XX.—*On Drainage and Sewerage, &c., of Towns, with special relation to the late Epidemics in Hobart Town and Launceston.* *By* Sir W. T. Denison, F.R.S., &c. [*Read 9th November,* 1853.]

The prevalence during the last three or four months of a fever, whose type was, I believe, assimilated most closely to that which characterizes scarlet fever, has induced me to bring under the notice of the Royal Society, in the first place, the nature of some of those influences which may have aggravated, if not caused, the disease; and in the second, an outline of the precautions which ought to be taken to secure to the inhabitants of Hobart Town a continuance of the advantages which its position entitles them to claim,—situated as it is on the banks of a noble river, with an atmosphere pure and healthy, if not affected by influences arising from within the city itself.

It would be altogether out of place were I to enter into a medical disquisition on the cause of fevers, and the effect produced by them on the human frame, but I may be allowed to submit a brief abstract of some of the facts established by the "Health of Towns' Commissioners" in 1844; at which period a close and searching investigation was made into the state of many towns in England, the results of which, with some modification from causes peculiar to each locality, are of universal application.

The evidence taken before the commissioners, or collected by them, goes to show that neglect in cleansing and draining the dwellings of the poor, and the absence of proper ventilation, is productive of the worst effects.

That fever is constantly present in one form or another where the people live in dirt and filth.

That fever breaks out first and becomes more prevalent and fatal in the neighbourhood of uncovered sewers, stagnant ditches and ponds, gutters full of putrifying matter, nightmen's yards, &c. That the effect of want of cleanliness and bad drainage, where their action is not sufficient to produce actual fever, is shown in the disease of the digestive organs, and predisposes the human frame to receive some of the most common and fatal maladies to which it is subject.

That persons who reside in habitations badly drained and subject to the influence of malaria, even if free from attacks of actual disease, are undergoing a process of deterioration; their constitutions are injured, mothers are unable to attend to their children—these latter have bad health, and the mortality among them is great.

That the ability of the labouring classes to maintain themselves is very much diminished by disease and weakness, engendered by the causes above alluded to.

I need only notice briefly the moral effects produced by such a state of things; they are, however, just as injurious to the character of the man who is subjected to them, as to his physical well-being. The lowering effect produced upon the frame by malaria is such as *drives* a man, if I may use the term, to the use of different kinds of stimulants; and if his home cannot be made comfortable, he is almost compelled to resort to the public-house.

The result of discomfort and incipient disease is often seen in confirmed habits of drunkenness and dissipation, which operate equally to the detriment of the physical and moral character.

This is a brief summary of some of the effects due to the various causes which want of cleanliness brings into action. I use the term want of cleanliness advisedly, not limiting it to the absence of habits of personal cleanliness, but apply-

ing it generally, to include all those cases, whatever may be the cause, where a disregard to all ideas of comfort as dependent upon order and method, or, to use a more expressive term, on *tidiness*, is exhibited.

The subject is deserving of special consideration at present, as from the circumstances in which the colony is now placed, there is a natural tendency towards a state of things analogous to that which prevailed in many of the towns of England, from which the evidence, bearing upon the facts stated above, was drawn.

House rent is high;—there is therefore every disposition among the labouring classes to crowd as many as possible into one room.

Fuel and water are dear;—proper attention will not therefore be paid to ventilation or cleanliness.

Labour is very much in demand;—less than usual therefore will be expended in keeping the houses and adjoining yards clean,—in removing soil, rubbish, &c.

It is by no means improbable that the epidemic which has prevailed, and which indeed does still prevail in Hobart Town and elsewhere, has been rendered more fatal than it otherwise would have been by the causes alluded to above; for the evidence given to the commissioners tended to prove that the poisonous condition of the atmosphere which they inhale predisposes children to acute fevers, accompanied with a rash upon the skin; such as scarlet fever, measles, small-pox, and renders such diseases fearfully mortal.

The evils arising from the state of things above described are patent enough; but how can they be met? How can a remedy be applied, simple in its operation, and at the same time effective enough to neutralize, if not all, at all events the most pressing, of the influences which affect so injuriously the health and morals of a town population? In reply to

this I would observe, that the evidence given to the Health of Towns' Commissioners was sufficient to prove that in the towns of England the application of a proper system of cleansing and draining reduced the mortality in those districts in which fever constantly prevailed to an extent of one-third, or even, in some instances, of one-half; and although such a system would not remove the evils arising from overcrowding the habitations of the poor, or from the faulty construction of the buildings in which they reside, yet, by creating a better atmosphere around them, many of the most active causes of disease would be neutralized.

I will proceed, therefore, to enquire into the principles by which a proper system of drainage should be regulated, and then discuss the best mode of applying these principles to the drainage of Hobart Town and Launceston; and I will lay before the Society such information as to the construction of sewers, their size, form, and the materials of which they may be composed, as may afford useful hints to those upon whom has devolved by law the charge of superintending the drainage and cleansing of these towns, besides enabling them to form an approximate estimate of the cost of such an undertaking.

We are met at the outset of an enquiry of this kind, by the fact that the character of the drainage must be to a great extent dependent upon the nature of the supply of water furnished to the inhabitants; and upon consideration this will appear perfectly clear. With a large supply of water, much must pass through the sewers; and again, these will be more easily cleansed and kept in order where the rush of water down them is frequent and large.

As a preliminary, therefore, to any enquiry into the drainage of towns, it is necessary to say a few words as to the supply of water, which is not only essential to good drainage,

but operates beneficially upon the habits of the people, by encouraging and facilitating cleanliness.

In both Hobart Town and Launceston this supply is deficient. In Hobart Town, the source, though it may be said to be perennial, is trifling in amount; while in Launceston, proper means have not yet been adopted for turning to account the ample streams discharged by the South Esk, a large portion of which river might be directed through the town if necessary.

In Hobart Town, the supply for many years, indeed until recourse is had to the water of the Derwent, will always be rather scanty; but by constructing reservoirs in the valleys above the town, a great body of water might be retained at an elevation sufficient to carry it through all the streets.

To return to the consideration of drainage: the elements of which a general system is composed are;—

1st. Main sewers, by which the accumulated drainage of the town is carried to its outlet, wherever that may be.

2nd. Branch sewers, by which the drainage of a certain amount of the area of the town is carried into the main sewer.

3rd. House-drains, or small channels by which the drainage of isolated buildings are discharged into the branch sewers.

With regard to the main sewer or sewers, it is evident that the dimensions of these must be sufficient to carry off not merely the drainage of the buildings composing the town, but also that of the whole area which discharges itself into the same channels.

In point of fact, the main sewer of a town often occupies the place of an old watercourse, which formed the outlet of the drainage of a large district, comprising not only the

area of the town, but also that of its suburbs; and the size of this sewer is very often dependent more upon the necessity of a rapid discharge of the water poured into it during heavy rains, than upon the actual drainage from the town.

In any calculations, therefore, which are made for determining the size of these main sewers, attention must be paid to the area of the district for which it is the outlet; to the maximum quantity of rain known to fall within a given period; to the usual discharge from the town. And it must also be remembered, that the effect of a perfect system of drainage is to carry off the water which falls on the surface much more rapidly than would happen were it allowed, as is now the case, to find its way gradually to the outlet or main sewer by such imperfect channels as it can make for itself; and, therefore, that the more perfect the system of drainage, the larger must be the main outlet.

The branch sewers, which convey the drainage of different portions of the town to the main sewer, must be constructed with reference to the maximum amount of water which will pass through them in the heaviest rains.

It would be false economy to make the sewers too small to convey the maximum charge, and equally so to make them larger than necessary. The size will be determined by a joint consideration of the quantity of water to be passed through them in a given time, and the velocity of discharge, which depends upon the fall or the slope which can be given to the bottom.

It is desirable to maintain, as far as possible, an uniform fall in the sewers, for if the upper portion be steep and the lower portion more nearly horizontal, the water flowing less rapidly through this latter would not be carried off as fast as it would be brought down from above, and there would

be a risk of the crown of the sewer being forced up, unless the dimensions were increased in the inverse proportion to the velocity of the water through it.

This is a matter to which attention should be paid, for it frequently occurs that the valley through which the main sewer runs has steep sides, and is then level, or nearly so, for some distance from the edge of the watercourse. In such cases it is necessary to increase the dimensions of the branch sewer on the level parts, in order to prevent the risk of damage which would be certain to happen should this portion be choked or gorged with water.

As to the actual construction of these sewers, this must depend of course very much upon the materials of which they are made. In some places, stone will be cheaper than brick; in others, it might be possible to use cylindrical pipes of different diameters, made of strong earthenware.

The engineer must of course be guided in the employment of any or all of these by the peculiar circumstances of the case. A preference of one over another should result only from a close examination of the advantages and disadvantages attendant upon each,—among which of course their relative economy is one of the most important considerations.

It is most desirable that no leakage should take place through the bottom or sides of the branch sewer, which should, therefore, always be carefully bedded in cement.

Where the sewers are built of brick, and the amount of water-way required is more than an 18-inch barrel drain would supply, the oval or egg form is that which combines most advantages. The effect of the scour of a small quantity of water is far greater in a sewer of this shape than in one with a flat floor. The quantity of material required in

the construction of a given length is much less, and the strength to resist the tendency of the earth to press in the sides of the sewer is far greater, than in one with upright sides.

It is most desirable that the entrance into these branch sewers from the street, as gulley-holes, &c., should be carefully trapped, so as not to allow the stench from the refuse contained in them to make its way into the streets or into the houses.

It is not necessary that I should enter more at length into details, my object being to lay before the Society the general principles which should guide those who are called upon either to submit or discuss plans for a comprehensive scheme of drainage for towns, together with such general observations upon form and materials as may be useful as hints.

In applying these observations to the towns of this colony, but more especially to Hobart Town, I would observe with reference to the directions of the main sewers, that the lines in which these will run are plainly determined by the outline of the land upon which the town is built. The Hobart Town Rivulet is the great outlet, not only for the town itself, but also for the side of Mount Wellington and the various gullies which are formed in the flanks of the mountain.

In heavy rains, the rush of water from the hills is so great as to fill the present watercourse nearly to the brim at the lower part, near the outfall into the river. It would not, therefore, be practicable to diminish the section of the channel here, though at points higher up the stream, where the fall is greater, a reduction might of course be effected.

At Launceston, the shape of the ground would also seem

to point out the direction of the main sewer, which in one case would follow the bottom of the valley in which the town is built; while the North Esk River would form the main outlet for a large portion of the town,—the branch sewers being carried at once into the channel of the river.

In many parts of Hobart Town the fall to the rivulet, or main outlet, is so rapid and short, as to render it probable that branch sewers of small dimensions would be amply sufficient to carry off, not merely the drainage from the houses, but also all the surface drainage of the streets; care being taken to provide against the risk of these small drains being choked by the accumulation of rubbish and mud from the streets.

With regard to drains from the houses to the branch sewers, it is difficult to lay down any precise rules for the guidance of the engineer or builder. These drains are a matter for the consideration of the owner of the property; and although law will step in to prevent any injury or nuisance which may be occasioned by the neglect or indifference of a proprietor, either to a neighbour or to the public, yet he must be allowed a great latitude as to the means which he may choose to employ to prevent such injury or nuisance.

The same considerations which regulate the size of the branch sewers, namely, those which relate to the quantity of matter discharged through them, and the slope or fall, apply with equal cogency to house drains.

It must be remembered that the smaller these drains are the more effective will be the scour of the water which is passed through them, and an earthenware pipe of moderate dimensions will in general be quite adequate to carry off every thing, unless where the length of the drain is great and the fall but trifling.

Though the mode in which the proprietor of land and houses may choose to drain them is, in justice and reason, left to himself, yet the community is too deeply interested in the question to allow of such an exercise of individual privilege as might lead a man to refuse to drain altogether; for by so doing he is practically injuring others, and the Legislature may justly interfere, and say that the rights of individuals must succumb when they interfere with the public good.

Legislative action will then be required to compel individuals to carry off, through the sewers, the refuse which, if left to accumulate and decay on their properties, might prove not only a nuisance, but a serious evil; and the same enactment would prescribe certain limits both to the rights of individuals to resist, and the rights of the corporate body to enforce, certain specific modes of action.

A more difficult question, however, is, that of the mode of providing the funds which would be required to carry out a comprehensive system of drainage; and with a few words upon this subject, I shall conclude a paper which I feel at once to be too long and too short,—too long as a mere sketch or outline, but far too brief if considered as an Essay on Drainage.

There are three parties interested in the subject of the drainage of large towns:—

1st. The individual owners of property in the town.

2nd. The whole body of inhabitants resident in the town.

3rd. The community generally.

Among these three parties must be distributed in certain proportions the cost of carrying out the whole of the works which will be required for an effective system of drainage.

But it would be obviously unjust to charge upon the present generation the whole cost of an undertaking of such

magnitude, the benefit from which will be felt for centuries. The money required should therefore be raised by way of loan, the interest of which, together with a sinking fund, by which the whole debt would be paid off in, say fifty years, would be charged upon the three parties before alluded to.

When, however, we come to consider the share of the burthen which each party is to bear, we find that the owner of property, though called upon in the first instance to execute the work of draining his estate, manages very soon to relieve himself of any pressure on that account by charging it upon the occupier in the shape of rent. And thus, in practice, the cost of that portion of the work which is more particularly public will have to be defrayed by the inhabitants of the town, represented by the Corporation, and the general community, represented by the Legislative Council.

The share of the expense which will fall on the inhabitants will take the shape of a rate levied by the Corporation, while the general revenue will be charged with a certain annual payment representing the interest of the colony at large in the undertaking.

When it is considered that the inhabitants of the town contribute to the general revenue in full proportion to their numbers, perhaps the whole cost of a general system of drainage might be divided into two equal portions, one of which should be paid out of local funds, the other out of the general revenue.

This, however, would be one of the matters which must come before the Legislature whenever the details of an enactment for providing for the systematic drainage of either Hobart Town or Launceston are under consideration; and it is to be hoped that the importance of the subject to the physical and moral well-being of the community will, ere long ensure the introduction of a measure conferring upon

the municipalities of these towns such power as may be necessary to enable them to carry out effectively one of the principal objects for which such bodies are organized.

XXI.—*Observations on the Census of the United States, taken 1st June, 1850. From the Official Report of the Superintendent of Census. By* JAMES BARNARD, Esq. [*Read 13th October,* 1852.]

THIS, the seventh, enumeration of the inhabitants of the United States exhibits results which every citizen of that country must contemplate with gratification and pride. Since the census of 1840 there have been added to the territory of the Republic, by annexation, conquest, and purchase, 824,969 square miles; and its title to a region covering 341,463 square miles, (previously claimed and partially occupied by England), has been established by negotiation, and brought within its acknowledged boundaries. By such means the area of the United States has been extended, during the past ten years, from 2,055,163 to 3,221,595 square miles, exclusive of the great lakes which lie upon its northern border, and the bays which indent its shores on the Atlantic and Pacific.*

* The Australasiatic group of British Colonies contains, together, almost a similar area; viz.—

The Continent of New Holland or Australia, comprising its principal division of New South Wales, South Australia, Western Australia, and North Australia, is 2400 miles from east to west, and 2000 miles the greatest breadth from north to south, having a superficies of about 3,000,000 square miles, reaching very nearly to the same area as the United States.

Tasmania, about 200 miles south of New Holland, contains 24,000 square miles.

New Zealand, 1000 miles to the east of New Holland, has an area of 100,000 square miles.

To estimate aright the progress of the population since 1840, there must be deducted from the aggregate number of inhabitants shown under this census the population of Texas in 1840, and the number contained within the limits of California and the new territories at the time of their acquisition. Texas, it is believed, in 1840, numbered 75,000 inhabitants; and California, New Mexico, and Oregon in 1846, when they became subject to America, had a population of 97,000. Thus, with the accessions of territory, there was an accession of 172,000 to the American population.

Assuming the population of California to be 165,000, the total number of inhabitants in the United States, on the 1st June, 1850, was 23,246,301.* The absolute increase since 1st June, 1840, has been 6,176,848, or 36·18 per cent. But the population acquired by additions of territory must be deducted in making a comparison between the results of the present and last census. These reductions diminish the total population of the country, as a basis of comparison, to 23,074,301, and the increase to 6,004,848. The relative increase, after this allowance, is found to be 35·17 per cent.

* The entire population of the Australasiatic group at the date of the census of 1851 may be estimated at about half a million, in the following proportions; viz.—

New South Wales	189,951
Victoria	77,345
Tasmania	70,130
South Australia	60,000
Western Australia	5,500
New Zealand (including Aborigines)	150,000

Insignificant as is this sum total when recorded in comparison with the teeming millions of the United States, the recent alluring discoveries of gold in the principal colonies of Australia seem likely to achieve an advancement in wealth and numbers that will speedily lay the foundations in the South of as great a nation as has sprung into existence in the West.

Since this note was penned the Statistics of Victoria for 1852 have appeared, and conclusively establish the truth of the preceding remark: for the population of that colony had increased from 83,350 in 1851 to 148,627 in 1852, or 78 per cent. in one year!

The aggregate number of white inhabitants in 1850 was 19,619,366, exhibiting a gain upon the number of the same class in 1840 of 5,423,371, or relative increase of 38·20 per cent.; but, excluding the 153,000 free population supposed to have been acquired by the addition of territory since 1840, the gain is 5,270,371, or an increase of 37·14 per cent.

The number of slaves by this census is 3,198,298; and it shows an increase of 711,085, equal to 28·58 per cent. Deducting 19,000 for the probable slave population of Texas in 1840, the result of the comparison will be slightly different. The absolute increase will be 692,085, and the rate per cent. 27·83.

The number of free coloured people in 1850 was 428,637; in 1840, 386,245. The increase of this class has been 42,392, or 10·95 per cent.

From 1830 to 1840, the increase of the whole population was 32·67 per cent. At the same rate of advancement, the absolute gain for the ten years last past would have been 5,578,333, or 426,515 less than it has been, without including the increase consequent upon addition of territory.

The decennial increase of the most favoured nations of Europe is less than 1½ per cent. per annum, while with the United States it is at the rate of 3½ per cent.* According

* With reference to the Australian Colonies, the census of 1851 exhibits in a striking light the surprising progress in population of Victoria even prior to the rise of the gold discoveries. Since 1846 its centesimal increase is stated at 135·24, or an average annual increase in these five years of 27·4 per cent.

New South Wales during the same period shows a centesimal increase of 21·20, or at the average annual rate of 4·24 per cent.

Tasmania shows only an increase of 4·12 per cent. between 1848, the date of the previous census, and 1851, affording scarcely the European average. Peculiar inducements have for a series of years acted upon a large portion of the community to quit this Colony and select Victoria for their residence; and have thus tended to diminish the population of Tasmania, while they contributed to swell the stream of emigration to the shores of the sister Colony.

to past progress, viewed in connection with that of European nations, the population of the United States in forty years will exceed that of England, France, Spain, Portugal, Sweden, and Switzerland combined.

The relative progress of the several races and classes of the population is shown in the following tabular statement:—

INCREASE per cent. of each Class of Inhabitants in the United States for Sixty Years.

Classes.	1790 to 1800.	1800 to 1810.	1810 to 1820.	1820 to 1830.	1830 to 1840.	1840 to 1850.
Whites	35·7	36·2	34·19	33·95	34·7	38·28
Free Coloured	82·2	72·2	25·25	36·85	20·9	10·9
Slaves	27·9	33·4	29·1	30·61	23·8	28·58
Total Coloured	32·2	37·6	28·58	31·44	23·4	26·22
Total Population	35·01	36·45	33·12	33·48	32·6	36·25

The following Table shows the increase from 1790 to 1850 without reference to intervening periods:—

	1790.	1850.	Absolute Increase in 60 Years.	Increase per cent. in 60 Years.
Whites	3,172,464	19,638,019	16,457,555	527·97
Free Coloured	59,466	428,637	369,171	617·44
Slaves	697,897	3,184,262	2,486,365	350·13
Total Free, Coloured, and Slaves	757,363	3,612,899	2,855,536	377·00
Total Population	3,929,827	23,246,301	19,316,444	491·52

Sixty years since, the proportion between the Whites and Blacks, bond and free, was 4·2 to 1. In 1850 it was 5·26 to 1, and the ratio in favour of the former race is increasing. Had the Blacks increased as fast as the Whites during these 60 years, their numbers would have been 4,657,239; so that, in comparison with the Whites, they have lost in this period 1,035,340.

This disparity is much more than accounted for by European emigration to the United States. The gain of the White population from this source is estimated by Dr. Chickering at 3,922,152. Prior to 1820 no reliable record was kept of the number of emigrants into the United States.

Dr. Chickering assumes that of the 6,431,088 inhabitants of the United States in 1820, 1,430,906 were foreigners arriving subsequent to 1790, or the descendants of such. According to Dr. Seybert, an earlier writer upon "Statistics," the number of foreign passengers from 1790 to 1810 was 120,000; and upon other evidence it appeared that the number of arrivals from 1810 to 1820 was 114,000. These estimates make for the thirty years preceding 1820, 234,000.

From 1820 to 1830 there arrived 135,986 foreign passengers; and from 1830 to 1840, 539,370; making for the twenty years 715,356. During this period also a large number of emigrants from England, Scotland, and Ireland came into the United States through Canada who were altogether omitted from the official returns; but as, during the same period, a considerable number of these entered are supposed to have landed at New York with the purpose of pursuing their route to Canada, it is probable that these relatively are about evenly balanced.

From 1840 to 1850 the arrivals of foreign passengers in the ports of the United States have been as follows : *—

1840-41	83,504	1847	234,576
1842	101,107	1848	226,524
1843	75,159	1849	269,610
1844	74,607	1850	173,011
1845	102,415		
1846	202,157	Total	1,542,850

Taking for granted the substantial correctness of the foregoing numbers, and the accuracy of the returns during the last ten years, the following statement will show the accessions to the population of the United States from immigration from 1790 to 1850 :—

Number of foreigners arriving from 1790 to 1810	120,000
Natural increase, reckoned in periods of ten years	47,560
Number of foreigners arriving from 1810 to 1820	114,000
Increase of the above to 1820	19,000
Ditto from 1810 to 1820 of those arriving previous to 1810	58,450

* The average addition to the population of America by European emigration, for the ten years ending 1850, has been yearly 154,285. By way of contrast, it may be stated that the number of immigrants into New South Wales, both at public and individual expense, for the whole of the last twenty years has been less than 100,000. An impetus has, however, been lately given, bidding fair to exhibit in future years very different results,—as will be apparent from the single fact that Victoria alone records an addition to her numbers in the year 1852 of 15,477 immigrants introduced at the public cost, and of 79,187 who were unassisted, making together 94,664 souls, and being equal to the whole twenty years' immigration into the elder colony !

Total number of immigrants and descendants of immigrants in 1820	359,010
Number of immigrants arriving from 1820 to 1830	203,979
Increase of the above	35,728
Ditto from 1830 to 1840 of immigrants and descendants in 1830	732,847
Number of immigrants arriving from 1830 to 1840	778,500
Increase of the above	135,150
Ditto from 1830 to 1840 of immigrants and descendants of immigrants in 1830	254,445
Total number of immigrants and descendants of immigrants in 1840	1,900,942
Number of immigrants arriving from 1840 to 1850	1,542,850
Increase of the above at 12 per cent.	185,142
Ditto from 1840 to 1850 of immigrants and descendants of immigrants in 1840	722,000
Total number of immigrants into the United States since 1790, and their descendants in 1850	4,350,934

The density of population is presented in the following Table, having been prepared from the most authentic data accessible :—

TABLE of the Area, and the Number of Inhabitants to the Square Mile, in each State and Territory in the Union.

STATE.	Area in Square Miles.	Population in 1850.	No. of Inhabitants to Square Mile.
Maine	30,000	583,188	19·44
New Hampshire	9,280	317,964	34·26
Vermont	10,212	313,611	30·07
Massachusetts	7,800	994,499	126·11
Rhode Island	1,306	147,544	108·05
Connecticut	4,674	370,791	79·83
New York	46,000	3,097,394	67·66
New Jersey	8,320	489,555	60·04
Pennsylvania	46,000	2,311,786	50·25
Delaware	2,120	91,535	43·64
Maryland	9,356	583,035	62·31
Virginia	61,352	1,421,661	23·17
North Carolina	45,000	868,903	19·30
South Carolina	24,500	668,507	27·28
Georgia	58,000	905,999	15·68
Alabama	50,722	771,671	15·21
Mississippi	47,156	606,555	12·86
Louisiana	46,431	511,974	11·02
Texas	237,321	212,592	0·89
Florida	59,268	87,401	1·47
Kentucky	37,680	982,405	26·07
Tennessee	45,600	1,002,625	21·98
Missouri	67,380	682,043	10·12
Arkansas	52,198	209,639	4·01
Ohio	39,964	1,980,408	49·55
Indiana	33,809	988,416	29·23
Illinois	55,405	851,470	15·37
Michigan	56,243	397,654	7·07
Iowa	50,914	192,214	3·77
Wisconsin	53,924	305,191	5·65
California	188,982		
Minnesota	83,000	6,077	0·07
Oregon	341,463	13,293	0·03
New Mexico	219,774	61,505	0·28
Utah	136,700		
Indiana	187,171		
North West	587,564		
District of Columbia	60	51,687	861·45

From the location, climate, and productions, and the habits and pursuits of their inhabitants, the States of the Union may be properly arranged into the following groups :*—

	Area in Square Miles.	Population.	No. of Inhabitants to Square Mile.
New England States, (6)	63,226	2,727,597	43·07
Middle States, including Maryland, Delaware, and Ohio, (6)	151,760	8,653,713	57·02
Coast Planting States, including South Carolina, Georgia, Florida, Alabama, Mississippi, and Louisiana, (6)	286,077	3,537,089	12·36
Central Slave States :—Virginia, North Carolina, Tennessee, Kentucky, Missouri, Arkansas, (6)	308,210	5,168,000	16·75
North-western States :—Indiana, Illinois, Michigan, Wisconsin, and Iowa, (5)...	250,000	2,737,000	10·92
Texas	237,000	212,000	0·89
California	189,000	165,000	0·87

Taking the thirty-one States together, their area is 1,485,870 square miles; and the average number of their inhabitants is 15·18 to the square mile. The total area of the United States is 3,220,000 square miles; and the average density of population is 7·219 to the square mile.

* The corresponding Australasiatic groups will be as under :—

	Area in Square Miles.	Population, (1852.)	Number of Inhabitants to Square Mile.
New South Wales.....	400,000	250,000	0·62
Victoria (Aborigines, estimated at about 2500, not included)	100,000	150,000	1·50
South Australia	300,000	60,000	0·20
Western Australia	900,000	8,000	0·08
Northern Australia	1,000,000	Uncolonised.	
Tasmania	24,000	72,900	3·
New Zealand (including Aborigines)	125,000	175,000	1·4

By the census of 1851 it appears that in Great Britain the mean ratio of population to the square mile was in towns 3337, and in the country 120 —England and Wales showing similarly 161, and Scotland 45, to the square mile in the rural districts.

MORTALITY.

The statistics of mortality represent the number of deaths occurring within the year that the census was taken as 320,194; the ratio being as 1 to 72·6 of the living population, or as 10 to each 726.*

* This rate of mortality is much below the European average. In England, for instance, the proportion of deaths to population is about 1 in 42 in towns, and 1 in 60 in the agricultural districts, affording a mean of about 1 in 52.

Australasia seems to occupy, generally, a middle position in this respect between Europe and the United States. In New South Wales the ratio of deaths to population in 1852 was 1 in 60; in Victoria, 1 in 70; in Tasmania 1 in 50, but 1 in 70 in 1849, (the increased mortality in 1852 being attributable to the commencement of the fatal epidemic of scarlet fever); and in Western Australia 1 in 285.

These results are so discordant as to require some explanation.—New South Wales, a long-established colony, with a centralised organisation by which the Government could, except in remote pastoral districts, ascertain with absolute certainty every casualty affecting human life, shows a mortality of about 1 in 60. This would appear to be about the average of the Australian Colonies free from the operation of disturbing causes. Tasmania, for instance, in 1849, at a time when convicts were introduced, gave 1 in 70; in 1852, when transportation had ceased, but the unusually severe epidemic alluded to prevailed through the island, and there was no balance of free immigrants over those leaving the colony, the mortality was 1 in 50; the average of the two extremes would correspond with the mortality in New South Wales, or 1 in 60.

The more limited area within which population exists in Tasmania, and the more advanced and concentrated character of her institutions, render it comparatively easy for the Government to obtain returns with great accuracy. For these reasons the returns for this island may be more depended upon than those of the adjoining colonies. Victoria in 1852 is in much the same position with respect to the influx of population that Tasmania was a few years ago. It has been stated that in 1849 the rate of mortality was 1 in 70; and we find that in Victoria under similar circumstances in 1852 the mortality was also 1 in 70. Doubtless in the interior of Victoria and New South Wales, and the other colonies of the main-land of Australia, deaths frequently occur which remain unrecorded: and if this be the case on the continent of New Holland, it must obtain much more in the backwoods of America, where population is similarly scattered, and still further detached from the machinery necessary to collect

The registration of the annual deaths marks an epoch in the history of "life contingencies" in the United States. To trace the effect of the wide range of physical conditions and natural productions upon the human constitution and faculties presents to every reflecting mind an interesting field of research; and scarcely less so to investigate the influence of mental occupations and industrial pursuits, and of the wide diversity of climate,—from the highlands of Maine to the glades of Florida,—where the persistence and duration of life is an object of paramount importance, not only in a scientific, but in a commercial and national point of view.

Among the more immediate advantages to be derived from data of this kind, through the medium of life-tables, are the following:—they would form a basis for the equitable distribution of life-interests in estates, pensions, and legacies; they would assign the true valuation of life annuities, assurances, and reversions of heritable property, and tend to protect the public from many ill-adjusted financial schemes, founded in ignorance of the true probabilities of life; they would correct a multitude of prejudices and misconceptions respecting the healthiness of different localities; and, besides this, form a common standard of reference in all those moral, sanitary, and mercantile statistics which have brought to light most valuable truths and generalizations, and which give promise of still greater benefits in the advancement of civilization.

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such data; where, too, instead of the sparse character peculiar to pastoral pursuits, the wilderness is dotted with families of men, women, and children, and with groups of families,—amongst whom, as is well known, the mortality is greater than amongst persons in the prime of life, such as are the stock-keepers and shepherds in the back runs of Australia.

In the construction of life-tables, the ratio of the annual deaths to the contemporary number living at each age constitutes the implicit element of computation. An enumeration of the living, or of the deaths only, is insufficient for that purpose.

TABLE of Deaths during the Year ending June 1st, 1850.

	No. of Deaths.	Ratio to the Number living.
Maine	7,545	77·29
New Hampshire	4,268	74·49
Vermont	3,132	100·13
Massachusetts	19,414	51·23
Rhode Island	2,241	65·83
Connecticut	5,781	64·13
New York	44,339	69·85
New Jersey	6,467	75·70
Pennsylvania	28,318	81·63
Delaware	1,209	75·71
Maryland	9,594	60·77
Virginia	19,053	74·61
North Carolina	10,207	85·12
South Carolina	7,997	83·59
Georgia	9,920	91·33
Alabama	9,084	84·94
Mississippi	8,711	69·63
Louisiana	11,948	42·85
Texas	3,046	69·79
Florida	933	93·67
Kentucky	15,206	64·60
Tennessee	11,759	85·34
Missouri	12,211	55·81
Arkansas	2,987	70·18
Ohio	28,949	68·41
Indiana	12,728	77·65
Illinois	11,619	73·28
Michigan	4,520	88·19
Iowa	2,044	94·03
Wisconsin	2,884	105·82
California		
Minnesota	30	202·56
Oregon	47	282·82
New Mexico	1,157	53·15
Utah	239	47·61
District of Columbia	846	61·09

The prodigious extent of the resources of the United States, and of its progress in wealth and numbers, may be judged of from the following general statement of its agricultural production for the year 1849; viz.—

AGRICULTURE. *

Total number of acres of land improved	112,042,000	acres
Value of farming implements and machines	151,820,273	dollars
Value of live stock	552,705,238	....
Wheat	104,799,230	bushels
Indian corn	591,586,053	....
Tobacco	199,532,494	lbs.
Ginned cotton, (bales of 400 lbs.)	2,474,214	bales
Wool	52,422,797	lbs.
Wine	141,295	gallons
Butter	312,202,286	lbs
Cheese	103,184,585	lbs.
Hay	13,605,384	tons
Hemp	75,241	....
Flax-seed	567,749	bushels
Maple sugar	32,759,263	lbs.

* It is as yet but the "day of small things" in respect to the agriculture of Australia as compared with the United States: but the importance of the pursuit, and the stimulus imparted to it by an unlimited market and "golden prices," and the facilities gradually unfolding themselves in Victoria by the "unlocking of the lands," comprising some of the richest alluvial soils in the world, give earnest of a rapid development of the best treasures of the earth.—Labour and industry only are wanted to ensure such results; and perhaps one of the best compensations to the colonists upon the loss of the supply of the former by the cessation of transportation, will be found in the removal of a stumbling-block to the exercise of the latter,—it being the sentiment of many that the existence of a servile class in the community tended to degrade labour, a reproach upon its dignity that must now be at once and for ever wiped away.

Cane sugar .....(hhds. of 1000 lbs.)	318,644	hhds.
Value of home-made manufactures	27,525,544	dollars

The following is a general Report of the facts relating to the most important Manufactures of the United States; viz.—

MANUFACTURES.*

	dollars.
The entire capital invested in the various manufactures in the United States amounted, in 1850, to	530,000,000
Value of raw material.....	550,000,000
Amount paid for labour	210,000,000
Value of manufactured articles.....	1,020,300,000
Number of persons employed	1,050,000

The following minute particulars respecting some of the principal American Manufactures will be also found interesting:—

COTTON GOODS.†

Capital invested.....	74,500,031	dollars
Bales of cotton	641,240	bales

* Little need be said on the subject of Australian manufactures. The few were in an infant state when the gold discoveries abstracted labourers and artizans from their legitimate pursuits, and put a stop to almost every enterprise of the sort.—But the elements of manufacturing greatness exist in Australia generally; and Tasmania, from her possession of coal and iron, those important elements of material prosperity, and her geographical position, is evidently destined to take pre-eminent rank as a manufacturing and commercial nation.

† The various trials made in the cultivation of the cotton plant in the northern parts of the colony of New South Wales would indicate that, at no distant period, America may find a formidable competitor in her trade with England in the supply of this article.

Some statistics also of the English cotton trade may here prove interesting.—In 1850 there were imported into the United Kingdom 563,576,816lbs. cotton, of which quantity 493,153,112lbs. came from the United States;

Coals used	121,099	tons
Value of all raw materials	31,835,036	dollars
Number of hands employed, (males)	33,150	
Ditto ditto, (females)	59,136	
Wages paid per month, (males)	653,778	dollars
Ditto ditto, (females)	703,414	....
Value of entire product	61,869,184	dollars
Yards sheeting, &c. &c.	763,678,407	
Sundries, (pounds of yarn and bales)	27,873,600	

Woollen Goods.*

Capital invested	28,118,650	dollars

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and in the same year there was consumed in British manufactures 584,200,000lbs. In the spinning of this raw cotton into yarn, and weaving the yarn into calico, there were employed 141,501 males, and 189,423 females, or a total of 330,924 people. The number of spindles for spinning the yarn was 21,000,000; and the number of power-looms for weaving the calico 250,000. These spindles and power-looms were kept in motion by the aid of 71,000 horse-power, and 11,500 horse water-power. The total value of cotton goods exported was, in 1850, £28,257,400; England's best customers for her cotton goods being those countries whence she imports the raw material.

* As England derives her chief supplies of cotton from America, so is she indebted to Australia for more than half the supply of wool consumed in her manufactures. The first importation of wool from New South Wales into England in 1807 was 245 lbs. In the year 1848, the quantity imported from New South Wales (Port Phillip included) amounted to 23,000,000 lbs., valued at more than £1,200,000. The subjoined statement will show the extraordinary progressive rate of increase, in decennial periods, in this staple of British commerce:—

In 1829 Australia exported to Great Britain..... 1,838,642 lbs.
1839 Ditto ditto .....10,128,774 ...
1849 Ditto ditto .....35,879,171 ...

The quantity and value exported in 1852 from the under-mentioned colonies were as under:—

	lbs.	Value.
Victoria	20,047,453	£1,062,787
New South Wales	11,086,974	676,815
Tasmania	4,904,000	245,200

Wool used	70,862,829	lbs.
Coal	46,370	tons
Value of all raw materials.....	25,755,988	dollars
Number of hands employed, (males)	22,678	....
Ditto ditto (females)	16,571	....
Wages paid per month, (males)	489,039	dollars
Ditto ditto, (females)	210,901	...
Value of products.....	43,207,555	....
Cloth manufactured	82,206,652	yards
Sundries ditto lbs. yarn.....	4,294,326	lbs.

PIG IRON.*

Capital invested	17,346,215	dollars

In exchange for this raw material, Australia received back in 1852 from the Mother-country in manufactured articles, woollen cloths and clothing, in the several proportions specified; viz.

	Cloths.	Clothing.	Total.
Victoria..,.....	£48,175	£93,887	£142,062
New South Wales ...	105,897	98,258	204,155
Tasmania..,... ..,....	112,167	56,855	169,022

Under the existing circumstances of the labour market, it may seem futile to point out or dwell upon the importance of founding and encouraging a domestic manufacture of woollen goods. In New South Wales in 1852, there were seven establishments engaged in such manufacture; the production of cloths and tweeds in that year being 234,378 yards. In Tasmania some steps were taken a few years ago, by the introduction of the requisite machinery, towards a commencement; but nothing further has been done. The possession of the raw material on the spot, without the delay and expense incident to a long sea-voyage to and from England, combined with the advantages of our superior climate, and abundant and rapidly accumulating capital, must ere long command, not only the use of the most improved machinery and processes of manufacture, but also the highest artistic and scientific skill which Great Britain can afford.

* Iron, which is known to exist in Tasmania and the neighbouring colonies as an ore in such quantities as will make it at no distant day of great importance in an economical point of view, in connection with her extensive beds of coal, has not yet been worked; but it is otherwise as

Ore used	1,579,309 tons
Mineral coal	645,242 ....

regards the more costly and precious metals. For instance, Lead has been worked in South Australia at the Wheal Gawler, Wheal Watkins, and Glen Osmond mines, &c.; and is known to exist in Tasmania, New South Wales, and Victoria. Copper has also been found in Tasmania and Victoria; it has been successfully worked in New South Wales; and perhaps no copper mine in the world ever yielded returns so rich upon an outlay of capital so small as the *Burra Burra* mine of South Australia—the shares in which, originally £5 paid up, rose within two or three years nearly to the value of £200 each! From the opening in 1845 to the end of 1850 (when 1000 men were employed), this mine yielded 56,428 tons of ore, averaging 40 per cent. of copper.

Gold has been found in Victoria, New South Wales, Adelaide, and Tasmania. In Tasmania, although found at several points, hitherto in small quantities. In Adelaide also in small quantities. In New South Wales, in the Bathurst and the adjoining districts, to such an extent that, from the discovery in May 1851 to the end of 1852, the quantity of gold-dust exported to England amounted to 1,256,295 ounces, of the value, at 67s. per ounce, of £4,840,000; while from Victoria the export of gold to England, from the discovery in October 1851 to the end of 1852, amounted to the value 2,377,968 ounces, of the value of £9,160,000, making a grand total within twenty-one months of £14,000,000 sterling!

In the report of W. Westgarth, Esq., M.L.C., to the Chamber of Commerce in February 1853, it is stated that the quantity of gold ascertained to have been produced in the province of Victoria in 1851 was 145,146 ozs., and in 1852, 3,783,780 ozs., making a total of 3,928,926 ozs., which at £3 17s. per oz. was worth £15,026,365 sterling.

The total quantity of gold produced in California in five years, from 1848 to 1852, was of the value of £40,000,000. The quantity produced in Australia within one year and a half was £16,000,000!

The estimated value of the gold brought into the markets of the world in 1852 from all sources, California and Australia excepted, was in round numbers £9,400,000; from California £12,500,000; while from Australia in the same year it was £14,400,000.

The largest amount produced in one year in Russia was, in 1848, £4,100,000.

In 1843 the largest lump of gold at that time known in the world was found in the Ural Mountains, now deposited in the Museum of the Imperial School of Mines, St. Petersburgh, weighing 78 lbs. This, however, has been completely thrown into the shade by recent discoveries in Australia. One of these large masses, found at Ballarat in Victoria, weighed 132 lbs. It has since been exhibited in London as one of the wonders of the world.

Coke and charcoal	54,165,236	bushels
Value of raw material, fuel, &c.	7,005,289	dollars
Number of hands employed, (males)	20,298	
Ditto ditto (females)	150	
Wages paid per month (males)	421,435	dollars
Ditto ditto (females)	784	....
Pig iron made	564,755	tons
Value of other products	259,700	dollars
Ditto of entire products	12,748,777	....

CASTINGS.

Capital invested	17,416,361	dollars
Pig-iron	345,553	tons
Old metal	11,416	....
Ore	9,850	....
Mineral coal	190,891	....
Coke and charcoal	2,413,750	bushels
Value raw material, fuel, &c.	10,316,355	dollars
Number of hands employed, (males)	23,541	
Ditto ditto (females)	48	
Castings made	322,745	tons
Value of other products	1,524,121	dollars
Ditto entire products	25,108,155	....

WROUGHT IRON.

Capital invested	14,495,220	dollars
Pig metal	251,491	tons
Blooms used	33,344	....
Ore used	78,787	....
Mineral coal	538,063	....
Coke and charcoal	14,510,828	bushels
Value of raw material used	9,698,109	dollars

Number of hands employed (males)	13,178	
Ditto ditto (females)	79	dollars.
Wrought iron made	278,044	tons
Value of other products.....	458,300	dollars
Ditto entire products	16,747,074	....

NUMBER of Establishments in operation in the foregoing Departments of Industry.

STATES.	Cotton.	Woollen.	Castings.	Pig Iron.	Wrought Iron.
Maine	12	36	25	1	-
New Hampshire	44	61	26	1	2
Vermont	9	72	26	3	8
Massachusetts	213	119	68	6	6
Rhode Island.....	158	45	20	-	1
Connecticut	128	149	60	13	18
New York.....	86	249	323	18	60
New Jersey.....	21	41	45	10	52
Pennsylvania	208	380	320	181	131
Delaware	12	8	13	-	2
Maryland	24	38	16	18	17
Virginia.....	27	121	54	29	39
North Carolina	28	1	5	2	19
South Carolina.....	18	-	6	-	-
Georgia.....	35	3	4	3	3
Alabama	12	-	10	3	1
Mississippi	2	-	8	-	-
Louisiana	-	-	8	-	-
Texas	-	1	2	-	-
Arkansas	3	-	-	-	-
Tennessee.....	33	4	16	23	42
Kentucky	8	25	20	21	4
Ohio	8	130	183	35	11
Michigan	-	15	63	1	-
Indiana	2	33	14	2	3
Illinois	-	16	29	2	-
Missouri	2	1	6	5	2
Iowa	-	1	3	-	-
Wisconsin.....	-	9	15	1	-
California	-	-	1	-	-
District of Columbia...	1	1	2	-	-
TOTAL.....	1094	1559	1391	377	422

The Press.*

The statistics of the newspaper press form an interesting feature in the census returns for 1850. It appears that the whole number of newspapers and periodicals in the United States, on 1st June, 1850, amounted to 2800. Of these 2194 were fully returned, 234 had all the facts excepting circulation given, and 72 are estimated for California and other places omitted. The aggregate circulation of these 2800 papers and periodicals is about 5,000,000; and the entire number of copies printed annually amounts to 422,600,000.

The following Table will show the number of daily, weekly, monthly, and other issues, with the aggregate circulation of each class :—

	No.	Circulation.	Number of Copies printed annually
Daily.....	350	750,000	235,000,000
Tri-weekly	150	75,000	11,700,000
Semi-weekly	125	80,000	8,320,000
Weekly..	2,000	2,875,000	149,500,000
Semi-monthly	50	300,000	7,200,000
Monthly	100	900,000	10,800,000
Quarterly	25	29,000	80,000
	2,800	5,000,000	422,600,000

* With insufficient data it is not possible to specify with minuteness the actual condition of the Australian press; but it cannot be doubted that, with the improved "means and appliances to boot" of the present day, it will keep pace with the progressive development of the material resources of these colonies. It is the proud privilege of those who live under shelter of the British Flag,—and it may be said of all the Anglo-Saxon race, in the age in which we live,—that no shackles exist amongst them to cramp or restrain the freest and most independent exercise of mind; and it is fair to assume that the intelligent spirit of scientific inquiry, and indomitable energy in the pursuit of knowledge and virtue and truth, coupled with the unquenchable love of freedom which characterise the American scion, in thought, speech, and action, exist as well in the Australian, and that they will be fully developed in the form of her institutions and the tone of her literature.

The average circulation of papers in the United States is 1785. There is one publication for every 7161 free inhabitants in the United States.

Mr. Kennedy, the Superintendent of Census, in the performance of his important task, visited the capitals of many of the Governments of Europe, for the purpose of examining into the methods adopted for the procuring and classification of such facts as are enumerated in their statistical investigations, and of deriving all the aids which they were calculated to afford him.

"It seems desirable," says Mr. Kennedy, "to possess every ray of light on this subject, when considering that the present census is one of unexampled importance to ourselves and our posterity, as exhibiting our condition to the middle of a century, and illustrative of the progress of a people, flourishing beyond all precedent, under a new form of government; one whose history and example must, as it becomes known, exert an important influence throughout the civilized world. This census, while it exhibits our progress for sixty years, with a precision and certainty which no other country has been able to enjoy, and giving a reality to the past unattainable with respect to any other people, discloses the present statistical history, and that for the first time, of a country embracing more than a million square miles of territory, the future destiny of which is inseparably connected with that of the original thirteen States . . . . . In England, several opportunities were offered for bringing the object of my mission before public audiences; and invitations were tendered me to address the London Statistical Society, and the British Association at Ipswich during its annual meeting, which was attended by Prince Albert. On each opportunity it gave me pleasure to present a full account of the character and extent of our

investigations under the Act of Congress for taking the seventh census, to make a fair and impartial exhibit of our progress in wealth and numbers during the past ten years, and at the same time urge the propriety of mutual efforts towards the attainment of more uniform and useful statistical publications by different governments. The propriety of this measure was felt by individuals who had made statistics a study, and the necessity for some action was universally conceded: and it affords me infinite gratification to state that an arrangement has been made for a general Statistical Congress, to be held at Brussels during the ensuing fall—a measure which has received the approbation of several of the most distinguished statists of Europe, and from which the most beneficial results are anticipated.

"Mr. Porter,* of the Board of Trade, has been appointed a delegate to this Statistical Congress from England. He is a gentleman distinguished no less by his laborious researches and valuable contributions to the science of Political Economy and statistical knowledge of the British Empire, than for the elevated position he holds as a public officer and man of letters."

* This distinguished writer on Statistics and Political Economy died before the period fixed for the meeting of the delegates at the projected Statistical Congress.

XXII.—*On the Cyclones of Tasmania and the surrounding Seas in July and August*, 1852. *By* Thomas Dobson, B.A. [*Read 9th February*, 1853.]

The general nature of the gales that prevail on the South Coast of Australia, Bass's Straits, and on the Coasts of Van Diemen's Land was correctly described by Flinders forty years ago. This description is the more valuable and trustworthy, inasmuch as Flinders was ignorant of the modern theory of rotatory storms. It occurs at pp. 244-5 of vol. i. of the "Voyage to Terra Australis," published in 1814. He says:—

"The progress of the gales is usually this: the barometer falls to 29·50, or lower; and the wind rises from the Northwestward, with thick weather, and commonly with rain. It veers gradually to the West, increasing in strength, and the weather begins to clear up so soon as it has got to the Southward of that point. At South West the gale blows hardest, and the barometer rises, and by the time the wind gets to South, or S.S.E., it becomes moderate, the weather is fine, and the barometer above 30 inches.

"Sometimes the wind may return back to West, or something Northward, with a fall in the mercury, and diminish in strength, or die away; but the gale is not over, although a cessation of a day or two may take place.

"In some cases the wind flies round suddenly from North West to South West, and the rainy, thick weather then continues a longer time.

"Such is the usual course of the gales along the South Coast, and in Bass's Straits; but on the East side of the

Straits, the winds partake of the nature of those on the East coast, where the gale often blows hardest between South and South East, and is accompanied with thick weather, and frequently with heavy rain."

Mr. Piddington, in the "Sailor's Horn Book of Storms," has thrown out the very probable suggestion that these gales are the Northern portions of Cyclones, which have an Easterly progressive motion. So long as this remains a mere suggestion, few would have the temerity to *act* upon it, in cases where life and property were involved. To justify a practical application of the suggestion, a demonstration of its correctness is necessary. In the following investigation of the Storms of July and August, 1852, I have been fortunate in obtaining accurate data from the log of H.M.S. *Fantome*, the Journal of Captain Major, of the ship *Duke of Lancaster*, of Liverpool; the log of the Packet Brig *Emma*, and the meteorological observations at the Magnetic Observatory, Hobart Town. The meteorological observations at Sydney, published in the "Sydney Morning Herald," are as complete and correct as could be desired. The barometrical observations at Melbourne, published in the "Argus" newspaper, are taken at midnight, and therefore only once in twenty-four hours; the barometrical curve for Melbourne consequently has not the same pretensions to accuracy as those for Sydney, Hobart Town, and the *Fantome* which are formed from three, or more, daily observations. (Fig. IX.) *

On the 28th July, the *Duke of Lancaster*, from London to Hobart Town, was in 43° 48′ S., and 121° 20′ E., that is, about due West of Van Diemen's Land, and South of King George's Sound:—

* See "Australian Cyclonology."

"From 9 P.M. of the 26th to 9 A.M. of the 27th, there was a calm. At noon, the wind was W.N.W.; P.M., an increasing breeze from W.; midnight strong increasing gales, W.S.W.

"28th.—3 A.M., strong S.W. gale and high sea. Noon, S.W. gales, squalls, and hail; P.M., strong increasing S.W. gale, squalls, and a high rising sea; midnight, hard S.W. gales and frequent squalls.

"29th—6 A.M., squalls terrific; hail and thick snow showers. 10 A.M., more moderate, sea dreadfuly high; noon, 42° 40′ S., 127° 11′ E.; strong S.W. gales, frequent violent squalls, very heavy sea from S.W.

"30th.—More moderate."

The barometer fell from 30·33 to 29·42, from the 27th to the 29th, and then rose gradually. The centre of this Cyclone passes the meridian (120° E.) of the ship early on the 28th, and the vessel sails in the N.W. quadrant until it leaves her in 130° E., on the 30th. About the same time that the *Duke of Lancaster* is dropping behind the N.W. margin in 130° E., the central area is passing over Van Diemen's Land in 147° E. The following is an abstract of a memorandum from the journal of the master of the brig *William*, which left Sydney on the 14th July for Launceston:—

"On the morning of the 28th got the wind strong from the westward, and crossed the Straits, under all sail, hoping to get in before sun-down. At 5 A.M. the light-house in sight, bearing S.W., distant 10 miles; the weather looked very threatening to the N.W. At 8 P.M. tacked in shore, and made another attempt to fetch the Heads, (George Town); but finding that impossible, and the gale having fairly set in, thought it prudent to keep what offing I had. At 10 P.M., wore off shore. Up to midnight carried all

possible sail, hoping to be able to hang to windward till daylight; but at midnight the gale had increased to such a fearful extent, that I was obliged to bring the brig under close-reefed topsails, after the main-trysail gaff had been carried away. During the whole of Thursday, (29th), the gale raged with unabated fury; but the barometer being stationary at 28·95, I hoped I had the weight of the gale at sun-down, although the weather looked, if anything, even worse. At 8 P.M. the barometer again falling, and at 9 P.M. barometer 28·80. It was at this time blowing harder than I ever remember before, and a terrific sea was running. At 10 P.M. our decks were filled with lightning, and immediately after a peal of thunder burst close on our weather bow. We had then a calm for about a minute, which I well knew would be followed by something awful, and we were immediately struck by a squall, which drove the brig's lee rail under. About 4 A.M. of the 30th the weather moderated a little, and continued so till noon, when it again assumed a threatening appearance, and finding myself as far to the eastward as Cape Portland, (148° E.), I bore up for Swan Island, and anchored there at 2 P.M. Just when bearing up, we were struck by one of the furious westerly squalls, and snapped the starboard bower cable. The second anchor brought the ship up with 90 fathoms of cable. I remained here till Tuesday, the 3rd August, when the wind came away at S.E., then weighed, and came through the Straits, and arrived at Launceston at day-break on the 4th, twenty-one days from Sydney, and through the severest gales I have ever experienced on the coast."

The deck filled with lightning, the single peal of thunder, the calm, the minimum-barometric depression, and furious westerly squalls, are so many well-known marks of the passage of the northern margin of the central portion of the

Cyclone. The extreme cold, which is characteristic of the central space, extended over the whole of Van Diemen's Land. During the whole of the 30th, and the forenoon of the 31st, there were continuous heavy snow squalls. Eight years had passed since the last snow storm in Hobart Town. The hills in the neighbourhood were covered with snow; and at Oatlands, Jericho, &c., the snow was two or three feet deep. The thermometer at the Observatory was 37° at 6 A.M., 37° at 2 P.M., and 36° at 10 P.M. of the 30th.

The newspapers furnish the following corroborative notices:—

"The *Charles Carter* left Hobart Town for Sydney on the 28th July. On the 30th she fell in with heavy gales from N.N.W. to S.W., which continued for four days."

"At 2 A.M. of the 1st August, the brig *Mary*, of London, was lost on Kent's Group, Bass's Straits."

"On the 31st July, the schooner *Spy*, of Hobart Town, was on shore at Kent's Group."

"The barque *Gratitude*, of London, from Sydney the 26th July, was compelled to return to port on the 31st, the weather being most terrific."

"The schooner *Gem* left Launceston on the 26th July, and whilst trying to beat into Waterloo Bay on the evening of the 30th, had nearly the whole of her canvas blown away, and was compelled to bear up for Twofold Bay to refit."

H.M.S. *Fantome* was then lying at the Auckland Islands, in 166° E., *i.e.*, about 18° to the E. of Cape Portland. The barometer on board falls rapidly on the 30th, and reaches its lowest point early on the 31st. During this interval the direction and force of the winds are:—

July 30.—N.N.E. 4; N. by E. 5; N.N.E. 6. 7.

July 31.—A.M., N.N.E. 6, 8, 9, 6.

showing the passage of the South Eastern quadrant. From

the 31st July to the 3rd August the mercury is low, and oscillates within moderate limits, and the wind is variable and moderate (4, 5, 2). On the 4th August the South Western quadrant approaches, and continues its passage until the 7th, the wind being steady at E. and then at S.E. On the 3rd there is a calm, and on the following days the force of the S.E. wind is 3, 4, and 5.

At Sydney, on the 30th, the changes of wind were N.W., W.N.W., W., W. by S., and W.S.W., indicating the transit to the eastward of the extreme northern margin. That the track of the centre lay between the parallels of Van Diemen's Land and the Auckland Islands is shown by the order of veering of the wind at each of these places. Consequently, a shorter chord of the Cyclone passed over Melbourne and Sydney than over Hobart Town. This accounts for the *great breadth* of the barometric depression at Hobart Town, indicating that the mercury began to fall sooner there, and was longer in rising, than at the more northern stations. The *eastward progress* of the Cyclone is likewise demonstrated by the comparison of the several barometric curves, (fig. IX.)* ; for the minimum depression, which occurs almost simultaneously at Melbourne and Hobart Town, happens early next day at Sydney, (4° to the Eastward) and at least two days later at the Auckland Islands, (18° to the eastward.) Since the Northern Margin extended to Sydney, and the Southern to the Auckland Islands, the diameter of the whole Cyclone was not less than 1000 miles.

Assuming the centre to have passed the *Duke of Lancaster* in 120° E. early on the 28th, the meridian of Van Diemen's Land early on the 30th, and that of the Auckland

* See "Australian Cyclonology."

Islands on the 1st August, it would have traversed 45° in five days, or 9° a-day; that is, 9 × 42 miles in 24 hours, which gives a mean velocity of progression of about fifteen miles an hour.

Now, from noon of the 28th to noon of the 29th, the *Duke of Lancaster* sailed to the eastward at about 11 miles an hour; and I have shown that the Cyclone overtook and passed her; therefore the velocity of fifteen miles an hour is probably not far from the actual rate.

This Cyclone was followed in a few days by another, of which the central track seems to have been considerably to the Northward of that of the first. A correspondent of the "Adelaide Observer" states that on Saturday, the 7th of August, there was a most fearful flood at Clare, (north of Adelaide), and no arrival of mails from the South, because of the floods at the intervening parts. In Clare the rains commenced on the night of Thursday the 5th, and continued till 5 P.M. on Saturday, when it poured down in torrents for ten hours. All the houses were flooded, one man was drowned, and a settler had 1700 sheep drowned in the River Bremer. (Adelaide 35° S. 138° E.)

At Portland (141° 38° E.) on Friday night, (6th August), there was one of such fearful gales from the South East, that the oldest inhabitant had not known the like before. The *Margaret and Agnes* went on shore, and was wrecked.

At Circular Head (145° 20° E.) a most severe gale was experienced on Saturday night (7th), and continued with unabated violence up to Sunday morning. The oldest inhabitants do not recollect ever witnessing such a gale and sea before, and with the highest tide. The schooner *Toroa* struck, and was driven up by the sea to a considerable distance. The schooner *Antares*, which had sailed from Launceston, put back from contrary winds, East. The gale

commenced with the barometer at 30·30, and the mercury fell to 29·30.

At Sydney the barometer begins to fall on the 6th, and continues low until the 15th. The corresponding meteorological remarks describe the passage of the N.E. half of the Cyclone:—

"Friday, 6th August.—6 A.M. rather heavy rains.

"8 A.M., wind in squalls from S. by E., then light, veering to E. Atmosphere raw and chill, and heavily charged with nimbus. P.M., became very coarse and squally from E. and N. of E., with driving showers. Towards evening grew more and more boisterous from N.E., and continued to blow with increasing violence throughout the night. Strong gales and squalls, veering to almost due N. at times, and latter part sometimes W. of N., with driving rain occasionally. Night altogether dark and dismal.

Saturday, 7th.—At daybreak, gusts quite furious from N.E. by N. with hard rain, and increased after 7 A.M. to still more violent gales from the same quarter. Between 1 and 2 P.M., gales from almost due N.; after 2, veered to N.W. by N., with severe squalls and rain. After 3 P.M. the tempest abated, clouds began to open and show patches of blue sky; and, after some very heavy showers, the whole sky became most rapidly clear on all sides, and the wind fell as rapidly to moderate breezes. Evening and night, light N.W. wind, and clear sky."

During the 8th, 9th, and 10th, the winds are moderate from N.W.; the *sky clear*, and the atmosphere *cold and wintry*.

On the 11th, a dark, dusky gloom all round; grew thicker during the forenoon. At 1 P.M. the N.W. wind arose, blew strong during the afternoon and night, and then shifted to about W. by N. A heavy swell on the sea still.

" 12th.—Wind rapidly rose to strong gales from W. by N. before 10 A.M., and subsequently kept increasing in force, and blew with extreme violence till about 4 P.M. Brisk gales all night.

" 13th.—Atmosphere dry and clear; no clouds. Strong westerly gales. Noon, wind a little S. of W., and rose to heavy gales before sunset; after that tacked to N. of W., and increased to most violent gales by 8 P.M., and continued to rage till 4 A.M. of the 14th. Between 9 and 11 P.M. of the 13th, there were some most furious gusts, and large stunted bushes and trees, which had withstood many heavy storms, fell a sacrifice to these, and were shivered or blown clean away by the roots.

" 14th.—Before 8 A.M. gales had again set in strong from W. by N., and blew with increasing violence all day, rising to heavy gales before noon. Atmosphere keen, and remarkably dry and clear. Gales continued with great violence till past midnight.

" 15th.—Moderately fresh breezes all day; clear fine weather, very sharp and dry. Wind W. by S. and W.S.W.

" 16th—Cold frosty air, wind W. by S.; S. by W.; S., and S. W. Evening, light wind and clear sky."

A correspondent of the " Sydney Morning Herald" writes from Goulburn on the 16th August:—" In the course of last week we had all the rigour of a northern winter, in a blustering cold piercing wind, with frequent showers of rain, hail, and snow. Snow fell to a considerable depth on Saturday evening. On Sunday we had a keen frost, which prevented the white covering of the earth from disappearing; in some places it remained till the following day, (Monday, 9th.) The rain which fell in the early part of last week caused the Woollondilly and Mulwarre rivers to rise to such a degree as to prevent communication at the ordinary crossing places for several days, &c.

The Launceston papers contain long accounts of the disastrous floods of the South Esk, at Longford, on the 9th, and at Perth and Launceston on the 10th August. The stone bridges at Entally and Perth were destroyed, the coaches stopped, and the Royal Mail Coach washed down the river at Ross. Meanwhile, very little rain fell around Hobart Town.

The central area, which is accompanied by extreme cold, heavy rains, snow and hail showers, appears to have swept over Victoria, Bass's Straits, and the northern portion of Van Diemen's Land; and this conclusion is confirmed by numerous notices of the weather at sea.

"On the 4th August, the *Duke of Lancaster* sighted the S.W. Cape of Van Diemen's Land, distant 15 leagues N.E., having light variable airs and calms until Friday, the 6th, when, at noon, the wind was E.N.E.

7th.—Wind moderate, N.N.E. 7 P.M., strong increasing breeze. 9 P.M., violent squalls off the land. Midnight, barometer falling rapidly. 7 A.M., hard gales and squalls. The Mewstone W.N.W. 7 leagues.

"8th.—Sunday, hard gales, E.N.E., violent squalls and a heavy sea. 11 A.M., found the main piece of the rudder sprung. Noon, a furious gale and sea.

"9th.—Furious E. gale, violent squalls and rain. 4 A.M., hove-to. Noon somewhat abated.

"10th.—Strong increasing gales, E.N.E. 10 A.M., nearly calm, swell heavy. Noon, light northerly airs, and clear.

"11th.—Calm, a heavy swell from E.

"12th.—Wind N. light, swell from E. 3 A.M., wind E.N.E. 9 A.M., wind S. and S.W. Noon, strong S.W. gales, thick, dirty, and rainy. A furious *cross-swell* from E., ship pitching, *forecastle under*.

"13th.—6 P.M., a severe S.W. gale, with furious squalls

and rain. Midnight, moderated and hauled to the W.N.W. Noon, light and variable.

" 14th.—Variable—anchored in Storm Bay, below the Iron Pot Light-house. 1 A.M. suddenly a hard gale, furious squalls and snow. Ship began to drift. Squalls furious, with thick snow showers. 2h. 30m. A.M., anchored in harbour of Hobart Town."

The barometrical curve of the observations on board the *Duke of Lancaster* does not differ materially from that at Hobart Town.

The *Emma* left Hobart Town for Sydney on the 4th August :—

" On the 6th, at 5 P.M., land was seen west of Cape Howe, wind E., inclining to E.N.E., the sea rising. Split the main-trysail. Midnight, gale increasing.

" Saturday 7th.—Wind steady at N.E. by E. 4 A.M. blowing very hard, hove-to. Noon, gale increased to a complete drift, with a sea running mountains high. 4 P.M., mizzling rain. 7 P.M., rain fell very heavy, when a sudden gust of wind nearly tore the masts out, and immediately after it fell a " clock calm." The main-boom, secured with three tackles and a strong guy, tore all adrift, &c. A light N.E. wind and a heavy sea running.

" Sunday 8th.—Light N.E.

" 9th.—Light W. throughout. Cape Howe N.E. Heavy swell from East.

" 10th.—Light, veering from W. to S. Midnight, rounded Cape Howe.

" 11th.—Off the Dromedary, strong N.N.W. gale, sea running heavy.

" 12th.—Veering to W. and W.N.W.

" 13th.—Off Wollogong, W.S.W. blowing a complete drift, hove-to. 2 P.M., moderating. 7 P.M., entered Sydney

Heads. 8 P.M., blowing a drift of wind from W. Both anchors down off Shark Island.

"14th,—Midnight, blowing fresh; the second officer fell overboard out of the boat, and was drowned."

The ship *Falcon*, 1106 tons, left Melbourne on the 5th and arrived at Sydney on the 18th August. On leaving she was three days with a strong drift from E. (6th, 7th, and 8th); and on the 9th was to the W. of Cape Otway (143° 30′ E.), sea still very heavy. Light westerly winds through the Straits, when it again began to blow from the eastward, veering round to N.W. On the 15th carried away her fore-topsail and foresail, and split her mainsail. The wind set westerly, and continued so until the evening of the 17th.

The *Duke of Cornwall*, which was in the same gales as the *Falcon*, was for several days under close-reefed main-topsail, and was driven as far as 154½° E.

The *Clarence*, steamer, was compelled to return to Sydney by the heavy gales on Saturday, the 7th August. The gale was principally from the E.N.E., and shifting thence to the N.W.

The *Hawkesbury Lass*, Captain Liddle, left Twofold Bay on the 7th August with an easterly gale. Sighted the Sisters on the evening of the 10th, when it became calm, with a very heavy sea from E. At daylight had drifted to leeward of the Sisters, blowing a strong gale from N.W. At 2 P.M. wind shifted suddenly to S.W., blowing very hard with heavy rain until 10 P.M., when the wind shifted round to N.W. Ship drove on shore on Babel Island, where the captain and crew subsisted on penguins for 14 days, until taken off by the schooner *Free Trader*.

The *Robert Syers*, from Melbourne to Sydney, when off Twofold Bay on Friday the 6th, was hove-to until Sunday

evening, the wind veering N.N.W. to S.W. during that time.

The *Miranda,* of Hobart Town, was wrecked on Rabbit Island.

The *Victoria Packet* left Melbourne on the 5th August, with about seventy passengers, and 200 sheep. On Monday the wind blew "great guns," and the sails were torn to pieces. All but 25 of the sheep were washed overboard. During the gale a passenger jumped overboard, and was drowned. When the vessel got outside of the Heads, early on the morning of the 6th, she had strong easterly winds, which continued increasing until 9 P.M., when it blew a heavy gale from eastward, with heavy rain and very thick weather. About midnight, they rounded-to, vessel's head N.E., and directly after that the main-topsail and foretop staysail were blown away. The screw-steamer, the *City of Melbourne,* was in company all day until 8 P.M., when it came on thick, and she was last seen on the port tack looking up for the Tamar. The *Victoria Packet* had very severe weather until daybreak, lying-to all night, head N.E. At daybreak they discovered the south end of King's Island close under their lee. The crew immediately wore ship, but could not weather the land on that tack, running into the breakers, and just clearing the eastern end of the Island. After getting the vessel on the port tack, they made sail, but it was all blown away, except the lee luff of the foresail, which brought her out. The gale continued until 11 A.M. on Saturday, when it lulled.

The steamer, *City of Melbourne,* was beached, about the middle of the East Coast of King's Island (39° 47′ S.), at 4½ P.M. of the 7th August. By the admirable coolness and skill with which this difficult manœuvre was successfully

accomplished, under most trying circumstances, the lives of the 250 persons on board were all saved. When the Emigrant Ship *Cataraqui* was wrecked on King's Island, in 1845, only 9 lives were saved out of 423! The following is the statement of Captain Saunders, of the *City of Melbourne*, steamer:—

"August 6th.—8 A.M., left Port Phillip Heads, wind N.E. All possible sail set. 10 A.M., fresh breezes—in foretop-gallant sail, outer jib and mizen. Noon, wind increasing, close-reefed the foretopsail, stowed the jib, and in two reefs of mainsail. 8 P.M., strong gale from E.N.E. with a heavy sea. Midnight, blowing very hard, with much rain. Close-reefed the mainsail, stowed the foresail and foretopsail.

"7th.—2. A.M., gale still increasing. 4 A.M. shipped a heavy sea. Carried away the weather main gangway, a great quantity of water went down into the engine-room and into the cuddy. 5 A.M. wind East. At daylight repaired the gangway, and wore ship to the North; took in the fore-trysail, which had split. Set the mainsail, close-reefed. Gale still increasing from East, sea running very high. 10 A.M., wore ship to S.S.E., the gangway having broken in, again filled the deck with water, a great quantity going down below. At 1h. 30m. P.M. saw breakers on the lee bow, supposed to be Sea Elephant Rocks. Wore ship to the North, set fore-trysail and square foresail, to claw off the land. The gale at this time was awful. Obliged to call up about 60 of the passengers from below to get the fore-tack aboard. At 4 P.M. saw breakers a-head, and the land about two points on the lee-bow. The weather was so thick that it was impossible to see half a mile from the ship. Finding that the vessel could not clear the land on either tack, for she was not more than half a mile from the breakers, and night setting in fast upon us, I determined, after consulting with

the passengers, that the only way to save life and property would be to run the vessel on shore while it was daylight.

"I then went up to the mast-head to look out for the best place to beach the vessel. At 4h. 30m. P.M. the helm was put up, and the passengers called up from below. In ten minutes the vessel struck the ground, and carried away the rudder and false keel. At the same time a tremendous sea broke over the poop, carrying all before it on to the main deck. The next sea took the vessel inside of the reef, about 50 yards from high-watermark, where she now lies, with her head to the North, on a rocky bed covered with loose stones."

In a published letter of one of the passengers, written on the 8th August, at King's Island, it is stated that "the Captain ran the vessel ashore over a tremendous reef in the most seaman-like manner. She grounded firmly upright, about 200 yards from the shore. All the passengers are saved, 250 souls, but we have only three days' provisions, &c."

The mate of the steamer arrived in a boat on the 12th at Circular Head, whence provisions, &c., were sent. All the people, including several very fortunate gold-diggers, were got off the island; and the steamer itself was recovered about four months after. A testimonial was afterwards presented to Captain Saunders by the passengers expressive of their gratitude for, and admiration of, that calmness and presence of mind by which he was instrumental in preserving the lives of all on board.

The North Eastern quadrant of the Cyclone appears to have passed between Moreton Bay and Sydney. On the 13th August, the *Thomas Lord* left Moreton Island in company with the *Zone*. She had heavy S.W. gales from the 13th up to the evening of the 19th. The *Zone* had

strong S.W. gales for three days after passing Smoky Cape, and a strong set to the N.E.

The *Fantôme* sailed from the Auckland Islands on the 8th, and arrived at Hobart Town on the 13th August. The direction and force of the wind show that she sailed into the S.E. quadrant of the Cyclone. These are :—

On the 7th....S.E. (3) ; E. (1) ; N.E. (2).
„ 8th....N.E. (2, 5, 6, 7).
„ 9th....N.E. (8) ; E. by N. (7) ; E. (7).
„ 10th...E. (7) ; N.N.E. (6) ; N.W. (3) ; N. (1) , W. (3) variable.

The barometric curves show that the mercury began to fall on the 6th at Melbourne, Hobart Town, and Sydney, but not until the 8th at the Auckland Islands; demonstrating the easterly progressive motion of the Cyclone. In the diagram VIII.,* the figures 28, 29, and 1 are the positions of the *Duke of Lancaster* on the 28th and 29th July and 1st of August respectively. The lower Cyclone (a) is in the position assigned to the 30th July, when the weather was moderating at 29, where there had been " hard S.W. gales, terrific squalls, hail, and thick snow showers" on the preceding day. In the Straits, the brig *William* had furious westerly gales, a terrific sea, lightning, &c., on the 29th and 30th ; and at the Auckland Islands the *Fantôme* had the wind from N.N.E. on the 30th and 31st July, and afterwards from E. and S.E.

The second, or upper, Cyclone (b), is in the position assigned to the 6th and 7th August, causing a South East gale at Portland, an East gale in the Straits, and N. and N.E. gales off the coasts of New South Wales. The *Duke of Lancaster,* off the S.W. Cape of Van Diemen's Land, has had E.N.E. gales, and the *Fantôme,* on the 7th, has

* See Dobson's " Australasian Cyclonology."

the wind increasing in force from 1 to 5, 6, 7, 8 on the 9th, and veering from E. to N.E. By supposing the upper Cyclone to have moved a little towards the E.S.E., it will be easy to trace the origin of the strong S.W. gales encountered by the *Zone* and *Thomas Lord* to the North of Sydney, after the 13th August.

The reading of the barometer at Melbourne at midnight of the 8th August is 27·38, showing a fall of two inches in the preceding 24 hours, and there is a rise of two inches during the following day. If this is not an error of the press, 27 being printed for 29, such a great and sudden fall and rise would indicate that the very centre itself passed over Melbourne, which seems probable from other considerations.

The supposition of the passage of two successive Cyclones in the tracks which have been assigned to them will be found to explain all the meteorological phenomena that have been here recorded. No false theory could bear the application of such a host of independent tests without betraying discrepancies or contradictions.

Each of the Cyclones just investigated may be regarded as the type of a class to which Bass's Straits are obnoxious. The first producing the well-known gales described by Flinders 40 years ago, which changed from N.W. to S. and S.W.; and the second those which change from N.E. to E. and S.E.

It is gratifying to be able to confirm, by such good and conclusive evidence, the suggestion hazarded by Mr. Piddington, one of the best writers on Cyclonology, and certainly the best teacher of the practical application of the art.

[*Supplementary, published in* "DOBSON'S" *Australasian Cyclonology.*]

HAVING now established a general rule for the motion of the Gales on the South Coast of Australia, we are enabled to interpret and explain the nature of isolated cases like the following, given by Sir James Ross in his account of the Exploring Expedition, carried on in the *Erebus* and *Terror* :—

" 1840, August 12.—Noon, S.W. Cape of Van Diemen's Land, bearing N.E. by N., distant 9 or 10 leagues. The wind increased so suddenly and violently that we could hardly take in our sails quickly enough, and in a few minutes were reduced to close-reefed mainsail. At 8 P.M., when blowing a perfect hurricane, the lee main-topsail sheet gave way, and in one instant the sail was rent into numberless ribbons, and soon entirely disappeared. The only sail then left on the ship, a new mainsail, was soon afterwards blown away. No canvas could stand against such a storm. At 10 P.M. barometer 28·16, and although it then began to rise, we could not perceive the slightest abatement of the hurricane until after midnight, when it gradually moderated, and at the same time shifted from North to West. It continued to blow a storm of ordinary violence, with only occasional furious squalls, throughout the 13th, 14th, and 15th, when, having been driven a great distance to the southward, we again stood in shore; we saw the land of Tasmania at 3 A.M., and anchored in Storm Bay at 11 P.M.

This Cyclone was moving to the S. of E. At Circular Head (7), at the Hampshire Hills (8), and at Hobart Town (9), the wind shifts from N. to W., and then to S.W. On referring to the barometric curves for each of these places,

it will be seen that the depression increases at the Southern Stations, and was greatest at the ship, which lay farthest to the South. This fact, and the veering of the wind, show that the centre lay to the South of Van Diemen's Land. (Fig. X., A, 7, 8, 9.) *

The following two instances of Easterly progression in a high latitude occur at pages 167 and 181, vol. 1 respectively, of the same work.

"1840, Dec. 25.—A strong gale, constant snow and rain as usual, attended the northerly gale. Hove-to. Noon, 62° 10′ S., 170° 24′ E.

"26th.—Wind veered to westward, hove-to until 2 P.M. Stood to southward.

"27th.—A strong south westerly gale, clear weather, and violent squalls, with snow-showers. Early next morning the gale moderated."

The centre of this Cyclone lay to the south of the ship; in the next case, the centre lies to the North of it.

"1841, Jan. 8.—8 P.M., increasing breeze from North, with thick snow.

"9th.—Northerly breeze increased to a strong gale, reducing us to close-reefed topsails. Noon 69° 15′ S., 176° 15′ E. The wind veered round gradually to eastward, and blew with great violence until 2 A.M. of the 10th, when it began to abate, and by 9 A.M. had moderated so much as to admit of our setting reefed courses. Noon, 70° 23′ S., 174° 50′ E. The wind soon afterwards veered to the S. E."

I regret that I have not been able to procure more information respecting the gales which prevail at New Zealand, which appears to lie in the way both of the Cyclones of the South Pacific and of those of the South Indian Ocean. Meteorological observations at this point would have an

* See "Australasian Cyclonology."

additional value on account of the occasional activity of the volcanic forces in those islands. The following severe Cyclone experienced there by Captain Cook seems to have belonged to the Port Essington class.

After leaving the Bay of Islands, in order to pass round the North Cape of New Zealand, Captain Cook appears to have fallen in with the northern half of a violent Cyclone moving to the eastward, and which had therefore probably passed along the South Coast of Australia previously. The details are given with Cook's usual precision, at p. 159 of the First Voyage; the storm began at N.N.W., veering to W., with a large swell rolling from westward. On the 28th December, 1769, it veered to S.W., and increased from a gale to a hurricane, with a prodigious sea. Nothing is said of the behaviour of the barometer, but Cook's concluding observations show the violent nature of the storm: he says, "it is very remarkable that in 35° S., and in the midst of summer, I met with a gale of wind which, for its strength and continuance, was such as I had scarcely ever been in before; and we were three weeks in getting 10 leagues to the westward. During the gale we were happily at a considerable distance from the land, otherwise it is highly probable that we should never have returned to relate our adventures."

Captain Brown, of the brig *Emma*, has favoured me with his Journal of the voyage of the ship *Strathisla*, from Auckland, New Zealand, to London, in 1846, which enables me to trace this class of Cyclones far to the eastward of New Zealand. On the 23rd October the ship was hove-to, in a heavy gale from the North. On the 24th the wind shifted from N. to N.W.; from N.W. to W.; and from W. to S.W., which *hove the sea up in sugar-loaves*, and caused the ship to strain and labour much. Position 52° S. and 131° W.

This exactly describes the passage to the eastward of the northern portion of a Cyclone, with the pyramidal seas caused by the interference of the superimposed ridges at the central area.

Colonel Reid has shown that the gales in the neighbourhood of Cape Horn are probably produced by Cyclones passing to the eastward, so that there seems reason to believe that Cyclones pass from South Australia across the whole breadth of the South Pacific Ocean. In the voyage of Captain Weddell towards the South Pole (1822-3) occur several instances of gales shifting "from N.N.W. to S.W., and leaving a most distressing sea." When off James Island, New South Shetland, in 62° 52′ S. and 62° 30′ W., they experienced a severe hurricane, in October 1823. On the 26th October, A.M., wind shifted to North and weather became foggy, and soon after freshened from N.W. to such a degree as to oblige them to take in the foretopsail, and it was with difficulty they obtained an offing. On the 27th a great westerly swell; at midnight a gale at West. At 8 A.M. of the 28th the wind shifted suddenly into the S.W., and increased to a complete hurricane. Sail reduced to the size of a mere napkin, and cold intense. In consequence of the wind having shifted, the sea ranged on board on the lee-side, sweeping everything before it. The gale continued with great violence from the S.W. by S. On the morning of the 29th it moderated, and afterwards continued at S.S.W. Lay-to; many ice-islands rolling with the noise of an earthquake.

This Cyclone was clearly moving towards the E.S.E. When we see a vessel near a dangerous and desolate coast, surrounded by huge icebergs, and on the point of being involved in a furious hurricane, we cannot fail to be forcibly reminded of the value of a science which would enable her

anxious commander to *foresee*, and therefore to *prepare for and profit by* a series of successive shifts of wind, which are certain to occur during the next few days in a fixed order. Among Captain Weddell's observations on the winds and weather in the neighbourhood of Cape Horn, the following quite establishes both the Cyclonic nature of the prevailing Gales, and their eastward progressive motion. At pp. 237-8, he says, "a North gale comes on gradually, draws from the N.W., and brings rain, and presently shifts into the S.W., without ceasing to blow, and continues from that point 12 or 15 hours. A vessel may anchor anywhere for shelter from a S.W. wind without fear of its shifting to the northward; but the contrary must be guarded against as the wind shifts from N.W. to S.W., continuing to blow with great violence." Captain Weddell states that Bridgeman's Island, in 62° 4′ S. and 56° 57′ W., is volcanic, having seen it emit smoke while passing it within 200 yards in 1821.

As little is known of the Cyclonology of this part of the track of the Australasian homeward-bound traders, I shall give here an extract from the log of the barque *Berwick Castle*, from Dundee to Valparaiso, from which it appears that she was carried around and in front of the centre of a Cyclone to the North of the Falkland Islands, in 1848, the Cyclone moving to the south-eastward:—

After several days of light winds, the barque was in 42° 22′ S. and 50° 33′ W., at noon of the 21st February, 1848.

"22nd Feb.—Midnight, increasing breeze W.N.W.; rain, thunder and lightning. 8 A.M., double-reefed topsails; strong wind and heavy sea. Noon 44° 9′ S., 52° 6′ W.

23rd.—Strong gale W.N.W., heavy showers of hail, hove-to. Noon 44° 47′ S., 51° 36′ W.

24th.—Strong gale W.N.W., hard squalls. 6 A.M., more moderate. Noon 45° 10′ S., 51° 5′ W.

25th.—Variable, clear, out reefs. 6 P.M., calm. 10 P.M. increasing breeze, N.E. Noon, 45° 53′ S., 50° 31′ W.

26th—Fresh breeze N.E. and hazy. 10 P.M., wind E.N.E. 6 A.M., strong East wind and rain, in studding sails, &c. 10 A.M., E.S.E. Noon, S.E. 47° 35′ S., 53° 45′ W.

27th.—Strong S.E. gale, and heavy rain. 6 P.M., wind S.S.E. 10 P.M., S., hove-to under main-topsail. Midnight, more moderate. Noon, light S.S.W. wind, out reefs. 47° 7′ S. 54° 33′ W.

Afterwards a heavy swell from S.W."

By marking off on a chart the successive positions of the ship, it will be seen to have actually described a track, nearly semicircular, to the eastward, while the successive shifts of wind from W.N.W. to S.S.W. show that it was carried through three-quarters of a circle relative to the moving centre of the Cyclone. This relative track may be conceived by supposing, in Fig. V.,* the *Berwick Castle* to start from D, and to be carried round the right-hand portion of the circumference until it reaches a point near to C[1].

In nearly the same position, in March 1849, the *Berwick Castle* met a Cyclone in which the successive shifts of wind were N.E., E.N.E., E. by S., with a lowering barometer and rain; S.E. and S.S.E., a heavy gale and a heavy cross sea running from South; W. by S. with a heavy cross sea from S.W. Hove-to. W.S.W. and S.W. gales, squalls, and showers of hailstones. Eight days afterwards sighted the Falkland Islands. The centre passes to the eastward, and North of the ship.

* See "Australasian Cyclonology."

In sailing from Australia towards Cape Horn, mariners have frequently observed a sudden and considerable barometrical depression, without experiencing the usual gales of which such a fall is considered a certain prognostication. A detailed instance of this is given in a recent number of the Nautical Magazine, and I have met with another well-marked instance in the excellent Journal of Captain Harmsworth, of the barque *Derwent*. The following is suggested as a probable explanation of this apparent anomaly. Considering, for the nonce, a Cyclone to be a conical spout piercing the atmosphere vertically, as in Fig. I., it may be easily conceived that one of the Port Essington class may have become considerably exhausted by the time that it has reached the meridian of New Zealand; and that, in passing on towards Cape Horn, the huge eddy may cease to reach down to the surface of the earth, and may therefore cease to create a whirlwind on the ocean—although the barometer will not fail to recognise the sudden removal of the superincumbent air, as the otherwise unnoticed eddy passes over the ship. This is, in fact, no more than an extension of Mr. Piddington's notion of the lifting-up of a Cyclone, and is analogous to the drawing-up of an exhausted waterspout. In such cases as these the sailors, who have been called to make all snug, may grumble at the Captain's "barometer-gales," but the faithful instrument never gives a false alarm; the enemy was in reality hovering above the vessel, though his arm was not long enough to reach her.

An inquiry into the nature of the Gales of the Coasts of South Australia, Victoria, New South Wales, and Van Diemen's Land would be incomplete without such a notice of the peculiar *hot winds* that proceed from the interior of Australia, as may put the seaman on his guard against their

effects. These winds occur three or four times every summer, and continue from 24 to 36 hours. They blow from the north-westward, causing the thermometer to rise to upwards of 100° F., and are succeeded almost instantaneously by a violent southerly wind, which lowers the temperature so rapidly that the thermometer has been known to fall 25° in 20 minutes. Their arid parching nature not only injures the fruit and crops, but leaves the timber and herbage an easy prey to the "bush fires" which prevail, whether by accident or design, during the summer months.

The most fearful and destructive visitation of this kind occurred on Thursday, the 6th February, 1851—a day ever since distinguished in the Australian calendar as "Black Thursday." The loss of life was serious, but the loss of property was immense and extensive. The fires swept over a tract of country of upwards of 600 miles in length. A few abridged extracts from the newspapers of the period will show the nature of this fiery tempest, both on land and at sea.

The most striking features of the Cape Otway country are, the immense size and crowdedness of the timber trees, and the density and luxuriant growth of the fern scrub. This *scrub*, in ordinary circumstances, burns slowly; while a fire may continue for weeks in some parts of the *timber* without extending far. Such a fire was, in fact, known to have existed for a month past in the mountain ranges, but no alarm was felt in consequence. The hot blast of Thursday, however, playing upon the kindled nucleus, caused the fire to spread with such fury that the dense scrub was swept away like stubble, and the flames were carried along the tops of the trees, leaving the massive trunks ignited wherever any decayed, hollow, or dead branch gave the fire a nestling place.

The body of flames came down with such rapidity from the mountain ranges towards the coast, that those who left their huts for a few hours found all swept away on their return.

At Portland there was a furious hot-wind from N.N.W., and thermometer in the sun 116°. After noticing the destruction of much property on shore, we are told that at sea the weather was even more fearful. Captain Reynolds reports that, on Thursday, when twenty miles from the Laurence Islands (in Portland Bay), the heat was so intense that every person on board was struck almost powerless. A sort of whirlwind in the afternoon struck the vessel, and carried the topsail, lowered down on the cap, clean out of the bolt-rope; and had he not been prepared for the shock, the vessel, he has no doubt, would have been capsized. Flakes of fire were at the time flying thick all around the vessel, from the shore, in the direction of Portland.

The *Portland Herald* states that the Master of the *Henry Edward* (Mr. T. Maybee), on arriving at the Laurence Island, on Thursday, experienced a hurricane of hot winds, which parted the vessel from her cables, riding at 100 fathoms on each cable. The fire flew above the vessel in large flakes, which burnt the running gear, so that the sails fell down on deck, and the great difficulty of the master and crew was to prevent the sails taking fire. The lights below were lit from 11 A.M. to 2 P.M., and burnt as blue as possible. After this the gale ceased, and blew from the W.S.W. a moderate breeze.

The Geelong and Melbourne papers are filled with accounts of the wide-spread destruction of flocks of sheep, horses, crops, buildings, &c.

About 4 P.M. the black, roaring tempest had crossed the Straits to Van Diemen's Land. The ship *Tasman*, on the

evening of Thursday, was off Cape Pillar, and was covered with dust and burnt wood. The land was invisible, and the ship driven so far to the S.E. that she only sighted land again on Saturday.

The following notices occur of the passage of the tempest across the Straits :—

On 6th February a captain of a vessel, about sixty miles from Port Fairy, saw an ominous cloud on the horizon, and immediately took in sail. He had scarcely done so when the vessel was laid on her beam-ends, and the atmosphere became oppressively hot. Hundreds of birds of all descriptions, driven by fire and wind across the sea, tried to alight on the masts."

Extract from the log of the *Velocity*, M'Veigh, from Sydney : —

" Thursday, Feb. 6.—Noon, light breeze from N.N.E., inclined to be hazy. 12h. 10m. rapid scud flying from N.W., took in all studding-sails, reefed topsails and foresail. 2 P.M. wind roaring terrifically over the ship, a great quantity of sand and leaves falling on board ; ship at this time becalmed. 3 P.M. the sky had the appearance of livid fire ; the hands on deck looked more like demons than men ; quantities of burnt bark, leaves, and birds falling on deck. $3\frac{1}{2}$ P.M. squalls. $4\frac{1}{2}$ P.M. in total darkness, such as I never experienced before ; sun this evening set at seven, heat excessive. At 5 P.M. electric lights all over the ship, heavy squalls with lightning and thunder, which continued until 9h. 45m., ship under bare poles. The wind then came in squalls from W.S.W. At 5 P.M. barometer 29°. Wilson's Promontory bearing about W. by N., distant 18 miles."

The ship Diana, 527 tons, Captain Fletcher, from Manila to Sydney, was then off Kent's Group, to the eastward of Bass's Straits. Captain Fletcher states :—

"At noon, Feb. 6, we were in 39° 3′ S. and 147° 26′ E. A clear sky overhead, but a strong haze all round. At 1 P.M. the haze increased in thickness from E.N.E. by N. to N.W. extending up to the sun and preventing it from casting a shadow. At 1·30 the breeze freshened, bringing more haze with it; which increased so fast that at 2 P.M. the sun was invisible, and at 3 P.M. it was difficult to read in the cuddy. Small dry, dark, burnt-looking leaves were borne along by the breeze, and a considerable quantity of dragon-flies. At 3 P.M. the breeze was light, the haze increasing in thickness in the W.S.W. and assuming a peculiar dark-looking colour. At 3·15 the haze began to disperse a little in the S.W., the breeze shifting to N.W., increasing, and bringing hot puffs of wind with it: sail was at once reduced, so as to prepare the ship for the worst. At 3·30 the haze thickened all round, increasing so fast that at 4 P.M. it was as dark as it ever is at night. The sun, however, made one more attempt to exert its power by tinging the haze red for about a quarter of an hour soon after 3·30 P.M. At 4·15 the whole heavens were darker than ever remembered by any one on board. It was literally impossible to see even a mast while standing within half a yard of it, much less any of the upper spars; the boom, painted white, could not even be seen—the darkness was complete. The breeze from 3·14 to 4 was variable between N.W. & W., bringing with it a fine black dust very similar to powdered charcoal, in addition to hot wind, the hottest of which came from W. in gusts; in the face of which the thermometer rose to 98°, and no doubt would have risen much higher, had the gusts lasted long enough to affect the mercury fully before the colder portion of the breeze blew upon it again. At 4·15 the breeze settled down at N.N.W. increasing fast, so that at 4·30 it blew a fresh gale, continuing so until 5·45, when it began to lull, and at

6·30 had fallen to a moderate breeze. During this period, viz., from about 4·30 to 5, we had an exhibition of the phosphoric lights, illuminating the points of the three topgallant yards, the gaff, and fore-topmast studding-sail boom-ends, and the royal-yard lifts, both to leeward as well as windward, these latter being quite covered with it.

This gale brought with it a great quantity of the fine dust, preventing any one from looking to windward.

From 7h. 30m. P.M. it blew hard again in squalls, the air becoming cooler during that time. At 8h. 30m., the breeze since eight having been light and variable from N.W. to S.W., a most severe gust came from the W., lasting about a minute, when it settled down into a strong breeze from that quarter, bringing more hot wind; this breeze, however, only lasted till 8h. 45m., when another severe gust came from the South, settling down into a strong breeze from S.W., phosphoric lights again appearing on the royal-yard points, though not to the same extent as previously. The S.W. breeze continued steady until 2 A.M. of the 7th, when it veered to the westward—and the darkness then, for the first time, began to show symptoms of decreasing; so that at 2h. 30m. A.M. the masts and yards could just be distinguished, at 3 the horizon pretty plainly, and at daylight the sky merely presented a very hazy aspect: the sun, however, was not at all visible until 6 A.M., when it appeared as a red ball, and at 7h. 30m. A.M. again cast a shadow."

Captain Fletcher has given thirty-six readings of the barometer from noon of the 5th to noon of the 7th; I have projected these in a curve in Fig. VII.* The mercury falls from 29·66 at noon of the 5th to its minimum 29·31 between 2 and 3 P.M. of the 6th, and rises to 29·645 at noon of the

* See "Australasian Cyclonology."

7th. The shower of burnt leaves, &c. reached New Zealand (Otago), on the morning of the 7th February.

In Van Diemen's Land, on the night of the 6th, a violent hurricane accompanied the hot wind. At Hamilton, the crashing and uprooting of forest trees was sublime—fences, palings, &c. were whirled in mid-air. The heat was intense. The whole of the "new country" adjacent to the Repulse and Gordon Rivers was in flames.

At New Norfolk, property worth £1,000 was destroyed. A verandah was blown some yards into the air, and alighted on the house.

Two seamen of the *Alcmène*, French corvette, were drowned at Hobart Town by the capsizing of a boat. The hurricane at Hobart Town was accompanied by vivid flashes of lightning, but no thunder nor rain.

In a hot wind the thermometer will be a much more sensitive index than the barometer. Though the hot wind was the proximate cause of the atmospheric disturbance on the 6th February, yet the resulting phenomena, both on land and at sea, were undoubtedly greatly influenced by the immense area in a state of intense conflagration. The barometrical and thermometrical fluctuations were, therefore, the results of the combined action of the bush-fires and the hot wind. The effect on the barometer of a hot wind alone I have shown by a curve of eighteen readings during fifteen hours, at Sydney on the 23rd and 24th of March, 1849. (Fig. VII.)*

These comparatively inconsiderable barometric depressions tend to show that the atmospheric disturbance produced by a hot wind is not a Cyclone.

* See "Australasian Cyclonology."

XXIII.—*Remarks on a Collection of Geological Specimens made in Tasmania.* *By* Thomas Moore, *Esq.* [*Read May 11th,* 1853.]

Upon the occasion of a former visit to Van Diemen's Land some few years ago, and during various excursions then taken through the country, I made a large collection of Geological Specimens; and returning afterwards to England, I presented a selection, of what I considered the most valuable portions of them, to Mr. Thomas Winsmore Wilson, of Barnsley, Yorkshire, a practical geologist of great repute, and this gentleman kindly furnished me with a minute description of each specimen.

Most of Mr. Wilson's remarks are so well worthy of notice here, and particularly so as showing forth the mineral wealth of this Island, that I have much pleasure in the opportunity now afforded me of laying them before the Members of this Society, for the benefit of the community at large.

I wish particularly to draw attention to the fact that very rich tin ore was found among the specimens which I presented to Mr. Wilson.

The *Argus*, Melbourne newspaper, of April 5th, has an interesting letter addressed to Mr. Cropper of Melbourne, by Mr. Stephen, Vice-President of the Geological Society in that city, announcing the discovery of the same valuable mineral in the vicinity of the Ovens diggings, Victoria.

The following is an extract from Mr. Wilson's letter addressed to me :—

Barnsley, 7th September, 1850.

Herewith you will receive a list of the fossils, minerals, and metals you were so kind to send me, and for which you will please accept my most sincere thanks.

They are a valuable addition to my Museum, and I feel proud of them.

I now beg leave to call your attention to the classification I have sent you, and if you have a duplicate set, I think you may follow it; indeed I am sure you may, as regards the mineral strata and metallic rocks.

I wish you to notice description No. 5, Magnetic Iron Ore—it is an exceedingly valuable metal, if it can be obtained in quantities; and also No. 6, Gypsum, from which is obtained the plaster of Paris, so largely used in the arts and sciences, and also in agriculture.

Gypsum belongs to the new red sandstone, and is often associated with rock salt.

No. 8, Asbestus Mountains.—This is a valuable formation, what mineralogists call steatite. It is employed in the manufacture of the finest porcelain. Sometimes this mineral is accompanied with native silver; this is the case with the specimen you have sent me.

No. 9, Roofing Slate from Port Phillip.—This is also very valuable, if you could find a good quarry.

Nos. 13, 14, 15.—These zinc ores are useful metals, and are found accompanying lead, iron, and copper.

No. 21, Sand Stone.—This rock should be viewed not only as valuable building stone, but as a member of the coal-measures.

No. 25, Tin Stone.—As regards the tin-stone, I need not remind you of its value. If you can open a mine as rich in tin as this specimen, you would be very fortunate in the mining department.

Nos. 27, 28 and 29 embrace the Mountain Limestone, which form the great depositary of the lead, copper, and many other metals in this country, and every other country on the face of the earth. My reason for calling your attention to the minerals and metals a second time is to point out to you their particular merits. They constitute the most useful and richest strata of the globe; and believing you brought the specimens to this country more on account of their utility than for any other cause, I thought it right to be particular in pointing out the most useful, rather than the most curious.

A List of Fossils, Minerals, and Metals from Van Diemen's Land, in Mr. Thomas Winsmore Wilson's Museum; received through the favour of Mr. Thomas Moore, of Bolton, in Lancashire:—

No. 1, Pebbles found on the surface at New Norfolk.

These pebbles have been detached from the primitive rocks, and abraded by the flux and reflux of the water, forming the shingle or gravel of the district. They consist of jasper, agates, carnelians, and quartz.

No. 2, Fragments of Fossil Wood from Evandale,* near Macquarie Plains.

These are very interesting specimens, showing us the powerful tendency of the absorbing properties of wood for mineral matter. These specimens are now principally silex, but will not scratch glass nor give fire with steel, and hence I shall denominate them opal.

They are capable of receiving a high polish, and remind you of those striped agates and flints which are used for brooches and the lids of snuff-boxes.

* Some locality between New Norfolk and Hamilton doubtless,—under a wrong name.

Query.—Have the so-called striped agates and flints originally been woody matter, and by the absorption of water charged with molecules of mineral matter, say silex, become crystallized minerals?

No. 3—the Fossil Tree at Macquarie Plains—is a very interesting fact, and opens a wide field for geological and mineralogical speculation. The specimens you have sent me show no appearance of the action of fire nor vitrification, or at least no more than opalized wood does; and when you crumble the fibres of the tree with your fingers, which you easily can do, it is reduced to a powder of silex—and when viewed through a magnifying-glass it exhibits, when only half reduced to a powder, rather a high state of crystallization, in a needle-shape form, which is nearly transparent.

The darker part of the graining of the wood, which I consider to have been the resinous part, is much harder, and requires a light hammer to break it; and when broken into small fragments, it resembles in appearance gum-arabic. It appears to me that this fossil tree has never come into direct contact with the real fire of the volcano, but has been overwhelmed or covered by what the volcano has discharged; and at the same time been placed in a favourable position for absorbing moisture, mixed with mineral matter, and warmth through the cracks or fissures of the strata in the neighbourhood—and so gradually becoming mineralized and crystallized, at the same time preserving the ramification of the structure of the tree, almost as perfect as when a living tree.

The rock in which it has been imbedded resembles much in appearance the structure and colour of porcelain jasper, but does not, like that mineral, scratch glass; but as regards hardness under the knife, they are very much the same, and

when breathed upon emit that odour common to all argillaceous substances, and I have no doubt of its being of the same family of minerals.

No. 4, found on the surface at St. Paul's Plains.

This is Lievrite or Yenite imbedded in quartz : it is rather a scarce mineral, and is found in Elba, at Rio, La Marina, and Cape Caluute. It is said to have been met with in Siberia, but has certainly been discovered in Brodgang Mine, Fossum, Norway.

No. 5, This specimen is a small one, and not labelled.

It is magnetic iron ore, and nearly attracts the needle as powerfully as native loadstone. It is a valuable little specimen.

No. 6, Gypsum from near New Norfolk.

This is gypsum, as you supposed. It is granular anhydrous gypsum,—scaly anhydrite.

No. 7, Found on St. Paul's Plains.

It is Augite, Pyroxene, composed of silex, lime, protoxide of iron, protoxide of manganese and alumine. It is met with in the production of volcanos, and in all volcanic countries.

No. 8, Asbestus, from the Asbestus Mountains, near George Town.

This asbestus is imbedded in a very valuable mineral called steatite or soap-stone, and is a very interesting specimen.

The steatite contains a small vein of silver, which by the way is not uncommon in this mineral, and is met with in most of the primitive mountains.

It is used for the manufacture of the finest earthenware.

No. 9, Slate from Port Phillip, Australia.

This slate is rather soft and adheres to the tongue, and is smooth to the touch.

It is generally called roofing slate.

No. 10, Found on the surface of St. Paul's Plains.

It is compact, granular, primitive limestone.

No. 11, From St. Mary's Pass, near Falmouth, East Coast.

This is fine grained granite or gneiss with purple garnets, and, I think, with scales of *native gold*.

It is a most singular compound mineral.

No. 12, From a bed of Rock at St. Paul's Plains.

This is massive hornblende rock, what some mineralogists would designate basaltic hornblende.

No. 13, From Hunterston, on the Shannon, near Bothwell.

This is blende, the sulphuret of zinc. It occurs in primitive and secondary rocks, and is found principally with sulphuret of lead, iron, and copper, and is common in most veins of those substances everywhere.

No. 14, From the summit of Mount Wellington, near Hobart Town.

A rare specimen of siliceous oxide of zinc. It is highly magnetic, and is found in lead and copper mines.

No. 15, From the Cataract Hill, Launceston.

Is carbonate of zinc, calamine.

No. 16, From Lake St. Clair.

It is grey sandstone coated with calamine.

No. 17, From elevated ground in the vicinity of an extinct volcano in Macquarie Plains.

This is vesicular lava; some of the vesicles are empty, others are filled up with oxide of zinc or calamine.

No. 18, Volcanic Rock, in which the fossil pine tree at Macquarie Plains is imbedded.

This specimen is also vesicular lava, and coated over with

calamine. The interior is not much changed, and is spotted with small patches of a white, shining, metallic substance.

This mineral is in colour a kind of slate or blue green, and when cut with a knife gives out an odour something like arsenic.

No. 19, Volcanic Rock, in which the pine tree is imbedded.

I think this specimen is zinc and copper, imbedded in dove-coloured mineral.

No. 20, Rock cropping out near the summit of a hill at Macquarie Plains.

The whole of this specimen is calamine.

No. 21, Sandstone from a quarry near Hobart Town.

Sandstone of this description is always found overlaying the coal formations, and I have no doubt coal will be found in the neighbourhood. It is also a good building stone.

No. 22, Coal from Schouten Island, East Coast.

This is anthracite coal. It is found at Flocton, near Barnsley, Yorkshire; at Walsall, Staffordshire; also in Wales, Scotland, and Ireland.

No. 23, From the banks of the River Derwent, near Hobart Town.

This is the brown oxide of iron-stone; the largest piece is covered with impressions of vegetable matter, similar to the iron-stone which overlays our coal measures.

No. 24, Nodule of Iron-stone, found in deep beds of gravel at New Norfolk.

This is brown hæmatite,—iron ore. It is found in this country and Scotland in veins in sandstone; also in Cumberland, Cornwall, and the Shetland Isles. It affords good iron and steel for needles.

This specimen assumes what is called stalactiticform. It

sometimes assumes the form of the madrepore and fungus and other shapes.

No. 25, On elevated land below the tier, St. Paul's Plains.

This is *tinstone*, or the oxide of tin, and a very fine specimen, and is evidently in a clay slate of the primitive mountains, and the same as in Cornwall, being the killas of the miner. The principal part of the numerous copper and tin mines of that county are in these strata.

No. 26, Fossil Shells from a bed of rock at Hunterston, on the Shannon River, near Bothwell.

This is a conglomerate magnesian limestone. The names of the shells, which can just be made out, are the *Productus gigantea* and *Productus antiquatus*.

No. 27, Fossil Shells from a lime quarry near New Norfolk.

This specimen is mountain limestone, and the shell is of the family of the *Trigonotreta speciosa*.

No. 28, Fossil Shell from a quarry near Hobart Town.

This shell is a very fine specimen of the *pecten* family.

The mineral in which it is imbedded is mountain limestone, as before.

No. 29, Specimen from the Limestone bed below the White Rock Tier, St. Paul's Plains, containing large quantities of fossil shells.

This is also mountain limestone, a formation prolific in shells.

No. 30, Fossil Rock found in great abundance near Swan Port, East Coast.

This is a very interesting specimen of the mountain limestone passing into chert, proving the transition of limestone into silex.

The shells are not definable, as they are too much broken.

No. 31, From St. Paul's Plains.

This specimen is limestone converted into chert and chalcedony; and would, if cut and polished, make a nice gem.

The shells are of the family of *Trigonotreta.*

No. 32, From a bed of Rock at the foot of Cummins' Hill, New Norfolk.

This is magnesian limestone rock.

No. 33, From Hunterston, near Bothwell.

These specimens are magnesian limestone, and all marked with impressions of the skin of some reptile or crustacean.

We have the same markings upon the magnesian limestone near Sunderland in this country, and no doubt the same formation.

No. 34, Scoriæ from the vicinity of the extinct volcanic crater at Macquarie Plains.

This is a beautiful specimen of scoriæ, and when viewed through a magnifying-glass has a gem-like appearance.

No. 35, Minute fibres resembling asbestus, collected from the outer coating of the fossil pine tree at Macquarie Plains.

Had this been presented to me without its history, I should have concluded it was asbestus. Mineralogists have what they call ligniform asbestus very much resembling this specimen, and they say it breaks into long masses in the direction of the fibres, and also separates with ease. This description answers to the outer coating of the fossil pine tree which you have sent me.

Query.—Has heat anything to do as an agent in changing wood into asbestus?

All the localities where it is found would lead to this conjecture, for it is generally found in primitive rocks in all countries. This specimen is nearly become all silex, and when seen through a magnifying-glass it exhibits long, slender, transparent crystals.

No. 36, Not labelled.

It is quartz hornblende and felspar coated over with calamine; and what makes this specimen interesting is a small streak of sapphire in the centre.

Here Mr. Wilson's remarks conclude, and if I could have produced duplicates of the various specimens which he has so ably described, it would have been satisfactory; but the fact is, I had presented the residue of my collection to the Manchester Geological Museum before receiving the notes I have just had the honour of reading.

Your worthy Secretary, Dr. Milligan, and others here who take an interest in geological pursuits, will at once, however, recognize the localities and nature of many of the specimens described; and of those which are not marked I have so vivid a recollection, that it will be in my power to point out the positions in which the principal portion of them were found.

You will perceive that amongst the 36 specimens mentioned, there are some valuable minerals; and if Mr. Wilson has reason to be proud of the collection, how much more ought you to be proud of the country which produces them!

No mention has been made here of the coal measures of the island, which have, however, engaged my attention, and may on some future opportunity form the subject of a paper to the Society.

XXIV.—*Remarks on the Botany of the Antarctic Voyages. Flora of New Zealand,* Part I., *of* J. D. Hooker, M.D.R.N., F.R.S., &c. &c. *By* Ronald C. Gunn, Esq., F.L.S. [*Read 8th March,* 1853.]

The first part of the Flora of New Zealand, by Dr. J. D. Hooker, has recently arrived in the Colony, and as few persons are likely to possess copies of the work, it may be interesting to many to compare the Flora of those islands with that of Tasmania, lying, as they do, in the same latitude and not more than twenty degrees of longitude apart.

It may be as well to observe that the Flora of New Zealand forms the second part of the Botany of the Antarctic voyages of H. M. ships *Erebus* and *Terror*, and that as the Flora of Tasmania is to form the third and concluding portion, I will adopt with the present work the same course which I took with the "Flora Antarctica," (*vide* Tasmanian Journal, vol. iii. p. 66), and present in a tabular form the genera and species of the New Zealand Flora, so that its peculiarities may be seen at a glance.

The natural Orders and Genera *not* represented in Tasmania are distinguished by an asterisk.

Natural Orders.	Genera.	Total Species in New Zealand	Species common to New Zealand & Tasmania.
Ranunculaceæ	Clematis	5	
	* Myosurus	1	
	Ranunculus	12	1
	* Caltha	1	
Magnoliaceæ	* Drimys	1	
	Cardamine	2	
	Nasturtium	1	1
Cruciferæ	Barbarea	1	1
	Lepidium	2	
	Viola	2	
Violarieæ	Hymenanthera	1	
	* Melicytus	4	
Droseraceæ	Drosera	6	5
Pittosporeæ	Pittosporum	10	

Natural Orders.	Genera.	Total Species in New Zealand.	Species common to New Zealand & Tasmania.
Caryophylleæ	Stellaria	4	1
	Arenaria	1	1
	Colobanthus	1	1
Elatineæ	Elatine	1	1
Lineæ	Linum	1	1
Malvaceæ	* Hibiscus	1	
	Plagianthus	2	
	* Hoheria	2	
* Tiliaceæ	Entelea	1	
Elæocarpeæ	Elæocarpus	2	
	Aristotelia	2	
* Olacineæ	* Pennantia	1	
Hypericineæ	Hypericum	2	2
Sapindaceæ	* Alectryon	1	
	Dodonæa	1	1
Meliaceæ	* Hartighsea	1	
Geraniaceæ	Geranium	4	4
	Pelargonium	1	1
Oxalideæ	Oxalis	2	2
Rutaceæ	*Melicope	2	
	Phebalium	1	
* Coriarieæ	* Coriaria	2	
Rhamneæ	Pomaderris	3	2
Stackhouseæ	Discaria	1	1
	Stackhousea	1	
* Anacardiaceæ	*Corynocarpus	1	
	* Clianthus	1	
Leguminosæ	* Carmichælia	5	
	* Edwardsia	1	
Rosaceæ	Rubus	1	
	Potentilla	1	1
	Acæna	3	1
	Geum	2	1
Onagrarieæ	* Fuchsia	2	
	Epilobium	14	4
Haloragieæ	Haloragis	4	3
	Myriophylum	2	2
	Callitriche	1	1
	Gunnera	2	
	*Metrosideros	9	
Myrtaceæ	* Myrtus	3	
	* Eugenia	1	
Curcurbitaceæ	Sicyos	1	1
* Passifloreæ	* Passiflora	1	
Portulaceæ	Claytonia	1	1
	Montia	1	1
Scleranthæ	Scleranthus	1	1
Crassolaceæ	Tillea	4	2
Ficoideæ	Mesembryanthe-mum	1	1
	Tetragonia	1	1
Escallonieæ	* Carpodetus	1	
	* Quintinia	2	
Cunoniaceæ	*Ackama	1	
	Weinmannia	2	
	TOTAL	162	48

From the preceding table the following results appear :—

Of the 36 natural orders published, 30 are found in Tasmania,—

Of 69 Genera..... 43

Of 162 Species 48

Although it would thus appear that most of the natural orders, 43 out of the 69 genera, and upwards of one-fourth of the total number of species published in this number, are found in Van Diemen's Land, nevertheless the principal and main features of the Flora of the two countries must be strikingly different, from the total want in New Zealand of the two characteristic Australian genera, *Eucalyptus* and *Acacia ;* most of the 48 species, common to the two colonies, are herbaceous, and do not, therefore, strike the eye in the forest and larger masses of vegetation.

Until the whole work is completed it will be impossible, however, to make a minute comparison of the Floras of the two countries ; but the table will show that the natural orders, *Dilleniaceæ* and *Polygaleæ* and *Tremandreæ*, are entirely absent from New Zealand, although very common all over Tasmania.

In *Leguminosæ* there are also only 7 species, whereas Tasmania possesses at least 80 to 100.

The work is beautifully executed, and every one who feels the slightest interest in the Botany of the Southern Hemisphere ought to possess it. When completed, we will enter more fully into a comparison of the Botany of New Zealand and that of Tasmania.

XXV.—*On the Introduction of Salmon into the Rivers of Tasmania.* [*Read 12th October*, 1854.]

Downing-street, 2nd June, 1853.

Sir,—I have to acknowledge the receipt of your Despatch No. 152, of 13th August last, with its enclosures, reporting the circumstances under which the measures adopted by the Land and Emigration Commissioners for sending out salmon and trout spawn from this country to Van Diemen's Land had failed of success.

The Commissioners to whom I referred those papers proceeded at once to place themselves in communication with Mr. Boccius on the subject; but in consequence of ill-health, that gentleman was for some length of time unable to attend to it. A copy of his Report is now enclosed, containing some explanations relative to the last experiment; from which it will be seen that he attributes its failure to causes of an accidental nature, the recurrence of which are not to be anticipated: the result has been, that I have authorized the Commissioners to take the proper steps for renewing the experiment, under the superintendence of Mr. Boccius; and it is intended to despatch the spawn-tub by a vessel leaving England early in October next.

I have to add that the probable expense is stated at about £300, which, as in the former instance, will be charged to the Land Fund.

I have the honor to be,

Sir,

Your most obedient Servant,

Newcastle.

Lieutenant-Governor

Sir W. Denison, &c.

Broadway, Hammersmith,
4th April, 1853.

Sir,—I have carefully read through the documents handed me for perusal from His Excellency Sir Wm. Denison, Governor of Van Diemen's Land, and of other parties, relative to the experiment of transmitting salmon spawn to that colony by order and desire of Earl Grey, Secretary of the Colonies in 1851.

As the arrangements for the purpose were left to my directions and instructions, I regret to read in those documents of the failure of the undertaking, over the cause of which I had no control, but experienced much vexation, as hereafter related. I am now, however, quite satisfied that salmon spawn can be conveyed in perfect safety alive to that colony for the desired purpose of propagation. I am much gratified to read that Sir W. Denison, even with this failure, wishes a second experiment to be undertaken; and for that purpose, His Grace the Duke of Newcastle is desirous to have my views and report as to the cause of such failure, and of the cost of a future trial.

The failure I attribute entirely to the following circumstances, which I trust will perfectly exonerate me from all carelessness or want of foresight towards carrying out to perfection the desired undertaking, after and upon my system of artificial spawning, breeding, and rearing of fish.

In referring to my Diary for 1851, I find that, on the 23rd of December, I was desired to call upon Messrs. Hall Brothers, Ship-brokers; who informed me that they had chartered the barque *Columbus,* Captain Daniel Smith, for Hobart Town direct, and that this vessel was positively to sail on the 12th January, 1852; therefore it would be abso-

lutely necessary that I should have all my arrangements for artificial spawning and breeding, &c., in order and on board by the 10th of that month. These I perfected, and left London on the 7th for Worcester, to procure the salmon spawn, which I succeeded in obtaining on the 9th; and upon my arrival in London on the 10th, with my stock of salmon eggs, I found that the *Columbus* had got very little of her cargo on board, and was not likely to start for some days later. It was during the period of delay I was enabled to collect some trout spawn, from some trout out of Mr. Samuel Gurner, junior's, stream in Carshalton, in Surrey, from whom I had obtained permission to place my salmon spawn in the stream, in order to keep it alive. The vessel was detained till the end of the month, when I completed the arrangements and placed the stock on board; but even then the *Columbus* did not leave the Dock Basin until the 3rd of February, and upon arriving in the Downs she was further detained a week by contrary winds; so that the salmon spawn was thirty-three days, and the trout thirteen days, advanced in embryo previous to leaving England, instead of being that length of time on the voyage. This it will be perceived is quite sufficient to account for and show the cause of the failure, and why the brood was bred out on this side of the equator; the spawn being so far advanced, life was perfected much earlier as the vessel neared the warmer latitudes.

In consequence, however, of the detention of the vessel in England, I had prepared for the brood coming into life on the voyage, and for which occurrence I gave written instructions to Captain Smith for their provision.

The usual period for incubation of salmon spawn is one hundred and of trout fifty days in a temperature of fifty-four degrees; so that the spawn sent out in the *Columbus* was already one-third hatched, or in life, previous to leaving our

coast. Had this delay not occurred, combined with the unfortunate detention under the equator, as Captain Smith states in his report—the weather throughout being intensely hot, with a vertical sun for many days—that was from the 1st to the 14th March,—I have not the slightest doubt that this first experiment would have been perfectly successful: and although it proved a failure, the experiment produced the positive fact, that salmon and trout were bred out on shipboard and at sea, which hitherto has not only never been achieved, but negatives all the theory of every former authority upon the habits of the Salmonidæ. I am, therefore, quite certain of success in a second undertaking. In this first experiment I had great difficulties to contend with, owing to many circumstances, but chiefly produced from the deception practised by the ship-brokers, in fixing a date for the vessel sailing, when they must have been cognizant that such could not take place; in fact, if I may use the expression, it perfectly dislocated the whole arrangement: and this prolonged detention I consider the only cause of the failure.

I trust, therefore, that this truthful statement will be sufficient to satisfy His Grace the Duke of Newcastle that the system I have advanced with such general success can be put into practical operation for the requirements of the colony.

In reference to Captain Daniel Smith, when I placed the spawn in his charge, on the 31st January, I felt quite assured that he would give the strictest attention to it, and do all in his power to carry out the experiment. He is, in my opinion, a careful, upright and industrious man, and deserves every praise and recommendation for his close attention to his instructions.

I have also perused with great care and interest the able and excellent report of Mr. J. L. Burnett, assisted by Dr. Milligan, of Hobart Town, to His Excellency the Governor,

offering their opinion for the future success of a second trial, and which I will reply to seriatim. It is also with unfeigned pleasure I read that so much interest had been created in the colony, from the belief that henceforth salmon can be transmitted to stock the rivers of those regions, and form a grand acquisition for food and mercantile speculation.

In Mr. J. L. Burnett's report, at the desire of Sir William Denison, upon the introduction of salmon and trout into Van Diemen's Land, that gentleman has given a very correct statement of my arrangements on board the *Columbus*, and of the written instructions handed to Captain Smith.

Now, as regards the cause of the failure of the experiment, I believe I have gone so fully into the subject in the foregoing remarks, that it will not be necessary for me again to repeat them in detail.

But upon the subject of the change of the quality of the water, I must entirely differ with that gentleman, Mr. J. L. Burnett, and offer a few words in explanation, as I am convinced, from the practical knowledge and experience I have obtained of the water sent out, that from its own properties it could not go over to putrescence; but owing to many of the eggs of the salmon and trout becoming addled, and which remained for some time in a state of *adipocere*—then decomposition from that state taking place—as the vessel remained under the line, numbers of the brood, if not all, ceased to exist in consequence of the great heat; and thus putrescence was produced—and not only fetidness, but also the thick, slimy state of the water in the spawn-tub, as described by Captain Smith. It was therefore decomposition of animal matter, and not putrescence of the water, in which previously no animal or vegetable matter had existed.

The water sent out was taken from the purest source in

England, and has been proved so to be by men of first-rate science before a committee of the House of Commons when deliberating on the water question for the supply of London; and personally I have tested its purity. I am therefore convinced that by the time the vessel had left the equator, and had reached the cooler latitudes, the putrescence was completely washed out of the spawn-tub by the regulated supply of new water taken from the store tanks to replenish as previously, and which retained its purity and soundness to Van Diemen's Land.

As regards the water in the spawn-tub appearing strongly to be impregnated with oxide of iron, I must say I have strong reasons to believe to the contrary; and I have much to regret that Mr. J. L. Burnett and Dr. Milligan did not test the residuum, as the water sent out to replenish the spawn-tub was taken from a spring of 55 degrees temperature, rising from a depth of several hundred feet from the surface of the earth, and flowing out of the chalk hills of Surrey; consequently little impurity could exist, save carbonic acid and lime slightly in excess, which would only tend to keep the water in a purer state.

I further conceive that the discoloration of the stones and gravel in the spawn-tub must have been produced by carbonate of lime of the water, through the evaporation caused by the great heat of the tropics.

Being in doubt, therefore, on the subject, I exceedingly regret that these intelligent gentlemen overlooked this interesting test, or the examination of the tanks in which the store water had been conveyed, more especially as the tanks had been filled with Thames water many weeks previous to the refilling for the voyage, in order to season them, during which time no oxide had formed or oozed through the var-

nish with which they were covered inside. I have further, many proofs of the insulating properties of the varnish for the purpose.

I have carefully read Mr. J. L. Burnett's report, giving his views as to the defective state of the plans adopted by me. To the

1st. I must beg to remark, that never having crossed the equator, I could only make strict enquiries of parties who had for information as regarded the heat against which I had to contend, and which was the only difficulty I had to fear in transmitting the embryo fish. I learned from Captain Smith and many other parties, I might calculate upon the temperature of the atmosphere between decks at from 85 to 90 degrees under the line. Not contented with nor trusting to my own ideas of being able to keep the water at a lower temperature in the spawn-tub than that of the surrounding atmosphere, I applied to Professor Owen, our great philosopher in natural history, as well as to other scientific gentlemen. The former gentleman also thought that ice would be of service placed in the spawn-tub, to keep the temperature of the water low; but upon discussing the merits and consequences of ice to the spawn and brood, and also explaining my views, he agreed with me that my plan of evaporation, produced from the surface of the water by a supply of new water to the bottom of the spawn-tub, and arranged as I had determined upon, was likely to prove the best method.

2nd. I perfectly agree with Mr. J. L. Burnett, that if arrangements could have been made to have the spawn-tub safely housed on deck, a far greater chance would have been given to the spawn, in consequence of the greater circulation of air over the surface of the water; and I further

agree that two spawn-tubs would have been advisable; namely, one for the breeding and the other for the brood, whereby a greater scope would be obtained for the brood, and a greater facility for the removing of any that might perchance die.

3rd. The quantity of spawn was not particularly in excess, if at all, as I have kept double the quantity of brood alive for many months perfectly healthy in less space than one-half of the spawn-tub, merely delivering to them a plentiful supply of pure water; by which arrangement they remained stunted in growth, until I turned them into water with a regular supply of food.

4th. The *Columbus* made a protracted voyage of 136 days' duration to Hobart Town; so that, had the brood arrived safe, it being then late in the season, the winter floods might have caused some mischief to them—but not to the extent believed, as it is not the brood that the fresh or new water affects so extensively in the fisheries, but the spawn beds, from the earthy deposits brought down by the floods. The period of the year best suited for the transmission of the salmon spawn from England to Van Diemen's Land is October, when, from the usual run of a sailing vessel, it might be expected that it or the brood would arrive out in the summer months of those regions. An arrangement to that effect was entertained in 1851, at that period of the year, but from circumstances became deferred, and the experiment was not carried out until January 1852, as previously detailed. As regards Mr. J. L. Burnett's views of sending out smolts, I fear that they would meet with the same fate, under the equator, as those bred out on board the *Columbus*, and from the same cause, viz., the great heat of the tropics affecting decomposition of the water so

extremely rapidly, or chemically separating, by evaporation, those two gases, which combined form water, and from which cause the fish became suffocated.

5th. I do not doubt that the white salmon, so termed by Mr. J. L. Burnett, might have been conveyed to Van Diemen's Land from the Chinese waters alive, but those fish had not to pass the tropics, therefore might be conveyed safely from a hot climate to a cooler one, and subject to no prostration from excessive heat.

6th. Upon the view taken I think all the points have been examined; and, for my part, I beg to offer my humble thanks to His Excellency Sir William Denison for the kind manner in which he has viewed the experiment; also for his further recommendation to have a second trial. To Mr. J. L. Burnett I have to offer my grateful acknowledgments for the interest that he has taken in the subject, and for his very lucid report thereon.

As regards the cost of a second experiment, that would depend greatly upon the arrangements, although, I believe, if economically undertaken, as far as I should have to execute, it would not exceed £105, and a further £105 for my professional services and attendance. The cost would not include the charges of freight and attendance, &c., on shipboard, and of which I can form no estimate myself, not being connected in trading affairs. I feel, however, the necessity that every economy should be effected in such an undertaking, although I consider the value of the success to be beyond all calculation of pecuniary remuneration.

I remain, &c.,

GOTTLIEB BOCCIUS.

XXV.—*On Sun Pictures, by the Calotype Process.* By Douglas T. Kilburn, Esq. [*Read 4th December*, 1853.]

The publications on the principles and practice of Photography are already numerous, and many of them are written with perspicuity and method, so as to form excellent Vade-mecums for the student, whether he may have prosecuted the art for professional gain, or yielded to its delightful and seducing influence as an amateur. My present purpose is not, therefore, to give a history of Photography, or such an elaborate description of its principles as would involve a consideration of the theory of light and of the laws of optics and of practical chemistry, but only to make public, through the means of the Society, the process which I have myself employed in the production of a few calotype views of Hobart Town, &c., submitted for inspection at a late meeting of the Society. An enthusiast myself in the pursuit of Photography, I am anxiously desirous of leading others into the same delightful path; but I am yet only a beginner, and venture with great diffidence to proceed.

Under the general name of Photography are comprised various subdivisions and modifications of the art; such as Daguerreotype, Calotype, Anthotype, Cyanotype, Ferreotype, &c. Of these, the three following have been successfully prosecuted: the Daguerreotype, discovered in 1839 by M. Daguerre, a Frenchman,—the process now so universally employed for taking likenesses on metal plates; the Calotype, or Talbotype, from Mr. Fox Talbot, by whom it was discovered in the same year,—the process upon paper

which, however, is only adapted for copying landscapes or buildings; the third is the process upon glass, by means of albumen or collodion,—it is the most recently discovered, and combining the advantages of each, it seems not unlikely, at no distant day, to supersede them both. I may here observe that collodion is a chemical compound of æther and gun-cotton.

Though tolerably conversant with all the three processes mentioned, it is to the second only (the Calotype) to which I crave attention.

The chemicals which I make use of for the production of views by this process are as follows:—

Iodide of potassium,
Bromide of ditto,
Cyanide of ditto,
Nitrate of silver crystallized
Liquid ammonia,
Hyposulphite of soda,
Acetic acid strong,
Nitric acid,
Gallic acid crystallized,
Muriate of soda, (common salt),
Distilled water.

The following are also required:—

A camera obscura with its lens, slides, and portable stand,
A pressure frame for positive pictures,
A pair of apothecaries' scales and weights, and graduated glass measures,
Four square japanned tin baths a little larger than the sheets of paper to be used,
Two tubs for water,
A small still for distilling water,

Several square boards a little larger than the paper,
And some large camel's hair brushes.

Before I describe the mode of preparing the papers, something may be said about the Camera that I use.

Being desirous of taking views of a rather large size, I felt that unless some means could be contrived for diminishing the size of the Camera, the apparatus would be too bulky to be carried about without the aid of two or three persons. The focal length of my lens was about 21 inches. I therefore, when lately in London, ordered a Camera to be made 24 inches in length, 15 in width, and 13 inches in height, and without a top, which I replaced with a double fold of black calico.

The ends were made to slide into grooves, and the sides to fold with hinges flat upon the bottom, which greatly lessened its bulk, and made it easy of carriage.

The stand for the Camera is of French manufacture, has folding legs, and is light and portable.

My lens, which is by Ross, of Holborn, London, is a compound double achromatic one, of $3\frac{1}{4}$ inches in diameter; when used for the Daguerreotype, it has a focal distance of about 12 inches, and will cover a plate of about 5 by 4 inches.

To adapt it for the Calotype process, I unscrew the two glasses next to the paper, and substitute for them the glasses from the opposite end, with the convex side next to the paper: it has then a focal distance of about 21 inches. To correct the aberration of the rays of light, I place at about $2\frac{1}{2}$ inches in front of the lens, a diaphragm which has an aperture of only a quarter of an inch. A large quantity of light being thus cut off renders the time of exposure very much longer; but as a compensation, the details of the picture are much sharpened, and the lines at the sides are tolerably straight.

Before leaving this part of the subject I must mention, as a curious fact, that these pictures cannot be taken quite so quickly here under the glorious sunshine, which so dazzles our eyes, as in the apparently unfavourable atmosphere of London,—I speak of the west end of London, not of the city, and of course exclude the real London fog days.

The reason is, that the quality of light here is too yellow for photographic purposes. The more northerly we go, the whiter the light becomes; and the whiter the light, the quicker a photographic picture of any kind can be taken.

It is well known that every beam of the sun's light is composed of a collection of rays, which may easily be separated and shown apart by allowing the beam of light to pass through a common glass prism, by which they are refracted, and may be thrown obliquely upon any white surface.

This spectrum (as it is called) will then be found to consist of nine rays (formerly believed to be only seven), of the following colours, and placed in the following order :—

1 ..... Lavender
2 ..... Violet
3 ..... Indigo
4 ..... Blue
5 ..... Green
6 ..... Yellow
7 ..... Orange
8 ..... Red
9 ..... Crimson.

It is likewise known that each collective beam or ray which proceeds from the sun possesses three distinct properties—namely, the property of heat, of light, and of actinism, or chemical power.

By experiment we can determine to which portion of the coloured spectrum each of these three properties belongs;

for instance—the maximum strength of the heating ray is found to lie between the colours red and crimson; that of the lighting ray between the yellow and orange colours; whilst the greatest power of the chemical ray is between the violet and indigo. Curious as it may appear, it is nevertheless true, that neither the light which we see, nor the heat which we feel, have any thing to do with the production of pictures by the sun; it is to the actinic, or chemical and invisible ray, that we are indebted for the wonderful power of so minutely delineating Nature's works and copying the master-pieces of art.

The photographist can easily prove the above facts to be correct by the following experiments:—Let him prepare a piece of photographic paper in the usual most simple manner, namely, by a wash of ammonio-nitrate of silver. This paper, if exposed to the sunlight in Hobart Town, at this season of the year, ought to become quite black in less than ten minutes. By preparing a second piece of paper in the same manner, and submitting it to the sun's rays, with a piece of yellow glass placed over it, the paper will be found nearly insusceptible of change; but if the same prepared paper be similarly exposed, with a piece of blue glass, of a colour so deep as apparently to obstruct all light, placed over it, the paper will blacken nearly as fast as if it were exposed to the unveiled sunlight. The knowledge of this fact enables me to prepare the papers (in that part of the process which would suffer from daylight) without the aid of a lighted candle, by the substitution of a medium of yellow calico, which thus cuts off the actinic rays, while it allows those of light to pass through freely. The following experiment shows conclusively the different degrees of actinic power which belong to the various portions of the spectrum. The rays being thrown by means of the prism upon a sheet of

paper, photographically prepared as before, the paper will be found to be very unequally darkened;—at the chemical rays, represented by the colours blue, indigo, violet, lavender, and beyond that shade, the paper will be found to have the intensest black; at the lighting rays, shown by the colours yellow and orange, the paper will retain its primitive whiteness; and lastly, at the heating rays, to which the crimson belongs, the paper will be but slightly affected: the actinic power therefore seems also to belong, though in a minor degree, to the red and the crimson, representing heat—a circumstance which has not yet been satisfactorily explained. The light in Australia, therefore, is too yellow for the production of very *quick* pictures by any of the photographic processes; but it is only a question of time, not of *distinctness*, upon that account.

It is stated that the nearer we approach the equator, the more feeble become the chemical rays; and consequently the more difficult are the pictures to be obtained.

But, besides the chemical power being stronger or weaker in different latitudes, it is also found to be affected by the seasons and by the different times of the day; thus the Spring and Autumn, and the early morning, are found to be the most favourable periods for the production of *quick* pictures. I shall now proceed to describe my method of preparing the papers.

Preparation of the Negative Paper.—Choice of Paper.

Whatman's English paper is very good, but rather too thick for negative pictures, and hardly sufficiently well sized for positives.

Turner's paper is good, but too expensive.

Canson-fre-res, a French paper, is very well sized, but a little too thin for negatives, and more so for positives.

The above, however, are the best papers with which I am acquainted.

1*st Operation—Iodising.*

Take 20 grains nitrate of silver, and dissolve in ½ an ounce of distilled water in a small glass-stoppered bottle. Take also 4 drachms of iodide of potassium, 4 grains of bromide of ditto, and dissolve in ½ an ounce of distilled water in another glass bottle.

These mixtures will not spoil by keeping, but ought not to be exposed to daylight.

When wanted for use, drop say 50 drops of the first mixture into a glass vessel, then add so many drops of the second solution, until the white precipitate which forms is re-dissolved, and the compound mixture becomes clear like water. Take a sheet of paper, and having marked with pencil one side, that you may know it again, pin it by one or two of the corners on to a deal board a little larger than the paper; then holding the board inclined, dip a clean large camel's-hair brush into the compound solution just described, and brush the paper smoothly and evenly across the sheet, and afterwards from the top to the bottom; the greatest care being taken that no part of the paper is omitted in brushing it over.

Dry by hanging the paper up by one corner; half-a-dozen papers may thus be coated at once. When quite dry place the papers with the coated face downwards in a large tub of clean water, and let them soak in it for twenty-four hours or so, according to the heat of the atmosphere; when taken out and dried, by hanging up by the corner, they will be found to be

tinted on the prepared side of a delicate straw colour. They will keep for any length of time without being affected by the light, care being taken never to touch the prepared surface with the fingers.

2nd Operation—The Sensitive Solution.

The following process must be performed by the light of a candle, or if by daylight it must be passed through a yellow medium, and the chemicals must be carefully guarded from the sun-light.

Take 25 grains nitrate of silver, $1\frac{1}{4}$ drachms acetic acid, $\frac{1}{2}$ an ounce of distilled water, mix in a glass bottle, then make a saturated solution of Gallic acid with distilled water in another bottle; when required for use mix 15 drops of the aceto-nitrate solution, with 30 drops of saturated Gallic acid, in 6 drachms of distilled water. Brush this into the prepared side of the paper, fastened on a board as before, with a clean brush, and let it remain for about a minute, the board being inclined. Then place the paper between folds of blotting-paper until nearly dry. It is now fit to be placed in the camera; and it is better to use it as soon as possible after the above preparation:—this last solution will not keep above a day.

3rd Operation—In the Camera.

Place the paper prepared as above, and carefully secured from the daylight, with its face to the glass of the frame of the camera; then slide the frame into the camera.

The focus of the object must previously have been carefully adjusted on the ground glass of the camera. The time of exposure can only be learned by practice; it will vary with the intensity of the chemical light on the day or season

of the operation; also with the degree of care devoted to the preparation of the paper.

4th Operation—The Development of the Picture.

The paper upon its removal from the camera rarely exhibits any trace of a picture. It must still more than ever be kept from the daylight.

Mix 1 part of aceto-nitrate solution with 3 parts of saturated solution of Gallic acid, as described in the 2nd operation. Take a clean brush and lay this on for a quarter of an hour, or until the picture is thoroughly developed: when the Gallic acid is used the brushes must be frequently changed, or soaked in a strong solution of nitric acid.

5th Operation—The Fixing.

Mix 1 part of saturated solution of hyposulphite of soda with 6 parts of clean water. This should be poured into a vessel sufficiently large to contain the paper lying flat. When the picture is considered to be sufficiently developed, it is to be plunged into this solution with the face downwards, and kept there until the yellow colour produced by the iodide of silver has entirely disappeared, which would be in about an hour. The solution will serve for a number of pictures if fresh hyposulphite is added occasionally, and the dirt extracted, by its being filtered through blotting-paper.

6th Operation—Removal of Hyposulphite.

I soak the picture for some time in two vessels of water, then dry by hanging it up by the corner. This finishes the production of the negative picture, the most difficult of the two. In a perfect negative, nature is as it were reversed: the sky and bright lights should be quite black, and the

trees and shadows ought to be nearly as white as the colour of the paper.

The picture, if carefully fixed according to the above directions, will be quite unalterable by daylight. Care should be taken to keep the back free from spots and blots, as they would cause white blotches in the positive pictures, now to be described.

7th Operation—The Positive Paper, or Printing Process.

Dissolve 8 grains muriate of soda (common salt), in 1 ounce of distilled water. Take a clean sheet of paper, and having, as before, marked one side, fix it on to a board and sponge it quickly and evenly over with this solution. Dry it, and keep it for use.

8th Operation—Sensitive, for Positive Paper.

Dissolve 50 grains of nitrate of silver in 1 ounce of distilled water. Drop into this solution as many drops of liquid ammonia as will cause the white precipitate which then forms nearly to clear—then stop; add to it 4 or 6 drops of acetic acid, and shake up the mixture, which will keep without change if closely shaded from daylight. Brush this into the positive paper prepared in the above-mentioned manner; then dry it thoroughly (by candle-light only), and the paper will keep for twelve hours or so.

9th Operation—In the Pressure Frame.

Place the prepared paper and a negative picture face to face, and then put them into the pressure frame, with the back of the negative picture next the glass; so that when placed directly opposite the sun, its rays may pass through the negative picture to the positive paper placed

beneath. The improved pressure frames will permit half of the picture to be examined without disturbing it, which will enable the operator to watch the process. When sufficiently darkened, it should be removed and fixed as follows.

10*th Operation—Fixing the Positive.*

Take 2 ounces of hyposulphite of soda, 1 quart of clean water. Make of these a bath in a tin vessel. Plunge the positive picture into the bath, and keep it in for an hour or two. The impression will appear to fade whilst in this bath, but when dried it will be found to have regained its tone.

The colour or tone may to a certain extent be modified by the length of time that the picture is kept in the hyposulphite bath. This solution will serve for several impressions, and will improve by use.

11*th Operation—And Last Process.*

Remove the picture from the above bath and pass it through two waters successively to cleanse it from the hyposulphite. It should remain in the last water for an hour or so. Then dry it as before directed, and it is finished. A hot smoothing-iron passed over it will deepen the tone considerably. The positive pictures never arrive at the sharpness and minuteness of detail which the negatives possess. The latter are made more transparent by saturating with white or virgin wax, and by this means the positives are rendered more distinct. The process of waxing, however, is very troublesome. Stains on the fingers may be removed by a strong solution of cyanide of potassium.

I have thus succinctly described my *modus operandi*, which differs considerably from that patented by Mr. Fox Talbot.

I have tried others, but I find this method the easiest and most certain.

Some calotypists use successive washes or baths of nitrate of silver, and solution of iodide of potassium, &c. Some wash first with the iodide solution, and then brush on the nitrate washes. Others again use the iodide bromide solution alone, &c.: but it would take volumes to contain all the processes and fancied improvements.

Without wishing to exalt the Calotype process above its great rival the Daguerreotype, I think that it possesses the following advantages:—Paper, the material upon which it is taken, is less costly and cumbersome than the metal plates of the Daguerreotype; the artist is not so much at the mercy of his subjects, as landscapes and buildings are not so troublesome to copy as nervous or fidgetty sitters for portraits; and lastly, the power of producing an infinity of copies from one matrix is not the least of its attractions.

On the other hand, the extreme minuteness of detail and sharpness of outline which the Daguerreotype gives is not to be obtained by the Calotype process. The time of exposure in the latter is fully five times as long as in the former, which renders its application to portraits impracticable.

It will readily be comprehended that the extreme uncertainty of success in this process, even after the greatest care and attention has been bestowed upon the preparation of the papers, renders the amusement highly exciting. At the moment that the paper is removed from exposure in the camera, there is no indication whether the operation may or may not have failed. Until the Gallic acid solution is applied the paper is generally white, or rather straw-coloured, as at the commencement of the operation. After, however, a few minutes application of the Gallic acid, a slight change comes

over the paper, the line of the sky is clearly marked and begins to darken, and the trees which cut it remain white—the buildings begin to appear: the operator watches them attentively as they seem to grow out of the paper. What is that?—a large part of the picture still retains its original whiteness. He cannot make it out; he applies more Gallic acid without any improvement, the white blot still remains; and the disappointed operator is at last obliged to acknowledge with regret that his negative is a failure. The most frequent cause of these disagreeable failures is, I think, the presence of organic matter in the water used in the first operation, which cannot always be obtained quite pure. Newly-caught rain water or spring water, not too hard, are the best.

Other causes of failure are the following. The paper may not be evenly or well made, the size upon it may not be pure, the paper may have been touched by dirty fingers; the chemicals may have been spoilt by the voyage from England, may not be pure, or may not be evenly spread upon the paper.

Many trials and the greatest care are requisite to produce even moderately good impressions. When, however, really good negatives of interesting subjects are obtained, they are truly valuable; as with care an unlimited number of copies may be procured from them, each slightly varying in tint from a rich brown to jet black.

If successful, the enthusiastic photographist feels that his labour is repaid, since he possesses the power of making copies from nature which in tint rival sketches produced in sepia and Indian ink, and surpass them in accuracy and minuteness. The labour of several days must be applied to the production of sketches by the hand such as

would compete in finish with the pictures produced by the sun in a few minutes.

The value of the Calotype pictures to the artist, as subjects to copy from, is very great. By their aid he is enabled to correct his perspective; to carry into his studio the designs from which he can work up his drawings to the highest degree of finish; to give to each object in his picture its exact size and value,—as it often happens in drawings that more than a proper degree of importance is given to objects which in nature are small and insignificant; and lastly, to use the calotypes as a study for the correct mode of throwing the shadows,—for nature itself, being its own artist, cannot err on these points.

I fear that I have but imperfectly described this most interesting process. There is so much to be said upon the subject that the difficulty has been to compress my communication within the limits of an ordinary paper. But if in any part of my description I have not made myself sufficiently intelligible, it will give me pleasure to assist personally any members of the Society who may desire to practise the delightful and amusing art.

XXVI.—*On the Epidemics of* 1852-3. *By* E. S. P. Bedford, *Esq.*, F.R.C.S. *London.* [*Read 4th December*, 1853.]

The poison of Scarlet Fever was brought to this colony from Sydney in 1812, and since that period this disease has more or less prevailed. The two epidemics which caused so many deaths took place in 1852-3. It should be borne in mind, that scarlet fever does not arise from poverty of living, like typhus fever; nor from ill-drained dwellings and filth, as common fever does—it requires its peculiar germ, or poison, whatever that may be: but while this is the case it must not be forgotten that the disease is made to spread, and its severity influenced by all those circumstances which impair general health, and that no causes operate more strongly upon it than the epidemic character of the season and the condition of the individual in relation to the poison.

The present epidemic followed a period of unusual sickness; many had been suffering from influenza, and the epidemic condition of the atmosphere not only affected men, but the lower animals also. At the time that many aged and sickly persons died from influenza, and the dogs were dying by dozens in the streets of distemper, the epidemic influence thus affecting both man and animals was not confined to this island, but New South Wales and Victoria also felt its effects.

We this year experienced the severest visitation of scarlet fever before the other colonies. On looking at the Return, it will be seen how much greater the number of deaths from epidemic causes was in 1852 and 3 than in 1842 and 3.

The scarlet fever of 1842 was ushered in by a better state of general health; the disease, though very common—and more so than the Returns show—yet never was either so common or fatal as it has been this year.

It is not necessary that I should enter into an explanation of the general symptoms of Scarlatina; they are so well understood by the profession, and of so little interest to those out of it, that the shorter time I occupy in referring to them the better.

The present epidemic fully bears out the remark of Dr. Graves, that in both acute and chronic diseases a constitutional affection may display its existence by only one or two of the numerous symptoms which usually characterize it. Had this correct view been more generally entertained, there would have been less confusion in separating the different kinds of attacks of one and the same disease, and calling by distinct names the affection, according to the severity of the attack or the prominence of particular symptoms.

At all periods of this epidemic mild and severe cases have been seen at one and the same time, often in the same house. The throat symptoms at the early part of the epidemic exhibited more of an inflammatory type and the tonsils chiefly were enlarged, whereas afterwards the throat affection was less prominent and there was more a diffused redness, extending over a large surface and passing down into the œsophagus, or, more unfortunately, in some cases into the larynx. This state of throat was less easily brought under the effect of treatment than the other; and while there was often little pain, there was frequently great difficulty of swallowing—sometimes from the epiglottis being affected, at others apparently from the swelling of the parts, by infiltration into the submucous cellular tissues.

Among the fatal cases were some which were early car-

ried off,—killed as it were by the immediate effect of the poison,—two or three days after the attack; now and then without the appearance of any rash. In a few of these cases the persons were of a darker colour about the hands and face, of almost a leaden hue, showing a congested condition of the superficial vessels. In the cases which died within the first three weeks, death arose from affection of the head, effects of poisoning, or sinking under the primary fever, without exhibiting disease of any particular organ—the pulse being very rapid and never hardly yielding in frequency, the mind clear, and the vital powers sinking. Two young women sank this way within ten days, or from irritation being set up in the mucus surfaces of the stomach and bowels, and low fever carrying them off. Of these I have seen fewer examples; the two former being far the most common causes of death early in the disease, in the cases I have witnessed. While the early stage of the disease carried off many victims, it was very fatal also after the twenty-first day, when death almost always supervened from diseased action in the kidney, producing consecutive morbid effects.

No writer with whom I am acquainted has so fully entered into this subject as Dr. Copeland, who very properly points out that it is not only in the more marked cases where anasarca arises from affection of the kidneys, that the kidney is much more early affected than is generally supposed, and that this complication must be looked for, if the disease is to be properly treated. In the year 1843 I was desirous of examining the state of the urine in anasarca after scarlet fever, to verify Dr. Christison's views, that the kidney resumes a healthy secretion after albumen has been passed, mixed with the urine; the results are contained in the following tables, compiled from observations made at the Orphan Schools, and it is seen that albumen existed in all cases of anasarca,

and in many of the cases of scarlet fever; but that after scarlet fever and anasarca, it was no longer found there.

So far, therefore, as regards the determination of the question, whether kidneys that had passed albumen with urine could return to a healthy state, these observations clearly show that they do so after scarlet fever; how far they may be liable to after disease I cannot say,—but while seeking for this information I was furnished by these tables with an unlooked-for result. In connection with the passage of albumen, there is at the same time an absence of urea, and its absence is clearly indicated and measured by the lowering of the specific gravity of the urine in proportion to the lessened quantity of urea. Not only is this the case in dropsy after scarlet fever, but during the fever there is a tendency to a lessening of the quantity of urea excreted, for on examining the tables carefully it will be seen that the urine rises after scarlet fever and after dropsy, although no albumen had been passed.

This rise in the specific gravity of urine before it can be trusted as a guide in prognosis must be looked at by comparison with the daily passage of each patient's urine, and marking its actual decrease or increase; it will be useless to take any number as a healthy standard, and individuals must be examined several times.

If the urine increases in specific gravity, the patient is not likely to be the subject of dropsy; if the urine sinks lower, although no signs of dropsy exist, they may be calculated upon.

This is a useful and desirable mode of enquiry when the practitioner has time to adopt it, as I know of no other means, before four weeks are passed, of being pretty sure that the patient will not have dropsy.

These tables also bear out the views of Dr. Copeland, and

show the early implication of the kidney, for in almost all the scarlet fever cases, that is—patients ill in the first week, albumen is shown to exist; in the cases after scarlet fever and anasarca, it is seen that the urine rises in specific gravity, in other words, gets rid of the pent-up urea, which acts, when not freely excreted, as a poison, producing anasarca and many other evils.

It cannot, therefore, be too strongly borne in mind by practitioners, that early and constant attention is necessary to the functions of the kidneys during all the stages of scarlatina.

The effect of the puerperal condition has been held to be so severe in its operation in scarlet fever that some authorities say it is always fatal: I was so unfortunate as to have two patients die under these circumstances. But in a family where the house was small, and all the children, seven in number, crowded into two rooms were ill, and one child died, the mother was confined, and had not a bad symptom, though she had never been the subject of scarlet fever. Last year a family was attacked; one child died from affection of the head in scarlet fever, and at that time the mother was confined and afterwards attacked with scarlet fever. I never saw a milder case than her's was, requiring scarcely any treatment.

If attention is paid to the state of wounds under the influence of scarlet fever, we may have some clue to the subject, bearing in mind Dr. Ferguson's views on puerperal fever. I have known a fracture to remain disunited after an attack of scarlet fever; I have seen wounds nearly healed protracted in their cure and unhealthy in their appearance with the absorption of recent adhesions.

Not only are mothers carried off by this affection in child-bed, but the infant often dies likewise. In the two

instances I attended this year, one infant which died in three weeks—the rash distinct; the other died with head symptoms. I saw two other infants die a few weeks after their mothers, and both died having discharge from the ears and convulsions: the affection of the ears was the only symptom in common with other cases of scarlatina. It will be seen by reference to the Tables that the total amount of deaths from scarlatina

In 1842 has been	23
In the year 1843	41
In the year 1852, and	89
In the year 1853	230

It is very difficut to arrive at one fact, that is, the number of deaths according to the cases treated; by referring to my memorandum I find 96 cases attended this year, exclusive of puerperal cases: out of these six died, or one case in every sixteen treated; but if the three puerperal cases are added, it will make the mortality one in $10\frac{2}{3}$.

I will now make an extract from an article of Dr. Tweedie, in the Cyclopædia of Practical Medicine, which will show that the deaths, numerous as they have been, have not proportionally exceeded those in England. It is very desirable that the public should know that this disease is not more fatal here than in other countries.

"In an epidemic scarlatina, which prevailed in Paris in 1743, we are told that every individual who was attacked perished; many, indeed, within nine hours from its first invasion. That which raged at Bromley, near Bow, in Middlesex, in the year 1746, it is stated by Dr. Fothergill, seemed to yield to no remedies or applications; several of the inhabitants were greatly alarmed by it, some losing the greater part of their children after a few days' indisposition. These are by no means solitary examples of the great fatality of scarlatina, as similar epidemic visitations have

been recorded by Huxham, Cotton, De Hœn, Johnstone, Rush, Lettsom, Sims, Willan, Bateman, Blane, M'Gregor, Tweedie, Carbutt, Sandwich, and others.

"We find by the register of cases kept at the London Fever Hospital, that the mortality of scarlatina shows great variation. In the years 1822-3, the disease appears to have been extremely mild, as none of the patients died during these years. In 1824 the mortality was one in twenty-one, in 1835 one in thirteen, in 1826 one in twenty-nine, in 1827 one in forty-one, in 1828 one in ten, in 1829 one in six, in 1830 one in six, in 1831 the disease was not prevalent, and none of the cases proved fatal. In 1832 the mortality was one in forty, and during the last year the average has been about one in twenty-two."

I will also read an extract from Dr. Copeland's work on this point:—

"The following will show the comparative prevalence in the metropolis of scarlet fever, measles, and small-pox from 1838 to 1848, both years included, during the last eleven years. It must be manifest that the numbers assigned can be an approximation only to the true amount, as the causes of death are in many instances arbitrarily assigned in the Returns, but they are sufficiently accurate to convey useful information:—

Years.	Scarlet Fever.	Measles.	Small-Pox.
1838. . . .	1,534	588	3,817
1839. . . .	2,499	2,036	634
1840. . . .	1,954	1,132	1,235
1841. . . .	663	973	1,053
1842. . . .	1,224	1,293	360
1843. . . .	1,867	1,442	438
1844. . . .	3,029	1,182	1,804
1845. . . .	1,085	2,318	909
1846. . . .	928	747	257
1847. . . .	1,433	1,778	955
1848. . . .	4,752	1,143	1,617
During 11 Years	20,962	14,632	13,079

"The greatest number of deaths from scarlet fever occur among the poor, owing to the circumstances which both predispose to infection and render the disease more malignant; and even those causes which develop the sequelæ of the disease and render them fatal are also most prevalent in the lower classes. If the above amount does not comprise the deaths from dropsy, or other diseases consequent upon scarlatina, the mortality from this malady must have been greater than here stated. The above results will show that there are few diseases, perhaps none, from which the general amount of mortality and of danger is greater than in scarlet fever; and yet there is not one of which the pathology and treatment has received less attention and elucidation in modern times than it."

There are probably two causes which concur to produce here so many deaths from these visitations. In England the disease is always present, a number each year being the subjects of its attack while in a mild form, and therefore not victims to the severer epidemic visitations. In new countries the poison, not so large in quantity, does not act so constantly; this, with the less dense population, causes fewer to be affected with fever in the intervals between the epidemic visitations. The other cause I believe to be, that a larger number of children attain in this country to fourteen years of age than in Europe; but many of them are not robust, or fitted to bear a severe disease.

Still it is desirable to watch the progress of epidemics with care and attention, so that all local circumstances operating or likely to operate on them should be investigated.

When I compare my own experience of the epidemic of 1842 and 3 with that of the present year, I am struck

with the proportion of cases that were then lost from dropsy. In Hobart Town, in 1842 and 3, I lost one case of scarlet fever, and was called in when one had effusion into all the cavities from dropsy; but at the Orphan School, where I lost a large number of children, the deaths were principally from dropsy. I was then made aware of one important fact, that the chance of dropsy depended greatly on the state of previous health of the patient.

The early deaths from scarlet fever seem to depend either on the severity of the epidemic, or individual aptitude to be affected by the poison; the deaths after three weeks depend a good deal on the previous health of the person affected. With regard to the treatment of this disease, I must offer some observations on the use of Belladonna, given as a preventive and as a curative.

I was induced to use this remedy from reading an article by Dr. Tweedie, and hearing that it had been used freely and with success in Sydney—feeling that, at the same time, in the doses there ordered, it could neither do harm nor interfere with other treatment.

In 1842 and 3 I used it in two schools; neither were broken up, and none of the boarders had the fever. I used it in a family in Collins-street, where one child was affected with the fever; the sister who nursed the child had sore throat, but none of the rest had fever.

I used it in my own family and in several others, and with good effect. I attributed the fewness of cases of scarlet fever that year in my own practice to its use. I got a medical friend to use it, and all his family took scarlet fever; and I used it for some time at the Orphan School—but the disease broke out there and it was discontinued, as it could hardly be given regularly to so many children.

I have used it this year in a school where twenty-six lived. Three had the disease when I was called in; two others afterwards took it, but suffered very slightly, mixing with the children.

A case occurred in a house with a large family of children; great exclusion was observed: no other child had fever.

I have given it in cases where the patients afterwards took fever; and one died who had regularly taken it fourteen days before seizure and during the treatment.

The evidence is still imperfect, and more facts are required on this subject. My present view is—

That it protects many from scarlet fever; that in no case does it do harm; that many who have taken it had the slightest attacks.

That it does not protect all.

That its use as a curative, if it has not been given before the attack commences, is not indicated any more than vaccination to a person with small-pox.

With reference to the question of treatment in general, they only who are little used to treat disease would tell you that all cases of scarlet fever should be treated alike.

In the early part of the attacks, if the Belladonna has not mitigated it, and the symptoms are very severe and threaten speedy death, it is a juncture when bleeding from the arm may perhaps save the patient. If done at all, it must be done early, and with great judgment in the selection of the cases; its object being either to relieve the state of congestion or remove a quantity of the poisoned blood: the former is the most likely use for the lancet. These are the only circumstances calling for free depletion for the general disease; but local symptoms which may set in must be met and treated with promptness.

The dropsy after scarlet fever should always be treated

as an acute disease; requiring almost always local bleeding, with purgatives, diuretics, and the maintenance of the action of the skin.

In a case where a wounded artery had caused the loss of a good deal of blood, in another where the patient had been freely bled for enteritis, both made very good recoveries; this, with the relief from epistaxis, points out the use and safety of blood-letting in many cases: but the type of the previous illnesses did not lead practitioners generally to look to it with much favour,—necessity only made them use the lancet.

Cases that of all others most imperatively call for the loss of blood are apoplectic or comatose affections, the result of the retention of urea in the system from diseased action in the kidneys; here free and copious bleeding is often well borne, and rapidly cuts off the symptoms calling for it, and relieves the system generally. One man who was apoplectic and anasarcous lost forty ounces of blood, and was well of both symptoms in three days. There is not only an increase of urea in the blood, but of water also; and the symptoms may be in part due to over-distention of vessels.

Among the local symptoms, the enlarged glands will almost always be relieved by early leeching, and the kidneys called into action by turpentine epithems.

The throat should be early and regularly treated with nitrate of silver, as much of the success depends upon early subduing the throat symptoms, to enable the patient to take nourishment.

The diffuse inflammation of the cellular tissues bears depletion badly, and is often not relieved by incisions, while turpentine epithems and hot applications are of use.

In the desquamative stage, warm bathing with alkalies and frequent purgatives are wanted: by careful attention

to this—not letting the patient up too early, and always being on the watch,—the cases of dropsy may either be avoided or most of them relieved, unless the patient's health has been much impaired.

With reference to the causes of death of those cases which fell exclusively under my care, five died from fever with throat affections, a rapid pulse and sinking of the vital powers, in nine days. One died in seven days' fever, rendered intense by inflammation of the periosteum of the thigh.

One died from sloughing ulceration of the throat on the twelfth day; this sloughing condition, as that of the two following cases, seeming to be the effect of the poison of the fever. One sank from extensive slough in the thigh, and died on the twenty-fourth day, having been relieved of severe head affections by active cuppings.

Another, a female child—who had suppurated glands in the neck, with slough on the thigh which was healing up—an abscess in the chest carried off.

Two who died were women in childbed; and two were infants three weeks old.

In 1842 and 3, out of twenty-seven deaths, eight were during the fever, nineteen of anasarca.

Observations on Urine during Scarlet Fever,

From the 21st March to 9th May, 1843.

Specific Gravity.	Effect of Heat.	Effect of Nit. Acid.
1008	None.	One-tenth.
1012	Do.	None.
1012	Do.	Darkened.
1013	Do.	One-fourth.
1013	Do.	None.
1014	Do.	Darkened.
1016	Do.	Do.
1016	Cloudiness.	One-fifth.
1017	None.	One-tenth.
1018	Do.	One-tenth.
1018	Do.	One-fourth.
1018	Cloudiness.	One-tenth.
1018	Quarter.	One-third.
1018	None.	One-fifth.
1020	Do.	Cloudiness.
1020	One-tenth.	None.
1026	None.	Darkened.
1026	Do.	Thickness.
1028	Do.	One-half.
1031	Clearness.	Four-fifths.

Observations on Urine after Scarlet Fever,

From 7th of October to 24th November, 1853.

Specific Gravity.	Effect of Heat.	Effect of Nit. Acid.
1006	None.	None.
1008	Do.	Do.
1010	Do.	Darkened.
1012	Do.	Do.
1012	Do.	None.
1014	Do.	Darkened.
1016	Do.	Do.
1016	Do.	Do.
1016	Do.	None.
1018	Do.	Darkened.
1018	Do.	Do.
1020	Do.	Do.
1020	Do.	Do.
1020	Do.	Do.
1024	Do.	Do.
1024	Do.	Cloudiness.
1026	Clearness.	Darkened.
1027	Do.	Thickness.
1028	Do.	Clearness.
1030	None.	Darkened.

Observations on Urine during Anasarca, subsequent to Scarlet Fever,

From 21st March to 9th May, 1853.

Specific Gravity.	Effect of Heat.	Effect of Nit. Acid.
1006	One-quarter.	One-sixth.
1006	None.	None.
1010	Do.	One-tenth.
1012	Quarter Red.	One-third.
1012	One-fifth.	One-half.
1013	One-third.	One-half.
1014	Three-fourths.	One-half.
1016	One-third.	One-half.
1016	One-third.	One-third.
1018	One-third Red.	One-half.
1018	One-quarter.	One-third.
1020	None.	One-tenth.
1020	Do.	One-tenth.
1022	One-half.	One-half.
1024	One-third Red.	One-half.
1026	One-half.	Three-fourths.
1028	Clearness.	One-quarter.

Observations on Urine after Anasarca, subsequent to Scarlet Fever.

From 18th September to 18th November, 1843.

Specific Gravity.	Effect of Heat.	Effect of Nit. Acid.
1010	None.	None.
1013	Do.	Darkened.
1014	Do.	Do.
1014	Do.	Do.
1016	Do.	Do.
1018	One-half.	One-fourth.
1018	None.	Darkened.
1020	Do.	Do.
1022	Do.	None.
1022	Do.	Darkened.
1024	Cloudiness.	Do.
1025	None.	Do.
1025	Do.	Do.
1025	Do.	Do.
1026	Do.	Do.
1028	Do.	Do.
1028	Clearness.	Clearness.
1028	None.	Darkened.
1028	Do.	Do.
1030	Do.	Do.
1030	Do.	Do.
1030	Do.	Do.
1030	Do.	Do.
1030	Do.	None.
1030	None.	Do.
1031	Do.	Clearness.
1032	Clearness.	Thickness.
1034	None.	Darkened.

Observations on Urine during and after Scarlatina and Anasarca.

NAME.	Disease.	Specific Gravity.	Effect of Heat.	Effect of Nitric Acid.
Margaret Melanphe...	Scarlet Fever...	1026	None	Darkened.
	After Do.	1028	None	Do.
Bridget Kelsh	Scarlet Fever...	1031	Clearness	Four-fifths.
	After Do.	1023	One-tenth	One-tenth.
Allen Duggan	Scarlet Fever...	1016	Cloudiness	One-fifth.
	After Do.	1028	None.	Darkened.
Margaret Murray.....	Scarlet Fever...	1012	None	None.
	After Do.	1028	None	Thickened.
Amelia Jones	Scarlet Fever...	1018	None	One-fifth.
	After Do.	1024	None	Cloudiness.
Charles Neels	Scarlet Fever...	1018	None	One-fifth.
	After Do.	1024	None	Cloudiness.
D. Budds	Anasarca	1010	None	One-fifth.
	After Do.	1030	None	None.
G. Gordon.....	Anasarca	1016	One-third	One-half.
	After Do.		None	Cloudiness.
James Forrett	Anasarca	1024	$\frac{1}{3}$ Red	One-half.
	After Do.	1028	None	Darkened.
C. Condway	Anasarca	1012	$\frac{1}{4}$ Red	One-third.
	After Do.	1025	None	Darkened.
D. Angus	Anasarca	1006	None	One-fourth.
	After Do.	1010	None	None.

Observations on Healthy Urine,

From 31st October to the 11th November, 1843.

Specific Gravity.	Effect of Heat.	Effect of Nit. Acid.
1010	None.	None.
1010	Do.	Darkened.
1010	Do.	Do.
1010	Do.	None.
1012	Do.	Do.
1012	Do.	Do.
1014	Do.	Do.
1016	Do.	Darkened.
1017	Do.	Do.
1018	Do.	None.
1018	Do.	Do.
1020	Do.	Darkened.
1020	Do.	Do.
1022	Do.	Do.
1023	Do.	None.
1024	Do.	Do.
1024	Cloudiness.	Darkened.
1026	None.	Do.
1026	Do.	Do.
1027	Do.	Do.

EXTRACTED FROM THE REGISTER OF DEATHS FOR THE DISTRICT HOBART TOWN, BY PERMISSION OF JOHN ABBOTT, ESQ., REGISTRAR-GENERAL.

		1842.													1843.													1852.													1853.												
—	—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	January.	February.	March.	April.	May.	June.	July.	September.	October.	November.	December.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Epidemic, Endemic, and Contagious Diseases.	Influenza									1		1		2																1							19	20	40	3	4	9	10	11	6	4	2	1				50
	Measles										2			2																																						
	Scarlatina						1			2	8	6	7	23	6	3	9	5	12	4		1		2		3	43		2	2	2	3	3	7	3	4	1	1	1	29		1	1	4	27	37	44	49	32	22	13		230
	Hooping Cough													1								1				4				2	3							5													
	Croup	1				1				1				3		3							4	6			14	2	4	1			3	5	2			2	19			1		1	2	3	8	8	1			21
	Thrush													4			2	2								4																										
	Diarrhœa		2	1	2	1	1						4	11	4	1	8		5	4	4	5	10	6	9	60	3	6	17	17	15	2	8	4	3	10	7	5	97	2	9	13		5	1	6	8	5	5	5	2	61
	Dysentery	5	1	1	5		1			1	1	1	7	23		13	13	14	7	2	3		2			58	10	9	5			3	1	4	1		5	3	41	4	6	3		3	1	3	2	1		12		35
	Cholera		1											1		1										1	1		2				1					4												
	Typhus														1				1							2	1												1												
	Synochus		2	5	4	1	4	2		1		4		23	6	3	1	1	4	3	2		1	2		24	2		1	3	1	3	1	3		1	3	3	21		3		1	3	2	4	3	1				17
	Plague																							1		1																									
	Erysipelas																																																	
	Syphilis	1			1						1			3														1	2									3												
	Dropsy	1			1		1	1			2		3	9		1			6	2	2	2		4	2	19	1	2	2	2	2	1	2	3	2	2	5	2	26	6	2	2	4		1	2	2	2	3	3	2	29
	All other Diseases	26	23	28	26	27	19	20	29	27	26	26	22	299	41	46	36	18	47	26	18	5	36	26	23	384	40	42	43	32	29	45	41	59	39	35	74	67	546	30	64	61	41	59	39	53	57	47	46	35	16	548
		34	29	35	39	30	27	23	29	33	40	38	43	400	58	71	69	40	82	39	30	7	55	41	37	614	58	64	78	59	54	57	64	81	51	49	114	103	832	45	89	90	60	109	89	119	131	97	77	68	20	994

Proceedings.

12th January, 1853.—Monthly evening meeting, held at the Museum, Harrington-street; His Excellency Sir William Denison, President, in the chair.

After a ballot the following gentlemen were declared duly elected:—

A. T. Stuart, Esq., of Port Arthur.

J. F. Hull, Esq., of Tolosa.

A letter was read from the Colonial Secretary transmitting, for the Society's Library, papers and pamphlets on the Cultivation of Flax in Ireland, including the Annual Report, &c., for 1851 of the Royal Society for promoting the Growth of Flax in Ireland, and "the Flax Movement," by the Chevalier Claussen.

A letter was read transmitting, by command of the Lieutenant-Governor, the Second Volume of Magnetical and Meteorological Observations taken at the Observatory, Hobart Town; printed under the superintendence of Colonel Sabine, and forwarded by the British Government.

A letter was read transmitting, by command of His Excellency Sir William Denison, 16 volumes (half-bound in Russia leather) of Table Circulars and Priced Lists of 876 Contributors to the Exhibition of the Industry of All Nations in 1851, forwarded by Her Majesty's Commissioners.

Dr. Agnew presented a copy of "Directions for Collecting and Preserving Animals," &c., published by the Council of the Royal College of Surgeons, London.

The Secretary reported receipt, from the Agricultural and Horticultural Society of India, of Part 2, vol. 8, of their Journal, and that Copies of the Geological Report on the Gold-fields in Wellington and Bathurst, New South Wales, by Lieutenant-Colonel Sir T. L. Mitchell, F.G.S., and of the Pamphlet on the new genus of Sperm Whale *(Euphesetes)*, have been presented by James Mitchell, Esq., of Sydney, late of the Commissariat here.

The Secretary reported the following presentations to the Museum:—From Alexander M'Naughtan, Esq., several hundred specimens of land and sea shells from the Mauritius, Ceylon, Malay Archipelago, &c., many of them curiously mounted on stands by the Chinese; also of some very beautiful and delicate specimens of filagree work, executed in silver by

Chinese workmen; and that Mr. M'Naughtan had sent to the Society's Gardens two cases of plants from Canton.

Joseph Hone, Esq., presented upwards of twenty of the Promissory Notes forming part of the circulating medium in Van Diemen's Land in 1823-4-5 and 6, for sums varying from 3*d.* to half-a-dollar, payable on demand.

A spirit preparation of a bi-chephalous chick was presented by Mr. A. Kissock, of Liverpool-street.

Mr. Perkins presented a sample of small nuggetty gold from Bendigo.

Mr. H. Hull presented numerous small fragments of quartz with gold, collected by Mr. Douglas Hull at Specimen Hill, near Bendigo Creek, Victoria; also a coralline, gathered on the beach at Kelso, George Town.

From Mr. James Dickenson was received a collection of about fifty geological specimens, in duplicate, from Mount Alexander, Ballaarat, and Bendigo, accompanied with an explanatory paper.

From Mr. E. Jervis was received a bundle of spears and other weapons, obtained at New Ireland and the adjacent islands by officers of H.M.S. *Meander.*

His Excellency Sir William Denison presented a portion of the shell of the gigantic egg first discovered in Madagascar in 1850. Sir William also placed on the table for examination a perfect specimen of this huge egg, brought from Bourbon by the French merchantman *Desilles*, and temporarily left in His Excellency's possession. Three such eggs, together with some bones found associated with one of them in alluvium, were despatched in 1850 to Paris, and two of them reached their destination in safety in 1851. These two differed in shape, and that now exhibited here varies a little from both in form and dimensions. Sir William Denison described this egg as an ellipse of revolution, measuring through its long axis 12·4375 inches; in its short diameter 9·25 inches; round its long circumference 33·875 inches; and round its middle 29· inches: having a thickness of shell 0·15 inch, and capacity to contain (ascertained by actual measurement) 15 pints of water. The structure of the shell resembles in its interior surface that of the Dinornis, but on its exterior the markings approach more the flexuous striated aspect characteristic of the egg of the Emu. It has been estimated that the *Dinornis Giganteus* measured 9½ feet in height, and that this large extinct bird of Madagascar must have stood about 11 feet 10 inches. It has been most appropriately named *Æpyornis Maximus.*

The Secretary placed before the meeting a sample, from a parcel of 25 ozs., of spurious metal, recently purchased as genuine gold-dust by one of the Banks in this city at the current price of the day. The prevailing form is that of nuggets, from the size of a fine pin's head upwards, spherical or irregularly rounded, and more or less flattened, with projecting sharp points and ragged edges, in no case angular or crystalline, but having always a distinctly fused appearance; it is whiter, or a shade paler, than any of

the gold-dust to which we are accustomed; it is also harder, and has a chink (when pieces are rattled together), different from the heavy sound of the genuine native metal; it is also decidedly harder, and in specific gravity it differs in the proportion of about 15· to 19·, which, assuming the alloy to be zinc, would indicate a deterioration to the extent of about 80 grains in the ounce; and which at £4 2*s*., the price in London, would make a difference of 13*s*. 8*d*. per ounce on the price realized, independently of a troublesome process of parting being involved. The usual tests for copper are, of course, useless as applied to this alloy; but when hammered out into thin leaves, and digested for twenty-four hours in sulphuric acid, it yields white flocculi of oxide of zinc when tested with ammonia.

The most striking and obvious characteristic of this spurious ore are its prevailing globular forms, and its whiteness and hardness, as compared with genuine gold-dust, with which all are now so familiar.

Andrew Clarke, Esq., Private Secretary, read a letter addressed to His Excellency, the President of this Institution, by the Secretary of the recently-instituted "Agri-Horticultural Society of the Punjab," requesting the establishment of communications and an interchange of seeds, &c., with the Royal Society of Van Diemen's Land.

Mr. Clarke also read a note from Mr. Courtenay, of Port Arthur, giving an account of a sudden rise of tide there to the height of 4 feet, where it remained about 5 minutes, and then as suddenly retired, about 20 minutes before 12 o'clock on Friday, 31st December last, thermometer being 71 degrees and barometer 29·352 inches. Mr. Clarke thought the phenomenon might be connected with submarine disturbance, perhaps with a recurrence of earthquake at New Zealand.

Mr. Milligan stated that about five minutes before eight o'clock on the evening of Sunday, 19th December last, he perceived five or six distinct shocks like those of earthquake, at Oyster Cove, D'Entrecasteaux's Channel. Each shock consisted of several oscillations, and they were repeated at intervals of one to two minutes. The oscillatory motion was east and west, and there were some peals of low muttering thunder, with a few dark cumuli close on the eastern horizon, and one or two faintly-seen flashes of lightning there. The vibratory motion was distinctly remarked by four persons at the same instant.

Conversations ensued on the various topics and objects before the meeting, in which most of the members joined.

The strangers present were Mr. Justice Barry, from Melbourne, and Professor Peet, of Grant's College, Bombay.

The thanks of the Society were voted unanimously for the various donations and communications, and the meeting broke up about the usual hour.

9TH FEBRUARY, 1853.—Monthly evening meeting; Robert Officer, Esq., a Vice-President, in the chair. The following gentlemen were ballotted for and duly elected Fellows of the Society:—His Honor Mr. Justice Barry, of Melbourne; George Anstey, Esq., Captain Hawkins, R.E., and Robert Walker, Esq., of Hobart Town.

The Secretary reported the following presentations to the Library:—From the Royal Geographical Society of London, through His Excellency Sir William Denison, "Anniversary Address at the Meeting of 24th May, 1852; by Sir R. I. Murchison." From Sir Wm. Hooker, and Dr. Joseph Hooker, F.R.S., sundry loose sheets consisting of "Scientific Excursions in New Holland, by Dr. Ludwig Leichhardt." "*Fioræ Tasmaniæ Spicilegium*," with a plate of *Dacrydium Franklinii*;" "*Algæ Tasmanicæ*," &c.

From Walter Mantell, Esq., of New Zealand, through His Excellency Sir George Grey, "Notice of the Discovery of the *Notornis Mantelli*, in the Middle Island of New Zealand, by Walter Mantell."

From Thomas Dobson, Esq., of the High School, Professor Done's monthly "Isothermal Lines of the Globe," with three charts.

From Mr. Phineas Moss, of Hobart Town, "The Journal of a Naturalist."

The following presentations to the Museum were reported:—

From His Excellency C. J. Latrobe, Esq., through Mr. Ronald Gunn, of Launceston, a small collection of "Rock specimens from the immediate neighbourhood of good Sir John Franklin's last known winter quarters near Cape Riley, and from Port Leopold, in Prince Regent's Inlet."

From the Rev. J. H. Fisher, Vicar of Kirby Lonsdale, Westmoreland, through Mr. Thomas Moore, per *Derwentwater*, a valuable collection of rock specimens, with fossils from the Lias and Mountain Limestone, and Silurian and other fossils from Germany.

From Mr. H. Hull, a small collection of sea shells, corallines, and echini, made at Kelso, by Miss Tremlett.

From Mr. Alderman Reeves, of this city, a spirit preparation of a *Moloch horridus* (?) said to have been brought from Swan River.

From Mr. Curzon Allport a collection of English grasses and other plants carefully pressed, dried and named.

From Andrew Clarke, Esq., R.E., a neat model in wood of the bridge now in course of erection over the Derwent, near Dunrobin.

From C. O. Parsons, Esq., a specimen of black shale, capable of being used by carpenters as a coarse graphite for marking on wood, &c., and said to have been procured from strata near Bothwell.

From Mr. Milligan's private collection, two specimens of the Porcupine Fish of the colony—one a Diodon, and the other nearly allied.

The receipt of two cases of Mango Plants at the Society's Gardens, presented by B. Berthon, Esq., was reported.

The Secretary read a letter from Mr. R. C. Wood, of Singapore, to Mr. Dobson, of the High School, recognising in earthquakes and volcanic action the source of hurricane and other such violent disturbances, and giving a series of most interesting details of typhoons and storms which have

traversed the Indian Ocean, the Malay Archipelago, and the Polynesian Seas during the last year. Mr. Wood volunteers his assistance to the Society and to Mr. Dobson in further elucidating this important subject.

Dr. Bedford drew attention to Mr. Courtenay's report of a very sudden and remarkable rise and recession of the tide observed at Port Arthur on the 31st of December last, and stated that he noticed a similar occurrence on the same day at New Town Bay. Mr. Clarke and Mr. Dobson remarked that the surmise of the former of a probable recurrence of earthquake at New Zealand, founded upon this circumstance, had been verified by reports since published in the newspapers.

The Secretary read a note from Mr. S. K. Davie, at Oyster Cove, giving an account of a sudden rise of tide to the height of three feet perpendicularly when about half-flood, and of a recession as remarkable, followed by the ordinary rise and fall in its usual course, about noon on the 30th January last. The water is described as having approached in the manner of a *Bore*.

Mr. Dobson read a carefully-drawn up paper, illustrated by diagrams and charts, showing the course of several Cyclones, which passed in a southerly and easterly direction over this and the neighbouring colonies during last winter, and the corresponding changes in atmospheric pressure and temperature, &c.

Conversations followed on the subjects introduced, in which many of the members present joined.

About half-past nine o'clock a vote of thanks, proposed by Dr. Butler, having been unanimously passed for the various donations and for the papers read, the members soon after separated.

9TH MARCH, 1853.—Monthly evening meeting;—Joseph Hone, Esq., in the chair.

The following gentlemen were balloted for and duly elected Fellows of the Society:—Professor John Peet, of Grant's College, Bombay; Dr. Boyd, of the High School, Hobart Town; Thomas Brown, Esq., of Hobart Town; Phillip Smith, Esq., of Syndall, Ross; John Bisdee, Esq., of Hutton Park; James Dunn, Esq., of Hobart Town; and Alfred A. Butler, Esq., of Hobart Town.

On the recommendation of the Council, the following gentlemen were elected Honorary Corresponding Members:—Joseph Dalton Hooker, Esq., M.D., F.R.S., &c.; John Gould, Esq., F.R.S., &c.; R. C. Wood, Esq., of Singapore.

The Secretary announced the following donations to the Library:—A complete set, 5 vols. and 6 parts, of the "Journal of the Indian Archipelago," from its commencement, presented by the Honourable Colonel Butterworth, C.B.;—a copy of "Leoni's Palladio," folio, published in 1742, with notes, by Inigo Jones—a rare and valuable work on Architecture, presented by J. D. Loch, Esq.; a Treatise on the Illumination of

Light-houses, by Sir D. Brewster, presented by Adam Jackson, Esq.; a Treatise on the Artificial Production of Fish, presented by Dr. Moore, of New Norfolk.

Dr. Moore placed before the meeting, for examination, specimens of Gold-dust brought by him from Fingal, where he saw it washed from the soil: it had the rough, nuggetty appearance characteristic of the gold hitherto obtained there. Dr. Moore presented specimens of indurated bluish-gray slate, thickly studded with cubes of iron *pyrites*, from the same locality.

Mr. H. Hull presented a small nugget of Gold from Fingal, weighing 18 grains.

Mr. Milligan submitted an assay of Tasmanian Gold-dust made by Samuel Thomas Abell and Co., of London, through the kindness of W. W. Saunders, Esq., of Lloyd's, which gives—

Gold	95·29
Silver	4·50
Copper	·19
Loss	·02
	100

Representing therefore a fineness of 22 carats 3½ grains; and after deducting loss in melting, and expences of melting, assaying, and brokerage, equal to a net value of 79*s.*, or 79*s.* 3*d.* per ounce.

The Secretary also submitted for inspection a massive nugget of gold from Mount Korong, Victoria,—weight 44 oz.

Fragments of quartz containing gold and pyrites of iron with gold interspersed, broken from a solid mass of auriferous quartz traversing the slate in the vicinity of "Specimen Hill" and "Sailors' Gulley," Victoria, were received from Mr. John Amos, who, with his brother and another partner, successfully worked the gold *in situ* for ten weeks, quarrying, blasting, and incinerating the quartz from which the precious metal was afterwards easily picked out.

Fragments of compact white quartz containing gold disseminated in grains, and deposited in drusy cavities and mixed with iron pyrites, together with specimens of drift gold arrested in an arenaceous conglomerate over soft clay slate, were received from Mr. William Robertson, of Macquarie-street.

Mr. John Abbott presented the skin of a nankin or ash-coloured duck recently shot at Muddy Plains, considered by some members an Albino variety, while others thought it a young specimen of Gould's *Leptotarsis Eytoni*, which it resembles a good deal in the form and colour of the head, neck, legs, and feet, but which had hitherto been only met with at the north of Australia.

Mr. Abbott, Dr. Agnew, and Mr. Propsting remarked on the unprecedented numbers in which the duck tribe have appeared along the coasts and throughout the length and breadth of Tasmania during the last few

months, and it was observed that the influx has been attributed to the fact of the birds having been disturbed and driven away from almost every river, creek, and lagoon of the south end of Australia; while reports state, on the other hand, that ducks are equally superabundant there as in Tasmania.

A letter from J. D. Loch, Esq., was read, transmitting for the Museum two large and elegant brass "Ghurrahs," or vessels used for holding water by the Hindoos, and procured at the "Holy City of Benares;" the ordinary jars used for the same purpose in India being made of porous red earthenware.

Mr. Loch also presented a long two-edged sword from India, with some remarks on the peculiar and dexterous manner with which a cut is made by those practised in its use.

The receipt of the skin of a white hawk, *Astur Novæ Hollandiæ*, (Vigor & Horsf.) was reported.

Mr. Milligan added to the collection the carapace of a small hawk's-bill turtle *(Chelonia imbricata)*, and a bottle of Manna, collected under the *Eucalypti* in the Government Domain at various times, from September last up to this date.

The receipt by the Superintendent of the Society's Gardens of two cases of plants, ex *Derwentwater*, through His Excellency Sir William Denison, containing 67 plants, of which 13 were dead; of one case, per *Derwentwater*, containing 24 plants, of which five were dead,—and of a packet containing 220 sorts of seeds, from Lieutenant Smith, R.N.; and of a case, per ship *Quito*, from Messrs. Backhouse and Son, of York, through Mr. G. W. Walker, containing 42 plants, of which 18 had perished, was announced.

The following varieties of Apple from the Society's Gardens were submitted for the opinion of members by Mr. Newman:—

1 New Hawthornden
2 St. Lawrence
3 Grey cider
4 Herefordshire pearmain
5 Old Hawthornden
6 Kerry pippin
7 Beachenwell
8 Spread-abroad cider
9 Ribston pippin
10 Alexander
11 ————
12 Lincolnshire Holland pippin
13 Cockle pippin
14 Reinette Française
15 Royal Russet
16 Mobs' Royal
17 Woodrick cider
18 Devonshire redstreak
19 Hughes' golden pippin
20 Newtown pippin
21 Nonpareil russet
22 Robinson's pippin
23 White Spanish reinette
24 Downton pippin
25 Early summer apple
26 Royal Jack cider
27 Caldwell's keeping
28 Scarlet nonpareil
29 Sturmer's pippin
30 Downton nonpareil
31 Pine-apple russet
32 Reinette du Canada
33 Desert apple (?)
34 Golden pippin
35 Golden nonpareil
36 Bradick's ditto
37 Siberian bitter-sweet cider
38 Franklin's pippin
39 Ireland's apple
40 Court of Wick
41 Rock pippin
42 Monk's codlin.

The Secretary then read the paper lately furnished by Mr. Dickenson to

the Society, explanatory of rock specimens from the gold districts of Victoria presented to the Museum by him, and specially descriptive of the geological characters of the Bendigo Gold-fields.

A vote of thanks having been passed to the various parties who had made donations and furnished communications to the meeting, the members separated a little before ten o'clock.

13TH APRIL, 1853.—Monthly evening meeting; His Excellency Sir W. T. Denison, President, in the Chair.

The following gentlemen were elected fellows of the Society:—Captain Hamilton, R.E.; Thomas Moore, Esq., of New Norfolk; R. H. Bland, Esq., of Melbourne.

The presentations to the Library were, "A Treatise on Flax Manufacture," from His Excellency Sir W. Denison. Fifteen numbers of the "Journal of the London Horticultural Society," from the Rev. J. Bishton, a copy of "Votes and Proceedings of the Legislative Council," in the first and second session of 1852, and of the Acts of Council passed in the first session, by order of the Hon. the Speaker. Eight volumes of "Shaw's Zoology," from Mr. Milligan.

The donations to the Museum were:—By Mr. Edward Macdowell, two boxes of Panoramic Views along the Rhine, in relief, with a description.

By John Abbott, Esq., two unusually large shells of the common Oyster, from the shoals on the margin of D'Entrecasteaux Channel, in the neighbourhood of his estate at Three Hut Point.

By A. B. Jones, Esq., seventeen coins, eight of silver, and nine of copper, amongst them one silver groat of Charles II., having on the *Obverse* the King's bust, in profile to the left, laureated, in a Roman Mantle, buttoned on the shoulder; and on the *Reverse*, 4 C's interlinked under a Crown, with Rose, Thistle, Fleur-de-Lis, and Harp in the quarters, dated 1679. One silver two-penny piece of Charles II., *Obverse* same as the preceding, and on the *Reverse* 2 C's interlinked under a Crown, date 1672. One silver penny of Charles II., *Obverse* same as the preceding; on the *Reverse* one C crowned, date 1672. One silver halfpenny of Charles I., having on either side a full-blown Rose, without name, date, or motto. One silver piece of Philip V. of Spain, date 1724. One silver piece, value 5 soldi Italian, of the Emperor Napoleon, date 1810. One silver (Ana?) piece, East Indian. One other silver piece, a fragment, (Dump). One Copper Guernsey penny, 1834. One Copper American cent. One Copper piece, Austrian. One copper piece of Sardinia, 1795. Three copper pieces, East Indian. One copper piece, value one centesimo, Lombardo-Venetian State, 1822. One Copper piece of Pius Septimus, 1802.

By Mr. Hugh Hull, a sample of magnetic Iron-sand, (said to have been found at Tolosa), and amongst it a fragment of a pink-coloured crystal, said to be amethyst.

By Mr. Adam Jackson, of Ross, a collection of fac-similes of some remarkable documents, and of autographs of many celebrated persons.

By Mr. Robert Pringle Stuart, A.P.M. of George Town, a very beautiful specimen of Iron Pyrites (*white* variety), arranged in a fasciated acicular or fibrous form, with a fragment of limestone from the quarry at "Middle Arm," on the Tamar River, where it is said to have been procured about 15 feet beneath the surface.

By Mr. W. G. Elliston, a good spirit preparation of portion of the *Glottis* of the *Larynx* of an Albatross.

By Lieutenant Young, H.E.I.C.S., the skin of a wild sheep from Thibet.

The Secretary placed on the table specimens of the five feet seam of Bituminous Coal, recently passed through by the Douglas River Coal Company at a depth of 188 feet from the surface.

This led to an animated discussion on the economic value of the several coal-fields of the island, and on the measures set afoot, or now in contemplation, for bringing coal from various of them into the market.

His Excellency the President stated that he had lately visited the Mersey and Don Rivers, and examined the deposit of coal there—that he had found the seam two feet six inches in thickness, dipping about one in ten, and that the coal it yields is of the finest quality—that in working it extensively the rapidity of the dip may create difficulties, and that shifts in the strata appear to prevail—that a tramroad nearly of the same length as that now in progress from Wabb's Harbour to the Douglas Coal Company's pits will be required, but that the Mersey affords every facility that could be desired for shipment of the coal when once brought down. The trial shaft now being sunk by Williams on the west side of the Mersey above the township has been carried down 150 to 200 feet, and there is yet no appearance of coal. His Excellency inspected the beds of combustible schist (Dysodile?) on the Mersey, and has sent a quantity of it to Sir Henry De La Beche, to have it examined at the Museum of Economic Geology, London. The practicability of forming a tramway from "Mount Nicholas," at Break-o'-Day, through St. Mary's Pass to George's River, so as to introduce the magnificent coal of that district into the market, was fully discussed; and considering the engineering difficulties to be overcome, and the great length of road unavoidably necessary, it appeared to be the impression that a sum of £35,000 at least would be absorbed before coal could be delivered at the place of shipment. His Excellency observed that the great thickness and position of the coal-seam on Mount Nicholas would give it vast advantages were the road once formed, as the coal would be worked and brought out by *adit*, and that there never could occur any embarrassment from water, the fall to the plains below being several hundred feet; and that both there and at St. Mary's Pass the circumstance of a rapid descent might be turned to account, so as to make the loaded waggons draw up by their descent the empty waggons on their return.

In reply to a remark made on the supposed failure of the beds of coal

now worked at Port Arthur, Sir W. Denison said that coal was known to exist at Salt Water River and Impression Bay, and that there is no good reason for believing the beds exhausted where the works now are, unless it be in the immediate vicinity of the present shafts.

The progress made with the tramway and the works upon the location granted to the Douglas River Coal Company on the East Coast, and the probability of the urgent and rapidly increasing demand for a superior fuel being shortly supplied from this source, fell also under discussion.

The meeting, after passing a vote of thanks to the several persons who had made donations, broke up about half-past nine o'clock.

11TH MAY, 1853.—Monthly Evening Meeting; His Excellency Sir W. T. Denison, President, in the chair.

The following gentlemen having been balloted for were declared duly elected:—James M'Arthur, Esq., of Deloraine; D. T. Kilburn, Esq., Francis Marshall, Esq., of Hobart Town. Other nominations were made for the next ballot.

The following presentations were made—

To the Library, by Mr. Pringle Stuart, a pamphlet dated London 1709, entitled "A New Theory and Method whereby the True Longitude, &c. may be found." By George Keith, M.A., &c.

To the Museum, by Sir W. Denison, samples of a clay rock, coated with a bluish-green incrustation, and forwarded to His Excellency from Sorell, under the supposition that they contained copper. Upon examination with the microscope, the green colour is found by Dr. Butler to be due to a minute fungus spreading in continuous patches over the surface, penetrating into the crevices, and lining the natural cleavage of the rock. The green colour caused by this delicate fungus is apparent enough in certain situations upon the sandstone and compact clay rocks on the Brown's River Road and along D'Entrecasteaux's Channel.

By A. C. G. Ashton, the jaws of a fish of the shark tribe, obtained in the China Sea, akin to *Squalus cornubicus;* also the skin of a snake, not named, about nine feet in length, said to have been met with near Moreton Bay.

By Mr. Lodge, through Mr. Rolwegan, of Collins-street, a fragment of fossil wood, from Burwood, near Newcastle, New South Wales—part of a mass weighing about half a ton deposited in the Sydney Museum; also a piece of curiously crystallized quartz from Green Creek, about thirty miles from the Hanging Rock, New South Wales.

By Mr. Lloyd, of Bryn Estyn, a specimen of silicified wood, found in the surface soil by the side of his residence, and probably belonging to detritus of the sandstones and argillaceous beds over the coal-measures. In the vicinity of the coal-rocks the surface and the soil to a considerable depth are often observed to be replete with similar fragmentary pieces.

By Mrs. Belstead, through Mr. H. Hull, two well-preserved skins of the handsome "Tropic bird" of the South Sea and Indian Ocean (*Phaeton phœnicurus*, Gmel.), procured at Norfolk Island, which is one of its breeding places.

By Mr. Marcus Aitkin, a stuffed specimen of the spur-winged plover of Tasmania ("Wattled Pewit," *Lobivanellus lobatus*, Gould), shot near Fingal. In the Museum there are also specimens shot near Oatlands by Mr. F. G. Anstey.

By Mr. Curzon Allport, two pieces of jet-like lignite broken from a fossilized tree imbedded in the bank of the River Derwent, near Cawthorn's, at Macquarie Plains—the principal portion of the trunk of the tree having been mineralized with silex.

Mr. Milligan stated that in the tertiary and post-tertiary strata forming the cliffs along the eastern side of the extensive estuary at Macquarie Harbour masses of fossilized wood are very frequent; that they are occasionally found partly converted into ferruginous sandstone, partly silicified, partly in the form of jet or dense lignite; that the woody tissue and resinous matter have in some instances been recognizable in the cavities of these mineral logs, and that they are almost always veined and dotted with white iron pyrites.

Sir William Denison drew attention to specimens of lignite deposited in the Museum, obtained by himself on the margin and in the channel of the Ouse River, near the bridge beyond Hamilton. His Excellency also reminded the meeting, that from Mr. Chilton's farm, near Hamilton, he had brought pieces from the symmetrical trunk of a silicified tree horizontally imbedded in the sandstone overlaying the coal-beds there.

Mr. Curzon Allport submitted to the meeting two samples of wheat—one having the aspect of "White Lammas," the other furnished with an unusually long-bearded ear and yielding an elongated coarse grain. This variety appears to have been reared as an experiment, but its history was not given, and it was not identified by any of the members present. Mr. C. Allport also produced a specimen of vesicular scoria or cinder, a product of the incineration of the wheat straw.

By the Rev. H. Millar, a good hand-specimen of compact white quartz richly interspersed with gold, from California; also a specimen of argillaceous rock replete with *fenestellæ*, and other marine remains characteristic of the palæozoic series with which the sections upon the Brown's River road near Cartwright's have made every one familiar, and which appears to be closely associated with the limestone flanking Mount Wellington and "The Dromedary," the ranges near Marlborough and the western mountains, and which again shows out at Fingal, on the Eastern Marshes, near Stanfield's, and again on Prosser's River, on Maria Island, and at East Bay Neck and Eagle Hawk Neck, &c. Mr. Millar's specimen was obtained near the Huon River, upon the estate of Mr. Kellaway.

Mr. Milligan contributed a mat of figured Tapa Cloth, remarkable for the distinctness of the colours employed and for the neatness and fidelity of the pattern.

An Esquimaux fishing canoe has been forwarded to the Reservoir at the Gardens by Mr. John Johnson, of the New Wharf. Mr. Johnson has also presented to the Museum paddles belonging to the canoe, with fishing spears and lines, and stout whaling lines made of the hide of the walrus: also a pair of Esquimaux snow shoes; a water bucket constructed of whalebone sewed with thongs of seal-skin, and carried by linked chains of ivory; an Esquimaux dress of deerskin; a coat-of-mail composed of plates of bone and ivory, secured with thongs of walrus hide, and intended for the protection of the body from the shoulders downwards; also a conical helmet of whalebone, tastefully edged and decorated with ivory, together with several water jars made of the skins of young seals.

The Secretary reported that the Council of the Society have forwarded, through the Colonial Government, to the Government at St. Helena, for cultivation there, a packet containing seeds of upwards of eighty species of trees, shrubs, and other ornamental plants indigenous to Tasmania. The Secretary read a note from Mr. Clarke, transmitting a copy of the *Nelson Examiner* of the 8th January, in which "a severe shock of earthquake" is reported to have occurred at Nelson, New Zealand, on Saturday, the 1st January, and drawing attention to the almost cotemporaneous occurrence of an unusual rise and sudden recession of tide at Port Arthur on the 31st December, 1852, as communicated to the Society in a note from Mr. Courtenay, at the meeting on the 12th of January last.

A paper was read by Mr. Thomas Moore, containing the remarks of a practical English geologist upon a series of specimens of rocks and minerals collected some years ago in various parts of Van Diemen's Land, and taken home by Mr. Moore for examination. From this paper it appears that *tin*, *zinc*, *silver*, and traces of *gold* were observed in the *killas* of St. Paul's Plains, the *Serpentine* of the Asbestos Hills, and the *syenitic granite* from St. Mary's Pass. Mr. Moore obligingly offered to revisit the precise localities referred to with the Secretary of the Society.

On the motion of Mr. P. Fraser, seconded by Mr. Hone, the thanks of the meeting were accorded to Mr. Moore for his valuable paper.

On the motion of Dr. Agnew, seconded by Mr. Crombie, a vote of thanks was also passed to the various persons who made donations to the Library and Museum.

The Secretary reported the receipt, per *Morning Star*, of the following Medals and Certificates, &c. for Tasmanian contributors to the Exhibition of the Industry of All Nations:—

Award of the Queen's Commissioners.

A Medal "for services," to Sir William Denison.
A Medal "for services," to Joseph Milligan.

Certificates of Prize Medals

Awarded by the Jurors to the following persons in Van Diemen's Land.

Sir W. Denison.
Capt. W. C. Hadden, R.E.
Rev. F. Brownrigg.
Henry Dowling.
A. M. Milligan.
Alex. M'Naughtan.
R. V. Hood.
W. Whitesides.
W. Fowler.
J. Milligan.

Certificates of Honourable Mention made by the Jurors.

Sir W. Denison, collection of produce.
W. Rout, for wax.
W. Watchorn, oils.
J. Boyd, marble from Maria Island.
Rev. E. Freeman, woods.
Lieutenant Smith, R.N., wattle gum.
M. Quin, collection of woods.
E. Tooth, malt.
P. Oakden, wools.
J. Milligan, collection of produce.
J. Walker, fine flour.
W. Murray, starch.
S. Moses, whalebone.
F. Lipscombe, a ham.
F. Lipscombe, flax.
J. Dixon, flax.
Hugh Hull, woods.
James Grant, wools.
Brown and Co., oils.
T. Button, tanning substances.

Exhibitors' Medals—Awards of the Jurors.

John Brown, Launceston.
W. Adcock, Hobart Town.
W. Strutt ,,
R. V. Hood ,,
F. Patterson ,,
H. Hull ,,
W. Hamilton ,,
L. Pearson ,,
W. Fowler ,,
G. Rolwegan ,,
W. Rout ,,
J. Boyd ,,
A. Fraser ,,
R. Cleburne ,,
Lieut. Smith ,,
W. Whitesides ,,
Douglas River Coal Company.
Philip Smith, Syndall.
R. Q. Kermode, Mona Vale.
J. E. Bicheno.
A. Walker, Norfolk Plains.
F. Lipscombe, Hobarton.
W. Champion ,,
Archdn. Davies ,,
R. Strachan ,,
G. Marshall, Pittwater.
Dr. Valentine, Campbelton.
T. Button, Launceston.
Mr. Robinson, Westbury.
G. Peck, Hobart Town.
Mr. Symonds ,,
Brown & Co. ,,
Jas. Thomson ,,
Mr. Haynes ,,
I. G. Reeves ,,
A. M'Naughtan ,,
W. S. Sharland, New Norfolk.
J. Barnard, Hobart Town.
Spt. Queen's Orphan Schools.
Mr. Crocker, Sorell.
Mrs. M'Kenzie, Blue Hills.
C. T. Smith, Hobart Town.
C. Ward ,,
Archdeacon Marriott, New Norfolk.
Mr. Tibbs, Hobart Town.
Mr. Wiseman ,,
W. Gunn, Launceston.
J. Walker, Hobart Town.
Mr. Armstrong, ,,
W. Murray ,,
S. Moses ,,
T. Y. Lowes ,,
J. Dixon, Skelton Castle.

Council of the Royal Society of Van Diemen's Land.

Exhibitors' Certificates.

Mrs. Burgess.
„ Fenton.
„ Sharland.
„ Steiglitz.
„ Mackenzie.
Sir W. Denison.
Mr. Dunn.
„ Quinn.
„ Robinson.
„ Barnard.
„ Brock.
„ C. T. Smith.
„ H. Clayton.
„ F. Patterson.
„ A. M. Milligan.
„ G. Marshall.
„ R. Strachan.
„ J. Brown.
„ Champion.
„ Pearson.
„ I. G. Reeves.
„ A. Fraser.
„ Hamilton.
„ W. Adcock.
„ Hart.
„ Marshall.
„ W. Gunn.
„ Lumsden.
„ R. Cleburne.
Inmates Queen's Orphan Schools.
Mr. Wiseman.
Archdeacon Marriott.
Mr. Fielding Browne.
Mr. Anderson.
Mr. Rolwegan.
„ A. Walker.
„ T. Y. Lowes.
„ Harper.
Archdeacon Davies.
Mr. J. Sly.
„ Regan.
„ C. Ward.
Dr. Valentine.
Mr. Jas. Thomson.
„ John Watson.
„ W. S. Sharland.
Messrs. Blackburn and Thomson.
Lieut. Akers, R.E.
Mr. W. Sharland.
„ George Kemp.
„ Reeves.
„ R. De Little.
„ T. Screen.
„ J. Haynes.
„ J. E. Bicheno.
„ J. Abbott.
„ Bonney.
„ F. Cox.
„ R. C. Flegg.
„ T. D. Jennings.
„ E. Symonds.
„ R. Q. Kermode.
„ W. Strutt.
„ Tibbs.
„ Philip Smith.
„ S. Moses.
„ George Peck.
„ J. Milligan.

Council of the Royal Society of Van Diemen's Land.

After inspecting the medals, &c., His Excellency the President left the chair, and the members separated soon after.

8TH JUNE, 1853.—Monthly Evening Meeting. In the absence of His Excellency the President and of the Vice-Presidents, the chair was occupied by James Barnard, Esq., a member of the Council of the Society.

The following gentlemen, having been proposed and ballotted for, were declared duly elected into the Society:—Robert Pringle Stuart, A.P.M. of George Town; George Carr Clarke, of Ellinthorpe Hall; Arthur Smith, of Ross; Pringle Whyte, of Glendhu; John Price, of Hobart Town; James Dixon, of Skelton Castle; and the Rev. Dr. Herman Hoeltzel, of Hobart Town.

The Secretary read a note from His Excellency Sir William Denison, transmitting for the Society's Library "The Journal of the Royal Geographical Society of London," Vol. 22, and "The Second Report of the Commissioners for the Exhibition of 1851."

A communication from William J. Hamilton, Esq., Secretary of the Geological Society of London, was read, acknowledging the receipt of Part 1, Vol. 2, of Papers and Proceedings of this Society.

A communication from Edward Solly, Esq., Secretary to the Society of Arts, London, was read, presenting the "Journal of the Society of Arts, &c.," No. 14, and soliciting interchanges.

The Secretary announced receipt of the "Journal of the Royal Institution of Great Britain," Part 2, and of the Report, with lists of members, officers, &c., for 1851.

Mr. Milligan announced receipt of two cases of books (Awards of the Juries), large and handsomely-bound volumes, of which one is ordered, by Her Majesty's Commissioners for the Exhibition of 1851, to be presented to Tasmanian Exhibitors; amongst them a volume (laid on the table) for the Royal Society of Van Diemen's Land.

Mr. Ronald C. Gunn forwarded for presentation to the Library of the Royal Society "Catalogue of the Specimens of Lizards in the collection of the British Museum."

The Rev. Mr. Cohen sent for the Museum two medals, one of Count Moellendorf 1793, and one having on one side a head of Moses, the Jewish Lawgiver, with the leading words of the Decalogue on the reverse, in Hebrew.

Mr. Thomas Browne, of Macquarie-street, presented an Irish halfpenny of 1725, and an Indian copper coin.

Mr. Brock, of Macquarie-street, presented a two-real piece (silver) of New Grenada.

Mr. C. T. Smith contributed a *Gordius* in a bottle of water.

Mr. Samuel Moses presented a silk waistcoat once worn by the famous "Tom Thumb."

Mr. F. W. Newman presented a few of the grotesque seed vessels of *Trapa bicornis*, the kernel of which is eaten by the Chinese; also, from the Island of Formosa, a section of the pith of the Araliaceous plant, from which Rice Paper is cut by the Chinese.

Mr. Macnaughtan presented specimens of a fossiliferous clay, taken from

a depth of 240 feet by Z. Williams, at the Mersey River, and which will probably be found identical, in geological position, with the spiriferous clay-rock and limestone underlying the coal measures; also three cases of insects and three cases of shells, all in fine condition.

The Secretary reported receipt at the Society's Gardens of three cases of plants, from Messrs. Lee of Hammersmith, per *Abberton*. Out of 23 plants contained in the *first* case—chiefly camellias, rhododendrons, and azaleas—eight were found dead; out of a varied and choice assortment of 23 plants contained in the *second* case, sixteen were alive; and the *third*, containing, with some select sorts of rose, the newest and most choice varieties of fruit-trees—namely, apple, pear, plum, cherry, currant, gooseberry, and raspberry—are in so sickly a condition that few, if any, will survive.

The receipt of a case containing 24 plants, ex *Abberton*, from Captain Goldsmith, was reported. Of these, six only have survived—namely, 3 varieties of Camellia, 2 varieties of Francisca, and 1 Scutellaria.

The Secretary read a note presenting, in the name of the Hon. Colonel Butterworth, a case containing 33 plants from Singapore—namely, 7 *Nepenthes ampullaria*, 14 *Nepenthes Rafflesia*, 2 *Hypericum monogynum*, 4 *Euphorbium splendens*, 2 *Ixora coccinea*, 2 *Gardenia Fortuni*, 1 *Hoya Imperialis* (dead), and 1 *Arundina*, a fine Orchid—said by Mrs. Butterworth to thrive at an elevation of 2000 to 3000 feet at Mount Ophir.

A short paper by R. C. Gunn, Esq., F.L.S., was read upon the extent to which identity of vegetable forms is found to exist in the Islands of New Zealand and Tasmania, so far as may be gathered from Part 1 of the "Flora of New Zealand," by Jos. D. Hooker, M.D. R.N., F.R.S., &c.,—in which Mr. Gunn alludes to the remarkable fact that the two genera of plants, *Eucalyptus* and *Acacia*, which are so abundantly prevalent throughout the Australias as to give a character to its vegetation and landscape, are in New Zealand altogether absent.

The Secretary read the annexed report by W. J. Macquorn Rankine, Esq., C.E., F.R.S.E., F.R.S.S.A., &c., on the practicability and probable cost of establishing an Electric Telegraph between Hobart Town and Launceston, and thence to Cape Portland—to be continued to Melbourne, Geelong, and Adelaide on one hand, and to Sydney on the other.

The cost of the Hobart Town and Launceston line, it will be seen, is estimated at about £3500. Allowing for the alteration which has taken place in the price of labour and materials here, the actual cost would probably scarcely exceed £5000, practical facilities for construction being presented along the cleared margin of the main line of road. It is understood that there exists large tracts of naturally clear ground between Cape Portland and Launceston, along which no great difficulty would be experienced or expense incurred in suspending a wire free from chances of rupture. The difficulty of sinking the electric cable from island to island, between Cape Portland and Wilson's Promontory, would not be formidable; and for the rest, whatever its magnitude, the rapidly accumulating capital and vast resources of the adjoining colonies would be more than adequate.

Mr. Alexander Macnaughtan, who transmitted the Report to be submitted to the Society, gives the following extracts from the letter of a mercantile friend at home:—

"Mr. Rankine has been engaged in the laying of wires extensively here and in other parts of the kingdom.

"I can discover nothing at all impracticable in the Report, even with the limited knowledge at present possessed in the art of laying submarine cables. This mode of telegraphing is yet in its infancy; but so many scientific men are at work upon it, that we may reasonably expect a better and cheaper line of submarine communication will be shortly announced.

"Suppose the wires laid as enumerated, and take for example the steamer *Formosa*—she left Sydney on the 9th November, Victoria 16th, and Adelaide 19th, and arrived in England in time to send on her mail by the *Precursor*. By this means we had news from Adelaide to the 19th November published in the London *Times* on the 10th January—only 59 days (!!!) from Adelaide. Were the telegraph established, news from all the Australian ports might have been received to the same date.

"In America they have a telegraph from New Orleans to New York, a distance of 2700 miles—nearly as far as from New York to Liverpool; and by each steamer that arrives we have news from New Orleans up to the previous evening of the starting from New York.

"It has been pronounced practicable, and is in contemplation, to have a submarine telegraph from this country to America—from Orkney via Iceland and Greenland; and I believe it is only a matter of time, *the having* wires laid all the way from Britain to Australia."

Mr. Macnaughtan gives the following instances of the advantages to accrue from the electric telegraph:—

To Government—In communicating with the neighbouring Governments, with ships-of-war, military authorities, police, &c., throughout the colonies.

Post-office Department—Communicating arrivals and departures of mails, times fixed for despatch of mails, &c.

Banks—Communicating with all the branches on the same day on the regulation of their business, fixing Exchanges, transactions with Government and with other Banks—without the delays and loss often arising from the ordinary mode of postal communication.

Shipping—Communicating arrivals and departures of vessels, names of passengers, nature and amount of cargo, &c.

Merchants—Communicating messages expeditiously to correspondents and agents, and generally to facilitate the diffusion of commercial intelligence; and

The Public at large—The instantaneous diffusion, by "the magic minister to knowledge," of political, foreign, and general intelligence: discovering to one part of the world the requirements and necessities of another—operating as a detective of and deterrent from crime—diminishing the chances of surprise, and so lessening the probabilities and dangers of war, &c.

REPORT *on the Construction and probable Cost of a proposed* Electric Telegraph *between Hobart Town and Launceston, Van Diemen's Land; with Remarks on a* Submarine Telegraph *between Van Diemen's Land and Australia—connected with Sydney, Melbourne, and Geelong.*

First—Construction of the proposed Hobart Town and Launceston Electric Telegraph.

When the length of the proposed line of Telegraph is, as in the present instance, considerable—compared with the number of stations which will probably be required—it is always desirable, if possible, to use a single wire only; for though the instruments required for commercial purposes on this system are more expensive than those which involve the laying of the two wires, this increased expense is very greatly exceeded by the saving in the cost of wires, both for construction and for repairs.

Single-wire telegraphs are used almost universally in the United States, and are now being introduced to a considerable extent into Britain.

I therefore recommend that, for the proposed Telegraph, a single wire should be used, and also that it should be of galvanized iron, of the size No. 8, and suspended from posts and trees, at a height of from 18 to 20 feet from the ground.

In very moist and foggy climates, in districts where it is difficult to find materials for posts, in localities where a suspended wire would be exposed to damage from storms or violence, and where repairs would be difficult of execution, and for lines of communication where the revenue is expected to be sufficient to warrant an additional investment of capital for the sake of durability, it may be preferable to use a copper wire, coated with gutta percha, and encased in an iron wire cord, the whole being buried in the earth; but in the present instance it does not appear to be necessary to have recourse to this more expensive mode of construction.

The posts ought to be of the hardest and most durable wood, which can be readily found in the locality: they should be not less than five inches in diameter at the butt end, and from three and a-half to four inches at the smaller end, and not less than twenty-two feet long.

They ought to be properly seasoned, roughly pointed at the lower end, and charred for about four feet up, and should be planted about three feet deep in the ground: where necessary, their stability may be increased by having stays of the same wire which is used for the Telegraph fixed to them, but care should be taken not to fix the stays too near the conducting wire.

The wire is fixed to the posts by supports, called insulators, which are of various kinds: as the whole efficiency of the telegraph depends on the completeness with which these insulators prevent the escape of the electric current from the wire to the posts, they ought to be of the best kind that can be procured. I recommend a contrivance, called in Britain Liddell's Insulator, originally used in America.

The cheapest telegraphic instruments are those which make signals by the motions of light magnetic needles. The double-needle instrument generally used in Britain costs about £12, the single-needle instrument about £7, and the additional cost of an alarm-bell apparatus is about £5; but the double-needle instrument of course requires two wires; and the single-needle instrument, although extremely useful for transmitting a limited number of signals, such as those relative to the working of a railway, is too tedious in its operation to be adequate to the rapid transmission of news and commercial messages.

I therefore recommend the adoption of the electric-magnetic instrument used in America, and known as Morse's, which works with a single wire, and transmits messages by marking dots and strokes on strips of paper, for although this instrument costs about £45, the additional expense, at the moderate number of stations which will probably be required, will be much more than compensated for by the great efficiency and rapidity with which messages are transmitted by it.

Second.—Probable cost of the proposed Hobart Town and Launceston Electric Telegraph.

The instruments, insulators, and wire for the proposed telegraph must of course be sent from Britain; and it will be necessary to send in charge of them a skilful mechanic, who will superintend the erection, and instruct the workmen who may be engaged in Van Diemen's Land to assist him. It may be advisable also to send an Assistant along with the Inspector, to take his place in the event of his dying or being disabled. The passage money of this Inspector and his Assistant will form an item of preliminary expenditure.

The instruments will, as I have stated, cost in Britain about £45 each.

The cost of offices or station-houses can of course be estimated on the spot.

The insulators, of which thirty will be required in each mile, may be estimated at about 1*s.* 3*d.* each.

In the present fluctuating state of the British Iron Market (caused chiefly by the operations of speculators), it is difficult to form a precise estimate of the cost of the galvanized wire, or, indeed, of any other article of iron. The *present* price is 40*s.* a cwt. of the best quality, and I have inserted this in the annexed Estimate; but it may safely be anticipated that before the execution of the Telegraph an opportunity will occur of making a contract at about 20 per cent. lower, that is, about 32*s.* per cwt. I wish it, therefore, to be understood that, although I have estimated the wire at the present high price, I think it probable that the actual cost may prove to be about one-fifth part lower.

The weight of the wire per mile is 3½ cwt., but to allow for stays and other extras, I have estimated the quantity required at 4 cwt. per mile.

The posts, of which there will be thirty to the mile, can be estimated on the spot.

The same is the case with the cost of fitting-up the Telegraph, especially in the present fluctuating state of wages in Australia and Van Diemen's Land. I specify in the annexed Estimate the time occupied in fitting-up, on the supposition that the men employed, having been instructed by the Inspector, set out in parties of two—a principal fitter and a labourer or assistant,—each party with a horse and cart, to convey their materials and provisions if necessary, the road being understood to be a good one, and that each party take from three to four days to erect a mile of telegraph.

I leave, however, the rates of wages blank.

ESTIMATE.

Passage-money and expenses of Inspector and his Assistant ...			
Instruments for —— Stations at £45 each			
Station-houses or offices			
Conducting-wire and fittings—cost per mile.....			
Four cwt. No. 8 galvanized best charcoal iron wire, present price 40*s.*	£8	0	0
Freight, £5 per ton	1	0	0
Thirty insulators, at 1*s.* 3*d.* each	1	17	6
	£10	17	6
Thirty Posts, 22 to 24 feet long, 5 inches diameter at large end, and 3 to 4 inches at smaller, of hard and durable timber, seasoned, including labour and cartage			
Fitting up wire, fitter and assistant, four days, at			
Horse and Cart, 4 days, at			
Miscellaneous expenses			
One hundred and twenty miles of wire, at £			
	£		
Contingencies 10 per cent.			
Total..... ..... £			

The prospective fall in the price of wire in Britain, to which I have already referred, would diminish this estimate by about 32*s.* per mile, or £192 in all. For the reasons already mentioned, it is difficult to estimate the probable annual cost of repairs; 20*s.* per mile per annum may be looked upon as a reasonably safe estimate.

The salaries of the clerks to work the telegraph can only be estimated on the spot.

Third.—Remarks on a Submarine Telegraph from Van Diemen's Land to Australia, in connection with a line to Melbourne, Sydney, and Geelong.

At the eastern end of Bass's Straits, between Wilson's Promontory in Australia and Cape Portland in Van Diemen's Land, there extends a chain of islands which offer remarkable facilities for the laying a submarine telegraph, to communicate through Melbourne with Sydney and Geelong.

The submarine telegraphic cable for this purpose would cost at the present prices, including freight, about £100 per mile, and may probably be obtained for £80. It would consist of detached portions, stretching from island to island between Cape Portland and Wilson's Promontory, and also of two small portions, each about a mile or a mile and a half long, crossing the inlets on each side of Philip Island, which appears to be a better route from Wilson's Promontory to Melbourne than to follow the main land the whole way.

The total length of submarine telegraph required would be about 150 miles, which would cost, including freight, from £12,000 to £15,000 sterling for the cable.

The cost of laying would consist principally of the hire of a small steamboat for ten days or a fortnight.

The length of land-telegraph required in connection with this line would be as follows:—

	MILES.
Launceston to Cape Portland	100
Islands in the Straits, say	20
Wilson's Promontory, by Philip's Island, to Melbourne	180
Melbourne to Sydney	650
Melbourne to Geelong	60
	1010

In the event of its being found desirable to lay some portion of these lines under ground, a light telegraphic cable might be used, similar to a submarine cable, but of about one-fourth part of the weight.

The cost of this cable, delivered in Australia or Van Diemen's Land, may be estimated at about £25 per mile at existing prices.

(Signed) W. J. Macquorn Rankine,
C.E., F.R.S.E., F.R.S.S.A., &c.

59, St. Vincent-street, Glasgow,
February 1853.

[copy.]

Van Diemen's Land Electric Telegraph.

59, *St. Vincent-street, Glasgow,*
19*th February*, 1853.

Dear Sir,—Since writing my original report on this subject, and the letter which I subsequently addressed to you on the 10th instant, I have received information which enables me to fill up the blanks left for the cost of labour, and some other expenses, in my original Estimate.

The sums, however, which I have put down for these items in the Esti-

mate, which I annex, are of course subject to the uncertainty which attends the cost of labour and materials in Van Diemen's Land, and which can be best judged of by persons resident on the spot.

The following is the Estimate which I now submit to you:—

	£	s.	d.
Passage Money and other preliminary payments to Inspector and his Assistants	200	0	0
Four Instruments, at £45 each.....	180	0	0
Four Station Houses, say	180	0	0
	£560	0	0

Conducting Wire and Fittings.—Cost per Mile.

	£	s.	d.
Wire, 4 cwt. at 40*s.* as per former Estimate...	8	0	0
Freight, 4 cwt., at 5*s.*, as before	1	0	0
Thirty Insulators, at 1*s.* 3*d.*, as before.....	1	17	6
Cost, per mile, of materials to be sent from Britain, as before	10	17	6
Thirty Posts, at 2*s.*	3	0	0
Labour, 4 days, at 12*s.* .....£2 8 0 Ditto 4 days, at 6*s.* 1 4 0	3	12	0
Carriage—4 days, horse, cart and driver, 15*s.*	3	0	0
Inspection	1	10	0
120 miles conducting wire, at £22 per mile	£2640	0	0
	£3200	0	0
Contingencies, 10 per cent.....	320	0	0
Total.....	£3520	0	0

I am, dear Sirs,
Yours faithfully,
(Signed) W. J. Macquorn Rankine.

P.S.—I beg leave to add a few remarks respecting the line of Telegraph which I suggested at the end of my Report, to Sydney, Melbourne, and Geelong.

A gentleman well acquainted with the navigation of Bass's Straits has suggested to me that by carrying the Submarine Telegraphic Cable across the western end of these Straits, from Cape Grim to King's Island and to Cape Otway, instead of across the eastern end, as I originally suggested, the advantages would be gained of having a sandy instead of a rocky bottom, and of placing Geelong on the main line instead of on a branch.

Against this must be set the advantages of the other route, in having several islets in its course, which would enable the cable to be sunk in short lengths.

The total lengths of land and submarine Telegraph respectively would be nearly the same by either route.

The preference must be determined by points of detail, which can be investigated in the event of there being a prospect of the carrying out of the scheme.

Yours faithfully,

(Signed) W. J. Macquorn Rankine.

[copy.]

VAN DIEMEN'S LAND ELECTRIC TELEGRAPH.

59, *St. Vincent-street, Glasgow,*

10*th February*, 1853.

Dear Sir,—Since reporting on this subject on the 29th ultimo, I have continued to make enquiries respecting the price of wire, and find it can now be had much lower than my original estimate of 40*s.* per cwt. I find that from information I have received to-day, that No. 8 galvanized telegraph wire, in quantities not less than ten tons, can now, and for three months hence, be delivered at Liverpool for £33 per ton; so that, including freight and other expences, its cost will probably not exceed £39 to £40 per ton. This will diminish the estimate of the cost of materials by about £1 per mile.

SUBMARINE TELEGRAPH.

I find from the number and extent of the islands in Bass's Straits, that the length of the submarine telegraph required to connect Van Diemen's Land with the Australian Continent would be only 120 miles, instead of 150 miles, as formerly calculated; the extent of land telegraph would be increased by a corresponding amount; so that the total length of telegraph between Launceston, Sydney, Melbourne and Geelong would be:—

	Miles.
Submarine.....	120
Land.....	1040
Total.....	1160

I am, dear Sir,

Yours faithfully,

(Signed) W. J. Macquorn Rankine.

A conversation ensued on the Report, in which Mr. Fraser, Capt. Young, Col. Last, Mr. Dobson, Mr. J. L. Burnett, Mr. Boot, &c., took part; the great advantages to the community of an Electric Telegraph being fully admitted, and the line from Cape Portland through the chain of islands in Bass's Straits to Wilson's Promontory being considered the best; while some doubts were expressed of the necessary capital and enterprise being found to carry out the project. It was observed by the Secretary, that magnetic wires are now being stretched over British

India—that, ere long, these will be connected with the European systems of Electric Telegraphs, and that the day is probably not far distant when a branch of the "Great Trunk Line" will be extended along the Malay Peninsula and through the Archipelago by Timor to North Australia, (where in all probability there may again be a British settlement formed), and thence onward by Western Australia and Adelaide to the gold regions of Victoria.

Mr. Kilburn exhibited his Stereoscope, and promised to reproduce it at next meeting. It is an instrument at once curious, interesting, and delightful to examine, and is a remarkable instance of the mastery of exact science, and as having been one of the many wonderful and valuable products of the Great Exhibition of 1851.

13TH JULY, 1853.—Monthly Evening Meeting; Robert Officer, Esq., a Vice-President, in the chair.

A ballot took place, when the following gentlemen were declared duly elected Fellows of the Society:—John Charles Blackett, of Auckland, New Zealand; Frederick Augustus Ducroz, of Launceston; Augustus Meyer Lochner, R.E., of Hobart Town; Charles Degraves, of Cascades; John F. Cox; James H. Burgess; Robert Lee, B.A., of Hobart Town; and on the recommendation of the Council, the Rev. J. H. Fisher, Vicar of Kirkby Lonsdale, Westmoreland, England, was elected an Honorary Corresponding Member.

The following presentations were made to the Library—By order of the Hon. the Speaker of the Legislative Council of Van Diemen's Land, one volume of "Votes and Proceedings" for the 2nd Session of 1852.—From Mr. Warren, of Argyle-street, one quarto volume in Latin on religious and moral subjects, printed in Black Letter, illuminated, without title-page, name of the author, place or date when printed—the manuscript portion bearing the date of 1472, and as the art of printing was not introduced into England till 1474, the press from which this book issued was probably German, and its date of publication one or more years antecedent to the time of its illumination.—From E. Hathaway, Esq., United States Consul, were received six very elaborate and valuable Charts of Winds and Currents prevailing in various seas throughout the World; by Lieut. Maury, of the American Navy.

Mr. Dobson remarked that Lieut. Maury made the N.E. and S.E. Trade Winds cross into opposite hemispheres, instead of maintaining the old theory of ascent near the Equator.

A copy of the "Reports of the Jurors," and an Exhibitor's Certificate from the Industrial Exhibition of 1851, for the Council of the Royal Society of Van Diemen's Land, were placed on the table.

The following donations were made the Museum:—From the Hon. Colonel Butterworth, C.B., a section nches in diameter and 2 feet in

length) of the trunk of the tree from which Gutta Percha is obtained, with specimens of the bark, twigs, and leaves, and a square box of gutta percha, made to contain the latter; also six painted, hollow wooden-balls, containing each a small stamped ingot of gold or silver, which are scattered by thousands amongst the populace on great State occasions at the Court of Bangkok—similar ingots fastened together in pairs with gold and silver threads, fancy flowers in gold and silver filagree work—rings, specimens of the modern gold coinage of the Kingdom of Siam,—forming, in fact, a portion of a series of presents recently forwarded to Colonel and Mrs. Butterworth by His Majesty Somdetch Phra Paramendr Maha Mongkeet, King of Siam, on the ceremony of his coronation and subsequent marriage to the young and amiable Phra Ong Chan Somanass Waddhanawaddy, "a princess of the highest dignity." From Miss Butterworth were received a collection of dried ferns made at Singapore; a pamphlet printed in Chinese; and a curious hair-comb, such as is commonly used by the Chinese.

Samuel Moses, Esq., presented a small collection of shells from the South Sea Islands, and also a diminutive gold ring, taken from the little finger of General Tom Thumb. From Miss Jackson, of Ross, was received a very large pearl, said to have been obtained from the common edible oyster of Tasmania.

Letters were read from James Mac Arthur, Esq., of Calstock, Deloraine, presenting a box of geological specimens from Barrowa Plains, Yass Plains, Braidwood, Manar, &c., New South Wales; together with a parcel of seed of a grass introduced and cultivated successfully for four years at Braidwood, New South Wales, by the late Dr. Anderson. Mr. Mac Arthur finds that it answers well at Deloraine, and thinks that it may prove a valuable addition to a hay crop. A packet has been sent to the Society's Gardens, and gentlemen desirous of giving it a trial may have seed by applying to the Secretary.

From Andrew Clarke, Esq., R.E., Surveyor-General, Victoria, was received a specimen of *tin ore* from that colony.

Mrs. Whitcomb sent a stuffed specimen of jackdaw (*Corvus monedula*, Linn.) mounted in a glazed case; also a few seeds indigenous to King George's Sound.

Dr. Turnbull presented a specimen of a fine compact pipe-clay, of a yellowish white colour, recently brought by him from his station in the Portland Bay district, Victoria.

From Mrs. Cox were received nine coins, of which seven are silver, one brass, and one copper, plated with silver; namely, 1 shilling of Geo. III. date 1787, in a perfect state of preservation; 1 sixpence, ditto, 1787, ditto; 1 twopenny silver piece ditto, 1780, ditto; 2 threepenny silver pieces ditto, 1762 and 1800, ditto; 1 silver groat, William and Mary, 1691; 1 silver coin, 1683 (?), lion rampant on one side, otherwise illegible; 1 brass coin, of Charles II., without date; 1 copper coin, legend and device totally illegible.

D. T. Kilburn, Esq., presented two framed Daguerreotype pictures of three Aborigines of Victoria, and mentioned the extreme difficulty experienced in getting them to sit a second time, as upon seeing their likenesses so suddenly and accurately fixed, they took him for nothing less than a sorcerer.

Mr. J. H. Burgess presented a series of moulds in plaster of Paris, from which casts of Tasmanian Aborigines were formerly taken.

A note was read from G. S. Davies, A.P.M. of Bothwell, transmitting a specimen of water-rat (*Hydromys chrysogaster*), caught in that neighbourhood.

Mr. Milligan gave the following measurements of the head, &c., of a shark caught a few months ago in Storm Bay, the jaws of which were exhibited at last meeting:—Width of the mouth from one commissure of the lips to the other, 18 inches; space between the upper lip and the extremity of the snout, 13 inches; space between the snout and the gills, 42 inches; girth round the head over the eyes, 39 inches; ditto round the neck and gills, 7 feet and 6 inches; length of the long segment or upper portion of the tail fin, 3 feet and 5 inches; ditto of the shorter tail fin, 2 feet and 7 inches; girth round at setting on of the tail, 1 foot and 8 inches; length of dorsal fin, 3 feet. The entire length of the enormous fish could not be correctly ascertained, in consequence of the head, tail, and fins only having been secured and brought to Hobart Town.

Two cases of plants have been received for the Society's Gardens, per *Senator*, from Messrs. Low & Co., of Clapton, London. Contents dead, four plants excepted.

Two cases Tasmanian, Australian, and Norfolk Island plants have been forwarded, per *Prince Regent*, to Messrs. Gibbs & Co., of Arica, South America,—in all fifty plants,—with a view to procure in exchange plants from the table lands there, which in all probability would thrive well in this climate.

One case has been forwarded to John Smith, Esq., of Melbourne, containing thirty-seven exotics.

Dr. Crooke observed that he had been unable with the aid of the blow-pipe to obtain metallic tin from the ore sent from Victoria.

The Secretary stated that he had extracted from it, with difficulty, two very small globules; and exhibited, for the sake of comparison, specimens of sulphuret of tin, stream tin ore, and oxide of tin in veins in *killas* from Cornwall.

Dr. Officer drew attention to a similarity in the venation and structure of the leaves of the gutta percha tree upon the table, and in those of the *Ficus Indica*, a plant yielding an analogous product.

Dr. Agnew and others expressed doubts of the pearl presented this evening being a genuine production of a Tasmanian oyster, as hitherto they only had been met with of a very small size.

Dr. Officer undertook to sow upon a patch of clean soil a portion of the

grass-seed submitted to-night, to give it due attention, and to report the result. The Secretary mentioned having already confided packets of the seed to Captain Dixon, to be tried on the Isis; to Mr. G. Marshall, for trial at Noble Farm, Pittwater; and to Mr. James Whyte, to be tested at the Cross Marsh.

The following papers were read:—

A richly emblazoned autograph letter in the English language, dated "Royal Residence named Rajmanderri House, Grand Palace, Bangkok, Siam, 20th June, 1852." From the reigning King of Siam to the Hon. Colonel Butterworth and Lady, transmitting presents, &c., "according to ancient Royal custom," on the occasion of his Coronation and of his Marriage, &c. Also an English translation of a document drawn up by Siamese officers, entitled "an account of the most lamentable illness and death of her young and amiable Majesty the Queen Somanass Waddhana-waddy, the lawful Royal Consort of His Most Excellent and Gracious Majesty Somdetch Phra Paramendr Maha Mongkeet, the reigning King of Siam."

The autograph letter of His Siamese Majesty excited much surprise by its style, its correct mode of expression, and the liberality of sentiment and just appreciation of public principles of action which it evinced. Mr. Francis Smith thought the letter gave evidence of its having been written by a man of very great capacity. Dr. Officer understood that the present Sovereign of Siam had effected numerous and very great reforms in the administration of public affairs.

Mr. Milligan produced a communication from R. Kippist, Esq., of the Linnæan Society, touching botanical specimens sent home, the reading of which was postponed on account of the lateness of the hour.

The most important of the illustrated works recently received by the Society lay on the table. Part IV. of Gould's Birds of Asia; Part IV. of Gould's Mammals of Australia; Parts 10 to 15 of Reeves' Conchologia Iconica; Parts 2 and 3 of Dr. Hooker's Flora of New Zealand; and Part 3 of the Rhododendrons of Himalaya; all executed in the highest style of art.

Upon the motion of Henry Hopkins, Esq., seconded by Mr. Moss, the thanks of the Society were voted to the various persons who had made donations and communicated papers, and the meeting separated soon after nine o'clock.

10TH AUGUST, 1853.—Monthly Evening Meeting; Joseph Hone, Esq., in the chair.

The following gentlemen were elected into the Society:—C. J. Weedon, Launceston; Isaac Sherwin, of Sherwood, Bothwell; Adam Jackson, of Williamswood, Ross.

The presentations were, to the Library—"Fasciculi (6 sheets) of Proceedings of the Linnæan Society of London, from February 1851 to June 1852," from the Linnæan Society.

From the Society of Arts, London, four numbers of their weekly journal.

From Messrs. Orger and Meryon, London, a classified Index of the London Catalogue of Books published in Great Britain—1816 to 1851.

From Mr. Warren, of Argyle-street, the European Gazetteer, London, 1702. The Unhappiness of England as to its Trade, &c., London, 1701. The Works of Hildebrand Jacob, Esq., &c., London, 1735.

Mr. John Price presented to the Museum two stone hatchets, said to have been dug up from a depth of several feet at Norfolk Island; and a note on the subject, and on the tree producing the "blood fruit," was read.

Fossil shells, of the silurian series—obtained at the Mersey River, near the estuary—were presented from Mr. James Scott, of Launceston.

From Mr. H. F. Anstey was received a nugget of gold, imbedded in ferruginous conglomerate, from the M'Ivor Diggings.

Mr. J. D. Loch presented a round shield of bull's hide, embossed with points of brass, brought by him from Benares.

From Mr. Adam Jackson, of Ross, was received two promissory notes of the States of Maryland and Pennsylvania, for the sum of six shillings and one dollar, of very old date, with official signatures attached.

A note from Mr. J. F. Hues was read, transmitting for the Museum 10 silver coins of England and other countries, and 19 promissory notes (of private persons) formerly in circulation in Van Diemen's Land, together with the following list of the same:—

COINS.

One Shilling William III., 1699.	One Threepence George III., 1762.
One Sixpence George II., 1757.	One Ditto George II., 1740.
One Sixpence George III., 1787.	One Dump.
One (Spanish) Charles III., 1781.	One Quarter dollar. .
One ditto Pistole Charles III., 1777.	One Ditto.

PROMISSORY NOTES.

One Dollar	William Barnes, 12th September, 1824.
One Shilling.....	Jocelyn Thomas, December 1825.
Sixpence	J. P. Deane, 1st January, 1823.
Two Dollars.....	A. Charlton, 6th July, 1823.
One Pound	J. T. Gellibrand, 1st March, 1827.
One Ditto.....	Ditto, 1st January, 1827.
One Dollar	W. Barnes, 27th September, 1824.
Sixpence	J. P. Deane, 1st July, 1823.
Five Shillings	J. Griffiths, 25th March, 1826.
Sixpence	W. Payton, 12th May, 1825.
Ditto.....	Richard Taylor, 31st March, 1826.
One Shilling.....	J. Haughton, 12th July, 1826.
Sixpence	J. Pugh, 22nd June, 1826.

One Shilling.....	J. Pugh, 18th July, 1826.
One Ditto.....	Ditto, 20th July, 1826.
One Ditto.....	J. Griffiths, 27th February, 1826.
One Ditto.....	J. Yeates, 5th April, 1824.
One Ditto.....	J. Haughton, 29th July, 1826.
Sixpence	Ditto, 24th July, 1826.

The following books, recently arrived from England, lay on the table for inspection—Reichenbach's Researches on the Dynamics of Magnetism, Electricity, Heat, Light, &c., in relation to Vital Forces. Badham's Funguses of England. Nereis Australis, by Wm. Henry Harvey, M.D., 2 parts. Zoology of H.M.S. *Erebus* and *Terror*, 15 parts. Six Ethnographical Maps, in 2 parts, by J. C. Prichard, M.D., F.R.S.

A letter from Mr. Bennett, Secretary to the Linnæan Society of London, was read, acknowledging Part 1 of Vol. 2 of "Papers and Proceedings of the Royal Society of Van Diemen's Land."

The Secretary drew attention to the attempts lately made in France to transpose the ova of salmon and trout, &c., to rivers in which they did not previously exist—the eminent success with which the experiments had been crowned, and the liberal encouragement and assistance afforded by the French Government to the execution of the project on a large scale. The Secretary then read the following article on the subject, taken from the *Perth Courier*:—

ARTIFICIAL PROPAGATION OF SALMON, TROUT, AND OTHER FISH.

We lately extracted an article from a metropolitan journal on the new mode of propagating salmon—invented, or at all events extensively and systematically practised, by two ingenious Frenchmen of the Vozges, which had been made the subject of a special report to the Minister of Agriculture and Commerce in August last. We have since received a copy of the report itself, which is interesting—both from the details it contains of the process followed, and from the evidence it affords of the attention which the French Government bestows on every scheme connected with the advancement of the national interests. Under the patronage of the latter, a sum of 30,000 francs was voted to the engineers of the canal which connects the Rhone with the Rhine, to form from its superfluous waters an artificial pond, with the requisite works for carrying out the new scheme on a large scale, where, within the first six months of its establishment, they had impregnated upwards of three millions of ova of different species, which had produced 1,683,200 living fish. On this fact being reported to the Minister of the Interior, M. Coste, a member of the Institute and an experienced naturalist, was appointed to visit the different establishments of the same nature situated in the Lagoons of the Adriatic, near the mouths of the Po, Adige, and Brenta, as well as the Camachio, where large conserves of delicious fish have existed for a long period—with the view of a general introduction of the system into all the suitable rivers of France.

The substance of M. Coste's report is, that not only the ova of the salmon, although carried from their native beds to great distances, preserve all their

qualities entire, but that the artificial means of incubation provided under the new system completes the process more quickly and more surely than when left to their natural course; in fact, two growths are obtained within the space of one ordinary breeding season. This double result enables the Government to make the scheme self-supporting, because the proprietors are ready to pay for the choice sorts of fish put at their disposal. The locality of the establishment at Huningue, upon the canal above mentioned, is then described, with the process of depositing the ova, as formerly given in our columns. A spring of remarkably clear water flows through a commonty of a few acres extent. In its course it divides itself into several smaller streams, into which the boxes are placed, with wire-cloth ends through which the water flows, leaving the ova and young fish in a constant running stream. This work M. Coste purposes to enlarge, substituting planks of wood laid lengthways in parallel divisions for the wire-cloth boxes, which are liable to choke up—enclosing the spring with a series of straight furrows, along which the water will precipitate itself. Certain obstructions like sluices are placed at intervals in these furrows, to regulate the current and to keep the water in proper condition for the object in view. These furrows extend along the meadow and empty themselves into a spacious basin, where the young spawn will be first received. Over this basin something like a greenhouse is to be erected, with shifting glass windows, to admit the sun and air. Attached to this will be an outhouse, or *laboratoire*, where a register of the weather, and observations on the natural history of the fish during their incubation and childhood, may be preserved.

When the period of infancy is passed, the next object is to provide ponds where the different species may have the means of attaining mature growth, or where experiments in crossing the breeds may be carried on. M. Coste proposes that a chain of fish-ponds should be dug along the banks of the canal, the land of which, for about fifteen metres on each side, belongs to Government. These ponds may be extended to any length, and communicate with each other by means of gates of wire or ironwork. When of sufficient growth to stand transportation, the canal with which these ponds communicate will be the natural channel through which the fish would be carried to the different rivers in France. This is to be effected by boxes attached by rings to rafts, the boxes to contain a sufficient quantity of water-plants to prevent the young fish being injured. These boxes can be detached from the raft at the openings to the fish-ponds, just as a waggon is left on a siding on a railway. The details of these operations we need not give, as they could not be well understood without diagrams. Suffice it, that the *personnel* of the bridges and roads are to do the whole work of the transmission of the fry from pond to pond, and along the canal; and that the yearly expense is calculated at no greater sum than 8,000f. after the first year. The report concludes with the result of M. Coste's experiments on the propagation of shell fish, equally successful with that of fresh water fish.

The subject is far from being entirely new in this country; for Mr. Young, who has charge of the Duke of Sutherland's rivers in the north,

has successfully bred salmon, taken after spawning, from one river to another; and the same has been done in other places. But what strikes us as noticeable in the above report is the evidence it affords of the readiness with which the Government in France, however constituted, applies itself to the encouragement of domestic industry upon the announcement of any discovery in science or the arts, which in our country would be left to private enterprise, and either carried on to private profit, or languish under the obstruction of "vested interests." In one "salmon seminary," in a province in France, last year, two engineers, from their own resources, raised 1,000,000 trouts, salmon, and mixed breed; what, then, might not be done by the wealthy proprietors of salmon fishings in the Tay, in the way of increased production of the finest species of that fish which frequents that river? Little can be done without combination; and the history of the Tay fishings affords proof that "coalitions" are as little relished on its banks in that branch of productive industry as in politics.

The Secretary read a long and interesting letter from R. Kippist, Esq., of the Linnæan Society of London, upon a collection of plants made at Macquarie Harbour by Mr. Milligan, and by him transmitted to the Linnæan Society.

The thanks of the Society were voted to the persons making donations and communications, and the members separated about nine o'clock.

14TH SEPTEMBER, 1853.—Monthly Evening Meeting; His Excellency Sir W. T. Denison, President, in the chair.

After a ballot the following gentlemen were declared duly elected into the Society:—John Leake, of Rosedale; James Richardson, of Hagley; T. L. Gellibrand, Henry Palmer, Alfred Wilkinson, and E. J. Dawes, of Hobart Town.

The presentations were as follows—From Dr. Kenworthy, a Treatise on the Microscope and Microscopic objects; a sample of grain gold intermixed with oxide of tin from the diggings at the Ovens, Victoria.

From Miss Butterworth, six specimens in duplicate of the decimal copper coinage of the East India Company—namely, cent, half-cent, and quarter-cent in circulation at Singapore.

From Mr. Gibson, of Circular Head, specimens of quartzose rock from the vicinity of the Black River there, of which large samples have been forwarded to England, under the supposition of its being auriferous.

From Mr. H. Hull, seeds of *Martynia fragrans*, from the Mauritius, for the Society's gardens.

From Mr. Dickenson, specimens of Micaceous Schist, veined with quartz, from the neighbourhood of Lake Dixon.

From Mr. Rolwegan, specimens of Sandstone, altered into a compact siliceous rock by igneous action, and having imbedded in its substance spherical bodies about three quarters of an inch in diameter, with a

papilla on one side of each, obtained from the flank of the range of hills on the west side of the Launceston road at Bagdad, upon Hayes' farm.

From Mr. Thomas Browne, of Macquarie-street, one East Indian Copper Coin.

From the Rev. Edward Freeman, of Brown's River, a specimen of Drift Wood cast up on the sea-beach there, upon which were fixed a congeries of conical ova-cells of a shell-fish—probably a *Murex* or *Fasciolaria*. On examination, the yolky contents of the cells were found more or less inspissated, without having made any advance towards organization.

From His Excellency Sir W. T. Denison, a packet containing 19 species of seeds from China for the Gardens.

From Francis Smith, Esq., Solicitor-General, a packet containing 120 species of Indian seeds for the Gardens.

A case containing 39 plants has been forwarded to Mr. Blackett at Auckland, for which a case of New Zealand plants is expected in return.

Sir W. Denison remarked in reference to the fragment of transmuted sandstone submitted, that specimens similarly altered had been brought by him from the neighbourhood of Hamilton, and he believed that it would in general be found that sedimentary strata in close proximity to eruptive rocks have been similarly transmuted. The Secretary observed that such is the case to a certain extent at Richmond, where a basaltic dyke has burst through and dislocated the coal strata, crossing the Coal River near Mr. Butcher's house; that it is not the case at Jerusalem, where a similar dyke intersects and displaces the coal and associated beds, without affecting their horizontality, at a distance not more than fifty yards from the adit level, whence coal was formerly worked out by the Government; and that no very obvious alteration of structure has taken place on the side of Ben Lomond, where the coal sandstones and shales have been elevated to a height of three thousand feet above the sea, and still rest on the igneous rocks in a nearly horizontal position, with their edges but slightly turned up, where they are in contact: the converse being the case at the South Cape coal-field, where contact with an erupted dyke has converted the shales into a striped, flinty-looking rock. Mr. W. Archer questioned the fact of the sandstones and coal on the side of Ben Lomond having been elevated to their present position, and ventured to think it possible that the sedimentary beds may have been deposited upon and against pre-existing igneous rocks, and that the edges, being upturned at the point of contact, may be wholly due to natural subsidence of the mass of the deposited matter. The Secretary supported his argument by stating that similar carboniferous rocks at the Schouten Island and at the Douglas River dip under the greenstone. His Excellency corroborated this, and said that at Schouten Island the edges of the coal beds had been found to abut against and to repose upon the granite, altogether unaltered in character and position, except that they are found to thin off near the junction. A conversation followed as to the age of the red sandstone, forming so marked a geological feature in the north-west,

extreme west, and south-west districts of Tasmania, and whether it bears any analogy to the *old red* or Devonian of the European system, a circumstance rendered more than doubtful in the opinion of Mr. Milligan,—first, from the non-discovery of the characteristic fossils, or indeed of any fossils in it hitherto; and, secondly, from its passing by degrees into a coarse ferruginous conglomerate, having amongst its components fragments of recent rocks.

The Secretary reported having recently received from Mr. James Macarthur, of Calstock, a small quantity of a fine pulverulent substance, washed by that gentleman from the combustible schist found at the Mersey (of which specimens have been repeatedly exhibited to the Society), which Mr. Archer had examined with a pocket microscope and pronounced to be resin. Mr. Archer described it as being in minute, smooth, flattened grains, giving the impression that it had exuded from the leaf or bark of the plant or tree by which it may have been produced, nearly of the size and form which it now possesses,—that it probably fell like small dust on the surface of the ground, where from its nature it would remain unaltered until swept by rain and other causes, intermixed with fine argillaceous particles into a lake or estuary where it would be deposited, and thus eventually form the thick beds in which it is now met with.

Dr. Agnew thought the point of its being of vegetable origin scarcely settled, and inquired its geological relation to the coal at the Mersey River.

Sir W. Denison stated that at one place it is elevated some 200 feet above the coal, and that it would probably be found to be a much more recent formation.

Mr. Milligan observed that the cliffs of incoherent sandstone forming the eastern margin of the estuary at Macquarie Harbour, which contain lignite of a jet-like aspect, and precisely similar to that obtained in the channel of the Derwent, near Cawthorn's, yield nodules of resin more or less perfect, and from which a peculiar fragrance is distinctly elicited by friction—these cliffs being beyond all question of a comparatively recent age.

The relative age, character, and qualities and structure of the different kinds of coals and lignites fell under observation, and a discussion of some interest arose upon the existing coniferæ, their respective habits and range in Tasmania, the size and value of their timber, and the appearance and mode of cultivation of the several genera and species Mr. Archdeacon Davies mentioned having sent to England several cases of *Arthrotaxis selaginoides*, but that the plants invariably perished on the voyage, and that he had more recently sent a case of the same to Sydney.

A member suggested the great difficulty generally experienced in cultivating the conifers of Tasmania. Mr. Archer informed the meeting that his attempts with them had usually been successful; and that he has now, in a thriving condition, in his garden at Cheshunt, (immediately at the foot of the Western Mountains), the following species:—*Arthrotaxis*

selaginoides, *A laxifolia*, *A cupressoides*, *Microcachrys tetragona*, *Pherosphœra Hookeriana*, *Callitris Australis*, *Phyllocladus asplenifolia*, *Podocarpus alpina*.

Mr. Kilburn submitted for inspection some most satisfactory results of trials which he is now making to obtain photographic pictures of public buildings, with landscapes, &c., by the Talbotype process.

Mr. Davies drew attention to the fact that great quantities of fish have of late been cast up at various points on the East Coast, killed, as has been reported, by a species of Fungus attacking and spreading round their gills; and also that immense masses of shrimps have recently been thrown up on the sea-shore near Swansea. Sir W. Denison observed that such phenomena were common during volcanic eruptions, and that certain striking irregularities noticed in the tides here a few months ago would lead to the belief that some great sub-marine commotion might be going on in our neighbourhood, a surmise strengthened by the contemporaneous occurrence of earthquake shocks at New Zealand.

Mr. Davies bore testimony to the accuracy of the report of a singularly sudden rise and recession of tide made to the Society a few months back by Dr. Edward Bedford, he having been on the spot at New Town at the time, and observed the fact.

Mr. Lochner confirmed the accuracy of the report made to the Society of the extraordinary rise and sudden recession of the tide at Port Arthur, about the 1st of January last.

Mr. W. Archer submitted for examination, and explained at some length, a series of drawings made by him of certain galls or tuberosities, with turret-like processes, upon twigs of the *Casuarina quadrivalvis*, laid before the Society a few months since by Dr. Officer, and of the insect contained, and promised to supply a description in writing for the next monthly meeting.

Mr. Archer drew attention to a small brown speck observable on the surface of Oranges brought here from Sydney this season, and to the fact that under each of these brown fungus-like scales he had found a minute living insect, little more than one-hundredth of an inch in diameter.

Mr. Archer also laid on the table a curiously convoluted and fantastic growth of a shoot of *Casuarina* for inspection.

A case of stuffed birds from the Himalaya ranges in India, together with skins of the Jackall, *Canis aureus*—a small feline animal, like the Garangan *Herpestes Javanicus*, with the head of a male of the Musk Deer, *Moschus moschiferus*, and skins of various species of squirrels lately purchased by the Society,—were open for inspection.

Some desultory conversation succeeded, when it was moved by Joseph Hone, Esq., and carried unanimously, "That the thanks of the Society be rendered to the various persons who have made donations."

His Excellency the President left the chair a little after nine o'clock, and by half-past the members had dispersed.

12TH OCTOBER, 1853.—Monthly Evening Meeting.

On the motion of H. Hull, Esq, the chair was taken by D. T. Kilburn Esq., in the absence of His Excellency the President, and the Vice-Presidents.

Upon a ballot for new members, the following gentlemen were declared duly elected:—W. J. Carroll, M. D.; Philip Ravenhill and Augustus Frederick Smith, 99th Regiment, Hobart Town; Alexander Clerke, M.L.C. of Mountford; James J. Bayles, of Rokeby; William Langdon, M.L.C. of Montacute; George Fordyce Story, M.D., of Grainge, Swanport; James Vautin and Lorenzo Lodge, of Hobart Town.

The following donations were made. For the Library—39 volumes (neatly bound) of the "Transactions of the Society of Arts of London," by George Carr Clarke, Esq., of Ellenthorpe Hall. One bound folio volume, being an attested "Fac-simile of Washington's Accounts," during the eventful period from June 1775 to June 1783, by E. Hathaway, Esq., U.S. Consul. "Jewish Calendar," by Phineas Moss, Esq. "Tasmanian Athenæum," No. 1, from the Editors. "Information regarding the Colony of Van Diemen's Land, intended for the use of Emigrants, &c.," from the Government Printer. "Journal of Society of Arts," from 20th May, 1835.

For the Museum—Specimens of thin seams of bituminous coal and associated fire-clay obtained from a shaft sunk to the depth of 100 feet at the Barrabool Hills, in the immediate vicinity of Geelong, forwarded by Robert Garrett, Esq., of Geelong, and John Roberts, Esq., of this city. It does not appear that coal-seams of a workable thickness have as yet been met with in the province of Victoria.

From Mrs. Arnold, samples of sand from Forest Creek, Victoria, containing numerous small crystals, supposed to be ruby, with specks of water-worn gold, &c.

From Captain Smith, of the Coal Mines, Tasman's Peninsula, samples of Algæ, cast up on Slopen Island, known to yield a pure and delicious jelly, to which purpose it has for years been applied.

From A. M. Lochner, Esq., three *Crania* of aborigines of New Zealand, New South Wales, and Tasmania, affording a good opportunity for contrasting the superior intellectual development of the first with the preponderating animal faculties of the latter.

Mr. Milligan added to the collection a dried specimen of *Diodon* from D'Entrecasteaux's Channel.

The following books, added to the library by purchase since last meeting, lay on the table for inspection:—"Wood's Practical Treatise on Railroads, &c.;" "Tredgold on the Steam Engine, Steam Navigation, and Construction of Steamboats, &c.," 2 vols., 4to; "Conchologia Iconica," of Reeve, Nos. 116 to 120—a work so accurately designed, and coloured with such fidelity, as to constitute in itself a collection of figures almost as useful as the most ample and varied cabinet of Conchology; also "Gould's Trochilidæ," parts 3 and 4; "Gould's Birds of Asia," parts 3 and 4—works finished in a style beyond all praise.

On the table were late numbers of the Edinburgh Review, Philosophical Journal, the Annals of Natural History, Hooker's Journal of Botany, Archive für Naturgeschichte, Turner's Fruitist and Florist, Geological Journal, &c. &c.

The Secretary read letters from A. Sprenger, Esq., Secretary to the Asiatic Society of Bengal, acknowledging receipt of "Papers and Proceedings of the Royal Society of Van Diemen's Land," and advising certain contributions made in return by that Society and by Mr. Blyth.

The Secretary read a Despatch from His Grace the Duke of Newcastle to His Excellency Sir William Denison, and a Report furnished to Her Majesty's Land and Emigration Commissioners, on the failure of the attempt made to introduce salmon and trout from England into Tasmania by means of spawn, shipped on board the "Columbus," in January 1852, by Dr. Boccius. This gentleman has undertaken, with the sanction of His Grace the Secretary of State for the Colonies, to make another effort to accomplish an object likely to prove so valuable to this country; and it had been resolved to ship spawn in October of this year, and to adopt every means to ensure success, which the probable causes of failure in the former trial would seem to render necessary.

Upon discussing the subject the opinion of the meeting appeared to be, that if the water which is to be supplied during the voyage to the spawn-tubs or smolt-tanks be conveyed in iron tanks, there is but too much reason to fear that the amount of metallic impregnation (notwithstanding the coating of varnish employed to protect the inner surface of the iron) will be such as to render the element unfit for the fish to survive in, and that death and decomposition must ensue, as in the attempt already made.

The Secretary laid before the meeting a note from Mr. Sherwin, recommending an inquiry into the origin, character, and progress of the epidemic diseases, Influenza and Scarlatina, which have lately prevailed, and which, in the case of the former, has affected and proved fatal to so many of the inferior animals.

On the motion of J. H. Moore, Esq., of New Norfolk, the thanks of the Society were accorded to the various persons making donations and for the papers produced. Some Indian correspondence was reserved for another meeting.

A member thought it desirable that greater publicity should be given to the fact that the Museum is now open to visitors daily, *Wednesdays excepted*, from 2 to 5 o'clock p.m.

The members separated about 10 o'clock.

9th NOVEMBER, 1853.—Monthly Evening Meeting; His Excellency Sir W. T. Denison, President, in the chair. The meeting was numerously attended.

The following gentlemen were ballotted for and duly elected into the Society:—The Rev. George Banks Smith, of Invermay; the Rev. Henry Plow Kane, of Launceston; the Rev. James Norman, of Launceston; William Stammers Button, Mayor of Launceston; William and Philip Barnes, of Trevallyn and Launceston; St. John E. Browne, William Campbell, William Cleveland, Henry St. John Brown, James Smith, Richard Green, Henry Norman Browne, and George Eddie, of Launceston; and Frederick Maitland Innes, of Patterson's Plains. Also W. A. Sandford, Colonial Secretary, Western Australia; Henry Butler Stoney, 99th Regiment; Charles D'Almeida Lempriere, of Brighton; Frederick Hall, John Forster and Isaac Wright, of Hobart Town.

The following presentations were made:—

To the Library—One 4to volume (3rd) of Magnetical and Meteorological Observations, taken at the Observatory, Hobart Town; forwarded by the British Government, and deposited with the Society by order of His Excellency.

Report on the Vegetation of the Colony of Victoria, by the Government Botanist there; printed, published, and forwarded hither by the Government, and transferred to the Society by Sir W. Denison.

One volume folio, dated London, 1618, entitled "The French Academie, in foure Bookes: 1. Institutions of Manners and Customs of all Estates. 2. Concerning the Soul and Body of Man. 3. A notable description of the whole World. 4. Christian Philosophie instructing the true and only means to Eternal Life. By Peter De La Primadelaye, Esquire, Lord of Barre, Chancellour and Steward of the French King's House." From Mr. Charles Peters, of Fingal, a book respectable for its age, and not more remarkable for the variety of its subject matter than the curious quaintness of its style.

Tasmanian Athenæum, No. 2, from the Editors.

Augustus F. Smith, Esq., of the 99th Regiment, presented for the Museum the model of a Telegraph Staff, with a sheet having four new codes of coloured signals displayed, and fully described upon it, invented by himself.

Peter Fraser, Esq., Colonial Treasurer, presented the well-preserved antlered head of a roe-buck (*Cervus capreolus*, LINN.), shot by himself in the north of Scotland.

George Whitcomb, Esq., presented a spirit preparation of the Spiny Lizard (*Moloch horridus*), of Western Australia; together with a section of the stem of a plant, (probably a *Dracæna*), from the same locality, under the name of cabbage-tree.

A mixed collection of dried Ferns, Lichens, Algæ, and Corallines, made for the late Captain Matthew Forster, at Norfolk Island, was received from John Forster, Esq.

The Secretary submitted a specimen of partially lignitized wood from the shaft recently sunk at the head of Warwick-street, by Mr. Z. Williams, in search for coal. The specimen is part of a considerable mass obtained near the junction of the diluvial boulder formation (where it is about 25 feet thick), with the sandstone upon which it rests.

D. T. Kilburn, Esq., submitted for inspection a series of photographic views of public and other buildings in Hobart Town, taken on paper, which exhibited a marked improvement over those produced on a former occasion by the same gentleman. Mr. Kilburn stated that he intended to prosecute the art, so as still further to improve on the results he has obtained—that he would endeavour to obtain impressions upon glass, and that he would submit a short paper on the subject to an early meeting.

His Excellency Sir William Denison read an interesting paper on Drainage and Sewerage of Towns, with reference to their influence on the health of the inhabitants, more especially with regard to the probable connexion which exists between the present imperfectly drained state of Launceston and Hobart Town, and the late severe epidemic diseases which have prevailed in these towns.

Before the members separated, it was moved by Mr. Crombie, seconded by Mr. Edward Macdowell, supported by Dr. Bedford and others, and carried,—That it is desirable immediately to communicate to the municipal bodies of Hobart Town and Launceston the contents of the paper on drainage of towns, &c., and that it is expedient the same should be published with the least possible delay.

His Excellency also before rising read to the meeting a letter from the Astronomer Royal, Professor Airey, communicating the fact of six complete sets of meteorological instruments having been forwarded to the colony; that he (Sir William) intended to place one set to be worked at the Observatory here, and a second set at Port Arthur, and that any suggestions as to the best position and mode of bringing the other sets into operation would be thankfully received.

A vote of thanks having been unanimously accorded to the persons who brought donations and furnished papers and communications, the meeting, after discussions on the best means of affording to Hobart Town and Launceston an abundant supply of good water, and its importance in a sanitary point of view, broke up.

14TH DECEMBER, 1853.—Monthly Evening Meeting; Robert Officer, Esq., M.L.C., a Vice-President, in the chair.

The following gentlemen having been ballotted for were declared to be duly elected into the Society:—Anthony Fenn Kemp, of Mount Vernon; Charles M'Lachlan, John Robertson, William Crosby, and William Gellibrand, of Hobart Town; William Giblin, of New Town;

James Robertson, David Murray, P. S. Tomlins, and John Dowling, of Launceston; and J. S. Martin, Esq., Evandale.

The Secretary laid on the table a list of the four Members of Council who retire at the ensuing Annual General Meeting, and of four members recommended for election.

The following presentations were announced:—

From the Royal Geographical Society of London, Address at the Anniversary Meeting, held 23rd May, 1853, by Sir R. I. Murchison.

From Mr. L. Lodge, New Testament in Greek, with the Psalms of David in Greek and English, dated 1652. One volume (5th) of Aristotle's Philosophy, in Latin, dated 1579.

Tasmanian Athenæum, from the Editors, No. 3.

From His Excellency, Sir W. T. Denison, the Botanical Report of William Swainson, Esq., F.R.S., &c., laid on the table of the Legislative Council, Victoria, and printed by order. This Report was read by the Secretary. Mr. Swainson has divided the Eucalyptidæ into five new genera, and concludes that he will be able to establish at least 500 distinct species! Mr. Swainson considers the Casuarinæ "the true pines of Australia," and states that he has determined and named "more than 200 species" growing near Melbourne!

From Alexander McNaughtan, Esq., was received a valuable collection of shells from Singapore for the Museum, together with a case of tea-plants for the Botanical Gardens.

Lieutenant Smith, R.N., Gold Commissioner at Castlemaine, Victoria, sent a specimen of quartz containing gold from Barker's Creek, and of various crystals, &c., washed out on the "Jim Crow" ranges; also a collection of ornamental skin dresses worn by the Esquimaux.

P. L. Capewell, Esq., of Ballan, Victoria, sent a box of well-prepared and very interesting microscopic objects, comprehending sections of Tasmanian Spheriæ, a new parasitical plant taken from an Eucalyptus at Ballan,—*Sarcoptes Ovis*—the acarus of scab in sheep; silicified coniferous wood of Tasmania;—*Foraminiferæ*, from Holdfast Bay, South Australia;—*Foraminiferæ* and *Polythalmiæ*, from dredgings in the Ægean Sea, by Professor Ed. Forbes; Siliceous Spiculæ of Sponge from Lake Hindmarsh (fresh water); Sponge from Port Phillip Bay, having spiculæ similar to the last; Sponge from Holdfast Bay, South Australia, with remarkable spiculæ; Zoophyte from Great Barrier Reef; Parasite of the Satin Bower Bird; Echinococci, Cysts from the liver of a Merino sheep, South Australia. Mr. Capewell mentions having caught two specimens of *Dasyurus maculatus* near Ballan, and that others had been taken in the ranges, and that it is not therefore confined to Van Diemen's Land, as supposed.

The Rev. James Garrett, of West Tamar, sent a sample of clay from his neighbourhood, supposed to be auriferous.

Lieut. Smith, 99th Regt., presented two spears, or swords, edged with shark's teeth, used by the aborigines of Hope Island.

Mr. James Burnett, of Macquarie-street, presented a prepared skin of

the (male) King Lory Parrot (*Aprosmictus scapulatus*, Gould), of New South Wales.

Captain Stoney, 99th Regt., presented the prepared skin of an Albatross, *Diomedea brachyura*, and two skins of the Cape Pigeon (*Daption Capensis*).

Mr. Hall, of Macquarie-street, sent a large double cocoa-nut, the seed-vessel of *Lodoicea Sechellarum*.

From Mr. Hugh Murray, of Guilford Hills, was received, through W. S. Sharland, Esq., M.L.C., one Silver Coin, dated 1735, stamped on one side with the Brazilian arms; motto and device partly illegible.

The Secretary laid before the meeting Returns of the number of Gold-digging Licences issued, and other information respecting the Gold Revenue, by Lieut. Smith, R.N.

The Secretary laid on the table two numbers of the New Zealand *Spectator*, containing interesting notices of fossil remains found on the cliffs and superficial deposits of blue clay, &c., at Awamoa, &c.*

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* Many of your readers may have read in the Papers and Proceedings of the Royal Society of Van Diemen's Land (a publication unequalled in interest in our Colonial Literature, until those of the New Zealand Society may be published), an abstract of a paper by Geoffory Saint Hilaire, on some bones and eggs of a gigantic bird, which he names Æpyornis maximus, found at Madagascar.

As we do not feel altogether satisfied at the manner in which this new discovery throws our own Moa into the shade, dislocating its mandibles, I will give you a few notes on the eggs of that ill-used biped, which you can publish if you think them of sufficient interest.

Last Christmas I camped at the mouth of the Awamoa, a small stream between Kakaunui and Oamaru, having found there a few weeks before the umus of the extinct aboriginal tribe of Waitaha, full of bones, stones, &c., and devoted a day to digging. The old surface in which the umus had been excavated was buried under a foot of alluvial deposit: beneath this the old sandy soil was blackened by the mixture of charcoal, large lumps of which were scattered among the chaotic mass. The primeval savages had evidently thrown back into the umu the remains of each feast, and lighted over it the fire to prepare the next. The disagreeable flavour which the scorched bones must have lent to each succeeding banquet was, we may hope, some slight punishment to them for exterminating the Moas. Their animal food seems to have consisted of Dinornis (very rare), Palapteryx, Notornis, Aptornis, Apteryx, Nestor, (Kaka or kea), Cormorants, Gulls, Ducks, and other small birds, dogs, a small rat, haliotis, fresh water unios, and other shell-fish, seals, porpoises, sharks, eels, and other fish: so that the bill of fare was varied enough. The bones of all were matted and locked together most intricately, large angular burnt stones (originally round boulders cracked by the fire), and a wet black sandy soil filling all interstices. Here and there we met relics of their dinner equipage, in the shape of large and small fragments of flint, totally different from any in the neighbourhood, and said by my respected friend, old Governor Railway, who formerly lived there, to come from Lake Hawea. Sometimes an ancient aborigine or his dog seemed to have retired to discuss a tit-bit in solitude, for embedded at intervals over the surface of the ancient kaika (whose former extent is well marked by the blackened sub-soil) we found an odd bone or so: I think the dogs must have done this, as the bones were generally foot and toe bones, which would probably have

Two Meteorological Tables for October and November, constructed from observations made at Government House, by Messrs. H. Hull and F. S. Dobson, with the Aneroid and Syphon Barometers, the Sympiesometer and Thermometers, were placed before the meeting. Dr. Officer observed that

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fallen to their share. The only human manufacture we found was a small ball of baked clay, the work most likely of some ingenious young savage, stopped on the threshold of the invention of pottery by a vindictive tibia thrown at his head by his enraged parent, with a concise order to go egg hunting, and not waste his time that way;—which brings me to eggs again. Here and there among the stones and bones was a mass of fragments of egg shells, which, having been the first to discover them in your island, I at once recognized, but which the Maories declared to be pieces of skulls, for which, while with the tent poles (our digging implements) they turned them out every five minutes, they were vainly seeking. Of these (the eggshells) I made them collect every fragment which did not escape them in the black mud, and on a subsequent visit which they made for me, for I could not spare time to prosecute the search, they brought a further supply, reporting that they had thoroughly dug out all the ovens. I found it necessary to wash each fragment separately with a brush and water, brushing even the edges, so tenaciously did the black slime cling to them. There were several thousand fragments, from two inches square downwards—about half a gallon (I know not how otherwise to describe their quantity), of all sorts, thoroughly mixed.

After carefully sorting these I have with some little patience succeeded in joining in their original places fragments of about 20 eggs, of from 6 to 8 different species. Of some the whole number of pieces restored makes but a sorry figure, though large enough to give accurately the size of the egg, and far larger than any previously found.* But in three or four (consisting of from 100 to 200 fragments each) no calculation is required, so I can venture to give their dimensions as ascertained by a foot rule and measuring tape.

	Long Diam. in.	Short Diam. in.	Circumfer. Round Mid. in.
H. D. 1. roughly and sinuously furrowed, ends dotted.....	8	7	21
H. D., 2. White, enamelled, furrows long, small scattered round papillæ.....	10	7·2	21·6
H. D. 3. White, furrows short straight parallel and very regular, ends dotted...	9	7·4	22·2
H. D., 4. Buff and white; thickly, deeply, and singularly furrowed on one side, less so on the other, ends gradually plain.....	105	? 8	? 24

I could give you more examples, but I am not attempting a scientific essay, a task to which I feel thoroughly incompetent, and the above will restore us and our Moas to a little more respectable position in comparison with our huge Madagascar rival; besides, as there were no bones of the largest Dinornis in the ovens, and only one or two (?) of any Dinornis, we may fairly infer that its eggs are even totally absent, and that these are all of Palapteryx. I do not profess to be certain on this point, as I am not a scientific man, but ground my inference on the close correspondence of the

* The largest of these, about four inches long, I found at Rangatapu, N.I, six years ago: it is now in the British Museum.

the last month has been the driest November known in the colony for twenty years.

Captain Stoney exhibited a model (incomplete) of a lever bridge to be constructed of timber, in one arch, and recommended its applicability to

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number of skulls which I found there to that of the pelvis and bones of the extremities—of the former I have forty or fifty, some wonderfully perfect, and all, though differing in species, and in size from 8 or 9 inches to 4, referable to Owen's genus Palapteryx. In the figure of this, however, restored from former less complete specimens, the length is too great in proportion; and the mandible has not the depression in its upper outline shown in the restoration.

Your readers must not imagine that any of these eggs are perfect—the best of them wants at least an eighth of its surface. Farther, I think it very unlikely that any will ever be found under the same circumstances as those of the Awamoa, which shall not be more or less imperfect—for this reason: the ancient savage having cooked his egg—I think these were roasted - would, so soon, that is as it cooled, break off and throw aside sufficient of the shell to admit him to its interior, when pi or no pi he ate it, and threw the shell into the umu, when the abominable little ancestral imps seem to have taken the same delight in pelting it to smithereens that our civilized infants take in "shying" at bottles. Our only chance is a swamp, a sandhill, or a peatmoss, (from the last I intend to produce feathers, and perhaps even a Moa quill to write you some future "notes;") but the chances are great against an egg which may even have died a natural death in either of these being found complete, much greater against its being unbroken. And it may be very long before such another nest as the Ruamoa is found—many such there cannot be. Almost all of mine are partially taken to pieces and packed, but I will endeavour to send one so packed that it can be opened at Wellington for the benefit of those who may wish to see the eggs of other days. M. St. Hilare says the broken Æpyornithic (what a word!) egg can be restored, but does not seem very confident on the subject. I am certain that I could now replace all the fragments of a Moa's egg could I find them all, and should any of your subscribers, more fortunate than I, succeed in obtaining such a treasure, I will gladly, if forwarded to me through you, return the egg reconstructed by the next vessel: two or three hours would be sufficient.

Though we do not gain any great insight into the habits of the early inhabitants of these islands from this discovery of their buried traces, I think some points worthy of observation. Nothing can be inferred from the one rat; it might have got there by accident, but it is clear it was either rare in the district, or not then commonly used as food: I incline to the latter opinion. It is clear that the dog was not only known to them at a period earlier than its surmised importation, but was a not rare article of food, though in this district now only used in that capacity at Moeraki, where the howling of te Wakaemi's future dinners make the sleepless traveller wish them cooked.

Another theory of which this may assist in forming the basis is this—that in this country, admirably adapted as it is for a class settlement of Moas, the Palapteryx survived the Dinornis, the latter, which in its largest varieties abounded at the period of the formation of the turbary deposit at Waikawaiti, having become very scarce when the Waitaha came to forage in the neighbourhood.

Unlike the Rangatapu remains, there were among these no human bones whatever; cannibalism seems then to have followed the extinction or great diminution of the Moa,—but too much reliance must not be placed on the

the South Esk, at Perth, where the width is upwards of 150 feet. The model was closely examined and its principle freely criticised.

By command of His Excellency the Lieutenant-Governor there was placed before the meeting eight massive quarto volumes, superbly bound in

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present case in support of this theory, as the island was then so thinly peopled, that the Waitaha residents of Ruamoa had probably no one near to fight with,—no flocks of hostile human mutton from which to obtain a change of diet; and they might have had prejudices against preying on their friends and relations even more strong than those of their Anglo-Saxon successors.

No signs were discovered of any attempt to adapt to use or ornament any of the bone which at a later period was so prized by the natives for fish hooks, and a variety of purposes. No ponamu was found, so that, although as almost proved by the flints, the smaller pieces of which were chipped into pretty effective knives, the lakes in the interior must have been familiar to them, the West coast must still have been unknown; and although it might have been peopled at the same period by way of Taitapu, the two streams of migration had not met. This event, however, had occurred at the period of the occupation of the old Kahaunui Kaika, about four miles south; for I not only found there many ponamu ornaments, but a stone ipu about twelve inches in diameter, with two grotesque heads roughly carved in a soft variety of jade, the history of which I may give you at some future time.

I will now leave the eggs to their fate and glance at one or two more wonders of the Awamoa; and if I should hereafter wander from those to places more and more remote, dragging your readers from one end to the other of our noble Province, let the blame rest, not on me, but on those who, a thousand times better qualified than I for the task, have left its wonders so long uncelebrated.

The sandy earth in which the ovens are dug is of no great depth, say from one foot to eighteen inches, the deeper ovens going quite through it into the pale blue clay below, of which the baked ball already mentioned was probably made. Now this blue clay, though a thin and apparently insignificant stratum, forms an interesting link in a chain of eras which I shall talk of by and by; and I give fair warning, that when I begin to theorize their anent, I shall theorize as wildly as possible, in the hope of provoking some great savant of the New Zealand Society to shake off his share of the slumbers of that body, for the savage pleasure of tearing my poor little theories into their constituent facts, or, if he can, into morsels yet more minute.

In this clay are millions of small univalve fossils shells of various genera, the names of which, did I know them, I would not inflict upon your readers, and all with those characteristics of thinness, &c., which we find in the shells of muddy brooks in England. It is, in short, a fresh-water formation, or possibly the sill of an estuary, a small tree here and there showing that wood was in its time not quite so scarce in its neighbourhood as now. How many species I collected there I cannot say, for I have not yet had time to remove them from the ball of clay in which, for their better protection in my haversack, I rolled them. This bed, about two feet thick, rests on one of darker blue clay, which is better seen in a low cliff two hundred yards up the river. In this there are multitudes of shells, univalves, bivalves, and all sorts of valves, with innumerable small shells of very elegant form; one of the largest and most abundant is a wing shaped spondylus (?) regularly striated and of a rich purplish brown colour. Some few, as the Voluta Pacifica, an ostrea, and a pinna, seem

red-grained morocco, richly gilt and ornamented, together with a case uniformly covered and ornamented and clasped with gold, containing a series of the Medals issued at the Great Exhibition of 1851, presented by Her Majesty's Commissioners to the colony of Van Diemen's Land. These

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identical with living species; but the remainder are new to me. Besides shells I found a rolled bone or two (cetacean?) and a few pieces of wood. Again, below this marine blue clay, at an unascertained depth, for I have not yet observed the junction of the beds, lies the tertiary limestone; from the little cliff on the Awaawa you can see it cropping out less than a mile off. This limestone (noticed in the proceedings of the Geological Society as the Ototara limestone) one meets more or less developed here and there throughout the Southern and Eastern part of the Province. Up to the Waiau, half way to the Anau; at Otago, in the Kaikarahi valley; at Waikawaiti, Goodwood, Waihemo, Kakaunui, and up the Waitaki far beyond the Gorge. It is full of fossils, which vary greatly in the different localities. At Takiroa caves the ground is strewed with pseudo-belemnites, as my maoris observed, very like Ngatimamoe, pipe-stalks without the bore: at Crinoline Cliffs large dentalia ore equally numerous round the base of the stone lady, while her voluminous gown is encircled by a band of huge areas. Spatangi, or sea urchins, are the fashionable shell at Waikawaiti, while their spines, most thorny affairs, seem to have migrated in a body to Christmas caves, near Awamoa. Shark's teeth of two or three different kinds are found every where: close to Crinoline, on the face of a cliff there, is a fine specimen of vertebræ, and other bones of a cetacean, which the Commissioner says he has left for the New Zealand Society, as it was too large for his haversack: it is about six feet long. But a list of the fossils already found in this limestone would fill a column of your paper, so I will restrict myself to a few more—terebratulæ; venericardia; a very beautiful spiral shell, genus unknown, (scalaria?) a pentacrinite with richly ornamented ossicles; goniasters, a large jointed oval, and last, not least, the tarsometatarsal (about 2½ in. long) of some large penguin-like bird. When we have any public museums to fill, this limestone will go far toward filling them, and we shall then feel more deeply our loss in the departure for Australia of the only perfectly scientific man in New Zealand.

Now for a simple notion about the succession of these formations. I cannot resist the temptation of theorizing, however absurdly; 'tis so much easier to start a theory than to collect facts.

Let us begin with the limestone;—that, beyond a shadow of a doubt, is marine to the back bone (of the cetacean at Crinoline aforesaid), deposited in a deep and tranquil sea, in which Mount Domett might have stood as a reef. The fossils of the limestone passing gradually into the blue clay above it, the same species being sometimes found in both, but differently developed, we may assume that the change which brought the detritus of the land to constitute the submarine deposit in place of the limestone, consisting of little but the remains of shells and corals, was slow—the future island emerging from the brine, with proper gravity and deliberation, till it had risen so high as to enclose a considerable body of water gradually freshened by drainage into the sea and constant dilution by land streams, in which the fresh water blue clay was deposited. The encroachment of the sea still in progress breaking the edge of the basin, the flat was left dry, and the territory peopled by a class settlement of Moas, on Dinornithic principles. Next comes man in the shape of the Waitaha tribe, and settles the country and the Moas. Next a bank is once more formed toward the sea, and the surface sandy loam soon accumulates from mud brought by the stream and sand blown in by the wind."

magnificent books—comprising "Reports to the Crown," 1 volume; "Jury Reports," 4 volumes; "Official, Descriptive, and Illustrated Catalogue," 3 volumes—besides being profusely and beautifully illustrated, are, as is well known, replete with information of the latest and most valuable description. In the elegant case of medals is contained—One General Council Medal, only issued to Sovereign Princes and States; One Council Medal, One Prize Medal, One Exhibition Medal, One Service Medal.

The Secretary laid on the table a paper received from G. H. Wathen, Esq., Mining Engineer, on the coal of Victoria.

Mr. Milligan also mentioned that in a recent letter from Mr. Clarke, Surveyor-General of Victoria, it is stated that Tin Ore and Antimony have been met with in large quantities at the MacIvor Diggings in that province; specimens of which, with geological reports, will be forwarded to this Society.

Mr. Milligan also reported that vocabularies of the languages of certain of the Aboriginal Tribes of Tasmania are now being prepared for publication.

A memorandum from the Belgian Consul at Sydney was read by Dr. McCarthy, soliciting from members of the Society information as to the sanitary condition of Tasmania generally, and more especially with regard to the diseases to which sheep, cattle, and domestic animals are peculiarly liable.

An interesting and valuable paper on the late epidemic, Scarlatina, which has prevailed in this and the neighbouring colony, supported and elucidated by tabular statements of an extensive series of cases, and by tables of mortality, compiled from the Records in the Registrar-General's office, was read by E. S. P. Bedford, Esq., from which it is satisfactory to learn that the mortality, serious as it has been in Hobart Town, has yet on the average proved less fatal than it has oftentimes done in England during visitations of the same disease.

An able and carefully drawn up paper on the practice of that branch of Photography, known as the Calotype or Talbot process, was read by D. T. Kilburn, Esq., in which is detailed the results of his own experience, the less favourable condition of the atmosphere here to the action of light, notwithstanding its dryness and clearness, as compared with that of England, &c. &c.

Aug. F. Smith, Esq., of the 99th Regt., read a very interesting paper on Hobart Town considered with regard to its Defence, illustrated with plans and diagrams of the town, river, and adjoining heights, and of detached batteries and lines of fortification, &c.

Captain Stoney, of the 99th Regiment, submitted plans and sections of a powerful Root Extractor, used for clearing land in America, and read a brief paper explanatory of the machine.

After some discussion and remarks from various members on subjects before the meeting, it was moved by Joseph Hone, Esq., and carried,

That the thanks of the Society are due to the several persons who have made presentations and contributed papers, &c.

The chair was occupied during the latter part of the evening by Peter Fraser, Esq., one of the Vice-Presidents, and vacated about half-past nine; when the members separated into conversational groups, which finally broke up about 10 o'clock.