved facilities for the capture, economic transmission, and distribution of Sea Fishes, and how these matters affect Irish Fisheries.
Infusoria, A Manual of the. 6 parts. By W. Saville-Kent, F.L.S.
Journal of Science, New Zealand, current numbers.
———————— the Royal Microscopical Society.
———————— the Society of Arts.
———————— of Science (May).
Journal and Proceedings of the Royal Society of New South Wales.
List of Books relating to Tasmania. By J. B. Walker.
Lamarck's Conchology, London, 1827. By E. A. Crouch.
Le Congo depuis l'Equateur jusqu'a l'Ocean.
Monthly Record, Melbourne Observatory.
Meteorological Returns for Tasmania.

Monthly Notices of the Royal Astronomical Society, London. Current numbers.
Materialism vindicated. By Veni.
Midland Medical Miscellany, The.
Meteorological Maps (two), from Meteorological Office, India.
———————— Reports, India, November and December, 1883.
———————— Report of the Meteorological Council to the Royal Society, for the year ending 1883.
———————— Observations made at the Adelaide Observatory and other places in South Australia and the Northern Territory.
Monthly Weather Report of the Meteorological Office, London, for January, 1884.
——— Record of Results and Observations, &c. By R. L. J. Ellery, F.R.S.
Mineral Statistics of Victoria.
Melbourne Monthly Record Meteorological Observations.
Meteorological Report for 1883, New Zealand.
Midland Medical Miscellany.
Monthly Weather Report, May and April, 1884, Meteorological Office, London.
Nature. Current numbers.
New Zealand Meteorological Report, 1883, including Returns for 1880-81-82.
New South Wales Physical Geography and Climate. By H. C. Russell.
New Zealand Geological Report for 1883-4. By James Hector, F.R.S.
Naturlastorischen Museum zu Hamburg. Report for 1883.
Observations on New Vegetable Fossils of the Auriferous Drifts. By Baron F. Von Müeller.
Observations of the Total Eclipse July 29, 1878. From U.S. Naval Observatory.
On the development of certain Worm Larvæ. By A. Agassiz, F.R.S.
On the Binjera Meteorite, New South Wales.
——— Chemical composition of certain Rocks, New South Wales.
Official Introduction to the Bahamas Fisheries, with a description of the Islands.
Proceedings of the Linnean Society of Sydney.
———————— of the Yorkshire Geological and Polytechnic Society.
"Progress Verbal," 17 parts.

Proceedings of the Academy of Natural Science of Philadelphia, part 3, 1883.
"Periodic Law." By J. A. R. Newlands.
Phanlogamia of the Mitta Mitta Source Basin, (article 2). By J. Sterling.
Proceedings of the Royal Society of Queensland, vol. 1, part 1, 1884.
Problems of Nature, (two papers.) New York.
Proceedings of the Royal Society of London, 5 parts, vols. 34-36, Nos. 227 to 231.
———— of the Philosophical Society of Glasgow, 1883-4,
———— and Transactions of the Royal Society of Canada. vol. 1, 1882-83. Pamphlets, 21. By W. Saville-Kent, F.L.S.
Quarterly Weather Report, part 4, 1876. Meteorological Office, London.
Records of the Geological Survey of India, vol. 17, part 4.
Report of Tasmanian Fisheries.
———— Progress for 1880-81-82, Canada.
———— Free Public Library, Sydney, N.S.W., for 1883-84.
——— on the progress and condition of the Botanic Gardens and Government Plantations, Adelaide. By R. Schomburgh, F.R.S.
Records of the Geological Survey of India, vol. 17, part 2, 1884.
Report of the Canadian Observations of the Transit of Venus.
———— Australian Museum, Sydney, for the year 1883.
———— Chief Inspector of Mines, Victoria, 1883.
Reports of the Mining Surveyors and Registrars, quarter ending 31st March, 1884, Victoria.
———— Department of Mines, N.S.W., for the year 1883.
Rocks from New Britain and New Ireland. By Prof. A. Liversidge.
Results of Rain and River Observations made in N.S.W. By H. C. Russell.
Records of the Geological Survey of India, vol. 17, part 3, 1884.
Report on the Zoological Collections made in the Indo-Pacific Ocean during the voyage of H.M.S. *Alert*, 1881-2.
Report on the Administration of the Meteorological Department of the Government of India.
Science Gossip, 1874 to 1882.
———— 10 pts., January to October, 1883.
Société Royale Malacologique de Belgique.

Statistical Register of the Colony of Victoria for 1883.
Special Catalogue of the Chinese Collection Exhibits for the International Fisheries Exhibition, London.
Sixty-fourth Report of the Council of the Leeds Philosophical and Literary Society.
Statistics of the Colony of New Zealand, pts. 4 & 5, 1883.
Surface Temperature Charts, Meteorological Office, London.
Selections from Embryological Monograph.
———— "Acalephs and Polyps," with 13 Plates, by Prof. A. Agassiz.
Transactions of the Royal Historical Society, vol. 2, pt. 1.
———— of the Asiatic Society of Japan, vol. 2, pt. 2.
Tasmanian Statutes, vols. 1, 2, 3.
———— House of Assembly Journals, vols. 44, 45.
———— Papers.
Uber Rinige Afrikanische, Reptilien, Amphibien, and Fische des Naturlastorischen Museum. By Dr. J. G. Fischer, Hamburg.
Victorian Naturalist, current numbers.
Vegetable Moulds and Earth Worms. By Chas. Darwin.
Vital and Meteorological Statistics of Tasmania. By R. M. Johnston, F.L.S.
Wilson's Human Anatomy.
Zoological and Acclimatisation Society of Victoria, 20th Annual Report, 1883.

LIST of Donors to the Museum during 1884.

(For particulars of Donations see lists in Monthly Proceedings.)

Arnold, J., Messrs.

Blyth, —
Broom, Capt.
Browne, Geo.
Bradley, Mrs.
Browne, Justin, Mrs.
Baynton, S. P.
Boyes, W. L.
Buckland, Miss
Bayless, R.
Brent, A., Miss
Brown, N. J., Hon.

Cotton, J.
Clarke, A.

Dove, Miss
Davies, Chas. Ellis
Davies, J. G., M.H.A.
Dunbabin, —

Evans, A.

Flexmore, A.

Green, J. R.
Gawne, E. B.
Graves, —
Gatty, H.

Hissey, J.
Hinsby, Geo.
Hull, E.
Howe, Geo.
Haywood, H.

Jones, A.
Johnston, R. M.

Kent, W. Saville
Kermode, W.

Lodge, —

Legge, Col. W. V.

Meredith, L., Mrs.
M'Clymont, J. R.
M'Ardell, J. O. O.
Morton, A.
Macpherson, D.
M'Cance, J.
M'Cluskey, —
Martin, W. A.

Oakley, J. L.

Petterd, W. F.
Propsting, N. H.

Ratte, F., Mons.
Rollings, R. W.
Reilly, W.
Rex, R. R.
Richards, J. G.
Read, R.
Ranclaud, L. Miss

Swan, John
Stephens, T.
Swan, E. D.
Self, W.
Shaw, B.
Swift, H. L.
Stewart, C. H.
Seal, M.

Turvey, W.
Trustees Australian Museum
Trustees Brisbane Museum

Whitehead, J.
Ward, W.
Webster, —

PLANTS INTRODUCED INTO THE ROYAL SOCIETY'S GARDENS DURING 1884.

Abies ajanensis
„ Albertiana
„ aloquoiana
„ concolor
„ leptolepis
„ polita
„ sechalinensis
„ Siberica
„ Veitcheii
Acacia dentifera
„ lunata
„ tortuosa
„ urophylla
Acer circinatum
Adansonia digitata
Albertia simplicifolia
Albizzia procera
Alfreda nivea
Alhagi comalarum
Alsine pinifolia
Anemone rivularis
Androsace sarmentosa
Aquilegia Bartoloni
„ canadensis
„ oxycephala
Aralia racemosa
Arum pictum
Aristolochia sarmentosa
Aspidium exaltatum
Asplenium attenuatum
„ Hookerianum
Aster lineatum
„ longifolium
„ oblongifolia
„ spectabilis
Atragene alpina
Berberis Thunbergii
Betula Fudisiana
Bougainvillea brasiliensis
Caliphaca volgarica
Campanula punctata
Cassia fistula
Casuarina glauca
Cedrela odorata
Cephalandra palmata
Cerastium villosum
Chrysopsis villosa
„ falcata
Clematis fusca
„ longorica
Convolvutus marginatus
Cyrilla racemiflora
Darwinia citriodora
Davallia Fijiensis
Daviesia corymbosa
Dictamnus albus
Dracocephalum altanense
Elodia virginica
Eremostachia laciniata
Erica ramentacea
„ rigida
„ scoparia
Erythrina Humei
„ Caffra grossa
Eucalyptus botryoides
„ fibrosa
„ Lehmanni
„ megacarpa
Euphorbia petulifera
Fraxinus Americana
„ plattycarpa
„ Lodgiana
„ potomophilla
„ raibocarpa
Grevillea asplenifolia
„ alpina
„ buxifolia
„ confertifolia
„ linearis
Glycirrhiza bacharica
Goniostoma ligustrifolia
Gypsophila fastigiata
Hakea cucullata
„ crassifolia
„ elliptica
„ flexilis
„ leucoptera
„ nitida
„ oleifolia
„ trinervis
Hohenstretia polystachya
Hedychium spicatum

Hovea heterophylla
Hypolepis millifolium
Iris Gueldenstadtii lutea
Jurinia Eversmanni
Lagerstrœmia Archeriana
Leea sambucina
Leontopodium Sibericum
Leucadendron glabrum
Lilium Catesbœ
Lithospermum officinale
Lomaria Banksii
Lonicera Luberechtiana
„ micrantha
Luffa sphœrica
Lysimachya punctata
Mæsia indica
Magnolia Halliana
Marsilea macrophylla
Matricaria eximea
„ nana
Melaleuca laterita
„ leiostachya
„ leucodendron
„ nesophila
„ styphelioides
„ tamariscina
Mesembryanthemum curvifolius
„ gemminifolia
Metrosideros scandens
Meytenus pendulinus
Mimosa glauca
„ rubicaulis
Momordica involucrata
Nepita kokamarica
Nertera depressa
Nitraria Schoberi
Nyssa aquatica
„ capitata
Oncaba Kramanni
Oxybalus hymalensis
Parkinsonia aculeata
Parnassia sp.
Petalostemon canadensis
Picea grandis
Pinus Korariensis
Plauchea camphorata
Poa foliosa
Podalyria velutina
Polygala Dalmaisiana
Polygonum divaricatum scabrum
„ polymorphum
„ roseum
Polypodium irioides
„ pallidum
„ pennigerum
Primula farinosa
„ obtusifolia
Protea cynarioides
Pterospermum acerifolia
Pyrethrum selaginoides
Pyrus prunifolius cerasifolius
„ baccata costata
„ „ genuina
Quercus agrifolia
„ bicolor
„ Mirbeckii
„ paniculata
„ sideroxylon
Renardia astrantifolia
Rhamnus utilis
Rheum longoricum
„ palmatum
„ spiciforme
„ tangitanum
Rhus aromatica
„ lœvigata
„ succedaneum
„ undulata
„ vernicifleua
Rudbeckia fulgida
Salix acuminata
„ finmarchica
„ nigra
„ phyllicifolia
„ purpurea mutabilis
Salvia farinacea
Sarcozygum Xanthozylon
Saxifraga bromelioides
„ chrysantha
„ crassifolia
„ cuneifolia
„ leptoceros
„ nivalis
Sedum Ewersii
Sempervivum arachnoidea
Senecio speciosus
Sidolacea candida
Silene repens

Simplocos crategioides
Solanum betaceum
Statice myriantha
„ Suworowii
Stephania hernandifolia
Syncarpia laurifolia
Syringa Ti Tikœa
Tacsonia Buchananiana
Tanacetum tricophyllum
Thalictrum cornutum
Thermopsis lanceolata
Toxicophlœa spectabilis
Trislania conferta
Tritoma aurea
„ recurvata
Tulipa triphylla
Ulmus crassifolia
Vitis cynthiana
„ elvira
„ indivisa
Zygophoro climopodioides
Zygophyllum enrypterum

Pelargonium—Large Flowered.

Archduchess
Coquette
Covenant
Decorator
Diplomatist
Duke of Bedford
Enchantress
Fascination
Hebe the Beautiful
Highland Lassie
Judith
Marchioness
Miss Harvey
Marion Wilkie
Prince Teck

Pelargonium—Regal.

Beauty of Oxton
Countess of Rosebery
Duke of Albany
Edward Perkins
Elegantissima
Karl Klein
M. P. H. Zeller
Ville de Caen

Pelargonium—Fancy.

Alpicus
Duchess of Edinburgh
Figaro
Jewell
Princess Teck
Romana
Undine

Pelargonium—Zonal.

Calliope
Dr. John Denny
Lizzie Brooks
Louis
Miss Fenn
Numitor
Percy
Rev. F. Atkinson
Surpasse Beauty Suresnes
Vanassa

Pelargonium—Ivy-leaved.

Anna Pfitzer
Brilliant
Charm
Corinth
Filiciana
Gamboda
La France
M. Dubois.
Mrs. H. Cannell.

Rose.

Baron A. de Vrints
Beauty François
Beauty of Stapleton
Comptesse Rizi du Parc
Chamois
Duchesse of Westminster
Dr. Sewell
Dupay Jamin
Domatella Beccan
Elizabeth Vigneron
Emilie Plantier
Frederic Sonilla
Harrison Weir
Jean Soupert
John Cranston
La Pactole
Lord Beaconsfield
Louisa Wood
Madame Ferd de la Forest
„ de St. Joseph
„ de Jute
„ Joseph Halphen
„ Juliet Wolfen
„ la Comte Casarta
„ Mathilda Lanærtos
Madame Prosper Longie
„ Proudhomme
„ Scipion Cochet
Marie Cordier
Marquis de Sanina
Michael Saunders
„ Souchet
Miss Ingram
„ Hassard
Monsieur Fillion
„ Woolfield
Oxonian
Pearl des Jardins
Perfection Monplais
Queen Eleanor
Reine des Blanches
„ Marie Henrietta
Red Saffrano
Souvenir Adolph Thiers
„ de George Sand
„ Victor Verdier
Thomas Mills
Vicomptesse Falmouth
Well's White

Bouvardia.

Alfred Newner
Corymbiflora alba
Dazzle
President Garfield

Chrysanthemum.—140 new.

FRUIT.

Apple.

Cleopatria
Carter's Blue
Cogswell
Crow's Egg
D. F. Fish
Early Strawberry
Gladney's Red
Greave's Pippin
Hoover
Jewett's Best
John Toon
Marston's Red Winter
Munroe's Favourite
New England Pigeon

Apricot.

Cannino Grossa
Maro
Royal Orange
Large French Red
Oulin's Early Peach

Peach.

Avenel	Duchardt
Comet	Magdala
Concor	Montgamet

Cherry.

Tomato

Orange.

Canton Mandarin	Queen
Egg Orange	St. Jago
Naranja Prata	Thorny Mandarin

Diospyrus Kaki.

Dio Dio Maro	Nino
Kuro Kumo	Zingi

Chestnut.

Bank's Prolific	Downton

Filbert.

Deviana Prize	Webb's Exhibition, White
Webb's Exhibition, Red	

Grape.

Bedwell's Seedling	Raisin des Dames
Black Manuka	„ Monstreuse
Early White Malvoisia	Ulliade
Madeline Royal	

EXCHANGE OF PLANTS AND SEEDS DURING 1884.

January.

From Mr. Wm. Bull, New Plant Merchant, London—Case containing 100 chrysanthemums.

From W. J. Latham, Hobart—Collection imported Dutch bulbs.

To Major Jacobs, Jeypore, India—1 package seeds.

February.

From the Botanic Gardens, Saharanpur, India—50 packets seeds.

From Baron Ferd. Von Müeller, Government Botanist, Victoria—2 packets seed.

From Mr. Oliver, New Plymouth, New Zealand—2 packets seeds.

To Mr. G. Brunning, Melbourne—36 nymphæ plants.

To Mr. A. James, Department Mines, Sydney—Bag sphagnum moss.

March.

From the Chamber of Agriculture, Washington, United States—60 packets seeds.

From Miss Owen, Ireland—7 packets seeds.

From Mr. A. James, Sydney—13 packets seeds.

To Messrs. De Smet Frères, Ghent, Belgium—1 case pines.

April.

From Mr. A. Thompson, Dunedin—1 case ferns.

From Baron Ferd. Von Müeller, Government Botanist, &c. Victoria—2 plants; 2 packets seeds.

To Messrs. Shepherd & Co., Sydney—Case sphagnum moss.

May.

From Mr. G. Brunning, Melbourne—40 chrysanthemums.

From Mons. A. Van Geert—5 packets seeds.

From Baron Von Müeller, Government Botanist, Victoria—290 packets seeds.

From the Chamber of Agriculture, Washington, United States—75 packets seeds.

From Mr. G. Brunning, Victoria—2 cases of plants.

From Messrs. Shepherd & Co., Sydney—14 packets eucalypti.

To Dr. R. Schomburg, Botanic Gardens, Adelaide—Sphagnum moss.

To Messrs. Shepherd & Co., Sydney—Sphagnum moss.

To Queensland Acclimatisation Society—Spagnum moss.
To Mr. J. Smith, Riddell's Creek, Victoria—Spagnum moss.
To Botanic Gardens, Queensland—Sphagnum moss
To Mr. G. Brunning, Victoria—Sphagnum moss.
To Messrs. Law & Somner, Melbourne—Sphagnum moss.
To Mr. C. F. Cresswell, Melbourne—Lily bulbs.

June.

From the Brisbane Botanic Gardens—18 varieties seeds.
From Mr. J. Smith, Riddell's Creek, Victoria—Case of plants.
From Messrs. Shepherd & Co., Sydney—Case of plants.
From Mr. J. Harris, South Yarra, Victoria—Case of plants.
From the Botanic Gardens, Saharanpur, India—Package seeds.
From Major Jacob, Jeypore, India—Package seeds.
From the Botanic Gardens, Calcutta—Package seeds.
From Baron Ferd. Von Müeller, Government Botanist, Victoria—8 papers seeds.

To Mr. John Smith, Riddell's Creek, Victoria—Case plants and package of seeds.
To Mr. Joseph Harris, South Yarra, near Melbourne—Package seeds.
To Mr. G. Brunning, St. Kilda, near Melbourne—Case plants and seeds.
To Mr. S. Purchase, Parramatta, N.S.W.—Package seeds.
To Messrs. Shepherd & Co., Sydney—Package seeds.
To the Chamber of Agriculture, Washington, United States—Package of seeds.
To Messrs. Vilmorin, Andrieux, et Cie., Paris—Package seeds.
To the Royal Gardens, Kew, near London—Package seeds.
To Baron Ferd. Von Müeller, Government Botanist, Victoria—Package seeds.
To Mr. C. F. Creswell, St. Kilda, Victoria—Package seeds.
To Messrs. Heyne & Co., Adelaide—Package seeds.
To Messrs. Law, Somner, & Co., Melbourne—Package seeds.
To W. R. Guilfoyle, Esq., Director Botanic Gardens, Melbourne—Pine seeds.
To Mr. Wm. Bull, New Plant Merchant, London—Package seeds.

July.

From Mr. Joseph Harris, South Yarra—Package trees.
From Messrs. Law & Somner, Melbourne—Case of plants.
From Mr. S. Purchase, Parramatta, N.S.W.—Case of plants.
From the Botanic Gardens, Brisbane—Case of ferns.
From Messrs. Heyne & Co., Adelaide—Package seeds.

To the Botanic Gardens, Rome—Package seeds.
To Mr. J. Harris, South Yarra—Case of plants.
To Messrs. Law & Somner, Melbourne—Case of plants.
To Mr. C. F. Creswell, Melbourne—Box of plants.

August.

From Messrs. Heyne & Co., Adelaide—Package seeds.
From Baron Ferd. Von Müeller, Government Botanist, Victoria—Nymphæ gigantea.
From the Botanic Gardens, Rome—Package seeds.
From James Grant, Esq., Queensland—Package seeds.
From Mr. J. Smith, Riddell's Creek, Victoria—Package plants.
From the Botanic Gardens, Melbourne—Case of plants and seeds.

November.

To Mr. G. Brunning, St. Kilda—Case Chrysanthemums.

December.

From Mrs. G. Oliver, New Plymouth, New Zealand—Package seeds.

F. ABBOTT, *Superintendent Royal Society's Gardens.*

WILLIAM THOMAS STRUTT,
GOVERNMENT PRINTER, TASMANIA.

SUMMARY OF METEOROLOGICAL OBSERVATIONS TAKEN AT HOBART FOR 1884.

Latitude, 42° 53′ 25″ S.: Longitude, 147° 26′ 6″ E. Height of Observatory above Sea Level, 190 feet. Barometer corrected to 32° Fahrenheit, and reduced to Sea Level.

YEAR.	BAROMETER.	THERMOMETER IN SHADE.						RADIATION.		HUMIDITY.			RAIN.		PREVAILING WINDS.		CLOUDS.
1884.	*Mean.*	*Maximum.*	*Mean Maximum.*	*Minimum.*	*Mean Minimum.*	*Mean Diurnal Range.*	*Mean Temperature of Month.*	*Solar Max.*	*Terrestrial Min.*	*Dew Point.*	*Pressure of Vapour.*	*Humidity.*	*Total Fall.*	*No. of days Rain fell.*	*Direction.*	*Force.*	*Amount.*
	Inches.	°	°	°	°	°	°	°	°	°			Inches.			(0—12)	(0—10.)
January	29·731	90·6	67·9	41·4	50·3	17·6	59·7	132·5	39·8	47·5	·329	0·64	3·50	16	S.S.E., S.W. & N.W.	2·5	7·3
February	29·964	96·6	70·3	42·2	51·9	18·4	59·2	142·5	36·5	48·6	·343	0·68	1·07	12	S.S.E. & N.N.W.	2·5	7·0
March	30·067	83·5	67·5	38·4	50·7	16·8	60·1	124·3	33·2	51·3	·378	0·73	0·36	8	S.S.E. & N.W.	2·0	6·5
April	30·103	78·8	66·7	38·8	48·4	18·3	58·1	121·0	34·0	50·8	·371	0·77	0·29	6	S. & N.W.	2·6	6·3
May	30·032	66·5	56·6	33·5	41·5	15·1	49·8	102·0	30·4	45·0	·209	0·84	1·76	13	S.S.E. & N.W.	3·0	6·6
June	29·949	67·8	53·4	36·4	41·7	11·7	48·6	105·0	30·5	43·4	·282	0·84	1·46	16	S. & N.W.	2·0	7·5
July	30·042	59·4	53·3	31·8	39·6	13·7	47·1	102·0	25·8	41·1	·258	0·80	0·68	17	S.S.W. & N.W.	2·3	8·3
August	29·861	65·5	55·0	32·2	41·4	13·6	48·5	111·0	28·5	44·1	·289	0·84	3·40	17	S. & N.W.	2·4	7·0
September	29·789	76·0	57·3	33·0	42·6	14·7	51·0	121·5	28·0	44·0	·288	0·77	2·67	19	S.S.W. & N.W.	3·6	7·0
October	29·786	78·0	61·3	34·0	43·1	18·2	53·3	131·0	29·2	44·8	·297	0·73	1·40	13	S.S.W. & N.W.	2·8	7·0
November	29·899	88·0	66·9	37·0	46·9	20·0	57·7	143·0	36·8	49·0	·347	0·73	1·09	15	S. & N.W.	2·0	7 0
December	29·617	76·2	65·0	45·0	49·4	15·6	57·8	139·6	39·6	50·9	·373	0·78	3·93	21	S.S.E. & N.W.	2·3	8·6
Mean	29·893	..	61·8	..	45·6	16·1	54·2	..	..	46·7	·321	0·76	1·80	14	S. & N.W.	2·4	7·0
Extremes	..	Feb. 21 96°	..	July 22 31° ·8	..	..	..	Nov. 20 143°	July 22 25°8	..	..	..	Total, 21·65	Total, 171			

EPITOME OF RESULTS OF METEOROLOGICAL OBSERVATIONS AT THE VARIOUS STATIONS FOR THE YEAR 1884.

STATIONS.	BAROMETER.	THERMOMETER, IN SHADE.						RADIATION.		HUMIDITY, MEAN.			RAIN.		PREVAILING WINDS.		CLOUDS.
	Mean.	Maximum.	Mean Maximum.	Minimum.	Mean Minimum.	Mean Diurnal Range.	Mean Temperature of Year.	Solar Max.	Terrestrial Min.	Dew Point.	Pressure of Vapour.	Humidity.	Total Fall.	No. of Days Rain fell.	Direction.	Force.	Amount.
	Inches.	°	°	°	°	°	°	°	°	°			Inches.			(0–12)	(0–10)
Southport	29·911	90·0	66·1	29·6	42·0	18·1	56·0	...	...	52·3	·395	0·87	42·36	186	S.S.W. & N.N.W.	3·0	6·4
Hobart	29·893	96·0	61·8	31·8	45·6	16·1	54·2	143	25·8	46·7	·321	0·78	21·65	171	S. & N.W.	2·4	7·0
Outlands	29·866	90·6	60·2	26·0	36·0	24·2	52·3	...	...	41·7	·265	0·68	21·13	97	S.W. & N.	3·0	6·3
Falmouth	29·936	95·0	82·2	28·0	44·9	17·3	55·0	...	...	47·2	·290	0·66	23·32	91	S. & N.N.W.	2·6	5·4
Launceston	29·950	88·0	64 5	27·0	43·8	20·7	56·5	132	20·5	46·1	·314	0·71	28·43	136	S. & N.N.W.	2·0	5·0
Low Head	29·969	78 0	61·9	32·0	47·9	14·0	56·1	...	...	51·2	·381	0·84	27·79	128	S.E., N.E., & W.N.W.	3·5	5·0
Circular Head	29·968	80·0	80·7	32·6	47·8	12·9	55·4	...	...	47·7	·328	0·74	27·87	196	S.S.W., E.N.E., & N.W.	3·5	6·2

MEAN AND EXTREME RESULTS FOR THE YEAR 1884.

From Observations taken at Hobart.

Barometer—
- Highest reading .... 30·712 inches, on 29th April.
- Lowest ditto .... 29·020 inches, on 10th Sept.
- Range for the year .... 1·692 inches.

Thermometer—
- Radiation, Solar, maximum .... 143°, on 20th November.
- Ditto, Terrestrial, minimum .... 25·8°, night of 22nd July.
- Maximum in the shade .... 98°, on 21st February.
- Minimum ditto .... 31·8°, night of 22nd July.
- Range for year .... 64·2°
- Highest mean daily reading for one month .... 60·1°, February.
- Lowest ditto ditto .... 47·1°, July.

Humidity—
- Mean maximum for month (saturation = 100)... ·84, in May, June, and August
- Mean for the year .... ·76.

Condensation—
- Total for the year .... 21·55 inches.
- Total Number of Rainy Days........ 171.
- Maximum fall for one month........ 3·93 inches, in December.
- Minimum ditto........ 0·29 inches, in April.

RAINFALL IN TASMANIA DURING THE YEAR 1884.

Showing the Latitude and Longitude, and Distance from the Sea Coast of each Station, and Number of Days Rain fell during each Month, and Total Rainfall.

Name of Station.	*Latitude, South.*	*Longitude, East.*	*Distance from Sea Coast.*	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUGUST.		SEPT.		OCTOBER.		NOVEMBER.		DECEMBER.		TOTAL.	
				Wet Days.	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*
	° ′ ″	° ′ ″	Miles.	No.	Inches.	No.	Inches.	No.	Inches.	No.	Inches.	No.	Inches.	No.	Inches.	No.	Inches.	No.	Inches.	No.	Inches.	No.	Inches.	No.	Inches.	No	Inches.	No.	Inches.
Southport	43 26 0	147 1 0	Coast.	19	6·38	9	2·66	4	0·50	16	0·64	13	4·09	14	3·02	21	3·82	21	4·96	22	6·00	18	2·56	12	3·29	17	4·98	186	42·36
Franklin	42 58 0	147 0 0	1	18	6·58	11	1·73	10	0·66	11	0·34	10	3·91	18	2·74	21	2·67	21	3·59	24	7·29	18	2·47	16	3·14	22	6·05	206	41·17
Mount Nelson	42 55 0	147 21 0	7	12	4·38	10	1·20	5	0·45	5	0·19	12	2·77	12	1·76	11	0·42	17	3·42	15	2·10	12	1·50	11	1·44	20	4·76	142	24·33
Clarence Plains	42 54 0	147 24 0	8	12	3·78	9	0·88	6	0·47	2	0·25	11	1·24	10	1·13	6	0·35	18	3·02	11	1·54	10	1·80	12	0·96	16	3·54	118	18·96
Hobart	42 53 0	147 21 0	10	16	3·50	12	1·07	6	0·36	8	0·29	13	1·76	16	1·40	17	0·68	17	3·40	19	2·67	13	1·40	15	1·09	21	3·93	171	21·55
Botanical Gardens, Hobart	42 52 0	147 20 0	12	15	3·18	12	0·78	4	0·37	3	0·19	12	1·69	12	1·23	12	0·44	17	2·72	18	2·02	11	1·02	11	0·91	18	3·46	145	18·61
New Norfolk	42 37 0	146 56 0	23	16	4·92	7	0·63	5	0·38	6	0·43	10	2·31	0	1·32	12	1·55	15	2·67	16	4·22	11	1·28	11	1·88	19	3·67	137	25·26
Richmond	42 45 0	147 30 0	19	15	2·47	5	0·68	7	0·52	4	0·14	13	1·43	14	1·62	8	0·71	14	2·96	14	1·56	12	1·67	11	0·70	21	4·73	138	19·11
Carnarvon	43 8 0	147 53 0	2	...	...	—	—	—	—	6	1·04	14	4·04	17	2·69	14	2·11	18	5·66	13	6·19	13	2·79	16	3·57	20	5·29	131	32·40
Swansea	42 8 0	148 7 0	Coast.	...	...	—	—	—	—	—	—	5	1·11	7	5·45	1	0·36	7	2·89	7	0·48	8	3·90	2	0·52	7	3·69	42	18·14
Hamilton	42 34 0	146 52 0	30	16	1·65	9	0·25	7	0·42	6	0·46	13	1·44	13	1·11	12	1·12	16	2·39	15	2·95	13	1·19	10	0·93	19	2·94	149	17·65
Macquarie Plains	42 35 0	147 5 0	35	...	2·46	—	0·75	—	0·51	2	0·16	9	1·77	12	1·27	16	1·21	16	2·98	16	2·76	12	1·73	10	1·66	23	3·54	—	20·80
Oatlands	42 18 0	147 24 0	28	12	3·18	4	0·94	3	0·58	1	0·36	9	1·05	12	2·41	4	0·78	13	2·94	11	1·39	7	2·39	7	0·99	14	4·12	97	21·13
Fingal	41 40 0	147 48 0	13	12	2·90	4	0·34	2	1·38	4	0·58	9	1·16	13	4·34	5	0·75	12	2·91	9	1·24	10	2·99	6	1·16	15	2·17	101	21·92
Killymoon, Fingal	41 35 0	148 16 0	9	10	3·59	7	0·63	2	1·52	10	1·44	11	2·44	16	6·16	6	0·34	17	3·64	10	0·46	6	3·21	6	0·96	16	3·41	111	27·82
Falmouth	41 32 0	148 19 0	Coast.	9	2·59	3	0·45	4	1·63	9	1·86	9	1·90	7	4·97	4	0·56	10	2·20	4	0·30	10	3·64	4	0·74	18	3·68	91	23 32
Gould's Country	41 15 0	148 0 0	13	8	5·58	2	0·66	7	4·53	8	3·62	11	5·69	10	12·50	6	3·72	11	7·05	11	7·66	8	6·25	6	4·45	—	—	86	61·85
Boobyalla	40 53 0	147 56 0	1	...	...	—	—	—	—	—	—	10	2·54	13	3·97	8	1·20	12	2·57	12	2·08	7	2·18	5	3·14	9	2·58	76	20·26
Low Head	41 3 0	146 48 0	Coast.	9	1·67	3	0·19	3	1·63	9	1·63	15	2·86	14	3·95	11	1·20	12	2·99	14	3·36	12	2·67	7	2·61	15	3·19	126	27·79
Launceston	41 26 0	147 10 0	28	13	2·51	5	0·10	6	1·46	6	1·48	11	2·38	16	2·91	12	1·87	15	2·83	14	3·53	12	3·11	6	2·52	26	3·73	136	28·43
Deloraine	41 30 0	146 40 0	23	12	2·96	8	0·17	9	1·43	14	2·53	19	2·25	22	4·63	14	3·01	19	4·27	20	5·46	16	3·00	12	3·29	26	3·82	185	36·82
Latrobe	41 13 0	146 25 0	8	11	2·22	5	0·20	6	1·66	9	1·53	13	2·89	15	5·98	16	2·16	16	5·63	15	6·37	16	3·35	4	3·06	16	3·46	132	37·79
Emu Bay	41 4 0	145 56 0	Coast.	12	2·31	10	0·29	7	1·29	13	2·35	18	3·38	25	5·65	18	2·84	21	5·47	24	7·58	18	4·63	12	2·95	26	4·03	204	42·77
Broomfield, S., Emu Bay	41 15 0	145 46 0	15	8	2·59	4	0·32	7	1·38	12	4·92	16	4·90	18	6·00	16	3·68	19	7·82	26	9·75	16	2·67	8	2·15	16	6·07	154	52·25
Mount Bischoff	41 25 0	145 34 0	28	25	6·42	14	2·22	12	1·19	18	8·20	23	8·36	27	7·72	27	9·10	26	10·16	27	15·14	26	7·67	21	6·25	28	10·11	274	90·46
Circular Head	40 43 0	145 17 0	Coast.	16	1·78	4	0·19	9	0·82	15	1·78	18	2·39	22	4·37	18	2·27	23	3·06	23	3·58	14	2·53	12	1·29	24	3·78	196	27·87
Coriuna	41 41 0	145 02 0	Coast.	22	6·79	12	3·47	12	1·37	16	4·53	19	7·43	19	7·36	22	8·36	22	6·86	...	Missed.		...	20	5·28	—	8·40	—	—

TABLE OF RAINFALL AT LIGHTHOUSES FOR THE YEAR 1884.

Showing the Number of days Rain fell during each Month, and Total Rainfall.

1884.	KING'S ISLAND.		KENT'S GROUP.		GOOSE ISLAND.		SWAN ISLAND.		SOUTH BRUNI.	
	Wet Days.	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*	*Wet Days.*	*Rainfall.*
	No.	Inches.	No.	Inches.	No.	Inches.	No.	Inches.	No.	Inches.
January	11	1·55	7	2·20	12	1·51	8	1·19	23	4·38
February	8	0 94	3	0·70	5	0·49	4	1·40	13	2·23
March	6	0·67	6	2·07	7	1·90	4	1·13	10	0·84
April	10	1·83	10	0·94	12	1·15	9	1·39	12	0·66
May	13	3·11	16	3·61	14	2·55	10	3·31	16	3·66
June	24	4·15	11	2·55	13	3·00	7	3·37	19	2·10
July	19	1·97	13	1·61	9	0·73	7	1·05	26	2·77
August	16	2·96	13	1·64	18	2·01	15	3·01	19	4·51
September	17	1·81	14	2·13	11	1·12	...	...	20	4·58
October	14	2·52	9	1·68	12	1·96	8	2·23	18	2·52
November	4	0·81	5	1·33	6	1·84	6	2·51	13	3·13
December	16	3·15	15	2·49	15	1·52	13	2·02	24	5·47
TOTAL	160	25·27	122	22·85	134	19·78	...	...	207	36·79

J. SHORTT, *Meteorological Observer.*

WILLIAM THOMAS STRUTT,
GOVERNMENT PRINTER, TASMANIA.


3 2044 106 281 843