PROCEEDINGS

OF THE

ZOOLOGICAL & ACCLIMATISATION SOCIETY OF VICTORIA.

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OF THE

Zoological and Acclimatisation Society

OF VICTORIA,

AND

REPORT OF THE ANNUAL MEETING OF THE SOCIETY,

HELD 24TH FEBRUARY, 1873.

"Omnis feret omnia tellus."

VOLUME II.

MELBOURNE:
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1873.

LIST OF THE OFFICERS

OF THE

Zoological & Acclimatisation Society

OF VICTORIA.

Patron:

His Excellency Sir G. F. Bowen, G.C.M.G.

President:

FREDERIC R. GODFREY, Esq.

Vice-Presidents:

SAMUEL WILSON, Esq. | ALBERT PURCHAS, Esq.

Hon. Treasurer:

DR. JOSEPH BLACK.

Members of the Council:

CURZON ALLPORT, Esq.
DR. THOMAS BLACK.
ROBERT HAMMOND, Esq.
BARON VON MUELLER, C.M.G.
FREDERICK G. MOULE, Esq.
ARCHIBALD MICHIE, Esq.
CHARLES RYAN, Esq.
PROFESSOR STRONG.
GEORGE SPRIGG, Esq.
H. P. VENABLES, Esq., B.A.
J. B. WERE, Esq.

Hon. Secretary:

ALBERT A. C. LE SOUEF, Esq.

Collector:

MR. A. O. SEGERBERG.

Hon. Veterinary Surgeon:

MR. GRAHAM MITCHELL.

Bailiff:

FRANCIS MEAKER.

OFFICE OF THE SOCIETY—30 SWANSTON STREET.

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REPORT OF THE COUNCIL.

THE Annual Meeting of the Zoological and Acclimatisation Society of Victoria was held on Monday, the 24th day of February, at the office of the Society, 30 Swanston-street.

The following Members were present:

DR. THOMAS BLACK, *President, in the chair.*
MR. LE SOUEF, *Honorary Secretary.*
MESSRS. C. ALLPORT.
„ F. R. GODFREY.
„ A. PURCHAS.
„ F. G. MOULE.
COUNT DE CASTELNAU.
MESSRS. C. RYAN.
„ G. SPRIGG.
„ J. B. WERE.
„ S. WILSON.
„ H. P. VENABLES.
DR. JOSEPH BLACK.

Mr. GODFREY stated, that some months since, he proposed an alteration in Rule 4, having for its object the reduction of the number of the Council from 18 Members to 12; at a meeting of the Council called to consider the proposed alteration, it was found that the power to alter the Rules rested only with the annual, or a special meeting of the Society, and not with the Council. He therefore withdrew his motion, on the understanding that it would be revived at the annual meeting, and he had given the necessary notice to the hon. secretary, and now begged

leave to move, in accordance with his notice, that the number of the Council be reduced from 18 Members to 12, and that no new appointments be made until the Council is reduced to that number.

Mr. PURCHAS seconded the motion.

COUNT DE CASTELNAU opposed the motion; he could see no reason for the change.

Several Members spoke in favour of the proposed alteration, which on being put from the chair, was carried by a considerable majority.

Mr. GODFREY also moved that the word "Treasurer" be struck out of line 8, clause 13; and contingent on the motion being carried, that the word "or" be inserted between the words President and Vice-Presidents in the same line. His reason for proposing this alteration was, that there were few gentlemen in the Council who could take the office; it was necessary that the hon. treasurer should reside in Melbourne, and be readily accessible by the hon. secretary; he feared that a difficulty would arise if a new treasurer had to be elected each year. After some discussion, in which most of the members present took part, the motion was put from the chair and carried.

The hon. secretary, Mr. LE SOUEF, then read the following Annual Report of the Council:

The Council of the Zoological and Acclimatisation Society have much satisfaction in presenting the Ninth Annual Report of their proceedings to the Subscribers. The past year has been one of greatly increased prosperity, and the Council congratulate the subscribers on the growing importance of the Society. At the last annual meeting the title of the Society

was altered, in order to give more prominence to the Zoological element; and since then not only has the collection of birds and animals at the Royal Park steadily increased, but the interest of the public has been shown by the large additions to the list of members. In 1871 the subscriptions were only £99 10s., while last year they reached the sum of £459 2s. 3d.—although the new rule, reducing the yearly subscription from two guineas to one, only then came into force. The number of visitors has also largely increased, and Zoological Gardens bid fair to become as popular here as they are in all the large cities of Europe where they are established. The Council, encouraged by the support and evident interest of the public, are determined to spare no effort to make the gardens worthy of the colony. The most notable additions to the collection during last year were—a fine pair of African lions, a leopard, a black bear from California, and some Indian monkeys. Communication has been opened up with kindred societies in different parts of the world, and it is hoped that the present year may see the stock considerably augmented. Several improvements have also been effected in the grounds. A large aviary has been erected at a considerable outlay, and most of the old aviaries have been altered and improved. Additional enclosures, in the shape of small paddocks, have been added for large birds; and the ponds for waterfowl have been cleared out and beautified, while many improvements are contemplated at an early date, amongst others, a reptile house for snakes, iguanas, lizards, &c.; a bear pit, and a new range of buildings for the great carnivora.

The Council have done their utmost to redeem the promise made at the last annual meeting, to establish a good Zoological collection, and have not been unmindful of Acclimatisation. The past season has been the most successful ever yet attained in pheasant breeding, more than 100 birds have been reared; some are already liberated, while others have been disposed of, and a considerable number are available for next season's operations. The Society will be in a position, in the coming season, to distribute a number of pheasant's eggs to Subscribers who have suitable country for breeding pheasants. A few valuable green and copper pheasants have lately been received from Japan, through the kindness of Mr. James Lyall Grant, of Foo Chow. Mr. Grant was also good enough, on two occasions, to ship a number of Bamboo fowl, but they unfortunately died on the voyage. Some Californian quail have been obtained from Nelson, N.Z., and turned out in country suited to their habits. In Nelson they have increased and spread in a most surprising manner, and there is every reason to hope that they will increase here as rapidly. Communication has been established with the recently inaugurated Acclimatisation Society of San Francisco; and it is the intention of the Council to obtain from thence the Eastern and Mountain quail. The different varieties of the Californian quail are larger and finer birds than ours, and will be a valuable addition to the game of the colony. Money has been sent to England for a shipment of red-legged partridge, as it is thought that this bird will answer well in certain parts of the country. A number of hares have as usual been sent inland, and some also to New Zealand. No deer have

been liberated during the year; but the different varieties at the Royal Park have increased in numbers, and are now available for distribution as suitable opportunities occur.

The Council are gratified at being able to inform the subscribers that the Society's flock of Angora goats, at Mr. Samuel Wilson's station, Longerenong, are thriving remarkably well. Mr. Wilson finds it expedient to shear the goats twice a year; the last clip brought 3s. 6d. per lb. in London. At the Exhibition just closed the Society was awarded a silver medal in recognition of its efforts in introducing the Angora goat.

The ostriches on the Wimmera are also thriving, but have not increased so quickly as it was hoped they would. The flock now numbers 20 birds.

Some valuable and interesting information on Ostrich farming, and on the Angora Goat, will be published in the next volume of the Society's proceedings.

The Council have for years past given considerable attention to Sericulture, and have endeavoured to obtain from neighbouring Colonies and from Japan improved species of silkworms, and have also acquired all information to be derived from Sericulturists in Queensland, Sydney and Adelaide. Their labours, however, have not hitherto met with the anticipated success, and they therefore notice with much satisfaction the efforts made by Mrs. Bladen Neill to establish sericulture in connection with breeding grain or silkworm eggs for exportation, which latter industry has proved in other countries to be of vast importance. "Silkworm eggs from Japan, to the amount of one hundred and thirty-five thousand

cards, costing in that country six hundred and seventy-five thousand dollars, lately arrived in San Francisco." —*Ex. Land and Water.*

Mrs. Neill has recently returned from Europe, bringing with her approved varieties of the mulberry tree and silkworm grain, said to be free from disease. The Council are most anxious for the success of sericulture in the colony, but feel that its ultimate success must be due either to Government or private enterprise more than to this Society, which has so many other pressing demands on its funds and on the time of its executive officers.

The Council regret that the trout ova, obtained from Tasmania last season, did not prove a success. From some cause, which cannot be satisfactorily explained, the greater part of the ova died after being placed in the hatching boxes, and numbers of the young fish that were hatched perished likewise. The latter was undoubtedly due to the bad state of the Yan Yean water. It is the more to be regretted, as the per centage of loss in hatching in 1871 was very small. To obviate this in future, it is proposed in the coming season to use filter beds. Two streams have, however, notwithstanding been well stocked with trout—one of them a tributary of the Campaspe. A large number of carp have recently been placed in the reservoirs at Maldon, Sandhurst, Castlemaine, Maryborough, &c. &c.

The San Francisco Society has kindly offered to send a supply of salmon ova for the mere cost of collecting, not exceeding £2 per thousand; but as the cost of transit would be great, the Council do not at present see their way to accept the liberal offer made to them.

The Government was good enough to place the sum of £1000 on the Estimates last year for the use of the Society, which amount was passed by the Parliament; but it is hoped that a larger vote will be made this year, as the extension of the Zoological collection necessarily entails largely increased expenditure.

It is the intention of the Society's energetic collector, Mr. Segerberg, to visit the country districts again this year, and the Council would desire to express their thanks for the liberal support and the kind manner in which he was nearly everywhere received on the occasion of his last visit.

The following gentlemen have received the Society's silver medal during the past year for services rendered, viz.:—Captain Lucas, steamship *Southern Cross;* Dr. George Bennett, F.L.S., F.Z.S. of Sydney; and Captain Conrad, of the German ship, *Herzog Ernst.* Captain Chapman, of the brig *Firefly,* received the bronze medal of the Society.

The Council feel it due to Dr. Black the retiring President, that they should express their sense of the services rendered by that gentleman to the Society since its formation, and the untiring energy and zeal which he has devoted to it during the many years he has acted as President.

They would also beg to tender their best thanks to Count de Castelnau and Baron Von Mueller, C.M.G., for their valuable scientific papers contributed during the last three years to the Society's printed proceedings.

The Council would desire, before concluding this report, to state that the success of the Society may, in a great measure, be attributed to the energy

and attention of the honorary secretary, Mr. A. A. C. Le Souef, and the zeal of the staff employed in the Gardens; the same persons have remained in the Society's service for years, and no small share of the present prosperity is due to the diligence with which they carry out their several duties.

During the past year Mr. George Coppin and the Hon. Dr. Dobson have retired from the Council, and Professor Strong has been elected. In conformity with Rule 4, the following gentlemen retire from the Council, being the three who have attended the fewest meetings, viz.: Professor M'Coy, T. J. Sumner, Esq., and Wm. Robertson, Esq., M.L.A. In compliance with Rule 13, the meeting has also to elect by ballot a president, and two vice-presidents, for the ensuing year.

The second volume of the Society's proceedings will be published as soon as possible, and forwarded to each member of the Society.

The total expenditure for the past year has been £1,501 14s. 1d.

The balance-sheets, audited by Mr. Rucker, public accountant, are laid before the meeting.

On the motion of Mr. MOULE, the Report was unanimously adopted.

The following letter was then read from the President to Lord Canterbury, on the occasion of his retirement from the office of Patron of the Society.

"Zoological and Acclimatisation Societies' Office,
"*February* 19*th*, 1873.

"My Lord,

I have the honor to address your Excellency at the request of the Council of the Zoological and Acclimatisation Society, to express the Council's regret at your Excellency's

approaching departure from the Colony, and to thank you for the interest you have taken in the Society, and for your kindness in having acted as its Patron during your tenure of office as Governor of Victoria.

"I have the honor to be, my Lord,

"Your most obedient Servant,

(Signed) "THOMAS BLACK, *President.*"

The President remarked that he was now about to retire from the position of President of the Society, with which he had been connected in different capacities for sixteen years. He could claim, in fact, to be the founder of the original Society, as on its formation, in 1857, he had been the first to suggest an extension of its objects, so as to include Zoology and Acclimatisation. He was proud to say that a great amount of good had been accomplished, for they had now herds of deer in different parts of the colony; hares were firmly established; pheasants were multiplying, and trout of 7 lbs. weight had been caught in our streams, and best of all, the angora goats were rapidly increasing. He believed, in fact, the Society was doing a noble work, and that future generations would be thankful to them for their labours. The claims of advancing years made him not unwilling to retire from the position he had held so long, and he might be allowed to say without egotism, with some credit to himself and advantage to the country. He should still continue as a Member of the Council to take a deep interest in the progress of the Society. He would now call on the meeting, under Rule 13, to elect the Office-Bearers for the ensuing year.

The thanks of the meeting were then again tendered to the retiring President, and on the motion of

Mr. MOULE, it was unanimously decided to recommend that the Silver Medal of the Society be awarded by the Council to Dr. Black for his services, at their next meeting.

The election of Office-Bearers for the ensuing year was then proceeded with by Ballot, with the following result :—

President—FREDERIC R. GODFREY, ESQ.

Vice-Presidents—SAM. WILSON AND A. PURCHAS, ESQS.

Hon. Treasurer—DR. JOSEPH BLACK.

After the gentlemen elected had thanked the meeting for the honor conferred upon them, it closed, with a vote of thanks to the Chairman.

ADDRESS TO THE LATE PRESIDENT.

On the 21st April, at a meeting of the Council of the Society, the following address, which had previously been unanimously voted to the late President, Dr. Thomas Black, was presented to that gentleman by the President, F. R. Godfrey, Esq.

"TO THOMAS BLACK, ESQ., M.D.

"Dear Sir,

"The Council of the Zoological and Acclimatisation Society of Victoria, desire on the occasion of your retiring from the office of President of the Society, which you have held for eight years, to express to you their sense of the very valuable services you have rendered, the many years you have devoted, and the untiring energy you have displayed in the cause of acclimatisation.

"The Council trust that you may be spared for many years to assist them in their labours, and to witness the extension of this Society, the welfare of which you have zealously helped to promote.

"On behalf of the Council,

(Signed) "FREDERIC R. GODFREY, *President.*"

To which Dr. Black read the following reply:—

"To the President and Members of the Zoological and Acclimatisation Society of Victoria."

"Gentlemen,—I thank you for the address you have unanimously voted to me on my retirement from the office of President, made imperative on my part, in accordance with a rule lately passed by the Society, viz.:—'That the President and Vice-Presidents should retire annually, and be ineligible for re-election.

"I can assure you, with all sincerity, that I value this kind expression of your sentiments towards me on the present occasion, infinitely more than medals of silver or gold.

"Acclimatisation and a good Zoological collection must necessarily be of slow growth, yet we have every reason to be satisfied with the progress made. I shall mention a few of the animals already introduced, and which have proved a great success. The hare, deer of many kinds, pheasant, Angora goat, and ostrich; British song and other birds have been liberated in several parts of the colony, and a variety of choice fish are to be found in many of our lakes and streams.

"This is not the only benefit arising from the labours of this Society, our correspondence with kindred societies throughout the world, and the interchange of reports serve to make us better known and appreciated. In a letter addressed to me some considerable time ago, from Mr. Edward Wilson, he thus writes:—'I can assure you our fame is rapidly extending through all lands, and we are not only covering ourselves with honour, but presenting our adopted country in a very favourable light in innumerable regions, in which, but for us, her name never would be heard of.' Such is the language of a staunch friend of this Society and the colony generally.

"With respect to the necessity of a Zoological collection at the Royal-park, I think there can be but one opinion. An excellent

commencement has already been made, and the gardens are now a great attraction to numerous visitors. From our geographical position and well-directed efforts of the Society, and also from the energy and good taste displayed by our Hon. Secretary, Mr. Le Souef, I think we may confidently expect, at no distant period, to have a collection second to none in Europe.

"The following extract, from a celebrated work on natural history, will show the great interest taken in the study of Zoology at an early period:—

"'The first establishment which was used practically and for the study of their nature, was a menagerie founded by Louis XIV., which served for the schools of Buffon and Daubenton, and following this the fine collection of the Garden of Plants at Paris, formed a source from which all Europe drew their researches.

"'In Britain during this period, the collection of wild animals were confined to one or two individuals, who made them sources of profit, and for many years that belonging to Mr. Cross, in Exeter Change, was well known as almost the only place where a study could be obtained.

"'Later years, however, and an increasing knowledge of the utility of natural history, have raised up noble collections.

"'The Tower has been renovated, London, Liverpool, and Dublin have now their Zoological Gardens, so England can be no longer taunted that she was unable to equal the menageries of the Continent.

"'The various Zoological Gardens which are established and establishing throughout the country, are now the schools of natural history, and the wild beasts of the forest and fowls of the air, instead of being destroyed in savage and unnatural conflicts, are studied to learn the wonders of their structure, and to discover the uses for which an all bountiful Creator has intended them.

"The transactions of this Society will doubtless form part of the future history of this colony. I shall therefore make no excuse for mentioning the names of gentlemen who have been identified with its progress from an early date, and who are in every way deserving of honourable mention:—His Excellency Sir Henry Barkly, Professor M'Coy, Baron von Mueller, Count

de Castelnau, Edward Wilson, Frederic R. Godfrey, Samuel Wilson, F. G. Moule, William Lyall, Sir Robert Officer, and Morton Allport, of Tasmania, and Dr. George Bennett, of Sydney.

"To the present and former Governments of this country we must feel deeply indebted for the liberal support we have received for so many years.

"Allow me again to thank you for the honour you have done me, and to assure you that I shall always continue to take a lively interest in promoting the cause we all have so much at heart, and which has afforded me such agreeable pastime for the last 16 years.

"I am, gentlemen, your obedient servant,

"THOMAS BLACK."

Account of Monies received and paid by the Zoological & Acclimatisation Society of Victoria,

During the period 1st January to 30th June, 1872.

RECEIPTS.	£	s.	d.
Government Grant	500	0	0
Subscriptions and Donations	186	13	3
Balance at Bank of Victoria, 1st January	230	7	8
Cash in Hon. Secretary's hands, 1st January	9	1	3
	£926	2	2

PAYMENTS.	£	s.	d.
Premises	96	6	9
Food and Forage	99	17	8
Farming Implements, Carts, Tools, &c.	1	17	6
Wages	165	4	6
Office Expenses	64	8	6
Incidental Expenses	106	6	3
Purchase and Transport of Stock	61	8	9
Balance at the Bank, 29th June	329	17	3
Cash in Hon. Secretary's hands	0	15	0
	£926	2	2

J. BLACK, M.D.
Hon. Treasurer Zoological and Acclimatisation Society.

Melbourne, *8th July*, 1872.

Audited and found correct,
W. F. A. RUCKER,
Accountant, &c.

ALBERT A. C. LE SOUEF, *Hon. Secretary.*

Account of Monies received and paid by the Zoological & Acclimatisation Society of Victoria,

During the period 1st July to 31st December, 1872.

RECEIPTS.

	£	s.	d.
Government Grant	500	0	0
Subscriptions and Donations	272	19	0
Sales of Stock and Wool	42	1	10
Balance at Bank of Victoria, 1st July	329	17	3
Cash in Hon. Secretary's hands, 1st July	0	15	0
	£1,145	13	1

PAYMENTS.

	£	s.	d.
Premises	202	5	8
Food and Forage	120	17	7
Farming Implements, Carts, Tools, &c.	7	0	0
Wages	179	15	6
Office Expenses	84	11	5
Incidental Expenses, Printing Proceedings, &c.	296	19	4
Purchase and Transport of Stock	226	4	2
Interest	0	2	8
Balance at Bank of Victoria, 31st December	22	1	11
Cash in Hon. Secretary's hands, 31st December	5	14	10
	£1,145	13	1

J. BLACK, M.D.
Hon. Treasurer Zoological and Acclimatisation Society.

Melbourne, 23*rd January*, 1873.

Audited and found correct,

W. F. A. RUCKER,
Accountant, &c.

ALBERT A. C. LE SOUEF, *Hon. Secretary.*

LIFE MEMBERS.

Aldworth and Co., Sandhurst £10 10 0
Armitage, George, Ballarat .. 10 10 0
Armstrong, W., Hexham.. .. 10 10 0
Barkly, His Excellency Sir Henry 42 0 0
Bear, Hon. J. P., M.L.C. .. 21 0 0
Bear, Thomas H., Heidelberg .. 10 10 0
Black, Dr. Thomas, Melbourne Club 10 10 0
Black, W., Belfast 10 10 0
Borough Council of Sandhurst .. 10 10 0
Box, H., Little Collins-street West 10 10 0
Boyd and Currie, Collins-street West 10 10 0
Bright Brothers, Messrs. & Co., Flinders-lane 10 10 0
Brown, Lindsay, Garramadda, Wahgunyah 10 10 0
Canterbury, His Excellency Viscount 10 10 0
Catto, John, Newbridge, Loddon 10 10 0
Chambers, H. J., St. Kilda .. Services
Cooper, Sir Daniel, London .. 37 2 0
Coppin, Geo. S. 10 10 0
Creswick, Borough Council of .. 10 10 0
Cumming, G., Mount Fyans .. 10 10 0
Cumming, W., Mount Fyans .. 10 10 0
Curr, E. M., Queen-street .. 10 10 0
Dalgety and Co , Messrs., Little Collins-street 10 10 0
Dooker, F. G., Wangaratta .. 10 10 0
Falconer., J. J., Bank of Australasia 20 0 0
Fellows, The Hon. T. H. 10 10 0
Firebrace, R. T 10 10 0
Fussell, R. S. R., Fou Chou dols. 50 .. .. 11 0 10
Glass, R. J., Waiparella 10 10 0
Hervey, The Hon. M. 10 10 0
Hoffmann, W., Bush Back, Essendon 25 0 0
Highett, Miss 10 10 0
Jamieson, Hugh 10 10 0
Jenner, Hon. C. J., M L.C. .. 10 10 0
Jones, Lloyd, Avenel 10 10 0
Joshua Bros., William-street .. 10 10 0
Landells, G. J., Lahore, India .. Services
Layard, C. P., Colombo .. . Services
Layard, E. L., Cape Town .. Services
Learmonth, Thomas, Ercibdanriley, Portland.. .. £10 10 0
Londesborough, The Right Honorable Lord, Carlton Gardens, London 37 10 0
Lyall, W. 10 10 0
Mackinnon, L., "Argus" Office Services
Mackenzie, John 10 10 0
Macintosh, Alexander 10 10 0
Marshall, Captain D. S. .. .. Services
Martin, Dr., Heidelberg 10 10 0
Matheson, J., Bank of Victoria .. 21 0 0
McGill, A. 10 10 0
McGregor, Samuel, Belfast .. 10 10 0
McHaffie, John, Phillip Island .. 10 10 0
McMullen, J., Union Bank .. 21 0 0
McKellar, Hon. T., M.L.C. .. 10 10 0
Molloy, W. T., Hawthorn .. 10 10 0
Mueller, Baron Von, Botanic Gardens 10 10 0
Municipal Council of Ballarat W. 20 0 0
Murray, S., Dunrobin 10 10 0
Nicholson, Germain, Collinsstreet East 10 10 0
Officer, C. S., Mount Talbot .. 10 10 0
Power, Hon. Thomas H., Hawthorn 10 10 0
Purchas, Albert, Kew .. .. Services
Ritchie, J., Streatham 10 10 0
Rostron, John R., Navarre .. 10 10 0
Rusden, G. W., Brighton.. .. 10 10 0
Russell, A. Matuwalloch 10 10 0
Rutledge, William, Belfast .. 10 10 0
Salmon, J., E. S. and A. C. Bank 21 0 0
Sargood, King and Sargood, Flinders-street East 10 10 0
Shoobridge, E., Valleyfield, Tasmania 10 10 0
Simpson, Robert, Lange Kal Kal 10 10 0
Sladen, Hon. C., Birregurra .. 10 10 0
Sloan, W. S., Fou Chou, dols. 50 11 0 10
Spowers, Allan, "Argus" Office 10 10 0
Stanbridge, W. E., Daylesford .. 10 10 0
Staughton, S. T., Little Collinsstreet West 10 10 0
Strachan, J., London Chartered Bank 21 0 0

Stewart, J., Emerdale, Streatham	£21	0	0
Sumner, T. J., 24 Flinders-lane West	10	10	0
Taylor, W., Overnewton, Keilor	10	10	0
Templeton, Hugh, Fitzroy	Services		
Ware, Joseph, Carramut	10	10	0
Wilson and Mackinnon, Collins-street East	42	9	0
Wilson, Edward, "Argus" Office	21	0	0
Wilson, Samuel, Wimmera	10	10	0
Winter, James, Toolamba, Murchison	10	10	0
Winter, Thomas, Winchelsea	10	10	0
Winter, S. P.	10	10	0
Youl, James, A., Clapham Park, London	Services		

LIFE MEMBERS, 1872.

Alfrey, Ernest H., Fernihnest	£10	10	0
Ayrey, Charles, Warranuke	10	10	0
Campbell, Finlay, Raywood	10	10	0
Edols, John, Ingleston	10	10	0
McEachern, D., Kangaroo	10	10	0
Fraser, Simon, Cornelian Creek	10	10	0
Lyster, Wm., Melbourne	10	10	0
Mein, G. A., Moolpa	10	10	0
Officer, T. H., Murray Downs	10	10	0
Officer, Wm., Tara	10	10	0

ANNUAL MEMBERS.

Allport, Curzon, Chancery-lane	£2	2	0
Anderson, A., Wallsloo	1	1	0
Adam, J. (of Lawrence and Adam) Elizabeth-street	1	1	0
Ashton, J. M., Richmond	1	1	0
Atkin, C. A., Hotham	1	1	0
Atkinson, W., Ballan	1	1	0
Adams, J. and W., St. Enochs	2	2	0
Australian Mortgage Land and Finance Company	2	2	0
Amess, Samuel, William-street	1	1	0
Anderson and Wright, Flinders-lane	1	1	0
Alcock and Co., Russell-street	1	1	0
Banks, Bros., Bell and Co., Flinders-lane	1	1	0
Baines, E., Little Collins-street	2	2	0
Black, Dr. J., Bourke-street	2	2	0
Bennett, T. K., Bourke-street	1	1	0
Batt, Thomas, Yarra Flats	1	1	0
Bright, C. E., Flinders-lane	1	1	0
Brown, Gavin G., Collins-street	2	2	0
Blair, Jas., Toorak	1	1	0
Barry, D. M., Brunswick	1	1	0
Borough Council, Portland	2	2	0
Borough Council, Sandridge	3	3	0
Barwise, John, Elizabeth-street	1	1	0
Bruce, W., Eaglehawk, Sandhurst	1	1	0
Buncle, J., Hotham	1	1	0
Beaney, Dr. J. G., Collins-street	1	1	0
Brown, M. J., Green Hills	1	1	0
Bear, Hon. J. P., M.L.C., Swanston-street	1	1	0
Bowyer, C., Cheaveley	1	1	0
Blair, W. G., Kyneton	1	1	0
Bryant, M., Baringhup	1	1	0
Bell, J., Garden Gully	£1	1	0
Buckley, E., Newbridge	1	1	0
Boys, Robert, Bridgewater	1	1	0
Bon, Mrs. Anne F., Wappan	1	1	0
Benn, John, Flinders-lane	1	1	0
Bindon, Judge, St. Kilda	1	1	0
Briscoe and Co., Collins street	1	1	0
Booth and Hunt, Sandhurst	1	1	0
Bligh and Harbottle, Flinders-lane	2	2	0
Brodribb, K. E., Chancery-lane	2	2	0
Burry, Leech and Co., Queen-street	1	1	0
Buckley and Nunn, Bourke-street	2	2	0
Clarke, W., and Co., Elizabeth-st.	1	1	0
Carter, E., Collins-street	1	1	0
Chomley, A. W., Temple-court	1	1	0
Cumming, Hon. J., M.L.C., Toorak	2	2	0
Clarke, J. L., Elizabeth-street	1	1	0
Clarke, Walter, Bulla	2	2	0
Carson, John, Collins-street	1	1	0
Crooke, Dr., Gertrude-street	1	1	0
Chenery, Alfred, Delatite	2	2	0
Clendinning, Dr., Ballarat East	1	1	0
Cuthbert, Henry, Ballarat	1	1	0
Cleeland, J., Bourke-street	1	1	0
Caselli, H. R., Ballarat	1	1	0
Clarke, W. J. T., Collins-street	1	1	0
Cock, Robert, Kyneton	1	1	0
Cay, Robert, Newbridge	1	1	0
Catto, J., Newbridge	1	1	0
Currie, George, Kaarimba	2	2	0
Christie, L. S., and Co., Ballarat	1	1	0
Croaker and Scott, Collins-street	1	1	0
Davidson, James, Deniliquin	1	1	0
Dobson, Hon. Dr., M.L.C., Temple-court	1	1	0

Danks, John, Bourke-street ..	£1	1	0
Daly, John, Victoria-street ..	1	1	0
Doyle, Laurence, Stephen-street ..	1	1	0
De Pass Brothers, Collins-street ..	1	1	0
De Beer, S., Queen-street	1	1	0
Evans, G., "Argus" Office ..	2	2	0
Ellis, Joseph, Royal Park	1	1	0
Foy, Mark, Smith-street	1	1	0
Fitch and French, Flinders-lane ..	1	1	0
Ford, W., and Co., Swanston-sreet	1	1	0
Fleming, J. W., Brunswick ..	1	1	0
Foxcroft, John, Elizabeth-street ..	1	1	0
Fiskin, A., Lal Lal	1	1	0
Findlay, J., Towong	2	2	0
Fraser, Hon. Alex., M.L.C., Collins-street	1	1	0
Fraser, C. F., Montpilier	1	1	0
Fletcher, G. A., Sandhurst ..	1	1	0
Fenton, W., Terricks West ..	1	1	0
Fraser, W., Tallagaroopna	2	2	0
Forsyth, R., and Sons, Maitoongoon	2	2	0
Fanning, Nankivell and Co., Melb.	2	2	0
Fellows, His Honour Mr. Justice	1	1	0
Ferguson and Moore, Flinders-lane	1	1	0
Goldsborough and Co., Bourke-street West	2	2	0
Grice, R., senr., Flinders-lane ..	1	1	0
Grant, John, Bourke-street ..	1	1	0
Gray, C., Nareeb Nareeb	2	2	0
Green, J. R., Gertrude-street ..	2	0	0
Graham, Hon. James, M.L.C., Collins-street	1	1	0
Green, Molesworth, Mount Hope	1	1	0
Gurner, H. F., Collins-street ..	1	1	0
Graham, John, Greensdale ..	1	1	0
Grant, P., Pentland Hills	1	1	0
Grant, George, Blloch Oilsprings	1	1	0
Grant, William, Mill Bank ..	1	1	0
Grant, Thomas, Genelgin	1	1	0
Haddon, F. W., "Argus" Office ..	2	2	0
Harper, R., Flinders-lane	1	1	0
Highett, Hon. W., M.L.C., Richmond	2	2	0
Haege, W., Queen-street	1	1	0
Hatton, S. W., Flemington ..	1	1	0
Henderson, T., Royal Park ..	1	1	0
Holdsworth, J., Sandhurst ..	1	1	0
House, Samuel, and Co., Queen-st.	2	2	0
Hepburne, B., Queen-street ..	1	1	0
Helm, J. A. C., Sandhurst ..	1	1	0
Hunt, Dr. Brunswick-street ..	1	1	0
Halstead and Kerr, Elizabeth-st.	1	1	0
Ham, C. J. and T., Swanston-st.	1	1	0
Hudson, Dr., Ballarat	1	1	0
Horwood, J., Sandhurst	£1	1	0
Hart, H. J., Queen-street	1	1	0
Hall, Samuel, Strathulloh ..	1	1	0
Heffernan, W., Sandhurst	1	1	0
Hegarty, R., Bridgewater	1	1	0
Holloway, George, Durham Creek	2	2	0
Howitt, Dr. G., Caulfield	1	1	0
Inglis, Daniel, Flinders-street ..	1	1	0
Ingamells, J., Royal Park	1	1	0
Jacobs, F., and Co., Queen-street	1	1	0
Johnston, E., Elizabeth-street ..	1	1	0
Jackson, Henry, Sandhurst ..	1	1	0
Jones, H., Gold Broker, Sandhurst	1	1	0
Joshua Bros., William-street ..	2	2	0
Kerr, R., Collins-street	1	1	0
King, S. G., Hotham	2	2	0
Kronheimer and Co., Queen-street	1	1	0
Keep, E., Elizabeth-street	1	1	0
Knight, A. H., Korongah	1	1	0
King, A. H., Ballarat East ..	1	1	0
Kelly, Charles, Runnymede ..	1	1	0
Kinnear, R. H., Lower Moira ..	1	1	0
Larnach, J., Kilmore, Waltonians	2	12	6
Langhorne, A., Laverton	1	1	0
Latham, E., Carlton Brewery ..	1	1	0
Lee, B., Bourke-street	2	2	0
Lindley, A. B., Elgin-street ..	1	1	0
Lambert, T. Lonsdale-street ..	1	1	0
Lyster, A. B., Bourke-street ..	1	1	0
Lawrence, J. B. (of Adams and Lawrence), Elizabeth-street ..	1	1	0
Lister, Charles, Bourke-street ..	1	1	0
Lansel, George, Sandhurst ..	1	1	0
Learmonth, F. S., Ballarat ..	1	1	0
Lavender, F., Kyneton	1	1	0
Lewis, J. F., Sandhurst	1	1	0
Liddle, Joseph, Sandhurst	1	1	0
Lang, T., and Co., Elizabeth-street	1	1	0
McNaughton, Love and Co., Flinders-lane	2	2	0
Martin, P. J., Flinders-lane ..	1	1	0
Matheson, J., Bank of Victoria ..	1	1	0
Mannallack, T., Brunswick ..	1	1	0
Moore and Co., Bourke-street ..	1	1	0
Murphy, E. J., William-street ..	1	1	0
Martin, G., and Co., Market-street	2	2	0
Maplestone, H., Elizabeth-street	1	1	0
McCoy, Professor, University ..	1	1	0
Maryborough Shire Council ..	5	0	0
Martin T., Brunswick	1	1	0
Maloney, Dr., Lonsdale-street ..	1	1	0
McKnight, C. H., Dunmore ..	1	1	0
McCulloch, Sellar and Co., Queen-st.	2	2	0
McLean and Co., Swanston-street	1	1	0

Murray, A. S., Dunrobin ..	£1	1	0
Martley, J., Sandhurst ..	1	1	0
Moorhead, Captain, Sandhurst ..	1	1	0
Madden, John, Chancery-lane ..	1	1	0
McEwan and Co., Elizabeth-street	1	1	0
McDougall, Jas., Carlton	1	1	0
Michaelis, M., Lonsdale-street ..	1	1	0
Muir, W. P., Collins-street ..	1	1	0
Mullen, S., Collins-street	1	1	0
Masterman, F. A., Brunswick-st.	1	1	0
Myers and Son, Cairnbank ..	1	1	0
Munckton, J. R., Coliban Estate ..	1	1	0
Morrison, D. R., Sandhurst ..	1	1	0
Mack, A., Rochester	1	1	0
Murphy, Jas., Kotupna	2	2	0
McKenzie, Worough	2	2	0
McDougall, C., Brunswick	1	1	0
Mitchell, Hon. W. H. F., M.L.C., Melbourne Club	1	1	0
McKellar, Hon. Thos., M.L.C., Melbourne Club	10	0	0
Moule, F. G., Market-street ..	1	1	0
McPherson and Co., Sandhurst ..	1	1	0
McFarland, Robert, Bourke-street	1	1	0
McLaren, W., Riddle's Craek ..	1	1	0
Mackay and Co., "Bendigo Advertiser"	1	1	0
McBean, Robert, Kilfera	2	2	0
McKellar, W., Lima	2	2	0
Moore Bros., Sandhurst	1	1	0
Nutt, R. W., William-street ..	1	1	0
Nicholson, Germain, Swanston-st.	1	1	0
Nicholson, Dr., Ballarat	1	1	0
Nelson, Jones J., Sandhurst ..	1	1	0
Noyes, Dr. A. W. F., Deniliquin ..	1	1	0
Ogilvy, A. J., Queen-street ..	1	1	0
Overend, B., Brunswick	1	1	0
Oldfield, L., Royal Park	1	1	0
Oliver, R., Coliban Park	1	1	0
Oliver, John, Reedy Lake	2	2	0
Peterson, W., and Co., Market-st.	1	1	0
Paterson, Ray, Palmer and Co., Flinders-lane	2	2	0
Paterson, W., Tasmania Insurance Co.	1	1	0
Ploos Van Amstel, J. W., Collins-st.	1	1	0
Ryan and Hammond, Bourke-street	2	2	0
Rocke, W. H., Collins-street ..	1	1	0
Rosser, E., Brunswick	1	1	0
Rosser, Charles, Brunswick ..	1	1	0
Robertson, W., M.L.A., Melbourne Club	2	2	0
Robertson, George, Elizabeth-street	1	1	0
Rucker, W. F. A., Collins-street ..	1	1	0
Russell, Hon. P., M.L.C., Melbourne Club	£1	1	0
Rosier, J. W., Elizabeth-street ..	1	1	0
Rudd, A. P., Flemington	2	2	0
Rede, Colonel, Ballarat	1	1	0
Robertson, W., Wooling	1	1	0
Roberts, J. S., Sandhurst	1	1	0
Rymer, J. S., Sandhurst	1	1	0
Raleigh, J., Raywood	1	1	0
Russell, Robert, Serpentine ..	1	1	0
Rowe, Dr. J. P., Mount Battery ..	2	2	0
Ross, Henderson and Fick, Sandhurst	1	1	0
Sloane, W., and Co., Collins-street	2	2	0
Sands and McDougall, Collins-st.	2	2	0
Sargood, Son and Co., Flinders-st.	2	2	0
Smith, C. and J., Albert-street ..	1	1	0
Sanderson, J., and Co., William-st.	1	1	0
Stanford and Co., Bonrke-street ..	1	1	0
Skinner, Judge, Windsor	2	2	0
Sumner, W., Swanston-street ..	1	1	0
Skene, Hon. W., M.L.C., Toorak	2	2	0
Straw, T., Brunswick	1	1	0
Simson, Hon. R., M.L.C., Toorak	2	2	0
Stevenson, A., King-street ..	1	1	0
Salmon, J., Collins-street	1	1	0
Sharp, John, Collins-street ..	1	1	0
Smith, George, Ballarat	1	1	0
Staughton, H., Exford	1	1	0
Staughton, S. G., Egnesbury ..	1	1	0
Shuter, C., J.P., Greendale ..	1	1	0
Sanders, J. T., Sandhurst	1	1	0
Stewart, J., Sandhurst	1	1	0
Summers, A., J.P., Newbridge ..	1	1	0
Simpson, C., Newbridge	1	1	0
Sharp, G., Benalla	1	1	0
Stodart, D. E., Millers Ponds ..	2	2	0
Strong, Professor, University ..	1	1	0
Sprigg, G., St. Kilda	1	1	0
Smale, A. W., Queen-street ..	2	2	0
Terry, A., Royal Park	1	1	0
Trench, Le Poer, Ballarat	1	1	0
Taylor, W., Keilor	2	2	0
Turner, W., Broad Lands	1	1	0
Thrupp, W., Sutton Grange ..	1	1	0
Taylor, J., Sandhurst	1	1	0
Taylor, Andrew, Sandhurst ..	1	1	0
Thunder, A., and Co., Sandhurst	1	1	0
Turnbull, Thomas, Upotipotpon ..	1	1	0
Twentyman, T., Emerald Hill ..	1	1	0
Twentyman, R., Flinders-street ..	1	1	0
Venables, H. P., Education Office	1	1	0
Vahland and Getzschman, Sandhurst	1	1	0

Wilson, E., Argus Office	£2	2	0
Wilshin and Leighton	1	1	0
Wood, J., and Son, Collingwood	1	1	0
Walker, P. N., William-street	1	1	0
Wilson, Dr. J. P., Cragieburn	1	1	0
Whitney, Chambers & Co., Swanston street	1	1	0
Waldock, S., Flemington	1	1	0
Wells, G. E., Iron Bark, Sandhurst	1	1	0
White, J. W., Collins-street	£1	1	0
Watson, Thomas, Swanston-street	1	1	0
Watson, J., Sandhurst	1	1	0
Wakley, R. S., Sandhurst	1	1	0
Woodworth, Geo. L., Green Valley	1	1	0
Watson, Thomas, Iron Bark, Sandhurst	1	1	0
Watson, J. B., Sandhurst	1	1	0
Williamson, W., Dr., Yanga	2	2	0

HONORARY MEMBERS.

Allport, Morton, Hobart Town.
Beckx, Gustave, Flinders Lane West.
Biagi, Giuseppe, William Street.
Blanchard, W., Collins Street West.
Bouton, A., Yahoue, New Caledonia.
Buckland, Dr. F., London.
Castelnau, Comte de, Apsley Place.
Chalmers, Dr., New Zealand.
Cleeland, J., Albion Hotel, Bourke-street.
Cooper, Ricardo, Queen Street.
Coste, Professor, Huningue.
Damyon, James, Market Street.
Drouyn, de Lhuys, Paris.
Francis, Francis, London.
Gillanders & Arbuthnot, Calcutta.
Godfrey, Captain J. B.
Graham, James, Little Collins Street East.
Grote, Arthur, Calcutta.
Howitt, Ed.
Johnston, Clement, Crown Lands Office.
Jones, Captain, "Superb."
Latham, General.
Madden, Walter, Office of Mines.
Mathieu, A., Yahoue, New Caledonia.
Merryman, Captain, "Essex."
Michaelis, Moritz, Elizabeth Street.
Michael, Major, Madras.
McQueen, Captain, "Martha Birnie."
Mullick, Rajendro, Calcutta.
Officer, Sir Robert, Hobart Town.
Ploos Van Amstel, J. W., Collins St. West.
Ramel, Monsieur, Paris.
Rentsch, Samuel, Flinders Street East.
Ridgers, Captain, "Sussex."
Robinson, J., Calcutta.
Salt, Sir Titus, Saltaire, England.
Scholstein, Adolp., Flinders Lane West.
Sclater, Dr. P. L., London.
Shinner, Captain, "Northumberland."
Smith, Captain, "Dover Castle."
Squire, Surgeon John, Dinapore.
St. Hilaire, G., Bois de Boulogne, Paris.
Were, J. B., Collins Street West.
White, J. H., Collins Street West.

DONATIONS.

Cornwall, A., Brunswick	£0	10	0
Coward, James, Benalla	1	0	0
Frost, W., Benalla	0	0	0
Firth, Henry, Brunswick	0	5	6
Fairchild, J. R., William-street	1	0	0
Günst, Dr., Collins-street	1	0	0
Gratton, H., Gowangardie	1	0	0
Gordon and Gotch, Collins-street	1	0	0
Harrington, P., Victoria-street	£1	0	0
Hoskin, T., Benalla	1	0	0
McKellar, James, Emeu Plains	1	0	0
McDonald, F., Benalla	1	0	0
Power, T. H., Collins-street	1	0	0
Turnbull, James, Emeu Plains	1	0	0
Turnbull, George, Mokoan	1	0	0

SUPPLEMENTAL LIST OF MEMBERS,

To 29th April, 1873.

Anderson & Wright, Flinders-lane	£1	1	0
Amess, Samuel (Life Member), William-street	10	10	0
Aitkins, Thomas, Victoria Parade	1	1	0
Banks Bros., Bell and Co., Flinders-lane	2	2	0
Briscoe and Co., Collins-street ..	2	2	0
Borough Council, Kilmore ..	2	2	0
Blair, Dr. J., President of Medical Society	1	1	0
Bates, Hon. W., M.L.A., Swanston-street	1	1	0
Bushell, C. (Life Member), Chiltern	10	10	0
Baines, Edward, Little Collins-st.	2	2	0
Canterbury, His Excellency. Viscount	10	0	0
Crosby, W., and Co., Queen-street	1	1	0
Edwards, H., Bourke-street ..	1	1	0
Evans, G., *Argus* Office	2	2	0
Frew, George, Royal Park ..	1	1	0
Fanning, Nankivell and Co., Melbourne	2	2	0
Fynn, J., Kilmore	1	1	0
Fleetwood, T. P., Chancery-lane ..	1	1	0
Goldsbrough and Co., Bourke-st.	2	2	0
Grimwood, Thos. S., Elizabeth-street	1	1	0
Grice, R., Flinders-lane	1	1	0
Gray, C., Nareeb Nareeb	2	2	0
Haddon, F. W., Argus Office ..	2	2	0
Hunt, Thos., Kilmore	1	1	0
Henty, E., Portland	10	10	0
Inglis, D., Flinders-street ..	1	1	0
Larnach, J. M., Kilmore	1	1	0
Laing and Webster, Flinders-lane	1	1	0
Latham, E. (Life Member), Carlton Brewery	£10	10	0
Long, D. R., Bourke-street ..	1	1	0
M'Ilwraith, John, Little Collins-st.	1	1	0
M'Naughton, Love and Co., Flinders-lane	1	1	0
Malleson and England, Queen-st.	1	1	0
Martin, George, and Co., Market-st.	2	2	0
Murphy, E. J., William-street ..	1	1	0
Newell and Co., Collins-street ..	1	1	0
O'Connor, J. D., Kilmore	1	1	0
Perry, John, Lonsdale-street ..	1	1	0
Peterson, W., and Co., Queen-st.	1	1	0
Ryan and Hammond, Bourke-st.	2	2	0
Rocke, W. H., Collins-street ..	1	1	0
Sprigg, W. G., Market-street ..	1	1	0
Spurling, W., Kilmore	1	1	0
Stevenson and Elliot, Lonsdale-st.	1	1	0
Sloane, W. and Co., Collins-street	1	1	0
Sargood and Son, Flinders-street	2	2	0
Sanderson, J., and Co., William-st.	1	1	0
Sands and M'Dougall, Collins-st.	2	2	0
Stillwell and Knight, 78 Collins-street east	1	1	0
Stanford and Co., Bourke-street ..	1	1	0
Thomas, J., Kilmore	1	1	0
Taylor, T. H., Chancery-lane ..	1	1	0
Twentyman, R., Flinders-street ..	1	1	0
Wilson, H., Kilmore	1	1	0
Woods, John, Smith-street ..	1	1	0
Watson, George, Bourke-street ..	1	1	0
Welch, Henry, Queen-street ..	1	1	0
Wilson, Edward, Argus Office ..	2	2	0
Watkins, W., M.L.A., Gertrude-st.	1	1	0
Wilshin and Leighton, William-st.	1	1	0

THE RULES AND OBJECTS

OF THE

Zoological & Acclimatisation Society

OF VICTORIA.

Objects of Society.

1. The objects of the Society shall be the introduction, acclimatisation, liberation, and domestication of innoxious animals and vegetables, whether useful or ornamental;—the perfection, propagation, and hybridisation of races newly introduced, or already domesticated;—the spread of indigenous animals, &c., from parts of the colonies where they are already known, to other localities where they are not known;—the procuring, whether by purchase, gift, or exchange, of animals, &c.;—the transmission of animals, &c., from the colony to England and foreign parts, in exchange for others sent thence to the Society;—the collection and maintenance of zoological specimens, for exhibition or otherwise;—the holding of periodical meetings, and the publication of reports and transactions, for the purpose of spreading knowledge of acclimatisation, and inquiry into the causes of success or failure;—the interchange of reports, &c., with kindred associations in other parts of the world, with the view, by correspondence and mutual good offices, of giving the widest possible scope to the project of acclimatisation;—the conferring rewards, honorary or intrinsically valuable, upon persons who may render valuable services to the cause of acclimatisation.

Membership.

2. A Subscriber of one guinea or upwards annually, which shall be payable in the month of January, shall be a

Member of the Society; and contributors, within one year, of ten guineas or upwards shall be Life Members of the Society; and any person who may render special services to the Society, by contribution of stock or otherwise, shall be eligible for life membership, and may be elected as such by the Council, or by any annual general meeting.

Property vest in the Council.

3. All the property of the Society shall vest in the Council for the time being, for the use, purposes, and benefit of the Society.

Executive Officers.

Council.

4. The Society shall be governed by a Council of twelve Members, to include a President, two Vice-Presidents, and an Honorary Treasurer, who shall annually retire from office, and three other Members (viz., those who have attended the fewest Meetings of the Council proportionately since their appointment) shall also retire annually, but shall be eligible for re-election, subject to Rule 13. Provided that if any sum of money be voted to the Society by Act of Parliament, or trusts conferred upon the Council by the Government, then it shall be lawful for the Chief Secretary for the time being to appoint, if he consider it expedient, any number of gentlemen, not exceeding three, to act as Members of the Council, and they shall have all the privileges as if otherwise duly elected.

Vacancy in Council, how supplied.

5. In case of a vacancy occurring by the death, resignation, or non-attendance of any Member of the Council for a period of two months, without leave of the Council, the remaining Members shall, in due course, appoint another Member of the Society to be a Member of the Council in the place and stead of the Member who shall so resign or absent himself; but such new Member shall be nominated at an ordinary meeting of the Council prior to the meeting at which he is elected.

Council to fill up Vacancies.

6. In case of a vacancy occurring by the death or resignation of the President, Vice-President, or Hon. Treasurer, the Council may appoint from amongst themselves, or the other Members of the Society, a person to fill the vacancy so occurring, and the person elected shall hold office only until the next Annual Meeting; but shall be eligible for re-election

for the subsequent year. Provided that such vacancy shall not be filled up unless seven days' notice in writing shall have been sent to each Member of the Council, stating the vacancies which it is proposed to fill up.

Eligibility of Members of Council

7. No person shall be eligible as a Member of Council unless he be a subscriber to the funds of the Society of at least one guinea per annum; and any Member of Council whose subscription shall be in arrear for three months after his subscription is payable, shall cease to be a Member of Council: Provided that this rule shall not apply to persons who may have become Life Members of the Society, by a payment of ten guineas, or who may be Honorary Members of the Society; and provided also, that a month's notice in writing shall be sent to the Member before his place can be filled up.

Meetings of Council.

8. The Council shall meet at least once a month, three Members to form a quorum, and transact the business of the Society.

Powers and Duties of Council.

9. The Council shall have the sole management of the affairs of the Society, and of the income and property thereof, for the uses, purposes, and benefit of the Society; and shall have the sole and exclusive right of appointing paid servants, as a Manager or Secretary, Collector, and such other officers, clerks, and labourers, and at such salaries as they may deem necessary, and of removing them if they shall think fit, and shall prescribe their respective duties. And such Council shall have power to consider and determine all matters, either directly or indirectly affecting the interests of the Society, and if they shall think fit so to do, shall bring the same under the notice of the Members of the Society, at any general or special meeting; and to make such bye-laws as they may deem necessary for the efficient management of the affairs and the promotion of the objects of the Society, and for the conduct of the business of the Council: Provided the same are not repugnant to these rules; to appoint one or more sub-committees, for any purpose contemplated by these rules; and

generally to perform such acts as may be requisite to carry out the objects of the Society.

Branch Societies, &c.

10. The Society shall have power to associate itself with other Societies with similar objects, and to found Branch Societies.

Minutes of Proceedings.

11. Minutes shall be made, in books kept for the purpose, of all proceedings at general and special meetings of the Members, and minutes shall also be made of the proceedings of the Council at their general and special meetings, and of the names of the Members attending the same, and such minutes shall be open to inspection by any Member of the Society at all reasonable times.

Moneys to be paid to Treasurer.

12. All subscriptions and other moneys received on account of the Society shall be paid to the Treasurer, or some person authorised by him in writing, who shall forthwith place the same in a bank, to be named by the Council, to the credit of the Society; and no sum shall be paid on account of the Society until the same shall have been ordered by the Council, and such order be duly entered in the book of the proceedings of the Council; and all cheques shall be signed by the Treasurer as such, and be countersigned by the President, or one of the Vice-Presidents, or by the Chairman of the meeting at which such payment is authorised.

Annual Meeting

13. An annual meeting shall be held in the month of February of each year, and the Council shall report their proceedings during the past year, and shall produce their accounts, duly audited, for publication; and the meeting shall elect by ballot the office-bearers for the ensuing year, and fill up any vacancy which may exist in the Council: Provided that no person shall hold the office of President or Vice-President, for two years successively.

Special Meetings of Members.

14. The Council may, and upon receiving a requisition in writing, signed by twelve or more Members, shall convene a special meeting of the Members, to be held within fifteen days after the receipt of such requisition: Provided that such requisition, and the notices convening the meeting, shall

specify the subject to be considered at such meeting, and that such subject only shall be discussed at such meeting.

Honorary Members.

15. The Council, or any general meeting of the Society, may admit, as Honorary Members, any ladies or gentlemen who may have distinguished themselves in connexion with the objects of the Society, and at such meeting any other business of the Society shall be transacted, of which one day's previous notice shall have been given to the Secretary by any Member desirous of bringing the same forward.

16. No Medal of the Society shall be awarded to any person except by the vote of at least seven Members of Council present at a Council Meeting, and after notice of motion for awarding such Medal shall have been given at the next preceding meeting of the Council.

Power to alter Rules.

17. It shall be lawful for any annual or special meeting of the Society to alter, vary, or amend the rules ; or to substitute another for any of the same ; or to make any new rule which may be considered desirable ; if and after a notice specifying the nature of such alteration, variation, amendment, substitution, or new rule, shall have been given to the Secretary fifteen days before the holding of such meeting. And such alteration, variation, amendment, substitution, or new rule shall be valid if carried by a majority of not less than two-thirds of the Members present at such meeting.

LIST OF DONORS

TO THE

ZOOLOGICAL & ACCLIMATISATION SOCIETY,

1872 AND 1873.

ANDERSON, CAPT.—1 Mongoose.
ALLPORT, MORTON—Number of English Perch.
AUCKLAND ACCLIMATISATION SOCIETY—2 pair ring-necked Pheasants.
BEDFORD, MR., CARLTON.—1 Monkey.
BUNCE, D., GEELONG—1 Native Bear, 1 Porcupine Anteater.
BALLARAT FISH ACCLIMATISATION SOCIETY—20 English Perch.
BROADBENT, THOMAS—2 Silver Pheasants, 4 Canaries, 4 Doves, 1 Linnet.
BOTANICAL GARDENS, GEELONG, TRUSTEES OF—1 Australian Eagle.
BRISBANE, MR.—1 pair Flying Squirrels.
BELL, W. MOORE, MELBOURNE—2 Tasmanian Devils.
BOWDEN, HENRY, MELBOURNE—3 Hen Pheasants.
BROWN, MR., TERMINUS HOTEL—1 Luwack or Screwtail.
BURMEISTER, MR., MELBOURNE—6 white Egyptian Rats.
BAXTER, MR., FRANKSTON—1 Native Bear.
BEDFORD, MR.—1 Monkey.
CRISP, GEORGE, QUEEN-STREET—1 pair Wonga Wonga Pigeons.
CONRAD, CAPTAIN, SHIP *Herzog Ernst*—3 Monkeys.
DAVEY, HUMPHREY—2 young Emus.
DENISTOUN, MR.—1 Pigeon.
DE PURY, MR., YERRINGBERG.—1 Mopoke.
DERMOTT, DR., HOKITIKI, N.Z.—1 Kiwi.
DAVIDSON, MR.—1 Red Kangaroo.
DAWBIN, MRS., WATTLE PARK—1 pair Crows.
FRANCIS, HON. J. G.—1 pair Australian Eagles.
FRASER, MISS, BULLA.—1 Native Companion.
FENTON, WM., TERRICKS WEST—2 Kangaroos, 2 Emus, 2 black Swans, 2 Native Companions.
FOX AND SONS, EASTERN MARKET—1 pair red poled Linnets.
FLEMING, J. W., BRUNSWICK—1 Monkey, 1 Wallaby, 1 Opossum.
GODFREY, FREDERIC R., MOUNT RIDLEY—28 Hares, 2 Owls.
GEE, ALBAN—1 Porcupine Ant Eater.
GREVILLE, MRS., BRIGHTON—1 pair Java Doves.
GRANT, CHARLES LYALL, FOO CHOW—8 Japanese Pheasants.
HOSE, REV. M.—1 Porcupine Ant Eater.
HENDERSON, MISS—1 Native Bear.
HARVEY, MR.—1 Brush Wallaby.

Hutchison, Mr., Riddell's Creek—1 Wombat.
Harding, Thomas, Maldon—1 Native Bear.
Kennedy, David—3 Black Swans, 1 Eagle, 2 Laughing Jackasses, 1 Mopoke.
King, Dr., Ballarat—1 pair Laughing Jackasses.
Kissley, Thomas, Chowar—3 Magpie Geese, 3 Native Companions, 2 Magpies, 4 young Emus, 2 Kangaroos, 1 black Swan.
Mason, F. C., M.L.A.—1 Porcupine Ant Eater.
Mills, Charles, Morton Plains—1 Native Companion.
Maundrell, Dr. Hokitiki, N.Z.—1 Kiwi.
Muelller, Baron Von—4 white Swans, 5 Water Hens.
Manners Sutton, The Hon. Miss—1 Kangaroo.
McArthur, Peter, Camperdown—1 pair Eagles.
McLean, J., Newbride—1 Nankeen Crane.
McMeckan, Capt.—1 Pheasant, 3 Parrots.
McFarland, Edw.—1 pair Ring-tailed Opossums.
Officer, T. H., 1 Emu.
Orme, W. H., Seymour—1 pair Mopokes.
Pitcher, Mr.—1 pair Eaglets.
Parkes, W. H.—1 Indian Monkey.
Reed, Angus, Emerald Hill—1 Monkey.
Rusden, G. W.—1 Porcupine Ant Eater.
Robertson, Mr., Hotham—1 Native Bear.
Shelly, R. J., Echuca—1 Emu, 1 pair black Swan.
Short, Mr.—1 Maori Hen.
Smith, Mr.—1 Opossum.
Schomburghk, Dr., Adelaide—1 pair Rock Wallaby, 1 pair East Indian Geese, some Parrots, 1 pair Beelbahs.
Salmon Commissioners, Hobart Town—2000 Trout Ova.
Skinner, Judge—1 Eagle.
Sandhurst, Town Clerk of—1 Kangaroo Rat.
Sumner, T. J.—1 Wallaby.
Slade, Edgar, Gipp's Land—1 Native Bear.
Turner, T. J., Stony Park.—1 Wallaby.
Terry, Mr., Royal Park—1 Parrot.
Trapp, Mr., St. Kilda—1 Monkey.
Terry, Miss, Royal Park—1 Kangaroo Rat.
Webb, Walter W.—1 Sacred Indian Monkey.
Wilson, Edward, Kent—36 English Robins.
Wheatley, Mr.—1 pair Paradise Ducks.
Winter, William—2 Emus, 1 Albino Opossum.

LIST OF ANIMALS AND BIRDS

IN THE ZOOLOGICAL GARDENS, ROYAL PARK.

ANIMALS.

1 African lion
1 Do. lioness
1 Panther, or leopard
1 Hunting leopard
1 American black bear
1 Cape silver jackall
1 Native dog
3 Tasmanian devils
15 Monkeys
1 Agouti
2 Mongoose

4 Native cats
2 Native bears
1 Wombat
2 Beelbahs
6 White Egyptian rats
6 Kangaroos
6 Wallaby
4 Kangaroo rats
6 Opossums
12 Hog deer
6 Bairanga deer

11 Formosa deer
4 Sambur deer
1 Nylghau
4 Mauritius deer
4 Japanese deer
4 Angora goats
4 Sheep, different varieties.
5 Brahmin cattle

120

BIRDS.

2 Ostriches
1 Mooruk, or cassowary
11 Emeus
7 Native companions
5 Eagles
2 White Swans
8 Black do.
2 Bar-headed geese
3 Magpie do.
5 Egyptian do.
6 Cape Barren do.
8 New Zealand paradise ducks
70 Ducks of different varieties
2 Crown goura pigeons
5 Wonga Wonga do.

4 Bleeding-heart doves
4 Java doves
20 Doves of other varieties
3 Water hens
1 Nankeen crane
1 Kagu
1 Maori hen
2 Curassows
3 Laughing Jackasses
2 Mopokes
3 Owls
4 Hawks
3 Satin birds
2 Blackbirds
2 Jackdaws

8 English song birds
1 English magpie
2 Native do.
2 Ravens
3 Crows
10 Californian quail
9 Pea fowl
2 Macaws
60 Parrots, different varieties
18 Cockatoos, do.
40 English pheasants
20 Silver do.
7 Japanese do.

374

AT MR. SAMUEL WILSON'S STATION, LONGERENONG.

108 Angora goats | 20 Ostriches

ANIMALS LIBERATED.

AT THE BOTANICAL GARDENS.

18 Canaries
18 Blackbirds
14 Thrushes

6 California quail
80 English wild ducks
35 Java sparrows

4 English robins
8 Turtle doves
50 Mainas

AT PHILLIP ISLAND.

10 Hares
5 Cape pheasants
8 English pheasants
4 Indian pheasants
8 Ceylon partridges
5 Indian partridges

4 Chinese partridges
70 Chinese quail
23 Tasmanian quail
6 Starlings
10 Algerine sand grouse
6 Wild ducks

5 Pheasants
6 Skylarks
6 California quail
4 Thrushes
4 Blackbirds
1 Pair white swans

AT SANDSTONE AND CHURCHILL ISLANDS.

4 Pheasants | 4 Skylarks | 4 Thrushes

AT YARRA BEND.

6 Thrushes | 4 Skylarks

NEAR SYDNEY.

9 Thrushes | 4 Skylarks | 10 Blackbirds

AT SUGARLOAF HILL.

5 Ceylon elk | 3 Axis deer

AT WILSON'S PROMONTORY.

4 Axis deer

AT THE ROYAL PARK.

4 Hares
20 Mainas
6 Starlings
60 English sparrows
40 Chaffinches

2 Thrushes
20 Greenfinches
15 Yellowhammers
200 Java sparrows
6 Blackbirds

20 Siskin finches
6 Powi birds
3 Partridges
6 Pheasants
10 English robins

AT ST. KILDA.

20 Chinese sparrows

AT BALLARAT.

5 English sparrows | 20 Java sparrows

AT BUNEEP.

13 Fallow deer

AT CAPE LIPTRAP.

12 Hog deer | 4 Ceylon peafowls
10 Pigeons | 4 Guinea fowl

AT AUCKLAND ISLANDS.

12 Goats
3 Geese

12 Rabbits
3 Pigs

6 Fowls
3 Ducks

AT WESTERNPORT.

7 Sambur deer

AT THE WIMMERA.

35 Axis deer

AT YERING.

5 Axis deer

AT PLENTY RANGES.

10 Pheasants. | 4 Jungle fowls. | 7 Guinea fowls.

LIBERATED IN THE BUSH IN 1870.

8 Hog deer	30 Pheasants	A number of doves
10 Pea fowl	Several brace of hares	25 Skylarks
20 Guinea fowl		

A large number of hares were likewise distributed in 1870 in various parts of the country, and upwards of 100 Angora goats were disposed of.

LIBERATED IN THE BUSH IN 1871.

150 Guinea fowl	Several brace of hares
15 Pheasants	3 Deer

And 2,400 trout fry placed in different streams.

A number of hares were likewise distributed in various parts of the country.

LIBERATED IN THE BUSH IN 1872.

50 Pheasants	17 English robins
20 Guinea fowl	A number of Californian quail.

1,700 carp, a number of English perch, and several hundred trout fry placed in suitable streams and reservoirs.

In addition to the above, 54 pheasants have been sold and distributed to Members of the Society.

ANIMALS SENT AWAY.

TO LONDON.

75 Kangaroos	30 Waterhens	40 Black ducks
5 Mountain ducks	4 Kangaroo rats	40 Teal
200 Murray codfish	10 Wombats	22 Wonga pigeons
22 Black swans	2 Cranes	31 Bronze-wing pigeons
20 Australian quail	7 Wood ducks	8 Swamp magpies
14 Eagle hawks	2 Kangaroo dogs	2 Iguanas
85 Magpies	3 Echidna	7 Land rails
4 Rosella parrots	26 Laughing jackasses	4 Sugar squirrels
8 King parrots	40 Shell parrots	3 Coots
8 Cockatoos	6 Mallee pheasants	5 Native companions
5 Dingos	36 Lowry parrots	Some Yarra fish
3 Talegallas	12 Opossums	
1 Tasmanian devil	4 Emeus	

TO PARIS.

24 Emeus	3 Curlews	8 Goatsuckers
30 Kangaroos	1 Native crane	2 Native companions
12 Black swans	8 Murray turtles	14 Rockhampton finches
3 Cape Barren geese	2 Wombats	1 Iguana
1 South Australian wombat	17 Australian quail	4 Opossums
4 Native geese	4 Laughing jackasses	20 Black ducks
	2 Bronze-wing pigeons	20 Teal

TO ST. PETERSBURG.

3 Kangaroos	2 Laughing jackasses	3 Emeus
3 Black swans	2 Wallabies	

TO AMSTERDAM.

3 Water hens	6 Australian quail

TO ROTTERDAM.

2 Cape Barren geese	2 Water hens	2 Kangaroos

TO HAMBURGH.

2 Wonga pigeons	2 Bronze-wing pigeons	2 Kangaroo rats
2 Black swans		

TO COLOGNE.

2 Black swans
2 Black geese
2 Curlews
2 Water hens

TO COPENHAGEN.

2 Black swans

TO CALCUTTA.

24 Black swans
12 Emeus
2 Eagles
6 White cockatoos
7 King parrots
15 Rosella parrots
10 Kangaroos
4 Opossums
1 Dingo
1 Wombat
6 Bronze-wing pigeons
6 Laughing jackasses
20 Shell parrots
52 Magpies

TO MAURITIUS.

2 Black swans
1 Kangaroo
2 Cape Barren geese
2 Eagle hawks
9 Fowls
7 Magpies
2 Laughing jackasses
4 Wallabies

TO BOURBON.

8 Black swans

TO SICILY.

6 Black swans
14 Native ducks

TO RANGOON.

6 Black Swans

TO JAVA.

2 Black swans
2 Cape Barren geese
1 Kangaroo

TO BURTENZONG.

2 Black swans
2 Cape Barren geese
1 Kangaroo

TO SYDNEY.

5 Angora goats
2 Brush kangaroos
2 Silver pheasants
2 Canadian geese
2 Egyptian geese
6 English wild ducks
1 Mallee hen
10 Blackbirds
10 Thrushes
4 Larks
4 Starlings
2 Ortolans
A number of sparrows

TO ADELAIDE.

10 Angora goats
2 Blackbirds
1 Brahmin Bull
2 Thrushes
3 English pheasants
1 Fallow deer
7 Silver pheasants

TO HOBART TOWN.

1 Angora goat
9 Native bears
Wild ducks, Indian & English
4 Egyptian geese
4 Hares
A number of sparrows.

TO NEW ZEALAND.

3 Thrushes
6 Magpies
4 Opossums
8 Brace of hares
Indian and English wild ducks

TO FOO CHOW.

48 Wild rabbits
2 Kangaroo
2 Parrots

TO NEW CALEDONIA.

238 Sparrows
12 Laughing jackasses

TO SHANGHAI.

2 Kangaroos.

CONTRIBUTION

TO THE

ICHTHYOLOGY OF AUSTRALIA.

By Count F. De Castelnau.

No. III.—SUPPLEMENT TO THE FISHES OF VICTORIA.

Since my last year's paper, very few new sorts have been obtained. The fish market has been very poorly provided, and the fishmongers seem to have decided only to purchase from the fishermen about a dozen of the edible sorts, as nearly none of the curious forms which used to appear from time to time have been observed during the last year. On the whole, the market has been even more scantily provided than on the previous years.

Before giving a full description of the sorts new to the Victorian Fauna that I have observed, I will submit a few notes taken on sorts already mentioned :

GERRES MELBOURNENSIS.

In the male we find the præorbital forms on each side, a small spine in front.

LATRIS HECATEIA.

(*Hobart Town Trumpeter.*)

The 12th of July I saw a specimen weighing twenty-five pounds.

MUSTELUS ANTARCTICUS.

(*Smooth Head.*)

In living specimens the fish is of a silvery-grey, rather darker on the back, with a light coloured longitudinal streak on each side. On these latter parts there are numerous minute, white, round spots, placed at some distance one from the other. Fins rather yellow, with their end of a dark reddish brown; muzzle yellow; eyes of a light blue; lower parts of the body white.

THERAPON NIGER.

From the Murray. When living, it has a golden tinge all over the body; the caudal is of a dark colour; dorsal flesh colour, with the upper part of the soft portion obscure; the anal similar; pectorals almost red, ventrals rosy.

PROTOTROCTES MARŒNA.

Prototroctes Marœna, *Gunther, Catal.* v., p. 382.

After two years' researches, I have at last obtained several specimens of this sort, which used to be very common in the Yarra, and is known as the *Yarra Herring*. I owe my first specimens to the kindness of Dr. Bleasdale.

This fish is very silvery, with the upper parts of a light olive green; dorsal and caudal of the same colour, bordered with a black tinge, the other fins white; the eye is of a bright yellow; the adipose of the colour of the back; snout brown. It has a strong smell of cucumber.

My specimens were caught in the beginning of April.

Length of the longest specimen a little under eight inches, but I believe they are not full grown. It is said to be a very good edible fish.

CHÆTESSUS EREBI.

I find that it was by mistake that I stated that this fish inhabited the sea; it is confined to the rivers of the interior, such as the Murray, the Darling, &c.

STIGMATOPHORA NIGRA.

The very numerous specimens I have seen show some variations in the length of the snout. In one, a large specimen four inches and three-quarters long, the snout is of the normal length, but it has on each of the body rings numerous round black spots, very small on the back, but larger on the sides; the lateral ones number three or four on each side of each ring. The lower part of the body has a golden tinge.

OLIGORUS MACQUARIENSIS.

(Murray Cod.)

A specimen obtained on the 2nd of July is entirely covered with round obscure spots, which extend to the soft dorsal and anal; on these fins they are placed in a regular manner.

UPENEUS VLAMINGII.

Upeneus Vlamingii, *Cuv. & Val.*, *Hist. Nat. des Poissons*, viii., p. 452, pl. 71.

Upenoides Vlamingii, *Gunth.*, *Cat.*, vol. i., p. 400.

I saw in the Melbourne Market, on the 8th of November last, two specimens of this sort, which was described at first as inhabiting the Indian sea, and has since been quoted by Richardson (*Ann. Mag. Nat. Hist.*, 1862, p. 211) as having been found at Queen Charlotte's Sound. The upper part is of a greyish green; the sides are of a yellowish white with pink tinges, and the lower parts of a deep saffron yellow. It is covered with numerous rounded spots of a beautiful blue, each surrounded by a dark circle; these spots become purple and pink on the belly. The head is of a golden grey, with lines of a fine blue; the eye has an internal yellow circle, and the remaining is blue, with transverse yellow and crimson spots; dorsal fins grey, marbled with yellow; caudal olive, spotted with blue, and having its lower edge red; pectorals pink; anal of a saffron yellow, with its anterior part bordered with red; ventrals yellow, with a longitudinal blue spot on the middle, and their anterior edges red.

NEOSEBASTES.

I had in my last year's publication considered it as granted that the fish known in the Melbourne market as the *Gurnet* was the *Centropogon Australis* of White, but since then I have come to the conclusion that this last is unknown to me, and that the *Gurnet* is the *Neosebastes Scorpœnoïdes*, described by M. Guichenot in the xiiith vol. of the "Mémoires de la Société Impériale des Sciences Naturelles de Cherbourg." I owe to our celebrated botanist, Baron Von Mueller, the paper concerning this fish.

NEOSEBASTES PERCOIDES.

Sebastes Percoides, *Rich., Erebus and Terror, Fishes*, p. 23, pl. 15, fig. 1.

I have obtained several specimens of this sort, found in the Victorian sea, but all are in a dry state.

It is evident, even on the stuffed specimens, that the general colour has been red, with four broad transverse brown bands, which do not extend to the lower part of the body. There are also traces of a similar band near the extremity of the caudal.

The numbers of the rays are as follow:—D. 11 1/12. A. 3/5. C. 14. V. 1/5. P. 19.

The largest of my normal specimens is under one foot long, but I have another specimen which is over thirteen inches, and which presents a singular conformation of the second dorsal, its spine being continued in a simple soft ray. The numbers would thus be 1st D. 10; 2nd, 11—but this is most probably accidental.

SEBASTES ALPORTI.

Very much like *Percoides*, and having also D. $11/\frac{1}{12}$ — A. $3\frac{3}{5}$ P. 9, branched, and 9 simple rays. The general form is longer, the height being four times in the total length; the head is less than three times in the same; the lower jaw is considerably longer than the upper one; the spines of the præoperculum are very strong and very sharp; the operculum terminates in a long pointed flap—its spines are strong, the

lowest is arched, with its point upwards; the vertex spines are very small, almost deficient; the diameter of the orbit contained four times in the length of the head; the scales of the body are smaller than in *Percoides*; the dorsal is considerably lower, the third spine being contained over three times in the length of the head; the soft portion of the fin is more equal, the last rays being two-thirds the length of the first ones.

The general colour, on the dried specimens, seems to have been of a dirty orange-yellow, marbled with brown, the body having broad transverse bands of the last colour; the dorsal is almost black, the soft portion being bordered with white; the caudal of the last colour, with a very broad transverse dark band occupying about one-half of its length; the anal is reddish, marbled with brown; the ventrals of a bright orange; the pectorals of the same colour, with a transverse brown band.

A very small specimen from Hobson's Bay, and a fine one, fifteen inches long, from Tasmania.

I have dedicated this sort to Mr. Moreton Alport, of Hobart Town, who has done so much for the cause of acclimatisation.

MELANICHTHYS SIMPLEX.

I have obtained another specimen, similar to the one I described last year. I find its proportions similar to those of *Tricuspidata*, and it only differs from it by its teeth, which are square at the end. The specimen is evidently young, and is only eight inches long.

MELANICHTHYS BLACKII.

Body oval, with its height contained three times in the total length of the fish; head four and a-half times in the same dimension; diameter of the eye four times in the length of the head; teeth with three points; præoperculum scaly; operculum naked, except on its upper external portion; it has a rather strong point; scales of the body rather small, numbering fifty-three or fifty four on the longitudinal line, and about thirty-two on the transverse one; dorsal having fifteen

spines, the first ones being the shortest, and the others going increasing backwards—the soft part is longer than the other, and formed of twelve rays; caudal large, entire, not emarginated behind, but rather rounded at its extremity; anal with three spines, the first being the shortest and the third the longest—the soft part is high, similar to the one of the dorsal, and formed of twelve rays; the spine of the ventrals is strong and straight; the pectorals have eighteen rays.

The colour, on the dried specimen, seems to have been of a uniform light brown, with the lower parts of the body more yellow.

The specimen is four inches and a half.

I have dedicated this sort to Dr. T. Black, who for so many years has been the President of the Acclimatisation Society of Victoria, as a just tribute to his devotion to science, and the many services he has rendered to it in this part of the world.

The Australian group of fishes to which this one belongs seems to form a small natural family, that I would propose to call the *Melanichthidæ* and which would be principally characterised by its trifid teeth. It would be composed of *Melanichthys* (*Girella*, Gunth.), *Melambasis* (*Neotephræops*, Cast.), and *Tephræops*. The *Girella Zonata* of Dr. Gunther (Catal., vol. i., p. 429), seems to me to be the striped variety of *Melan. Tricuspis* that I mentioned in the "Proceedings" of last year.

LACEPEDIA.

Præoperculum strongly serrated, operculum entire, but with a strong point; teeth of the upper jaw numerous, fine, cardiform, on several series, and forming in front two bunches of larger ones directed backwards. In front of these teeth, there are, at the anterior part of each jaw, two canine teeth; on the palatines, a transverse band of strong teeth; at the lower jaw the teeth are also cardiform and on several series, but some much larger ones are placed at the back part; in front are also two strong canines, one on each side; the fins, in great part covered with scales; dorsal unic with eleven spines,

anal with three, ventrals with one spine and five rays, pectorals large, with the rays strong and thick, some simple; all the head and body covered with rather large ciliated scales, having their ventral part longitudinally elevated. Lateral line continuous to the base of the caudal.

The disposition of the teeth, and the armature of the præoperculum and operculum would place this genus with the *Percidæ*, but its fins almost entirely scaly and its strong pectoral rays would lead me to place it with *Cirrhitidæ*; unfortunately, the only specimen I have seen is stuffed, and has its pectorals imperfect, but it appears that, if any of their rays are simple, this could only be the case with the two lower ones. The head and body entirely covered with thick scales, having each a longtitudinal ridge, gives it a general rough and unequal appearance.

LACEPEDIA CATAPHRACTA.

The general form oval, the upper profile rather high and convex; cleft of the mouth oblique, the lower jaw being longer than the upper one; all the pieces of the head covered with elevated scales. Præoperculum with its margin formed of numerous points, which become stronger on the rounded part; operculum with two points. Body entirely covered with moderately large scales; these have a rather triangular form, principally on the upper part of the body, and are ciliated on their edge; their surface is elevated, but the base is depressed; the lateral line is formed of rather larger ones and they are more smooth, it runs from above the upper opercular point to the base of the caudal in following the profile of the back; it is formed of about fifty-six scales up to the caudal's base; the transverse line has twenty-eight; the dorsal is not high, formed of eleven spines, the first is the shortest (the second is broken in the specimen), and the others about equal; the branched part is rather longer than the other, and being of equal length forms a perfect continuation with it; it is formed of twenty-two rays; the caudal is bilobed of sixteen long rays with four or five shorter ones, on each side. The anal has three spines, the first being the shortest and the third the longest;

the soft part is formed of ten rays. All these fins are covered with scales on the greatest part of their length. Ventrals inserted below the pectorals; their spine is long, rather slender, and bearing at its internal side notches having the form of scales; there are five rays.

The pectorals are large, formed of very thick rays, which have an articulated appearance; they number thirteen, and their membranes are covered with scales.

The height of the body is contained twice and one-third in the length to the base of the caudal; the head three and a quarter times in the same, and the eye a little over four times in the length of the head.

The only specimen I have seen is imperfect; it is seven inches long; the colour in the dried state is uniform and of a light yellowish brown. I had dedicated this genus to the great Indian ichthyologist, Dr. Bleeker, of whom I have, during my travels in India, received so many marks of kindness, but I find that Dr. Gunther had already given his name to a genus of fishes, and I thus find myself obliged to substitute to it the name of Lacepede, one of the founders of Ichthyology.

APHRITES URVILLII.

Aphrites Urvillii, *Cuv. Val.*, vol. viii., p. 484.

This sort has been described by the authors as inhabiting the fresh waters of Tasmania; but I have received several dried specimens from Bass's Straits, and so I consider it a sea-sort.

Cuvier's description agrees entirely with my fish, except the first dorsal, which is described as having six spines, and is in my specimens composed of seven in one and of eight in the other; in both, the first is much shorter than the others.

The genus is characterised by its cylindrical form, its double dorsal, the first portion of which is much shorter than the other; its long anal; its mouth is situated in a rather oblique way, the lower jaw being longer than the upper one; its jugular ventrals; its villiform teeth at both of the jaws, on the vomer and the palatines. It has no canines; its operculums are entire.

Cuvier places it in his *Percoidæ*, and Dr. Gunther in the *Trachinidæ*; it comes close to the genus I described under the name of *Pseudaphritis*. It is possible, that on account of the difference in the number of the rays of the first dorsal, these fish may differ from the true *aphritis*, but my two specimens presenting a variation on this point, I thought it better to unite them with Cuvier's fish.

BOVICHTHYS.

I have obtained since my last publication a dried specimen of this curious fish, which belongs to the family of *Trachinidæ*.

BOVICHTHYS VARIEGATUS.

Bovichthys Variegatus, *Rich., Ereb. & Terror, Fishes*, p. 56, pl. 34, fig. 1.

The specimen described by Richardson came from Sydney, and mine was found in Hobson's Bay ; it is only five inches long. This genus is characterised by its two dorsals, the first having eight spines ; its body without scales ; its jugular ventrals ; its pectorals having their five lower rays simple ; its upper jaw rather longer than the lower ; its operculum terminated by a very long spine. The second dorsal is high and has twenty rays, the anal fourteen ; the caudal is rounded with fourteen rays; the pectorals are very large, with fourteen rays. The fins are diaphanous, variegated with brown.

CYTHUS.

Since my last year's publication, I have had opportunity of obtaining two specimens of the Australian sort, one of which was in a fresh state.

CYTHUS AUSTRALIS.

Capros Australis, *Rich., Ereb. & Terror, Fishes*, p. 137, pl. 59, fig. 5.

Cythus Australis, Gunther *Catal.* vol ii , p. 396.

Of a fine silvery colour, with a greenish tinge on the back; parts of the mouth flesh-colour; eye silvery ; dorsal, caudal and

anal of a reddish pink ; the end of the caudal and of the prolonged rays of the dorsal black ; ventrals also of that colour.

When the mouth is fully extended, the distance from the anterior end of the jaws to the front margin of the eye, is equal to the one from this same margin to the base of the dorsal.

The first dorsal has eight rays, or rather one spine and seven rays ; the second, thirty rays ; the anal has two spines and thirty rays ; the ventrals one spine and six rays ; the pectorals eleven rays.

The height of the body is contained once and eight-tenths in the total length of the fish ; the head is twice and one-third in the same, the eye is contained three times in the head.

This sort seems to attain considerable dimensions, as I have a dried specimen, which with its mouth extended has sixteen inches in length, and its breadth is over six.

TRACHURUS TRACHURUS.

Scomber Trachurus, *Lin. Syst. Nat.*, vol. i., p. 494.

This genus has been formed on the *horse-mackerel*, and it is only very lately that I have been able to observe it on the the Melbourne market. Specimens of this fish are found almost all over the world, and are so very similar one to the other as to make it probable that they all belong to one sort. They present, it is true, some variations in the number of the shields which form their lateral line, and also in the form of this line itself. The numerous specimens I observed at the Cape of Good Hope seemed to differ enough from those of Europe to justify their specific separation from them (*Trach. Capensis*, Cast.) ; but sorts founded on such slight characters are always very doubtful, and will only be well established when numerous specimens from all parts have been carefully compared.

The two specimens I have seen at Melbourne have their height contained four times and two-thirds in the length, up

to the central end of the caudal; the head is three times and eight-tenths in the same; the eye four times and a quarter in the length of the head; the lateral line has eighty shields, and bends rather more suddenly than in the figure given by Cuvier and Valenciennes; the upper profile of the body is of a regular oval form. The body and head are silvery, with their upper part of a dark green, rather iridescent.

Very rare at Melbourne. My specimens were found in the month of May.

GOBIUS CAUDATUS.

This sort belongs to Dr. Gunther's division, characterised by having "the anterior dorsal with six spines; scales large or moderate; no crest on the head, which is longer than high; all the spines flexible; caudal fin elongate;" height of body five times in the length without the caudal; head four times in the same; eye three times and a half in the length of the head; the lower jaw longer than the upper one; teeth small, some rather longer than the others; head smooth; scales of the body large. First dorsal with six rays, the first of which is much shorter than the others, the fifth being the longest, and produced in a short filament; second dorsal about as high as the first in front, but becoming longer behind; the last ray rather produced; it is formed of eleven rays. The caudal very large, pointed; formed of fifteen principal rays, and of several smaller ones on each side; its central rays are produced in filaments; the total length of this fin is equal to half the length of the fish without it. Anal having the same form as the second dorsal, of eleven rays, the last rather produced; ventrals united to nearly one-half of their length; pectorals long, pointed, of fifteen rays, the central ones filamentary.

On the dried specimen the colour is of a light brown, with marks of obscure spots; the head shows a dark oblique band running from the eyes to the operculum; the fins are diaphonous; the first dorsal has an obscure longitudinal band on the middle of its height; the second has its external and posterior portions obscure; the caudal shows obscure transverse bands, and its prolongated rays are almost black; the exterior part of

the anal is of the last colour, as are also the ventrals ; the pectorals are obscure.

The total length of the specimen is about six inches and a half.

CRISTICEPS AMÆNUS.

This sort is very nearly allied to *Cr. Multifenestratus*, and has the same numerous transparent spots on the dorsal and anal, of which the general colour forms a sort of trellis work, so remarkable in that sort ; but the body is shorter, its height being here contained four and two-thirds times in the total length, when in *Multifenestratus* it is over five times and a half. The operculum, which is smooth in the last-mentioned sort, is strongly striated in *Amœnus*. The general colour is also different, the dried specimen showing still the beautiful orange-red which adorned it in the fresh state.

The length of the specimen is eight inches.

Nota.—The length of *Fenestratus* is erroneously stated in my description of it ("Proceedings, 1872," p. 131). The present measurement is the correct one.

CRISTICEPS HOWITTII.

I have seen several specimens of this sort, but in a dried state. The height of the body is contained a little more than five times in the total length ; the head is four and one-third times in the same, and the eye four times and two-thirds in the length of the head ; the lower jaw is longer than the other, no scales. The first dorsal is placed over the centre of the orbit ; it is formed of three rays, the first of which is strongly prolongated ; the second dorsal is high, particularly at its posterior part ; it is formed of thirty-five rays. The caudal is lanceolate and is very long, and is contained four times and two-thirds in the total length ; the anal of the same form as the second dorsal, of twenty-seven rays ; the ventrals of two rays, one bifide ; the pectorals long, having more than two-thirds the length of the head, of eleven rays, the centre ones being much larger than the side ones.

The general colour, on the dried specimens, is of a reddish brown; the front part of the head is yellow; a broad black band runs rather obliquely downwards, below the orbit. The body is marmorated with dark brown, and in some specimens there are traces of transverse bands of that colour; there are also some oscellated light spots; the dorsal and anal are yellow, and have five broad transverse obscure bands; the caudal is yellow at its base, and brown in its second half, and the pectorals, on the contrary, are yellow with their base brown.

All my specimens are about four and a half inches long; they have been found at Western Port.

CALLIONYMUS.

Two sorts of this genus are, to my knowledge, found in the Victorian seas; one appears to be a different and undescribed sex of one of Richardson's sorts, and the other a new species.

CALLIONYMUS CALAUROPOMUS.

Callionymus Calauropomus, *Rich.*, *Erebus and Terror, Fishes,* p. 10, pl. 7.

My dried specimen agrees with Richardson's description and figure, but the central rays of the caudal are prolongated in form of long filamentary appendages, which are longer than the fin itself. I believe this to be the male, and that Richardson's figure represents the female of the same species. It was found in Hobson's Bay. Length of specimen, without the caudal appendages, eleven inches.

CALLIONYMUS OCELLIFER.

1st D. 4; 2nd, 7. A. 5. C. 8. P. 18. V. 1/5.

The anterior part of the head covered with small white tubercules; the muzzle compressed before the eyes; the first dorsal very high, the first three rays equal, the fourth a little shorter; the second dorsal very large, very high, the rays becoming longer towards the posterior part, the last the longest of all; the caudal very long, rounded at its end; anal large, the first four rays equal, the last considerably pro-

longated ; the ventrals large, extending to the end of the pectorals ; the head, from the muzzle to the end of the opercule, is contained four and a quarter times in the total length ; the caudal three and one-fifth in the same length. The head is a little broader than the body, the breadth of the latter is contained six and a half times in the total length. The general colour (in the liquor) is of a greyish purple. On the head, traces of darker spots. The first dorsal has an ocellated white spot and several irregular ones ; these spots are bordered off with black lines, and they are covered with small brown lines ; the second dorsal has two series of transversal white spots extending on their membranous part, one towards the middle, and the other near the superior margin ; they are also bordered with black and covered with narrow concentric brown lines ; between them there are other small rounded similar spots, and towards the base of the fin are seen some very indistinct lines ; the caudal is covered with little white irregular but longitudinal lines, and also with small black spots ; the anal is dark towards its margin and covered with narrow oblique white lines ; the ventrals have a yellow tinge and become darker towards their extremity ; the pectorals are of a lighter brown, and have some very faint brown spots on their superior part ; on the orbits of the eyes, and on the sides of the body appear numerous transverse lines ; the lower part of the body is of a whitish colour ; the operculum terminates by a sort of long, flat, arched spine, bifurcated at its extremity. Cape Schanck—total length, four inches.

I have also seen several specimens from Hobson's Bay ; this species seems to be nearly allied to *Cat. ocellatus*, Pallas (*Spic.*, vol. viii., pl. 51, and *Encyclop. Method*, p. 43, pl. 27, fig. 95.)

Nota.—I have a specimen of Callyonimus from Hobson's Bay, in which the fins, and particularly the first dorsal, are lower, and the ocellated spots of the latter are less marked ; it is only about three inches long. I think it is the female of this sort, and in that case none of the caudal rays would be produced in either sex.

RUPPELIA.

This new genus, dedicated to the celebrated traveller and naturalist, Ruppel, is characterised in the *Nandidæ*, by its ventrals formed of one spine and only three rays, and also by its soft dorsal, and anal considerably prolongated; opening of the mouth oblique and superior; teeth numerous, villiform on several series, the external one formed of larger, conical ones disposed near one another; the vomer and palatines with transverse series of teeth; tongue and interior of the lower jaw very unequal and covered with very strong papillæ, almost amounting to teeth; a short fleshy filament on each side of the upper jaw, near its centre and on the lip; eye large; body oblong, covered with moderate or even rather large scales; lateral line curved, running along the back till the end of the dorsal, and another straight along the middle of the body; this latter does not attain the base of the pectorals, but is well marked to the centre of the base of the caudal; dorsal with the spinous part longer than the branched one, formed of twelve spines; the soft portion of the dorsal considerably prolongated; caudal, rather long, rounded, anal with three spines, the soft portion prolongated like the one of the dorsal; ventrals long, with one spine and three branched rays.

RUPPELIA PROLONGATA.

Height, two and three-quarters in length of body without the caudal fin; head, three and a-quarter in the same; diameter of the eye, four and a-half in the length of the head.

The lower jaw longer than the upper one; head without scales, its upper part unequal and having a longitudinal groove between the eyes, all its parts devoid of spines; but the operculum has a prolongated rounded angle near the base of the pectorals; forty-four or forty-five transverse lines of scales; these very feebly ciliated on the edge; dorsal fin with twelve spines, the first of which is only one-half as long as the second; all the following increase gradually in length as they go backwards, and the twelfth is about twice as long as the second, the soft or branched rays number ten, and go gradually increasing in length, the two first not being much longer than

the last spine, but the sixth and seventh are much longer than the height of the body, and would not be contained more than twice and one-third in the length of the fish (without the caudal) ; the three last are much shorter, and the tenth is not longer than the fifth spine; caudal not complete in my specimen, but seems rounded, it has twenty rays and a couple of short basilar ones on each side ; anal with three spines, the first the shortest, and the third the longest, they are rather slender and arched ; the soft portion is very large and high, of ten branched rays, which go on lengthening up to the sixth and seventh, which are the longest, and then they become shorter again ; as on the dorsal the prolongated rays are very long, and extend further than the end of the caudal ; ventrals inserted a little in front of the pectorals, having one long slender spine, and three elongated branched rays, the fins as long as the head; pectorals rather large, of eighteen rays.

I have a single specimen, which is stuffed. The fishermen call this sort the *devil fish*, and say that when living it was of a brownish red. It appears to be very scarce ; its total length is thirteen inches. This genus is named in honour of the celebrated zoologist, Ruppell, whose works on the animals of the Red Sea are so well known.

Nota.—In my paper on the edible fishes of Victoria, in the Exhibition Essays, 1873, I stated by a *lapsus calami* that this fish was my *Bleckeria Catafracta* (Lacepedia). This mistake is easily seen by the few descriptive words which are contained in that paper.

LABRICHTHYS PSITTACULA.

Labr. Psittacula, *Richard., Proc. Zool. Soc.*, 1840, p. 26.

Tautoga Psittacula, *Richard., Ereb. and Terror, Fishes*, p. 129.

Labrichthys Psittacula, *Gunther. Catal.* vol. iv., p. 114, pl. 59, fig. 7.

This is the only sort of this genus that I have yet been able to put under one of the described species.

The only specimen I have obtained is in a dried state, but shows that it has been of a general red colour, with broad

brown transverse band on the body behind the end of the pectorals, and not extending to the belly.

NOTA.—I have obtained in the market, and during the month of October, several specimens of *Lebrichthys Richardsoni* and *Vestita*. The upper profile of the head is much more convex in the first than in the second, the scales of the cheeks are smooth on the living specimens.

LABRICHTHYS CUVIERI.

This sort enters in Dr. Gunther's division, having only two series of scales on the cheeks, and having no posterior canine teeth; it could only be united with *Parila* of Richardson, but the disposition of colours is totally different. There is a well-formed, internal, second series of teeth at the superior jaw, which shows how impossible it is to maintain the genus *Labrichthys*, and this is also the case with several other divisions of the Labridæ. The superior profile of the head is not very convex; the teeth are strong, two canines in front at each jaw; none at the posterior angle; the head is ruguous; the cheeks have a narrow band formed of two series of scales; the lateral line runs over twenty-seven scales; it is formed of a succession of strong ridges, each of which ends in an *arbuscule* of considerable size and ramifications.

The dorsal and anal fins have no scales on their base; the caudal when shut is emarginated.

The colours are pretty well preserved on the dry specimen; the head and body are greenish, with two broad red transverse bands, the second covering nearly the posterior half of the body. The pectorals are of a brilliant orange yellow; the spinous portion of the dorsal is of the same colour, and the second is dark and almost black; the caudal olive.

This sort is principally characterised by the absence of the posterior canines, which sometimes are not visible in young specimens of other sorts; but the large size of this, twenty-two inches long, precludes the idea that they might appear at a further date.

It was sent to me from Hobart Town, but a skull found on the shore at Phillip Island shows that it also inhabits Bass's Straits.

Mr. Gulliver, who sent me the Tasmanian specimen, says, that when living the colour was most beautiful, that the body was of a magnificent purple, with the broad transverse bands of a brilliant crimson, and that the head presented all the colours of the iris.

MONACANTHUS RUDIS.

Monacanthus Rudis, *Rich., Ereb. and Terror*, p. 65, pl. 40, fig. 7.

———— Gunth. *Cat.* vol. viii., p. 244.

The Australian species of *Monacanthus* seem to be very numerous ; I have obtained the following since my last year's publication, but all the specimens being preserved and dried, I cannot say anything about their natural colours. I have also seen a second specimen of *Prasinus*, and numerous ones of *Forsteri* ; the largest is six inches long, and has a faint narrow blue stripe, which extends from the anterior margin of the eye towards the mouth.

This sort is placed by Dr. Gunther in a division characterised by " anal fin with less than forty rays ; dorsal spine with only two series of barbs ; ventral spine present, anchylosed to the pelvic bone."

The form is oblong and rather elongate ; the entire surface is covered with very small, irregular, spiniferous scales ; the colour is of a yellowish brown, marked with minute brown spots ; on the tail are two series of straight points directed backwards, which are probably only to be seen on the male. This sort is found on the southern coast of Tasmania, and also in Bass's Straits.

On my specimen the teeth are very small, but this is probably due to age ; it was ten and a half inches long.

Dr. Gunther mentions, among his uncertain species, a *Monacanthus Freycineti* of Hollard, characterised by having caudal spines, disposed on two series, and having their points directed backwards. This would agree well with my specimen, but I cannot unfortunately have here access to Mr. Hollard's Work (*Ann. Sc. Nat.*) In all cases, this fish is so very similar to *Rudis*, that I should consider it as belonging to this species.

Nota.—Dr. Gunther (*Catal.* vol. viii., p. 246) says, that in *Mon. Hippocrepis*, some specimens, either young or females, have the caudal spine directed backwards, these spines being directed forwards in other specimens. This seems very doubtful, but if it is confirmed, it would probably be the case with many other sorts.

The fish I here describe could perhaps, in that case, belong to *Hippocrepis*, but it seems to differ considerably from it, not only in colour, but by its rounded caudal and its dorsal spine, which has a posterior line of barbs, and three or four anterior lines on each side of small spinous tubercules.

MONACANTHUS BAUDINI.

Dorsal spine with four series of barbs, the front series much smaller and closer than the hinder one; body covered with indistinct scales having a lozenge form, and bearing each three or four spinlets; the muzzle is very long, and its upper profile is straight. The distance from the anterior part of the mouth to the orbit being only contained four times in the total length. The teeth are very large; the upper ones conical, and the lower ones strongly and obliquely emarginated and forming a strong external point. The ventral spine is very small, and seems to be anchylosed in the pelvic bone; its spinlets are very short. The dorsal spine is situated over the posterior half of the orbit; it is slender and almost straight; it is contained six times in the total length; its entire surface is irregular—the ray is very short—the dorsal fin is high, and formed of thirty-five rays. The caudal is rounded, of eight rays; the anal has the form of the dorsal, and has thirty-one rays; the pectorals are formed of thirteen; there are no spines on the tail in the two specimens I have seen; one was obtained on the coast of Victoria and the other at Hobart Town; the first is rather larger than the other, and has ten and a half inches in length. I have named this sort in honor of Captain Baudin, whose expedition has done so much for the geography and zoology of Australia. This fish seems to have considerable resemblance with *M. Trachylepis* of Dr. Gunther.

MONACANTHUS LESUEURII.

Belongs, in Dr. Gunther's classification, to the same section as *Peronii*, characterised by its four-edged dorsal spine; these edges being equidistant and armed with barbs.

The body is oblong, with the upper profile of the head very concave; body covered with very minute and smooth scales; those of the head and of some parts of the body are more granulous. The snout is thick, with its upper profile very convex; its length to the anterior edge of the orbit is contained four times in the total length of the fish. The teeth are of moderate size, almost square, with the two upper front ones larger, and shaped obliquely into a point; the ventral spine is of moderate size, rounded, and surrounded by a crown of very short spines; it does not appear movable. The dorsal spine is thick, straight, and inserted over the centre of the orbit, which is placed obliquely; the barbs are strong, and the spine is nearly as long as the snout; the dorsal is rather low, and formed of thirty-four rays; the caudal is rather long; the anal has the same form as the soft dorsal, and is formed of thirty-three rays, and the pectorals have fifteen.

The general colour, on the dried specimen, is a dark brown; the fins have evidently been of a lighter colour, and probably pink.

The total length is four inches. The specimen came from Western Port.

Dedicated to Lesueur, the faithful companion of Péron, during their exploration of Australia in Captain Baudin's expedition.

MONACANTHUS TROSSULUS.

Alutarius Trossulus, *Rich., Ereb. & Terror, Fishes*, p. 68, pl. 40.

My specimen is not much over an inch and a half long, and the one figured by Richardson is very little larger. This sort can be distinguished by the broad form of its body; its absence of a ventral spine; its dorsal spine rather short and arched, covered with short granular spines. There is no ray to the first dorsal, which has only the front spine.

The colour of the dried specimen is brown, with vestiges of darker spots; the fins are light green, and the caudal has transverse dark dots.

Western Port.

PEGASUS.

I have obtained a dried specimen belonging to :

PEGASUS LANCIFER.

Pegasus Lancifer, *Kaup. Trosch. Arch.* vol. i., p. 116—*Loph*, p. 4, pl. 1. fig. 2.

Parapegasus Lancifer, *Dum. Ich.*, vol. ii., p. 494.

It corresponds well to the figure, but the ventrals have evidently three rays; it is three inches long, and was found in Hobson's Bay.

RAYA ROSTRATA.

I have described in the last year's *Proceedings* a sort very common here, under the name of *Oxyrhynchus*, thinking at the time that it was similar to the European sort; but further researches lead me to believe that it is distinct.

The differences consist in the absence, in the Australian species, of spines over the eyes, and in the greater length of the snout, which is twice and a half as long as the entire space which separates the eyes.

It also differs from the New Zealand sort (*nasuta*), by the absence of spines over the eyes, and also by the teeth, which have no points. Mr. Hutton (*New Zealand Fishes*) says, that in that sort the belly is smooth; whereas in the Australian fish it is, on the contrary, covered with strong granulations. It attains very large dimensions, and often weighs over sixty pounds. The female is larger than the male; the anterior point is more obtuse, and she is of a uniform colour, without the white spots. The teeth are very different in the two sexes, as is the case with many other sorts of this family.

RAYA LEMPRIERI.

Since last year I have seen many specimens of this sort, and I believe that it is the *Raya Nasuta* of Solander. The spines

are subject to very great variations. Those on the sides of the pectorals, that I had only seen on young specimens, belong to the male sex, and are placed in two or three series. The orbit spines are equal in both sexes, but in one female they form also a transverse line behind the orbits; the line of strong spines which extend on the median line of the back does not sometimes extend to the anterior part of the body; the disc is generally covered with very small spines, placed far apart one from the other, but in some specimens it is almost entirely smooth, and the lower parts are always so; the tail is more or less covered with large spines, which form from one to four longitudinal series on the centre, without taking in account the small slender arched ones, which are very numerous.

MYLIOBATIS NIEUHOFII.

In my last year's paper, I stated that two sorts of *Mylobatis* were found in the Melbourne sea, but I now believe that they must be all united under the present name.

The documents I have at my disposal are:

1. Two small specimens, with cross blue bands, similar to the one I described. (*Proceedings*, p. 226.)

2. The mouth of a large specimen.

3. A large specimen, forty-two inches long. This has no traces of transverse bands, and the tail is proportionately rather shorter and thicker than in the small specimens; its caudal spine is four and a-half inches long.

I believe that the young Australian specimens of *M. Aquila* mentioned by Dr. Gunther, belong to this sort, which attains enormous dimensions, and sometimes, it is said, weighs up to two thousand pounds.

CONTRIBUTION

TO THE

ICHTHYOLOGY OF AUSTRALIA.

NO. IV.—FISHES OF SOUTH AUSTRALIA.

I have already mentioned in my last year's publication that Mr. Waterhouse, the curator of the South Australian Museum, had collected a considerable number of new or rare fishes in the St. Vincent's Gulf, and I gave a short notice of them; I will submit here to the public a more complete description of those sorts deserving a particular notice.

VINCENTIA.

The singular fish I here describe is most difficult to place in the system; it has the general appearance of an *Apogon*, caused by the great development of its anterior part, its large eyes, its double dorsal, the obliquity of the cleft of its mouth; but the absence of teeth on the bones of the palate, and of spines to the operculum, places it in a different family; this last character would bring it near *Cheilodipterus*, but it has no canines, and the first one near *Pomatomus*, from which it is easily distinguished, by its general high form, its two dorsals inserted one very near the other, and the form of the opercular bones.

The general characters can be defined thus: seven branchiostegals; teeth viliform on both jaws; none on the palatine bones; no canines; two dorsals placed one near the other; operculum denticulated; scales large, adherent.

VINCENTIA WATERHOUSII.

Height of body contained a little over three times in the length of the fish; head three times and a-quarter in the same; orbit three times in the length of the head.

The upper profile is convex; the lower one almost straight at the tail and convex on the body; head very large; the lower jaw shorter than the upper one, when the mouth is open; teeth exeeedingly minute, numerous, viliform; none on the vomer nor on the palatines, but the pharyngien ones are covered with small granular teeth; the operculum has no points, but is angular at its edge; præoperculum serrated; the denticulations being directed upwards; it is rounded inferiorly, and has an interior ridge, which is straight posteriorly and rather rounded at its lower angle; body rather compressed, covered with very large scales, which are finely ciliated on the edge; they number twelve on the transverse series, the lateral line running on the fourth; the number of transverse series is twenty-four.

The lateral line is well marked, being formed of a succession of little ridges; it follows regularly the profile of the back at less than one-third the height of the fish; it continues on the base of the caudal fin, where it is represented by three supplementary scales. First dorsal fin inserted on the vertical from the posterior edge of the operculum, of seven spines; the first very short, the second near four times as long, and the third about twice this; it is the longest and thickest of all, it is rather arched and very pointed; the others go on decreasing, and the fin has a triangular form. The second dorsal almost touches the first at its base, it is formed of a long spine, almost straight and very sharp, and of seven rays, longer than the spine; caudal rounded, of twenty-four rays, including the small lateral ones; seventeen are longer than the others; anal formed of two spines and seven rays; the first spine is rather short, and the second, which is strong, straight, and pointed, is three times as long. The ventrals are inserted a little in front of the pectorals; they are large and formed of a long, thick, sharp spine, and of five rays

longer still; these are longer than the membranes which unite them, and are manifestly formed each of four branches; pectorals rather long, equal to the distance from the centre of the orbit to the posterior edge of the operculum; they have fourteen rays. The head is covered with pores; the operculums are scaly; the upper part of the head has no scales; it has a longitudinal ridge, and several transverse ones in front of the eyes, and behind them are rather numerous longitudinal ridges; the space between the eyes is equal to the diameter of the orbit.

After having been preserved in liquor, the body seems to have been red; the upper part of the head and the end of the fins (except the pectorals) have a purple black tinge; the points of the ventrals are black; there are also some irregular purple spots on the body.

The mouth is very broad, when opened its lower part seems filled by the red of the branchiostigals; the tongue can only be perceived very much backward; it is small, not free, but covered with asperities.

Mr. Waterhouse has sent me several specimens which measure about four inches.

PLATYCEPHALUS INOPS?

Platycephalus Inops? *Jenyns, Beagle, Fishes*, p. 33.

The description of *P. Inops* agrees entirely with this fish, except that the ventrals and anal are of a different colour, being of a light yellow covered with dark spots, like the other fins. The head has also round black spots placed far apart.

GLYPTAUCHEN.

This genus of the *Triglidæ* family has been established by Dr. Gunther on the *Apistus Panduratus* of Richardson, which he does not appear to have seen. The characters have been given by Richardson with so much detail that it is useless to repeat them; but all he says is more general than specific, and it is impossible to decide whether the following is of the same sort as the one he mentions, as he says nothing of the remarkable disposition of its colours:

GLYPTAUCHEN PANDURATUS.

Apistus Panduratus ; *Rich. Proc. Zool. Soc.*, 1850, p. 58, pl. 1, fig. 3.

Glyptauchen Panduratus, *Gunther Cat.*, vol. ii., p. 121.

D 17/7. A 3/6. C 11/ (long rays). V 1/6. P. 13.

The head is almost rounded, and seen laterally appears to be joined to the body by a sort of neck. The suborbitary are sharp and spiny ; over the nostrils there is a sort of foliated flap ; on the upper surface of the head there are two strong ridges, which diverge backwards in form of an angle ; in front of the eyes there is a deep transverse sulcate, which divides the longitudinal ridges in two parts ; the first being short, and rounded in front The præorbital has two points ; the external of which is strong and obtuse, and the internal very long, arched, and attains to the third of the orbit. The præoperculum has two very short spines (the upper one twice as long as the other), and three shorter ones ; these latter are on its inferior edge. On the operculum there is an upper limb, which has numerous very strong ridges and spines.

The head is very broad behind, being in this part more than twice the width it has in front of the eyes ; it can be said that it is compressed in front and depressed behind.

The body is covered with rather small scales, which do not extend over the anterior half of the back ; this part presents the appearance of a very ruguous skin. The lateral line is straight, and extends to the centre of the tail up to the insertion of the caudal ; it is formed of a succession of ridges disposed rather obliquely.

The dorsal is very high ; its height being equal to two-thirds the one of the body ; it has two portions, but continuous ; the first is rounded and formed of seventeen strong spines, the anterior ones being shorter, as also the posterior ones ; the second is short, but much higher than the end of the first, and is formed of seven rays ; this part extends over the base of the caudal ; the length of the second dorsal is not one-fifth the one of the spinous part. The caudal is long,

rounded, of ten long rays, with three shorter ones on each side. The anal is short and has three very strong spines and six rays; the first spine is the shortest, and the second the longest and thickest. The ventrals are long, rounded, formed of one spine and five rays.

The pectorals are very large, being only contained two and a-half times in the total length of the fish; they are formed of fourteen branched rays; the membranes are shorter than the rays.

Preserved in liquor, the fish is of a light brown, becoming of a dirty white on the lower half of the head and on the anterior part of the belly. The body is marbled with darker brown, and the sides of the head have a carmine hue. A transverse, yellowish white band extends on the tail, and also on the anal and the soft part of the dorsal: on the anal it is marked even on the last two spines. The fins are variegated, with light and dark brown; the ventrals have their lower surface whitish. I have only seen one specimen, which measures five inches.

APLOACTISOMA.

Body oblong; compressed; two dorsals united; the first situated on the head, and formed of five spines; the second long, with the first eight rays spinous, and the others deeply fringed. Skin very ruguous, covered with numerous but very short filaments, which have the appearance of short spines; gills opening, being a rather long split before the pectorals. These are pediculated, large, and pronged; ventrals inserted a little in front of the lower edge of the base of the pectorals, formed of one spine and two rays; two dorsals, the first placed on the head, the second of eight spines and fifteen rays; anal formed of one feeble spine and ten fringed rays; three gills. Præoperculum with three strong obtuse spines; operculum with several spinous ridges. The mouth is surrounded by numerous short tentaculæ or filaments; the two jaws are covered with very numerous and small teeth, disposed in pavement; each of these minute teeth is pointed; those of the upper jaw are separated in the middle by a

longitudinal ridge, which has in front two teeth rather larger than the others. The vomer and palatines are covered with similar teeth, and the tongue, which is broad and thin, is covered with papilæ ; lateral line well-marked, and straight to the insertion of the caudal.

APLOACTISOMA SCHOMBURGKII.

Height contained four times in the total length ; head three and two-thirds in the same ; eye five times in the length of the head. All the head is ruguous, and covered with elevated ridges, and a circular one extends round the eye ; these ridges form several long obtuse points on the præoperculum and operculum. The first dorsal is as high as the distance from the snout to the centre of the orbit, it begins in front of the eye ; it has five spines, the three first much longer and thicker than the others, and placed one near the other ; the second is the longest ; the fourth is much shorter and more remote from the others ; the fifth is the smallest, and placed half-way between the other and the second dorsal ; this is composed of eight spines and of fifteen soft rays ; all of them have their membranes very strongly emarginated, and this gives the fins the appearance of being pronged ; one might count the fifth spine of the first dorsal with those of the second, and then there would be four on one and nine on the other. The spiny part is about equal in height, but the soft one becomes higher as it goes backwards, and is rounded posteriorily. The caudal is rounded, formed of eleven strong, full-length rays, with several shorter ones on each side : anal of the same form as the second dorsal, but not quite so high ; it has one feeble spine and eleven rays ; the pectorals are nearly as long as the head ; they have ten rays, the five centre ones being the longest, and nearly equal amongst themselves, with two upper ones and three lower ones shorter. The ventrals are long, slender, formed of one spine and of two rays longer than the spine. All these rays have their extremity free, and their surface is as ruguous as the whole body.

The colour is of a dark brown marbled with black ; there is a spot of that colour at the posterior angle of the second

dorsal, and the caudal and anal are bordered with the same.

I have seen two specimens, the longest of which measures five inches, but Mr. Waterhouse tells me that he has one almost twice that size.

The fish on which this genus is established must be very nearly allied to Richardson's *Aploactis Milesii* (*Proc. Zool. Soc.* 1850, p. 60; *Pisces*, pl. 1, figs. 1, 2, and repeated *Ann. and Mag. Nat. Hist.*, 1851, vol. ii., p. 275—277). But the presence of teeth on the palatine bones and the difference in the composition of the fins (D $\frac{14}{14}$ A. 12) obliges me to consider it as distinct. In all cases it cannot enter the genus *Aploactis*, on account of the characters I have just mentioned, and if it was found that some mistakes have taken place in Richardson's description, which is possible as he had only seen a dried specimen, and that the two sorts are identical, then the specific name would be *Milesii* Richard.

I have named this sort in honor of the learned Director of the Adelaide Botanical Gardens.

CHIRONECTES FILAMENTOSUS.

Body rather globulous: its height is two and one-third times in the total length, and the breadth five-sixths of its height. The upper profile is very gibbous in front.

The fish is smooth but entirely covered with long fringes, measuring about half an inch; the mouth is broad; the lips have strong tubercles. The upper teeth are small and conical, the lower are also on several series; the most internal of which are long, sharp, and directed on several rows placed inwards. Inside the mouth, there is also on each side a bunch of teeth; there is on the head a long thin spine supporting six or seven long cutaneous tentacles, some simple, and some bifide; on each side of this spine is inserted a slender filiform, and rather long tentacle, which terminates by two large, fleshy, pointed appendices. This fleshy part has more than one-half the length of the filiform one; the eye is pediculated and surrounded by tentacles.

Behind the spine of the head is another, on the back; it is

also slender, longer than the other, and rather arched ; it is ended, as is the first, by a tuberculous knob, and bears also cutaneous tentacles. The dorsal is formed of thirteen strong, flexible rays; these are ended by filaments, and are considerably longer than the membranes; they all bear filaments and tubercles on their length; this fin extends to about one-half of the caudal and it begins over the insertion of the pectorals.

Caudal long, of nine strong rays, which are rather longer than their membranes ; on its upper and inferior edge it has a line of filaments ; the anal is formed of eight rays ; the pectorals are tuberculous, and have eleven rays ; the ventrals are placed rather in front of the pectorals and have five rays ; in all these fins the rays are longer than their membranes.

The lower parts of the body, and particularly the throat, are covered with long fleshy appendices ; the latter shows also numerous tubercles.

The fish is of a light brown with several very large black blotches on the body, but none on the fins, nor on the lower parts of the body; some silvery white, small and irregular spots on the cheeks, inside of the mouth and tongue, covered with white tubercles.

This sort seems nearly allied to *chironectes vittatus, Rich. (Ereb. & Terror)* that Dr. Gunther unites with so many others under the name of *Marmoratus.*

The genus I here mention was formed by Cuvier in his Règne animal under the name of *Chironectes,* and this must, I think, be adopted, as the one of *Antennarius* was not published at that time, and, in fact, is only a manuscript name given by Commerson.

CRISTICEPS SPLENDENS.

The upper profile is very converse, and gibbous over the head ; its height is contained a little over four times in the total length ; the length of the head three and two-thirds in the same ; eye five times in the length of the head ; the snout is a little longer than the diameter of the eye ; the width of the interorbital space is equal to the vertical diameter of the eye ; a rather long quadridigitated tentacle on the nostril, and

another stronger and rather longer above the orbit, it is compressed and simple, having only a small angle on its anterior edge; teeth very numerous and sharp on the jaws; others on the vomer more blunt; on the lower jaw they are also very numerous, the outer ones forming a line of rather large and more conical ones; scales more or less visible, particularly so on the middle of the body; they are almost round, and fall very easily; the lateral line begins above the operculum, and follows the back, but opposite the sixth spine of the second dorsal it bends downwards, and follows the middle of the body to the tail; it is formed of a succession of little ridges apart one from the other; the muscular fluxes are very visible.

The first dorsal is placed over the centre of the orbit; it is short, formed of three rays, the first as long as the height of the body; the second rather shorter, and the third only one-half of the first; the space between the two dorsals is equal to one and a-half that from the anterior base of the first ray, to the posterior one of the third (first dorsal); the second dorsal begins over the end of the operculum, and goes increasing in height to its end; it is high and formed of twenty eight spines, and six rays which can only with difficulty be distinguished from them. The last membrane is attached to the tail at a distance from the base of the caudal, equal to one and a-half times the diameter of the eye; the caudal is long, oblong, of nine rays longer than the membranes which unite them; the anal begins opposite to the twelfth spine of the second dorsal; it is of the same form as that fin, and is composed of two spines and twenty-three rays; it is attached to the tail in front of the insertion of the dorsal; its rays are longer than their membranes; the ventrals are placed in front of the pectorals, they are formed of two short and of two long filaments; pectorals rather large, of eleven rays longer than the membranes. After having been in liquor, this fish appears to have been of a uniform carmine, with the head and fins orange.

The male organ is most remarkable, having the form of a large ruguous globe.

My largest specimen, a female, is seven inches long, and the largest male only a little over five. I have also a very young specimen, which is similar, but has faint traces of narrow, obscure, transverse bands on the body; of the last I also find very faint traces on one of the large specimens; this sort seems very distinct from all those mentioned by Dr. Gunther, and also from *Axillaris* of Richardson in Stokes's "Discoveries in Australia," vol. i., p. 486, pl. 1, fig. 1. The species of *Cristiceps* appear to be very numerous in the southern waters of Australia.

HETEROCLINUS.

Body sub-elongate; mouth opening upwards; snout without tentacles; ventral fins inserted in front of the pectorals, formed of one short and two long filaments; dorsals two; the first short, the second formed of numerous spines, and only three posterior rays; it is attached to the base of the caudal, and of two spines and numerous rays; it is attached to the tail. Lateral line only marked on the extreme anterior part of the body; gill membranes inflated.

Teeth short, blunt, thick, crowded on both jaws, with an external line of more slender and sharper ones; teeth are also very numerous on all the palatine bones; those in front being on a band.

HETEROCLINUS ADELAIDÆ.

Very much like *Ophiclinus Antartica*, but much shorter. The height of the body is contained a little less than five times in the total length of the fish. The head is contained four and two-third times in the same; the eye is twice in the head; the mouth opens upperly, and the head appears truncated in front when the mouth is shut; the eye is very large, and attains the profile of the head; the upper lip embraces the lower jaw when the mouth is shut.

Two dorsals; the first short, placed behind the head, of three spines; the first much stronger than the others, and rather prolongated; the second dorsal with 28 spines and three rays placed posteriorly, and attached by a membrane to the extreme

base of the caudal; this fin is rather long, of eleven entire rays; anal with two spines, the first shorter than the second, and 25 rays, the last of which is attached to the extremity of the tail. The body has four deep longitudinal sulcates, and the lateral line does not extend to the end of the pectorals; these are rather long of 12 rays; they are placed rather in front of the ventrals, which are almost united at their base, and formed of one short and two long filaments.

The upper parts of the fish are of a reddish brown, and the lower ones of a yellow white; on the sides of the body extends an irregular black longitudinal band, and some blotches of this colour are observed on the lower parts; the dorsal and anal are obscure, with some white portions; the ventrals, caudal, and pectorals are of a light colour; the two last sprinkled with black; the prolongated part of the first dorsal is red.

Length three and a half inches.

OPHIOCLINUS.

Body very elongated; mouth opening upwards; snout having two short filaments; ventral fins inserted in front of the pectorals, having one short and two long filaments; dorsal formed of numerous spines, and of only two rays, which are situated posteriorly; it has no anterior detached portion and is, as the anal, attached to the caudal; the anal has no spines, lateral line only marked on the extreme anterior part of the body; gill membranes inflated; teeth very numerous, short, very thick, rather arched, crowding all the bones of the palate, and also on very numerous rows on the lower jaw, particularly in front.

These fish have something of the appearance of *Brotula*.

OPHIOCLINUS ANTARCTICUS.

Height of body seven times in total length; head six times in the same; eye four times in the length of the head. The cleft of the mouth is very oblique; and extends further than the perpendicular from the anterior edge of the orbit; when the mouth is shut, the lower jaw is rather shorter than the other; the upper jaw, vomer and palatine bones are

crowded with short blunt, thick teeth; those of the lower jaw are similar. There is in front of each eye on the snout a very short barbel, which is broad, rounded, but not longer than one-fourth at the transverse diameter of the orbit; the eye is large and lateral; the head has no appearance of scales; the body is covered with very minute scales imbedded in the skin, except on the posterior part where they are more apparent. The muscular fluxes are very visible, the anus which is very salient is placed at one-third of the length of the body (without the head). There are five longitudinal depressions or sulcates marked on the body, but which do not extend to the extremity of the tail. The dorsal begins a little behind the head and joins the caudal; it is very low anteriorly and goes insensibly increasing a little in height to the end; it is formed of about sixty-three spines and two rays; the spines as they extend backwards become rather longer than their membranes. The anal is similar to the dorsal, of about thirty-nine rays; it begins at a short distance behind the anus; these two fins join the caudal, but this is distinct from them; it is rounded and formed of eighteen rays; the ventrals are inserted near one another, a little in front of the pectorals; they are formed of one short and two long filaments; the posterior of which is longer than the other; pectorals much shorter than the ventrals, of ten rays.

The gill openings are very broad; the lateral line only visible behind the gill opening at a distance contained twice in the length of the head; it is marked by a succession of small ridges; the male organ is very prominent, of a uniform brownish red; the lower parts of the body lighter; some minute black spots on the fins, which are rather red; caudal and anal bordered with black.

Length five inches.

CHEILINUS AURANTIACUS.

D 9/11. C. 14 long rays. A 3/10. V. 1/5. P. 11.
l. l. 23. l. tr. 3/7.

Body rather elongate and compressed; contained three times and three-quarters in the total length (caudal included).

Head contained four times and one-tenth in the same; eye four times in the length of the head.

Head rather concave; two rows of scales on the cheeks; radiant reticulations round the eye and on the inner margin of the præoperculum. The canine teeth rather long, particularly those of the upper jaw; the snout rather pointed, not longer than the eye; the lower jaw is rather more advanced than the upper one; the body is covered with very large scales, which present radiant striæ; the lateral line is very strongly bent downwards, a little before the end of the dorsal, and from this runs to the centre of the caudal. The spiny part of the dorsal fin is rather lower than the soft one, and is also rather shorter; the spines are nearly equal in length with the first, only shorter than the others; the membranes which unite them are rather prolongated. The caudal is large, being nearly one-fifth of the total length of the fish; it is formed of four long rays, of which the one on each side is not so long as the others, and of five or six shorter ones. Anal with three spines, the first of which is shorter than the second, and the third much thicker and longer than either; the soft rays are rather long and equal; the spine of the ventral is rather strong and straight; the pectorals are large, and their end is on a line with the base of the eighth dorsal spine.

The general colour after a short stay in spirits, is of a fine orange with the back rather carmine, the dorsal and anal are yellow, with a broad external black band and a series of feeble obscure spots near the body; the space between the first and second dorsal spines is black, and the sides of the caudal are obscure; there are traces of feeble brown spots on the back, and some on the head, particularly round the eyes. The ventrals have their first half orange and their external one black; the pectorals are entirely of a fine reddish orange.

Length of only specimen seen a little less than five inches.

ODAX RADIATUS.

Malacanthus Radiatus, *Quoy et Gaimard, Astrol. Zool.* iii., p. 719., pl. 19., fig. 2.

Cheilio Lineatus, *Cuv. and Val.* xiii. p. 354.

Odax. Lineatus, *Rich.*, *Erebus and Terror*, *Fishes*, p. 133., pl. 60, fig. 1.

———————— *Gunther*, *Catal.* iv., p. 242.

The first spine of the dorsal is prolonged in a filament nearly as long as the spine.

After having been a short time in liquor, the back is olive, and the lower parts orange; a broad carmine band extends on all the length over the lateral line (except on the anterior curve, where it runs on it). The fins are yellow; the dorsal is covered with undulating longitudinal and rather obscure lines, and at the middle of its length it has on the part adjoining the back a long dark blue spot, lined externally with scarlet; this spot extends from the eighth to the seventeenth spines; the extremity of the long rhombic caudal is obscure, length six inches.

ODAX RICHARDSONII.

Gunther, *Cat.* iv., p. 241.

Appears entirely similar to the Victorian specimens.

Mr. Waterhouse says it is called *mud-fish* by the Adelaide fishermen.

ODAX FRENATUS.

Gunther, *Cat.* iv., p. 2, fig. 1.

This seems to remain small. My largest specimen measures five inches.

This sort has the same form of caudal as *Radiatus*, but it is easily distinguished by its upper parts being brown, and the lower yellowish; on each side and below the lateral line extends a rather broad longitudinal band. The fins are yellow, but the caudal rather obscure, as are sometimes the first rays of the dorsal.

Dr. Gunther's specimens were from Swan River.

ODAX PUSILLUS.

Height six and a half times in the total length; head four and a quarter in the same; eye contained three and a third times

in the length of the head; lower jaw rather longer than the upper one. Teeth denticulated on the edge; præoperculum entire; operculum extended backwards and rounded.

Lateral line rounded in front, but extending, being the pectorals on a straight line to the centre of the base of the caudal. Scales large.

Dorsal of two rays; anal of thirteen; pectorals of fourteen; caudal of nineteen; the dorsal and anal are high; the caudal is long and pointed; the central rays being very long, and the lateral short.

The general colour is lilac, marbled with brown; length one inch and two-thirds.

Nota.—The bad state of the only specimen I have seen, leaves some uncertainty about the number of rays of some of the fins.

HETEROSCARUS.

Upper jaw longer than the lower; its teeth soldered together, and forming a sharp lamina on each side; on the lower jaw they are all soldered together like in *Scarus*, without the medium suture of the upper jaw. Scales large; fourteen or fifteen stiff dorsal spines; the three first prolonged in form of filaments; head naked, porous; cheeks covered with scales soldered together, and present impressions having the appearance of pores; operculum with several rows of large scales; lateral line continuous.

The filaments of the dorsal give, particularly to the first sort, a great resemblance with *Lachnolaimus*, but its dentition is evidently *scaroid*, and the disposition of the scales of the head make it also very distinct.

Nota.—I have only one specimen of each sort, and that not in a good state, and as I found it impossible to open the mouth without entirely destroying the teeth, I was obliged to postpone the description of the internal parts of the mouth till I obtain other specimens; but the characters I have enumerated appear quite sufficient to justify the establishment of this new genus.

HETEROSCARUS FILAMENTOSUS.

General form oblong oval; the head rounded in front, and the back rather gibbous; height three and one-eighth in total length; head nearly four times in the same; eye five times in the length of the head; this without scales, and covered with pores; operculum only having, towards its posterior part, two rows of very large scales; the first numbering six or seven, and the second four or five; behind these extends a space finely striated and naked; no scales on the cheeks; operculum striated; body covered with large scales numbering twenty-nine or thirty on the longitudinal line, and twelve on the transverse one; those near the end of the tail are very large and oval; lateral line beginning over the operculum, arched downwards and following the centre of the tail; it is formed of a succession of short oblique ridges. Dorsal formed of fifteen spines and eleven rays; the two first spines about equal, prolongated in long filaments having the length of the height of the body; the third shorter and the following much shorter still, and about equal between themselves. The soft rays are much longer than the spines, and, when laying down, extend to the base of the caudal. This has ten long rays and three shorter ones on each side; it seems truncated but is not perfect in the only specimen I have seen. Anal with two feeble spines and twelve rays; these have the same form as those of the dorsal. Pectorals large, round posteriorly, of fourteen rays; ventrals united at the base, smaller than the pectorals, but extending further backwards, having one rather long slender spine and four rays.

The colours (after having been in liquor) are of a reddish pink, becoming of a light brown on the back, with faint traces of three or four irregular transverse brown bands, which are interrupted a little under the lateral line, and reappear as blotches on the sides of the belly. The head is brown on its upper parts and pink on the sides and below; a longitudinal narrow well-defined blue stripe, bordered with black, extends from the posterior edge of the orbit to the end of the scaly part of the operculum; a second runs similarly below the eye, but extends

in front to the mouth, a third similar one originates at the angle of the mouth and ends at the serrated part of the præoperculum; the dorsal has its spines white but its membranes and prolonged filaments are black; the other part of the fin is yellow, with a broad longitudinal dark blue stripe extending nearer to the edge than to the base; the anal and ventrals similar; the caudal and pectorals of a fine yellow.

The second dorsal and anal have their base covered with long pointed scales; the teeth are white, those of the upper jaw are two, one on each side; they are not solved together, and in front they are like two sharp laminæ which are joined at the base, but have a triangular open space between them towards their edge; length seven and a quarter inches.

HETEROSCARUS MODESTUS.

Same form as *Filamentosus*, but rather shorter. The cheeks covered with large, thin flat scales, difficult to distinguish one from the other; the upper limb of the præoperculum is covered with minute irregular scales; the præoperculum is striato-serrated; the operculum is naked and covered with pores in its anterior half, and has on its second portion three series of large scales, these are followed by a denudated and striated posterior part; the body is covered with large scales, thirty-two on the longitudinal line and thirteen on the transverse one; the lateral line begins behind the flat rounded points of the operculum, descends very gradually, and extends on the centre of the tail up to the insertion of the caudal; it is formed of a succession of ridges adjoining one another, and divergent posteriorly upwards and downwards.

The dorsal is formed of fourteen spines and ten rays; the anterior part of the spinous portion is elevated, and the first spines have filamentary prolongations, but the longest of all, the second, is not quite equal to two-thirds of the height of the body; the spine itself being as long as the space from the anterior edge of the snout to the internal edge of the præoperculum. The caudal is truncated of eleven long rays and several short lateral ones.

The anal has two feeble spines and eleven rays; it does not, nor does the dorsal, attain the base of the caudal; the ventrals are almost as large as the pectorals, and being inserted much further back, extend considerably behind them; they are united at the base, and have a slender spine and four rays; the pectorals are rounded and formed of thirteen rays.

The colour is (after having been in liquor) of a fleshy pink, with the sides of the head brilliant; there is no trace of coloured stripes on the head; the fins are yellow, with a black tinge on the anterior and posterior parts of the dorsal. The caudal has four transverse black bands; the anal a broad faint black stripe on the middle of its height, and the second half of the ventrals is of the same colour.

Total length six inches.

PHYLLOPTERYX ELONGATUS.

Very much like *Foliatus*, and at first I thought it was a variety of it, but I have seen four specimens, and they all agree together; the following are the differential characters: generally smaller, the largest adult female being only nine inches long (the same in *Foliatus* about fifteen); the spine on each side of the snout is lateral and not superior. The body is much more elongate; in the female its greatest height is contained twice in the length of the snout up to the anterior edge of the eye, and in the male three times. The lower side of the body only presents a pair of ventral processes in both sexes, when in *Foliatus* the female at least has another, without foliated appendages, under the anus. The foliated appendages of the back are much shorter and broader and of an oval form, they are not generally much longer than the processes itself.

The colour of the dried specimens is much lighter; on those in liquor I find that the end of the muzzle, the lower parts of the head and body, and the sides of the tail, are white; the upper parts of the snout, head, and body, are of a lilac colour, covered with numerous round white spots. The foliated appendages and the end of the tail are black.

On the living specimens, Mr. Waterhouse says, that the colour is orange, with granular dark blue spots and markings

STIGMATOPHORA ARGUS.

Stigmatophora Argus, *Rich. Proceed. Zool. Society*, 1840, p. 29.

——————— *Rich. Trans. Zool. Soc.* iii., p. 183, pl. 7, fig. 2.

——————— *Kaup. Loph.*, p. 53.

——————— *Gunther, Catal.* vol. viii., p. 190.

Of a light olive colour; the body covered with oval black oscellated spots disposed in longitudinal lines; the head and body without spots.

This sort is remarkable by its long snout, the absence of the caudal, and its long extended dorsal fin.

Length of specimen seven inches and a half.

STIGMATOPHORA OLIVACEA.

Snout rather more than twice the length of the remaining part of the head. This contained a little less than six times in the total length of the body; the opening of the mouth is upwards; a longitudinal ridge runs all along the upper surface of the snout; operculum without any ridge; body rings nineteen; vent below the middle of the dorsal fin; egg-pouch extending over thirteen rings; tail formed of about eighty-four rings. The pectorals rather large, of eighteen rays; the dorsal of about forty-five; no caudal; the general colour is a light olive, becoming grey on the lower part; the egg-pouch is orange; all the rings present an obscure tinge at their junction, and these very feeble transverse bands extend on the snout; total length nine inches.

LEPTOICHTHYS FISTULARIUS.

Leptoichthys Fistularius, *Kaup. Lophob.*, p. 52.

Head five times in the total length; snout, up to the nostril, contained seven times and one-third in the same; it is long, compressed, and unites to the head by a gradual profile; the mouth opens superiorly; the orbit is contained seven times in the length of the head, and the space between the nostril and

the anterior edge of the eye is equal to half the diameter of the orbit. The upper part of the head is covered with very minute scales, which have on the operculum a radiated disposition. The pectorals are large and formed of twenty-three rays ; the body pentagonal and flat on its upper and lower surfaces ; the anus is below the twenty-sixth ring ; the dorsal begins on the middle of the twenty-fourth, and extends over the eight following ; it is high and composed of thirty-four rays ; the tail is formed of twenty rings ; the last ones longer than the others ; its form is similar to the one of the body ; the caudal is as long as the snout ; it is rhomboidal, of ten rays, with the four central ones prolonged in long filaments.

The body, particularly on its upper parts, is covered with granulations, probably due to the presence of very minute scales.

The colour is olive, with the lower parts rather yellow ; the base of the body rings is rather darker ; the fins are transparent, except the caudal, which is almost black.

The total length of the specimen is eight inches.

There can be no doubt as to the genus of this fish ; but I am not certain that it belongs to the sort described by Dr. Kaup. I cannot see any trace of the anal that he mentions. His specimen was a female, as is also mine, and as he says distinctly that he has not seen the male, I cannot understand how Dr. Gunther (*Catal.* vol. viii., p. 187), who says himself he has never seen the fish, and only quotes it from Dr. Kaup's description, can have learned (p. 153) that *the male has the egg-pouch on the abdomen.*

SYNGNATHUS PÆCILOLÆMUS.

Syngnathus Pæcilolæmus, *Peters, Monatsber, ak. Wiss., Berlin*, 1868, p. 458.

——————————— *Gunther, Catal.*, vol. viii., p. 174.

This sort has some general resemblance of coloration with *Stig. Argus*, but is easily distinguished by the presence of a caudal ; it is of an olive colour, becoming of a dirty yellow on the lower side ; the snout has faint transverse brown bands,

better marked on the lower part; the sides and lower part of the head are sprinkled with rounded black dots, which extend on the lower part of the four or five first body rings. Small and rather faint brown oscellated spots are seen on the sides of the body rings; caudal black; the dorsal rays are speckled with the same colour. Length nine and a half inches.

Nota.—In two smaller specimens (seven and five and a half inches long) I find that the ventral ridge is much better marked than on the large one, that the colour has more of a reddish tinge; the snout is more slender in proportion; the body has none of the oscellated spots; these specimens are all females.

SYNGHATHUS CURTIROSTRIS.

Snout contained twice in the remaining portion of the head, and only once and a half in the orbit; head twelve times in the total length of the fish; mouth opening upwards; snout having a strong longitudinal ridge on its upper part, and a feeble one on each side; operculum covered with deep punctured, radiated striæ, and having its upper edge elevated like a curved ridge; but no longitudinal ridge on its surface. The anus is situated on the eighteenth body ring; tail with forty-two rings; it goes tapering towards the end.

The body is quadrilateral, with a faint ridge on each side, which only extends to the vent; on the first rings of the tail an oblique ridge is marked, but it joins the upper edge on the fifth ring. The dorsal is inserted on the first ring of the tail, and extends on the four following; it is formed of twenty rays. The caudal is longer than the two last tail rings; it is rounded at its extremity and formed of six rays.

After having been in spirits, the fish appears of a dark brown, with irregular silvery spots on the lower parts of the head and on the two or three first segments of the body; these spots are surrounded by a dark line; the pectorals and the dorsal are of a light colour speckled with brown.

Length a little over four inches and a half.

MONACANTHUS MARGARITIFER.

Monacanthus Perulifer, *Cast. Olim.*

This sort, which appears to me not to have yet been described, belongs to the division with : " Anal fin with less than forty rays ; dorsal spine with four series of barbs ; the front series much closer together than the hinder series, and formed by small barbs."

This species would probably enter in Dr. Blecker's genus *Pseudomonacanthus.*

The upper profile of the head is rather concave ; the gill opening is situated below the two posterior thirds of the orbit ; the distance from the extremity of the snout to the gill-opening is contained three and two-third times in total length of the fish, including (as always) the caudal ; diameter of the eye three times in the same ; the lower profile forming an extended triangular pouch ended by the ventral star ; the distance from the end of this ventral spine to the back is not included quite once and a half in the total length.

The whole body is covered with papillæ, each terminated like a small mushroom or a pearl.

The first dorsal is formed of one large spine and of one short ray ; the spine is rather arched and about as long as the distance from the anterior extremity of the snout to the centre of the orbit ; it has four ridges, the two front ones placed very near one another and only separated by a longitudinal sulcate ; they are armed with a series of small spines directed downwards ; those of the posterior ridges are much larger, arched, and also directed downwards ; the second dorsal is rather high, and formed of twenty-seven rays ; the caudal is as long as the distance from the snout to the first third of the orbit ; it is rounded and formed of nine rays ; the anal is similar to the second dorsal, and composed of the same number of rays ; the pectorals are rather short ; their length being contained twice in the distance from the snout to the centre of the orbit ; they are formed of twelve rays.

The ventral star or spine is anchylosed to the pelvic bone ;

it is oblong, and surrounded by a series of rather long and slender spines.

In all the four specimens I have seen, the tail is only covered with spinous papillæ like those of the body but finer, and these extend to some distance of the base of the caudal fins; the colour is entirely of a light brownish yellow, with the extremity of the caudal almost black.

The largest of my specimens is near four inches and a half in length.

Nota.—This sort is very nearly allied to *Mon. Granulatus* (White, *Voyage to New South Wales*, p. 295, pl. 254; Richard., *Ereb. and Terror*, p. 63., pl. 40, fig. 1), and I should certainly have thought that it was similar to it if Dr. Gunther had not placed this in the division having its dorsal spine with only two series of barbs. This author adds that this spine is strong, barbed behind, but not in front; Richardson's figure certainly don't seem to represent such a fish, and it is possible that Dr. Gunther's sort may be different from his.

MONACANTHUS VITTIGER.

Height of body contained twice and two-thirds in the total length; head about three times in the same; diameter of the orbit contained once and two-thirds in the snout.

Form rather elongate; the body is covered with minute granulations similar to those that have been often compared to mushrooms; they are similar all over the body, and the tail has no larger ones. The ventral spine is formed of a little bunch of spinules; the dorsal spine is inserted a little behind the centre of the orbit, and a little in front of the insertion of the pectorals; its height is about equal to half the one of the body; it is straight, four-edged, and ended by a small filament; the anterior barbs are strong, directed downwards; the back ones are more feeble, and placed on two series, less distant one from the other than the anterior ones; the second dorsal has thirty rays; the anal also; the caudal is rather long, of twelve rays; the pectorals have thirteen.

The colour is of a light green, becoming white on the lower parts; an irregular but broad longitudinal band extends on each side from the snout to the tail; the dorsal is green; the second dorsal, anal, and pectorals transparent and white. The specimen is not quite two inches long.

CONTRIBUTION

TO THE

ICHTHYOLOGY OF AUSTRALIA.

No. V.—NOTES ON FISHES FROM NORTH AUSTRALIA.

Most of the fishes I have seen from the northern part of the Australian Continent were kindly sent to me by Mr. Waterhouse, the Curator of the South Australian Museum, and are from Port Darwin. As might be expected, a great part of them belong to Indian sorts.

The only sort here described from a different locality is a most curious little fish, which was given to me by Mr. Ch. French, and was found by one of the members of the Melbourne Eclipse Expedition. I have been unable to ascertain to what family it belongs.

THERAPON THERAPS.

Therapon Theraps, *Cuv. and Val.*, vol. iii, p. 129.

Remarkable by its silvery colour, marked with three obscure longitudinal narrow streaks; the two superior ones arched and the third straight; the latter situated below the middle of the body and extending to the extremity of the caudal. This has also two other similar oblique bands, one on each lobee of the caudal; the extremity of the upper one is also obscure. A large purple spot covers a considerable part of the spinous dorsal, and some spots of the same colour are also on the soft portion of the same. Common in the Indian and Chinese Seas.

Port Darwin.

TOXOTES JACULATOR.

Scæina Jaculatrix, *Pall. Spicil.* viii., p. 41.

Labrus Jaculatrix, *Lacep.* iii., p. 429.

Toxotes Jaculator, *Cuv. and Val.*, vol. vii., p. 314, pl. 192.

The specimen is only two and a quarter inches long, and does not appear to differ from the Indian ones; the transverse spots of the body are very slightly marked.

Port Darwin.

Nota.—This genus is placed with the *Squamipennes*, but appears to me to constitute a separate family; I would propose to call *Toxotidæ*.

LETHRINUS JOHNII.

Anthias Johnii, *Bloch.*, pl. 318.

Mesoprion Johnii, *Gunth.*, *Cat.*, vol. i., p. 200.

——— Unimaculatus, *Quoy. and Gaim., Voy. Freycinet*, p. 304.

——————— *Cuv. and Val.*, vol. ii., p. 441.

Coius Catus *Buch.*, *Gang. Fish.*, p. 90, pl. 38, fig. 30.

Remarkable by the large oval black blotch it has on each side; over the lateral line there are on the back rather numerous black, narrow, and oblique lines; the palatine teeth are few and feeble.

This fish is very much like *Lethrinus Harak*, of Farskal.

Its usual *habitat* is the Indian Sea.

Port Darwin.

EQUULA EDENTULA.

Scomber Edentulus, *Bloch.*, pl., 426.

Equula Ensifera, *Cuv. and Val.*, vol. x., p. 66.

The specimen is only two inches long; it agrees well with the description of the authors, but the second spine of the dorsal is shorter than stated by Dr. Gunther (three-quarters of the length of the head); it is, as Cuvier and Valenciennes describe it, one-sixth of the total length of the fish.

The colour, after having been in spirits, is silvery, with the back of a fine light blue; head and fins of a rather brownish yellow.

There is no trace whatever of the transverse bands or lines mentioned by Cuvier and Valenciennes, but this may depend on the age of the specimen.

Dr. Gunther (*Catal.*, vol. ii., p. 499) places doubtfully, with this species, the *Equula Serrulifera* of Richard., *Ereb. and Terror*, p. 137, pl. 59; but, judging by this plate, it would be very distinct by the strong denticulations which arm some of the dorsal spines.

Port Darwin.

ELEOTRIS MOGURNDA.

Eleotris Mogurnda, *Richard., Ereb. and Terror*, pl. 2, fig. 1.

———————— *Gunther, Catal.*, vol. iii., pl. 111.

Several small specimens about two inches long, appear to belong to that sort by their broad snout and the three rather oblique dark stripes they have on their cheeks and opercles. The body appears yellow, marbled with brown; the upper parts of the last colour; a series of round dark blotches extend along the lateral line; the one at the base of the caudal generally darker than the others. The dorsal and caudal are finely marked with brown. Some of the dorsal rays are rather produced in one of the specimens.

Port Darwin.

ELEOTRIS MODESTA.

Body very elongate, contained four times and five-eighths in the total length of the fish, or a little over four times in the same without the caudal; head three times and a half in the same; eye three times and a fifth in the length of the head.

The snout is considerably shorter than the diameter of the eye; it is rather depressed but not very broad, its breadth in front of the eyes being equal to the distance from its extremity to the first third of the diameter of these organs. The cleft of the mouth is oblique, and does not extend to the perpendicular from the anterior edge of the eye. Operculums

simple; head entirely scaly; body covered with large scales, thirty-one on the longitudinal line and eleven on the transverse one; these scales are striated and finely serrated on their edge. The lateral line is very feebly marked, and only extends to the thirteenth scale. The first dorsal has six feeble spines; the first of which is shorter than the others; these are rather produced in filaments; the second dorsal has one spine and eight rays; the caudal has fifteen long rays and several shorter on each side; anal with one spine and nine rays; ventrals inserted below the pectorals, very near one another; they have one feeble spine and five rather long rays; pectorals not longer than the ventrals of seventeen rays.

General colour of a light yellow, with the upper parts rather brown; a very small and faint obscure spot at the upper angle of the base of the pectoral, and a rather dark but very faint line along the body to the base of the caudal. The dorsals have some irregular oblique transverse spots and the extremity of the second is black; the caudal is transversely speckled with brown.

Length less than two inches.

Port Darwin.

PERIOPHTHALMUS KOELREUTERI.

Periopthalmus Koelreuteri, *Bl. Sch.*, p. 65.

———————— *Cuv. and Val.*, vol. xii., p., 181.

Gobius ———————— *Pallas. Spic.*, viii., p. 8, pl. 2, fig. 1.

The specimen is two inches and two-thirds long. After having been preserved in liquor, it is of a light grey, indistinctly marmorated with purple, and the lower parts are of a dirty white; the ventrals and anal are of the latter colour; the pectorals and caudal are punctured with brown; the dorsal is spotted, and has on both of its portions a broad obscure longitudinal band running at some distance from the edge.

The first dorsal is not produced and the ventrals are separated.

It is found in all parts of the Indian and in the Red Seas.

Port Darwin.

APOCRYPTES MACROPHTHALMUS.

The genus *Apocryptes* has been formed by Valenciennes to place fishes which, with the united ventrals of *Gobius*, have only one line of canine teeth at each jaw. The sort I here describe has the prominent eyes of *Periopthalmus* and of *Boleophthalmus*, but the body much more elongate, and the fins absolutely united, does not admit of it being placed with either.

Height of body eight and a quarter times in the total length, or six and eight-tenths in the same, without the caudal; head four times in the last dimension or five in the first; eye four and a half times in the length of the head; snout very convex, and a little longer than the diameter of the eye. The head is broad at its back part, being in this portion only contained once and a third in the length of the head; the upper jaw is a little longer than the lower; the eyes are prominent, placed at the upper part of the head; gape of the mouth nearly horizontal, and extending near to the line from the posterior part of the eye. Teeth strong, canine-like, apart one from the other; lower jaw with a series of rather short tentaculæ; the entire fish is covered with very minute scales imbedded in the skin. The body is narrow, compressed, not more than one-half the breadth of the head; it goes tapering to the extremity. The lateral line is deeply marked, as are also the muscular flakes. The anus is situated a little nearer to the snout than to the base of the caudal; the first dorsal is inserted in front of the anus, it is formed of five rays, the last of which are prolonged more or less, in filaments; the second dorsal is very long, and is united with the base of the caudal; it is rather high, formed of twenty-seven rays, the two first of which are rather prolonged in short filaments. Caudal lanceolate of fifteen rays: anal united by a membrane to the base of the caudal, of about twenty-five rays; ventrals placed below the throat, in front of the pectorals, absolutely united, each being formed of one simple and of five branched rays; they are not adherent to the belly. Pectorals large, extending a little further than the ventrals, of eighteen or nineteen rays.

The fish, after having been preserved in liquor, appears of a light silvery grey, with the upper parts rather darker.

My largest specimen is over four inches long, its dorsal is very little prolongated ; the other is about three inches and a half, and that I believe a male ; has a long dorsal filament.

Port Darwin.

ZANTECLA.

Teeth on one single row at the upper jaw ; they are very numerous, rather large, pointed, and arched ; at the lower jaw they are similarly disposed, but shorter and straighter.

The centre of the snout arched and rather produced in front ; maxillaries not extending to the perpendicular from the anterior edge of the eye.

A strip of strong teeth on the vomer.

General form oval, compressed ; head pointed, covered with large scales ; eye large ; no lateral line ; two dorsals, both situated on the second half of the back, and each having one long and strong spine ; anal very long, having one spine and numerous rays ; ventrals abdominal.

This genus appears to me to differ by its characters from all the families established till now ; by most of them it comes near the *Atherinidæ*, but, by its unic strong spine at each dorsal, and at the anal, and also by its well developed dentition, I think it will be the type of a new family, that might be called *Zanteclidæ*.

ZANTECLA PUSILLA.

Height three times in the length to the base of the caudal, or three and a third with this included. Head three times and two thirds in the first of these dimensions ; eye twice and one-third in the length of the head.

The general form is oval ; the profile being a little more convex than the upper one ; the head is attenuated and pointed in front ; the lower jaw a little longer than the upper one and much thicker ; the opercular pieces are simple and covered with scales ; the operculum is round behind ; the

scales of the body are rather large; they are covered with very faint concentric lines, and their edge is entire; they number thirty-five on the longitudinal line, and ten on the transverse one.

Two dorsal fins, the first inserted at an equal distance from the snout and the base of the caudal, formed of one strong arched spine, and of five rather filamentary rays. The second dorsal is separated from the first by a space equal to the diameter of the eye; it is formed of one long arched spine, and of nine rays; the two last extend as filaments over the tail; caudal rather bifurcated, of sixteen long rays and several shorter ones on each side; anal very long, beginning rather in front of the first dorsal, and formed of one long arched spine, and of seventeen rays; the height of these go increasing as they are placed backwards, and the last are rather pro longated.

The ventrals are placed very near one another, at a considerable distance behind the pectorals, and are formed of a slender spine and of five rays; the pectorals have thirteen rays.

The general colour, after having been in spirits, is silvery, with the back of a light lilac; a rather broad straight longitudinal stripe runs from behind the eye to the extremity of the caudal; it is silvery, bordered with black; the rays of the dorsal and the end of those of the anal are obscure. Two inches long.

Port Darwin.

POMACENTRUS BILINEATUS.

This sort has to be placed in the section characterised by "Body without cross-bands; its height is more than one-third of the total length; blue lines along the nape and the forehead."

It comes near *Unilineatus* of Cuv. and Valen.; but is easily distinguished from Ruppel's figure (*Biocellatus* N.W. fish., pl. 31, fig. 3) by the form of the caudal, which is rounded and rather prolongated in its centre in mine, and strongly emarginated in the other. The general form of mine is also much

more elongate, and the disposition of the colours is rather different, as there is no trace of a spot on the upper part of the tail.

The height of the body is contained twice and two-thirds in the entire length; the head is a little over four times in the same; eye contained twice and a half in the length of the head.

The præorbital and the præoperculum are strongly crenulated; the operculum is entire; the lateral line follows the upper profile in approximating it gradually; it stops a little behind the centre of the soft dorsal, and runs over eighteen scales. The number of scales on the longitudinal line is about thirty; the transverse one has twelve; the lateral line running over the third; the dorsal has thirteen spines; the first is shorter than the others, which all go increasing in length as they extend backwards; the soft portion of the dorsal is formed of fourteen rays; the caudal of seventeen, and of a few small ones on each side; the central ones are longer than the others.

Anal with two spines, the second of which is more than twice the length of the first, and fourteen rays; the ventrals are formed of a spine and of five rays; the two outer ones of these prolongated in long filaments, which extend to the base of the second anal spine; pectorals nearly as long as the head, of seventeen rays.

The general colour (in liquor) is of a light purple brown; a narrow blue line runs over each eye, from the mouth to the base of the dorsal; these lines unite over the mouth, several other longitudinal blue lines, irregular and interrupted, run on the sides of the head. Each scale is marked with two or three light blue spots, which are more visible on the back and belly than on the sides; there is no trace of a spot on the tail; the fins are yellow, the end of the dorsal fins is rather obscure.

I have two specimens of this sort, which measure each a little over two inches long.

Port Darwin.

AMPHIPRION RUPPELII.

This sort is nearly allied in form to Ruppel's *Amph. Bicinctus*, the dorsal not being notched.

Height of body contained twice and two-thirds in the total length of the fish, or twice and one height in the same, without the caudal; head three times in the latter dimension; eye three times also in the length of the head.

The general form is high; the upper profile very convex; the lower jaw is longer than the upper one; the infraorbital is very strongly serrated; the snout is considerably shorter than the diameter of the eye; the præoperculum is feebly denticulated on its posterior part, and not at all on its lower one; the operculum is very strongly serrated and four-lobed; the lateral line rises at first and then follows regularly the profile of the back, but ends before the extremity of the dorsal; it covers about thirty-eight scales.

Dorsal of nearly equal height in all its length, of ten spines and eighteen rays; caudal rounded, with the four central rays prolongated in short filaments, of seventeen long rays, with four or five short ones on each side; anal with two spines and fourteen rays; the second spine being much stronger and longer than the other. Ventrals placed under the base of the pectorals; they are long and attain at least the first anal spine; they are formed of a long slender spine and of five rays; the pectorals are about as long as the ventrals, and have eighteen rays.

The general colour, after preservation in spirits, is of a light pink, with a very large black blotch covering all the back and the sides up to the height of the base of the pectorals; backwards it extends to the end of the dorsal; a broad pearly white transverse band runs rather obliquely from the nape of the neck to the lower edge of the operculum; its anterior edge runs behind the eye, and it ends downwards by a point; it is bordered with black. On the back, below the end of the spiny dorsal, there is another faint transverse white line that does not extend far below the lateral line; the fins are of a light yellow.

Length of the specimen one inch and six-eighths.

Port Darwin.

AMPHIPRION BICOLOR.

This sort is very nearly allied to the *Lutjanus Percula* of Lacepède, and, if Dr. Gunther is right in uniting with it the *Amp. Tunicatus, Ocellaris, Melanucus,* of Cuvier and Valenciennes, it might possibly prove to be also a simple variety of this sort; but the form is shorter, and the number of dorsal spines seem very different.

The body is nearly like the figure of *Tunicatus*, given by Lesson (*Voyage de la Coquille*, pl. 25, fig. 3) but is shorter, and the upper profile more convex. The height is twice and two-thirds in the total length of the fish; the head is four times in the same, and the eye three times in the length of the head.

The præoperculum is bilobed and each lobe is very strongly serrated.

The dorsal is formed of thirteen spines and of thirteen rays; the spines are as follows: the first is about one-third longer than the second; the five following are nearly equal to this, and rather curved; the seventh, eighth and ninth are straight, and become gradually shorter; the others are also straight, the tenth and eleventh are equal to the precedent, the twelfth a little longer, and the thirteenth twice as long, slender, and forming a part of the second portion of the dorsal. The caudal is oblong, of twenty-two rays; the anal has two spines and twelve rays; the ventrals are rather large; they have one rather long and slender spine and five rays; the pectorals are rounded posteriorly, rather shorter than the ventrals, and formed of seventeen rays. The lateral line begins over the upper end of the operculum, curves towards the back, which it approaches gradually; from whence it reaches the back part of the body; it is only marked posteriorly by a series of very feeble and interrupted ridges, which extend to a little more than the second portion of the dorsal, where they disappear.

The colour is of a deep black, with three broad transverse pearl-white bands; the first arched, and covering the posterior part of the head; the second beginning behind the high spines

of the dorsal, and covering the ninth, tenth, and eleventh of them; it descends almost straight on its posterior edge, but presents a very strong dilatation in front, below the pectorals; the third band is on the tail; the fins are black, with the edge of the second dorsal, the caudal, the anal, and the pectorals white.

The total length is one inch and two-thirds.

Port Darwin.

MELETTA SCHLEGELII.

This species would be placed by Dr. Gunther in the section of *Clupea*, characterised by: minute teeth on the palate, none on the vomer; root of the ventrals opposite to the middle of dorsal; height of body less than one-third of the total length without the caudal.

This author, contrary to his habit, divides the species according to their *habitat*, but his only *Australian* species is *Meletta Novæ Hollandiæ*, Cuv. and Val., which is very different from this. I cannot either place it with any of the Indian sorts of *Clupea*.

Height of body three times and one-third in the length without the caudal, or a little over three times and a half to the central end of this fin. Head contained four times in the length (without caudal); eye twice and three-fourths in the head.

The snout is considerably shorter than the diameter of the eye; the lower jaw much longer than the other; the maxillary extend to below the first third of the eye; the cheeks and the two operculums are finely striated; the lower profile is rather more convex than the upper one; scales regularly arranged, rather firm; they are strongly striated, with their margin finely crenulated; dorsal of nineteen rays; the end of this fin is at an equal distance to the snout, and to the end of the tail. The caudal is deeply forked, of sixteen long rays, with several shorter ones on each side; anal of twenty-eight or twenty-nine rays; the ventrals are small; the pectorals nearly twice as long, of sixteen rays.

The general colour is bright and silvery, with the back of a

light purple ; the anterior part of the head and the fins are yellow ; the operculum gilt.

Length three inches.

Port Darwin.

NOTA.—In the *Fishes of New Zealand*, p. 133, Dr. Hector describes a sort from that island nearly allied to *Clupea Sprattus*, but differing chiefly by the dorsal fin being placed further back. He considers it as a simple variety of the European sort, and, following Dr. Gunther's habit of naming varieties, he calls it *Clupea Sprattus var. Antipodum.* It is useless to add that the characters we have just mentioned prove it to be a most distinct species.

TETRODON DARWINII.

Entering in the division called *Gastrophysus* by Muller and characterised by : no scutes forming a carapace ; nasal organs very conspicuous ; back broad, not compressed ; nasal openings two on each side, opposite to each other, and situated on a rather prominent papillæ ; a fold along the lower part of the tail, receiving the anal fin ; body in part spiny.

The height of the body contained four times in the total length of the fish, and the breadth four and a half in the same ; head contained three times and two-thirds in the above ; eye three times and a half in the length of the head ; the nostrils are situated just in front of the line from the anterior parts of the eyes, and they are placed from these organs at a distance equal to one-half the diameter of the orbit. Snout rather obtuse, this being nearer to its extremity than to the gill opening. Two rooted minute spines cover the upper part of the head and the back up to near the end of the pectorals where they terminate in forming a triangle. The front part of the head and cheeks are smooth ; the spines beginning behind the nostrils ; the space between the end of the spiny part and the base of the dorsal is equal to two-thirds the length of the head ; the throat and belly are covered with small spines and pores. The dorsal begins at a point equally distant from the extremity of the snout and the end of the

caudal; it is rather long, and formed of eleven rays, the first of which is short. The tail is nearly equal in length to the breadth of the back; it is truncated, and formed of nine rays with a few shorter ones on the side; it is considerably longer than the distance that separates it from the dorsal; the anal is inserted below the dorsal, and extends a little further backwards. It is received in a rather deep longitudinal cavity of the tail, which only extends to its length; it is formed of six rays; the pectorals are large, almost square, of eighteen rays.

After having been in liquor, it appears to have been yellow, with the upper parts of a slaty blue; fins yellow. It presents no trace of spots whatever.

Length three and a half inches.

Port Darwin. Dedicated to the greatest naturalist of the age.

ELLERYA.

The extraordinary little fish on which I propose forming this genus, presents an assemblage of characters such as to leave me in complete uncertainty as to the family to which it belongs; the complete absence of spines to its fins places it amongst the *Anacanthini*, but its general form does not allow it to be placed in any of the natural group this order contains.

The general appearance is something like that of some *Coryphœna* but shorter; its form is very compressed, oval, and almost truncated in front; the upper part of the head is very convex; the mouth saillant, and the lower part forming a chin; the teeth are small, numerous, sharp, and on one series on each jaw; the eye is of moderate size; the opercular pieces simple; the body naked, finely puncturated, with the muscular flaxes well-marked; the dorsal is unic; the caudal rather large, rounded; the anal well developed; the ventrals placed a little behind the insertion of the pectorals.

ELLERYA UNICOLOR.

Height of body the greatest over the insertion of the pectorals, where it is contained a little over twice in the length

up to the insertion of the caudal, or twice and two-thirds to the end of this fin ; the head is a little over one quarter of this last dimension, and the eye is four times in the length of the head ; the forehead is very convex, and protruding a little in front of the eyes ; the profile is convex, and the nasal bone forms a rather sharp point ; the membrane which unites the maxillary to it is very apparent and stops considerably backwards ; the cleft of the mouth is very oblique, and the maxillaries extend to the perpendicular from the posterior edge of the orbit ; the lower jaw is about of the same length as the upper one, or very slightly shorter ; the profile under the mouth becomes strongly concave, and then protrudes a little obliquely, to form a sort of chin ; the lower profile extends to the ventrals in a rather convex way. The upper profile presents a little notch over the eye, and then extends to the back, in forming a rather concave line, with a feeble bump over the end of the operculum ; the highest part is over the lower part of the insertion of the pectorals ; the præoperculum is rounded, and is marked with feeble radiated striæ ; the operculum is also rounded ; the branchial aperture is broad, and extends to the length of the base of the pectorals, but not below : the lower edge of this opening is longitudinally striated ; there are no scales on the head nor on the body ; the skin is finely punctured ; the lateral line is elevated, at its base, up to near the end of the pectorals, and from thence it is marked by a depression to the end of the tail ; there are two other lines almost parallel to it, one on the back and the other below ; the muscular flaxes are very apparent ; the dorsal is unic ; it is inserted a little in front of the base of the pectorals on the dorsal bump I have mentioned ; it is formed of sixteen rather strong rays, the two first seem rather detached from the others in my specimen (but this may be the effect of dessication) ; it is higher at its posterior part than at its anterior one ; the caudal is as long as the head, subtruncated, or rather rounded at its extremity. The angle is high ; the front rays rather longer than the last ; the first a little shorter than the others ; the ventrals small, of five

multiradiated rays ; pectorals large, having, at least, one and a-half the length of the ventrals, of seventeen rays.

The colour, after dessication, is of a light reddish brown ; the specimen I have seen is only an inch and a half long, and was found by a member of the Victorian Eclipse Expedition, at about half a mile from Eclipse Island, Cape Sidmouth.

I have dedicated the genus to Mr. Ellery, the learned Government Astronomer of Melbourne, who was the director of the expedition during which the specimen was found.

CONTRIBUTION

TO THE

ICHTHYOLOGY OF AUSTRALIA.

VI.—NOTES ON FISHES FROM KNOB ISLAND.

The following species were contained in a small bottle purchased from a sailor, who said they came from Nob or Knob Island, in the north of Australia. I am unable to find out where this is situated, but I am inclined to believe that it may be one of the numerous islands of Torres Straits, as the sorts have a decided tropical appearance.

NEOMYRIPRISTIS.

This genus, by its large eyes, its opercular bones serrated; its spiny operculum, its præopercular without a spine; its large scales; its two dorsals scarcely united; its ventrals with seven rays; its forked caudal, and its four spines at the anal, comes very near to *Myripristis*, but its dentition is different, being composed of a simple series of small, sharp, arched teeth on each jaw; it has also transverse series of sharp teeth on the vomer and palatines.

The snout is prominent and like gibbous, which gives it a singular appearance; the upper part of the head presents the singular sculptures which are also observable in *Myripristis* and *Holocentrum*; they are formed of ridges which have on the top of the head the form of a very long quadrilater; behind this, on each side, there is a bunch of ridges which are disposed in a radiated and rather palmated way; over the

orbit other ridges are apparent, they form an angle a little in front of the centre of the eye, and then are directed obliquely to the anterior end of the above-mentioned quadrilater.

NEOMYRIPRISTIS AMÆNUS.

Height three times in total length; head three and two-thirds in same; eye twice and one-third in the length of the head; the general profile is oval, but the one of the anterior part of the head is very convex and the snout protrudes considerably over the mouth; the lower jaw is rather longer than the upper one; the maxillary is striated and extends to the perpendicular from the centre of the orbit; the infraorbital is serrated; the præoperculum is very strongly serrated, as is also the operculum, which has a rather long spine, below which are two shorter ones, and over the long spine is a rather deep indentiture or deep cut, surmounted by a spine of moderate length; the lateral line extends all along the back, at a little less than one-fourth the height of the body; it runs over thirty-five series of scales, which are all very strongly serrated; on the transverse line the scales number nine, on the middle of the fourth runs the lateral, forming a ridge on each.

The dorsal fin is formed of ten spines; the first is about one-third shorter than the second, which is the longest; the others go gradually in, decreasing; the second dorsal is almost united with the first; it has a rather long spine and fifteen rays; this fin is about as long as the highest spines. Caudal with nineteen rays; anal formed of four spines and fourteen rays; the first spine is very short, the second more than twice as long, the third very broad, straight, nearly three times as long as the precedent; the fourth not quite so long and much more slender; the ventrals have a rather long, slender, and arched spine and seven rays; they are placed a little behind the pectorals, and are longer than them. Pectorals of fourteen rays.

This little fish must have been very brilliant; after preservation in liquor, it is of a golden shiny colour, with the back grey; the head and fins of a bright yellow; the spines of

the first dorsal are rather obscure. I have several specimens which measure about two inches and a quarter.

PRIACANTHUS BLEEKERI.

Form oval, very compressed; the anus is placed nearer to the extremity of the snout than to the base of the caudal. Height of body two and eight-tenths times in the total length; head three times and a quarter in the same; eye twice in the length of the head; lower jaw much longer than the upper one, and forming a prominent chin; maxillaries extending a little further than over the first third of the orbit; body and head entirely covered with very minute and rough scales; præoperculum serrated and armed with a very strong acute spine at its lower angle; this spine extends further backwards than the margin of the operculum, and this is serrated on its inferior part, and forms a strong angle over the insertion of the pectoral. The lateral line follows the profile of the back, and is formed by a succession of rather larger and keeled scales. Dorsal with ten spines; the first is much shorter than the second, and this a little more so than the third, which is the longest, and from thence, the others go gradually decreasing in height; they are all very finely barbed on their margins. The soft rays number eleven, and are longer than the last spines; caudal rounded, of seventeen rays (in counting one strong but shorter one on each side) and of several small ones. Anal formed of three strong spines, these are arched and nearly equal in length, the last being somewhat the longest and broadest; the first and third are striated and barbed; the rays number thirteen and are similar to the dorsal ones.

The ventrals are very large, composed of a strong crenulated spine and of five rays; this fin extends over the base of the first of the free spines I mentioned. The pectorals are small, formed of two single spine-like rays, the first of which is short and of fifteen rays; the dorsal and anal are received in a deep sheath of the back; the teeth are viliform and very small on the upper jaw; on the lower one they are larger, conical, disposed on one series and rather far apart, one from the other.

The colour is uniform, of a golden hue, with the membranes of the spiny dorsal obscure; anal and ventrals also obscure. In the living state it was probably very beautiful and perhaps scarlet.

The specimen is three and a quarter inches long.

By its long præopercular spine, this sort must come near *Priacanthus Holocentrum*, of Bleeker.

NEOCIRRHITES.

Very nearly allied to *Cirrhites*, but having palatine teeth and the præoperculum armed with spines. These characters bring it near Dr. Bleeker's genus *Cirrhitichthys*, but it has canines only at the lower jaw, and none on the upper one, and its viliform teeth even are only visible in front.

The lower jaw is crowded with small sharp viliform teeth, and presents strong canines, curbed backwards; they are placed far apart one from the other, one on each side in front, and two backwards.

The lower rays of the pectorals are simple and few.

In following strictly the method, this fish, by its armed præoperculum and its palatine and vomer teeth, ought to be put with the *Percidæ*, but its natural place is evidently with *Cirrhites*.

NEOCIRRHITES ARMATUS.

Form broad, oval, compressed, upper profile equally and very strongly convex; height a little over twice and a third in the total length of the fish; head four times in the same; eye twice and a half in the length of the head; upper jaw a little longer than the lower one; lips thick; cheeks covered with very minute scales; præoperculum with its edge rounded and armed with a series of rather long spines, which do not extend to the lower portion; operculum covered with large scales similar to those of the body; it is entire, but has a strong notch superiorly, and is considerably advanced over the base of the pectorals; the suprascapula is serrated; the body is covered with rather large scales; these are entire on their edge, and number forty-three on the longitudinal line and

sixteen on the transverse one; the lateral line which passes over the seventh extends regularly to the base of caudal; the dorsal has ten strong spines of about equal length, except the first, which is much shorter than the others, and thirteen rays; the caudal is not complete, but appears rounded; it has fifteen long rays and several small ones on each side; the anal has three strong spines, the first is the shortest and the second the longest; but the third is nearly equal to the last; the ventrals are well developed and have one rather long spine and five rays; the pectorals are large; they have nine branched rays and six simple ones; these are thick and longer than the others; they extend as far as the extremity of the ventrals; the dorsal is received in a scaly sheath of the back, in which the spines lay alternately, forming two rows.

The general colour is of a light yellowish brown, with the back darker; the only specimen is two inches long.

SPHYRŒNA COMMERSONII.

Syphrœna Commersonii, *Cuv. and Val.*, vol. iii., p. 352.

Young specimen four inches long.

CARANX VALENCIENNEI.

The præoperculum is very lightly serrated, which would place this sort in the genus *Carangichthys*, but this character being so feebly marked, and only visible on the membranous part, I consider it advisable to leave it in *Caranx*, and it then has to be placed with those which have none of the rays detached from the rest of the fins, neither at the dorsal or at the anal; the first dorsal developed, and none of the rays elongate; teeth on the palate, those on the jaws small, on a viliform band, with an outer series of external longer ones; height of body more than one-fourth of the total length; it would thus be a *Caranx* for Dr. Bleeker, but differs from most of the known sorts by the greater height of the body, and its short maxillaries.

The height of the body is contained twice and two-thirds in the total length; the head three times and two-thirds in

the same; the orbit three times and three-fourths in the length of the head; the snout is a little longer than the diameter of the orbit; the lower jaw is longer than the upper one; the maxillaries are far from extending to the vertical of the anterior margin of the eye. The lateral line curbs behind the pectorals, and its arched portion is contained once and two-thirds in the straight one; the carinated plates of which it is formed on this part go increasing in height to the base of the tail, and then grow smaller to the end; the body is covered with minute scales, which extend on the breast. The first dorsal is received in a sheath of the back, it is formed of eight rays; the second dorsal is composed of a spine and twenty-three rays; the caudal of eighteen long rays and eight or nine shorter ones on each side; the anal has two front detached short spines, forming a short fin; the anal proper is composed of one spine and twenty rays; the pectoral is nearly as long as the head, arched, and formed of sixteen rays.

The straight portion of the lateral line is formed of about forty-six shields; the greatest height of the body is just behind the two detached spines of the anal; on each side of the tail, near the base of the caudal, there is a short oblique ridge.

The colour is (in spirits) entirely gilt, with the upper parts of a light blue; no spot on the operculum; fins of a bright yellow. I have several specimens, the largest is not quite four and a half inches long.

Dr. Gunther has in several places changed names of species dedicated to the celebrated French Ichthyologist in *Valensiennesii*, but this is not only useless but disfigures entirely the name, as the terminal *s* is not pronounced in French.

Nota.—This sort comes very near to *Caranx Lepturus* of Agassix, in *Spix. Pisc. Bras.*, p. 106, pl. lvi., *b*, fig. 2, and only seems to differ from it by the maxillaries, which are much shorter in my new sort, and the ventrals, which are represented in the plate as inserted more forward.

ACRONURUS FORMOSUS.

The genus *Acronurus* of Gunther is particularly distinguished from *Acanthurus*, by the absence of scales, and by the skin of the body being covered with very fine vertical strię.

The four known sorts included in this division are all from the Indian Ocean; several of the species present the same disposition of colours we have to record here, but the proportions of the body do not allow this species to be placed with either, except *Melanurus*, of which it is easily distinguishable.

Height of body being three-fifths of the length without the caudal fin, or once and eight-tenths of the total length. The head is contained three times and one-third in the same, and the eye twice and two-thirds in the head.

The body is very compressed, forming a broad oval; the anterior profile of the head is convex; the crest over the orbit is serrated; the lateral line is elevated, forming a ridge sinuous and curbed strongly downwards towards the end on the dorsal, to arch a little over the caudal spine; it extends to the base of the caudal in running a little lower than the middle of the tail; on this last part the fine transverse ridges take the form of regular scales; the movable spine is rather arched.

The dorsal has nine spines, the first of which is short and the second much broader than all the others, and sulcated in the middle; they are all of about the same length except the first; the soft rays number thirty; the caudal is bifurcated; it is formed of sixteen long rays and of several short ones on each side; the anal is formed of three spines and of twenty-seven rays; the first spine is large, broad, and arched, and presents the same sulcated appearance as the second of the dorsal. The ventrals have a strong spine and six rays; the pectorals are as long as the head, formed of one very short and of another long simple ray and of fourteen branched ones.

The colour, after preservation in spirits, is of a fine reddish brown; with all the anterior part, comprising the head and all the portion extending to behind the insertion of the pectorals, of a fine golden colour; the fins are similar; the

caudal of the general colour of the body, with its sides golden; on the back there are four series of large rounded black blotches.

I have five specimens, the largest of which is two and a half inches long; on the smaller specimens one inch long; the anterior part of the head and body are brown, and the black blotches of the body are not visible.

This sort must be very nearly allied to *Acanthurus Orbicularis*, Cuv. and Val., but the proportions of the body are different; the caudal of their species is truncated, and the lateral line is described as impressed.

AULOSTOMA CHINENSE.

Fistularia Chinensis, *Bloch*, pl. 388.

Aulostomus Chinensis, *Lacép.*, v., p. 357.

Aulostoma Chinense, *Schleg.*, *Richard.*, *Gunther*.

The head, from the anterior edge of the eye to the end of the operculum, is contained a little over twice in the space from that edge to the end of the snout; the lateral line is formed of a rather irregular interrupted ridge. The colour is uniformly brown without any spots; there is a barbel at the end of the maxillary, and another on the chin; this is very convex.

I have searched very minutely for teeth, but cannot find any. I am not certain that this sort is the one figured by Bloch.

Several specimens from six to seven inches long.

FISTULARIA SERRATA.

Fistularia Serrata, *Cuv. Règne Animal*, vol. ii., p. 267.

——— ——— *Gunther*, *Cat.*, vol. iii., p. 533.

——— Tabaccaria, *White*, *New South Wales*, p. 296, fig. 2.

———Immaculata, *Cuv. Règne Animal*, vol. xi., p. 267.

Two specimens of this curious fish are in the collection; they have both lost the posterior part of their body, and have

evidently been taken out of the stomach of some voracious sort. The length of the snout, up to the anterior margin of the eye, contains three times and a third the one from that margin to the end of the operculum.

SCOPELUS CUVIERI.

This sort would come in the division having the anal fin with more rays than the dorsal; eye more than one-third the length of the head; no spine over the orbit; scales denticulated (subgenus *Dasyscopelus*, Gunther); it appears to differ from the two species included in this division, by the greater length of the pectorals, but comes very near to Dr. Richardson's *Myctophum Asper* (*Scopelus Asper* Valenciennes).

Height of body contained three times and eight-tenths in the total length; head four times in the same; eye twice in the length of the head.

The highest part of the body is just behind the insertion of the pectorals; the profile of the anterior part is very convex; the nostrils are large and inflated; the lower jaw is longer than the upper one; the teeth are numerous and viliform; the maxillaries are very long and almost reach the end of the præoperculum; they are slender, but become gradually rather broader behind, where they are rounded, and end rather obliquely; the eye is very large; the scales are very strongly ciliated on their margin; very large ones extend over the two operculums; on the lateral line they are very broad, and number forty or forty-one. These scales have a short ridge on their anterior part, but those on the anterior portion of the body present only a very faint trace of it.

The dorsal is placed considerably nearer to the snout than to the base of the caudal; it is formed of two short spines and of ten rays; the first spine is much shorter than the second; the caudal is strongly forked, and has nineteen long rays and several short ones on each side; the anal has two short spines and seventeen rays; the ventrals have eight rays; the pectorals are twice as long as the ventrals and extend backwards as far as these do; they have seventeen rays.

The ventrals are placed rather in advance of the dorsal, and the anal behind the end of it. The adipose is broad, arched, pointed, and placed above the end of the anal; towards the middle of the spine, between the anal and the root of the caudal, two sharp spines are seen on the lower profile.

The general colour of the specimens which have been in spirits is of a dark brown where the scales have fallen, which takes place very easily, but where they exist, it is of a most brilliant irridated silver; the fins are of a bright yellow.

I have two specimens which both measure about three inches.

BALISTES GARNOTI.

Enters in Dr. Gunther's division characterised by "the free portion of the tail compressed; teeth white, uneven, deeply notched; no groove in front of the eyes, of a protruded sort; species inhabiting China, Japan, India, the Cape of Good Hope, the Western coast of Africa, the West Indies, and appearing occasionally on the British coast."

The form is short and high; the height of the body is contained twice in the total length of the fish; the head is twice and eight-tenths in the same; the eye three times in the head.

The anterior profile of the head is almost straight, very little concave; it is entirely covered with the same scales as the body; these are rough and armed with minute points; the back is strongly convex; the first dorsal is inserted behind the orbit and very little in advance of the base of the pectoral; its spine is strong and straight, and is a little over one-half the height of the body; it presents in front a double series of broad, compressed, bifide spinulets; it is sharp at its extremity, and has a deep longitudinal groove on its posterior surface; on this side also it presents on each side a series of blunt spinulets, which run obliquely downwards and join the anterior series; the space behind the posterior series is covered with longitudinal striæ; the second dorsal spine is a little over one-third of the first, and is joined to

it by a membrane about as high as it is itself; the third spine is very short and wide apart, being placed from the second at a distance equal to the diameter of the orbit; it is joined to the precedent spine by a very low membrane; the second dorsal is rather high, triangular, and formed of twenty-two rays; the caudal is as long as the snout, rounded at its extremity, formed of twelve rays, several of which are much thicker than the others; anal of the same form as the second dorsal, of nineteen rays; the pectorals are formed of fifteen rays; the pelvic bone is covered with very strong irregular spinulets, and is ended by a similar ventral spine.

The colour is of a light yellowish brown, darker on the back; this part presents faint traces of annular spots; the base of the second dorsal has also traces of brown spots, and at the base of the anal there are one or two very irregular obscure blotches; on each side there is a very faint brown line, which bifurcates itself towards the middle of the body in two oblique branches, one running to the posterior edge of the dorsal, and the other to the one of the anal; the fins are of a bright yellow.

My unique specimen is only one and a half inches long, and I should have hesitated to establish a species on probably such a young fish, if it had not presented so well defined characters; it is probable that the very faint traces of spots that it presents change with age.

The disposition of the dorsal spine is very much like those of *B. Azureus*, Lesson (*Voyage de la Coquille, Zool.*, pl. 10, fig. 2) that Dr. Gunther unites with several other sorts, to obtain the result he so much seeks for.

MONACANTHUS BRUNNEUS.

Enters in division characterised by: anal fin with less than forty rays; dorsal spine with only two series of barbs, which point backwards; ventral spine anchylosed to the pelvic bone.

Height contained twice and one-third in the total length; head three times and two-thirds in same; eye three times in length of head; body rather elongate, covered entirely with

very fine spines, which give it a velvety appearance. No particular spines on the tail; snout rather concave in its upper profile; teeth triangular; at the upper jaw the lateral ones almost as long as the front ones, but at the lower jaw these are much larger, triangular, and rather arched; on the side of these is only one broad one on each side, which is pointed in front and rounded behind, and has a bifide appearance; the space between the two dorsals is convex.

The dorsal spine is broken in my specimen; it is inserted over the first third of the orbit, it is stout, covered with fine tubercules closely placed one to the other on longitudinal lines, and has on its posterior edge two series of tuburculous, short, thick, conical spines, which, towards the base, extend to the middle of the breadth of the spine; the second ray is very visible; the dorsal begins at the height of the ventral spine, it is formed of thirty-five rays. Caudal about two-thirds as long as the snout, rounded at its extremity, of seven strong rays; anal beginning behind the dorsal, of twenty-seven rays; it has, as is also the case with the dorsal, its broadest part of about one-fourth of its length; pectorals of fifteen rays; they have once and a half the length of the orbit.

The ventral spine is formed of a small knob of spinules, with a few longer ones on the sides, and four still much longer ones directed obliquely, two forwards and two backwards.

General colour of a chocolate brown; caudal similar, with its posterior margin white; dorsal and anal pink; pectorals of a light brown.

Length of specimen three inches and a half.

CONTRIBUTION

TO THE

ICHTHYOLOGY OF AUSTRALIA.

No. VII.—FISHES OF NEW CALEDONIA.

The animals of New Caledonia are generally very distinct from those of Australia, but I thought it might be useful to give here the little information I have been able to obtain on the fishes of that region, as it is probable that under particular circumstances, most of them may be driven on the opposite coast of Queensland. All my knowledge of the ichthyology of this island is due to a collection that Mr. Adet, the French merchant of this city, was kind enough to make for me during a sojourn of a few months at Noumea.

CHRYSOPHRYS NOVÆ CALEDONIÆ.

It is with some doubt that I separate under that name, the specimen I have under my eyes, from the *Sp. Berda*, of Forskal and Ruppel, which has only, till this time, been found in the Red Sea. Dr. Gunther has proved that it is by mistake that Cuvier and Valenciennes included this sort with the *Sparus Hasta* of Bloch, which is found all over the Indian Sea.

The figure given by Ruppel applies perfectly with my sort, with the exception of the opercular spine, which is not marked on it, and the anal, which is shorter ; the number of the anal rays seems also different.

The height is contained a little over twice and a quarter in the length to the central end of the caudal, or rather more than twice without that fin ; the head is three times and two-thirds in the last distance ; the eye is three times and two-thirds in the length of the head ; the snout has once and a

half the length of the orbit; the upper profile is very, and almost regularly, convex; the cheeks have five series of scales, and the operculum the same number; this last has a well-marked point; the lateral line runs over forty-seven scales, and is not visible on the very small ones of the end of the tail; the transverse line has eighteen scales; the lateral line passing over the sixth.

The dorsal has eleven spines and as many rays; the spines are thick and inflated on their back edge; the first is short; the second about twice as long; the third a little longer and the fourth the longest of all, and equal to one-half the length of the head; the caudal is rather deeply forked, of seventeen long rays; the anal has three spines and eight rays; the first spine is very short, the second four times as long, and considerably longer than the fourth dorsal; the third is very strong, almost straight, about one-fourth shorter than the second and not quite as long as the rays; it is contained once and a half in the length of the head; the ventrals are large and extend to the snout; the pectorals are long and have nearly once and one-third the length of the head, they are pointed and formed of sixteen rays.

The total length is nine inches, and the colour uniform silvery, with the outer part of the dorsal, caudal, anal, and ventrals more obscure.

DIACOPUS ADETII.

The genus *Diacopus* of Cuvier is easily recognised amongst the *Percidæ*, by the deep notch of the lower part of the præoperculum, which receives a strong tubercule of the interoperculum; these fish have the general appearance of *Sparidæ*. The name of the genus has been changed by Dr. Gunther into *Genyoroge*, employed by Dr. Cantor for one of its sorts, but all other authors have adopted the name given by the great French naturalist.

The sort I here describe appears very distinct from the three or four others which have eleven spines at the anal, and which are all adorned with bands or stripes, which this does not possess.

Height of body three times and one-third in total length of the fish, or three times without the caudal; head twice and six-eighths in the same dimension; eye four times and a half in the length of the head.

The upper profile is very convex, with the head attenuated; the lower profile almost straight; the teeth are in small number, far apart one from the other; there is on the upper jaw, and in front a rather strong canine, on each side; the lower jaw is longer than the upper one; its teeth are larger behind than in front; the head is generally naked, but there are four series of scales on the sides of the cheeks, and more on their lower part; the præoperculum is finely serrated backwards, but not at its lower edge; the notch is considerable; the operculum terminates by an angular flat spine; it has eight series of scales on its greatest breadth.

The body is compressed; the lateral line runs regularly to the base of the caudal; it extends over about sixty-six transverse lines of scales, without counting a few more very indistinct ones at the base of the caudal; the transverse series number about thirty-four; the lateral line passing over the tenth.

The dorsal fin is formed of eleven spines, of which the first is the shortest, the second nearly twice as long, the fourth, fifth, and sixth the longest, and about equal; the others grow shorter as they go backwards; the soft dorsal is formed of fifteen rays; the caudal is strongly emarginated, of seventeen rays, which, except the central ones, are covered with minute scales. Anal with three spines; the first short; the second twice and a-half as long; the third is nearly as long as the second, but much more slender; the soft part is formed of eight rays, and this part, as is also the case with the similar portion of the dorsal, has its base covered with minute scales; the pectorals are rather large, with their spine long and slender; the pectorals extends much further back than the ventrals; they are very pointed and formed of seventeen rays.

The general colour is of a beautiful red pink, with the head of a lighter tinge; a sulphur yellow stripe runs from the anterior margin of the eye towards the mouth; the same

colour extends round the orbit; a rather broad longitudinal stripe extends from the operculum to the base of the caudal, below the lateral line it is of a beautiful yellow; on the sides and on a part of the back the scales have a black margin, which gives an obscure colour to these parts; the fins appear to have been of a beautiful scarlet colour.

Length of my largest specimen thirteen inches; the black colour of the margin of some of the body scales seems subject to considerable variation in extent and place. In one specimen there are two canines on one side of the upper jaw, and only one on the other.

This beautiful fish seems to be common.

SILLAGO CILIATA?

Sillago Ciliata, *Cuv. and Val.*, vol. iii., p. 415; *Règne An. Illustré, Poissons*, pl. 13.

Height of the body five and two-thirds in the total length (to the end of the centre of the caudal); head three and a-half times in the same; eye five times in the head; the space between the eyes nearly twice in the snout; teeth numerous, viliform, extending on the palatines; snout, up to the nostril, forming one-half of the space to the end of the præoperculum; the edge of this is crenulated; the scales of the body number sixty-three on the longitudinal line from the operculum, and sixteen on the transverse one; the lateral line running over the sixth; these scales are very finely ciliated at their edge; the first dorsal has nine spines, the first of which is stronger, but rather shorter than the following; the second dorsal is formed of one spine and seventeen rays; this fin is in great part covered by minute scales; the caudal is strongly emarginated, of sixteen long rays and several shorter ones on each side; the rays are scaly in the two first thirds of their length; the anal is formed of two spines and sixteen rays; it bears no scales; the ventrals have a rather long and slender spine and five rays, the first of which is rather filamentous; the pectorals are rather longer than the space from the end of the snout to the anterior edge of the orbit; they are formed of seventeen rays.

The colour is white and silvery, with the upper parts darker and rather purple; there is no longitudinal streak on the sides; the fins are yellow, edged with black, with the exception of the anal and ventrals, which are entirely of a bright sulphur colour; the membranes of the second dorsal have oblique obscure streaks.

Length of my largest specimens from eleven to twelve inches.

It is only with some doubt that I consider this fish to belong to *S. Ciliata*, as it has no appearance of a longitudinal streak. If on comparison it was found different, I would propose for it the name of *Insularis*.

EQUULA CABALLA.

Centrogaster Equula, *Lin. Gm.*, 1337.

Cæsio Equulus, *Lacép.* iii., 88, 90.

Equula Caballa, *Cuv. and Val.* x., p. 73.

Two specimens, eight inches long; silvery, with the back of a light blue; fins yellow; the axle of the pectorals obscure.

ECHENEIS NAUCRATES.

Echeneis Naucrates, *Lin. Sys., Nat.* i., p. 446.

The disk has twenty-five laminæ, and is contained four times and a-half in the total length; dorsal with thirty-nine rays, and anal with thirty-eight; caudal rather strongly bilobed; the lower lobe much larger than the upper one; pectorals nearly as long as the head

Length twenty-three inches and a-half.

TEUTHYS CONCATENATUS.

Amphacanthus Concatenatus, *Cuv. and Val.*, vol. x., p. 127.

Height of body twice and one-third to the central edge of the caudal, or a little over twice in the length without this fin; head four times in the first of these measurements; eye three times and a quarter in the length of the head, and once and two-thirds in the distance from the end of the caudal to

the anterior edge of the orbit. Upper profile very convex, falling over the head and convex again on this part; the cheeks covered with small scales; the operculum with transverse and rather radiate striæ; the caudal strongly emarginated; pectorals not attaining as far backwards as the ventrals, of seventeen rays.

The general colour is of a light blue; on the head there are, on each side, several broad, oblique, yellow stripes; the body is entirely covered with similar vermicular ones; they are broader than the ground spaces left between them; on the back they are more irregular, and have generally an oblique direction; on the sides they are flexuous and longitudinal; on the lower parts of the body they are more apart, and form very interrupted lines or rather longitudinal series of oblong blotches. All these lines have a darker border; the spinous part of the dorsal and of the anal and also the ventrals are irregularly marbled with yellow, but the soft parts of these fins have transverse series of small yellow brown blotches; the pectorals are entirely of a light greyish yellow.

TEUTHYS PUNCTATUS.

Amphacanthus Punctatus, *Bloch. Sch.*, p. 210, 6.

Harpurus Inermis, *Forster*, MS. iv., 3.

This sort appears to come very near to *Amphacanthus Sutor* of Cuvier and Valenciennes; in fact, the few words that Dr. Gunther says on this sort in his Catalogue, applies entirely to it: "The height of the body is more than one-third of the total length, brown, minutely dotted all over with whitish;" but in the original work of the French naturalists I find (vol. x., p. 148) that the head is contained near six times in the total length, and this cannot agree with the present species, but seems to agree with the *Punctatus* of Bloch, which was brought by Forster from New Caledonia.

The height is contained twice and a-half in the length without the caudal fin, or twice and three-fourths with it; the head is four times in the length to the base of the caudal;

the eye a little over twice and a-half in the head ; the form is oval, the two profiles being almost equally convex.

The dorsal is, as usual in the genus, formed of thirteen spines, without the one directed forwards, and ten rays ; the caudal is very strongly emarginated, of sixteen long rays and several shorter on each side ; the anal of seven spines and nine rays ; the ventrals have two spines and two soft rays ; the first and last being spines, and the three central ones only rays. In one specimen, one of the pectorals has three spines and only two rays ; the pectorals are twice as long as the orbit and have fifteen rays.

The colour is of a silvery grey, with the lower parts almost white ; the head and body are entirely covered with round white spots (which may have been blue on the living specimens); they are very numerous, and on an average the distance from centre to centre is equal to one-half the one from the posterior edge of the eye to the one of the præoperculum; traces of these spots are also seen on the fins, which are of the general colour ; the rays are marbled with dark grey and white.

Length six inches and a-half.

Very common.

Bloch's (Schneid.) description agrees well with this sort, with the exception of the words *Cauda Carinata*, but this appearance may have beeen due to the mode of preserving the specimen.

Dr. Gunther thinks that Forster's fish is the same as *Nebulosa* of Quoy and Gaimard (Uranie), but this cannot be the case if it is, as I believe, the sort I here describe.

MUGIL NEOCALEDONICUS.

Height four and a-half times in the total length, or four times in the same without the caudal; head equal to the height; eye five times in the length of the head ; space between the eyes contained twice in the length of the head.

Head very broad, rounded in front ; eye without an adipose membrane ; lips very thick ; the upper one as broad as two-

thirds the diameter of the eye; the longitudinal line running over about forty-four scales (the last being difficult to count) and the transverse one fifteen; these scales are finely striated and ciliated on the edge; they have a longitudinal ridge which does not extend to the end; these ridges, by their union, form longitudinal lines on the body. The first dorsal is formed of four spines, it is inserted at an equal distance to the end of the snout and to the lateral base of the caudal. The spine is as long as the space between the posterior margin of the eye and the end of the operculum; the second dorsal has one spine and eight rays; the space between the base of the two dorsals is rather more considerable than the length of the head; the caudal is very strongly bifurcated; the lobes being very pointed; it has fourteen long rays and several short ones on each side; anal inserted rather behind the second dorsal, of three spines and nine rays; the ventrals are rather large; the pectorals not quite as long as the head, and extend to near the vertical from the origin of the first dorsal, of sixteen rays.

The colour is white, silvery, with the upper parts grey; the caudal is bordered laterally with slate colour; the dorsal is grey; the anal and ventrals white; the pectorals yellow, with the base of their external edge dark.

Length sixteen inches.

This sort is nearly allied to *M. Waigiensis*, but the thick lip, the deeply bifurcated caudal, and the colour of the pectorals distinguish it at once.

The anterior part of the head is without scales; there are twenty-one of these before the first dorsal.

GERRES GIGAS.

Gerres Gigas, *Gunth. Catal.*, vol. iv., p. 263.

I think there is very little doubt that this is the *Gigas* of Dr. Gunther, his specimens were from the Tonga Islands, but as mine shows some slight differences, I will give a succinct description of it.

Height of the body contained twice and a-half in the length without the caudal, or a little over three times to the end of

this fin ; head three times and a-half in the first of these dimensions ; eye three times and eight-tenths in the length of the head.

The snout is considerably produced, and is, up to the nostril, a little longer than the diameter of the eye ; the maxillary bone extends further than the anterior edge of the eye ; the upper front part of the head is naked ; the cheeks have three series of scales ; the operculum is slightly bilobed behind, and has five series of scales ; the highest part of the body is at the insertion of the dorsal ; the scales are rather angulous on their edge, they number about forty-eight on the longitudinal line and nineteen on the transverse one ; the lateral line passes over the seventh.

The dorsal is formed of nine spines and ten rays ; the first spine is very short, the second much longer than all the others, and equal in length to the distance from the anterior edge of the orbit to the end of the operculum ; the caudal is considerably longer than the head, it is very deeply forked, and formed of fifteen long rays with other short ones at the base ; the anal and the dorsal are received in a deep scaly sheath ; it is formed of three spines and eight rays ; the first spine is very short, the second eight times longer, and the third nearly as long as the precedent, but not so thick ; this second spine is more slender than the second of the dorsal, and is less than two-thirds of its length ; the ventrals are rather large and inserted behind the pectorals, they are as long as the head, of sixteen rays ; they are at least as long as one-fourth of the total length to the extremity of the caudal.

The colour is white and silvery ; the upper parts have a bluish tinge ; the dorsal and caudal have an obscure edge.

The total length is over fourteen inches.

NEOSUDIS.

Body very elongate ; height eight and a-half times in the total length ; head six times and one-third in the same ; eye four and two-thirds in the head ; body compressed, very elongate, sharp below ; head also compressed ; the lower jaw con-

siderably longer than the upper one; chin salient and rounded; teeth strong, slender, almost straight, apart one from the other; those of the upper jaw much shorter than those of the mandible, with the exception of the two front ones, which are often unequal in length and directed obliquely forwards; the lower teeth are very long, pointed, directed backwards. The opening of the mouth is superior, and the maxillaries extend further than the edge of the eye; eyes covered by a veil; the operculum rounded; upper surface of the head depressed between the eyes, with three longitudinal ridges, the central one abbreviated; body covered with minute scales; dorsal unique inserted very considerably behind the middle of the body, and at about two-thirds of its length; this fin is about two-thirds of the length of the head; it has sixteen rays, the posterior ones and the base of the others are covered with scales, and the fin has an adipose appearance; the caudal is very deeply forked, formed of twenty long rays and of a considerable number of shorter ones on each side; anal inserted a little behind the beginning of the dorsal, and over twice as long as this; it is covered in great part by scales, and the rays are difficult to count, numbering twenty-six to twenty-eight; the anterior rays are considerably longer than the others. Ventrals very small, of about one-fifth the length of the pectorals, placed a little nearer to the base of the pectorals than to that of the anal, and formed of eight stiff rays; the lower ones formed of a sort of broad lamina, which is also the case with the dorsal and anal; pectorals situated near the lower edge of the operculum, of fourteen rays; they are nearly as long as two-thirds of the head.

I can only place this remarkable fish with the *Scopelidæ*, and its dorsal fin, placed on the posterior part of the body, would bring it near *Sudis*.

NEOSUDIS VORAX.

Silvery, with the upper parts of a dark slate colour; dorsal, ventrals, and anal, white; caudal rather yellow, bordered with black.

The largest of my specimens is over twenty-four inches in length.

Noumea, New Caledonia.

HEMIRHAMPHUS COMMERSONII.

Hemirhamphus Commersonii, *Cuv. and Val.*, vol. xix., p. 28.

The specimen is seventeen inches long. This sort has been found in the Red Sea, all along the east coast of Africa, and in the Indian Archipelago.

GASTEROTOKEUS BIACULEATUS.

Syngnathus Biaculeatus, *Bloch.*, pl. 121, fig. 1.

———————————— *Bl. Schn.*, pl. 107.

The absence of a caudal fin, the depressed body, the well developed pectorals and the long dorsal, places this genus very near *Stigmatophora*; its caudal slightly prehensible has caused it to be included in the group of *Hippocampina*, but it is much nearer allied to the *Syngnathidæ*.

The spine of the superciliary margin being bifide, I am not certain that the specimen belongs to the sort figured by Bloch.

The height of the body is contained nearly twice in its breadth; the snout, up to the nostrils, is only a little longer than the remaining portion of the head; it is compressed and has a longitudinal sulcate, which runs rather obliquely from its extremity to the centre of the anterior edge of the orbit; there is a short bifide spine over the orbit directed backwards, and a small bunch of three or four spines arms the posterior edge of the head, which is strongly granulated; the operculum has two longitudinal ridges, which unite in front, the space between them is longitudinally sulcated, but below them the sulcates are radiated. The suborbitor presents several blunt spines; the body becomes gradually very broad towards its centre; its section presents an irregular quadrilator, narrow on the back and very broad on the sides; the two upper ridges do not extend further than the dorsal, but the lower ones follow on the tail. There are eighteen body rings and

forty-four caudal ones; these rings are strongly and transversely striated and reticulated; on the lower surface there are two feeble longitudinal lines, which extend on the base of the tail; the body portion of this surface has its central part covered with broad, rounded, striated scales. The dorsal begins at the sixteenth body ring, and extends over the eleven following ones; it has about forty-six rays and the pectorals, twenty-three.

The general colour is of an olive green, with the edges of the body segments rather obscure.

The total length of the specimen is seven and a-half inches.

TETRODON GIGANTEUS.

No scutes forming a carapace; nasal organs very conspicuous; body broad; nasal opening single on each side; body smooth.

Head contained four times in total length; its breadth eight-tenths of its length; the upper jaw has on each side of its median suture a longitudinal depression; the nasal openings have each two short tentacles; the pectorals are large and have sixteen rays; the dorsal is in front of the anal and has nine rays; the anal seven; the caudal is long, being equal to the breadth of the head, subtruncate, of seven rays. The body is entirely smooth, except below the throat, where it is covered with short tubercules.

The general colour is of a dark green, with the lower part white; it is entirely covered with round white blotches; these are very numerous, and smaller on the back part of the fish than on the head; they cover the caudal; on the sides of the belly and the lower part of the head, the green colour extends in form of oblique transverse streaks; the fins are of a yellowish yellow; the pectorals and anal have a few white spots on their base.

Length of the specimen, twenty-one inches.

RAYA TRIGONOIDES.

Disc rhombic, smooth, broader than long; the anterior angle very obtuse, rounded; tail once and a-half as long as

the body, tapering and very slender at its end; no caudal; dorsal small, inserted a little nearer to the end of the tail than to its base; anal at least four times as long as the dorsal; a feeble longitudinal fold on each side of the tail, and a still feebler one on its upper part in front of the dorsal; ventrals entire, not marginated nor divided. The body is entirely smooth, and there is no spines on any part of the fish.

Entirely of a light brown lilac colour, with a few faint white oscillated spots on the disc, and a larger number of smaller black ones dispersed in a most irregular way; posterior part of the tail annulated, black and orange; lower side of the body entirely of a light cream colour.

Length of the body six inches., total length fourteen inches.

The anterior profile is something like the one of *Raya Asterias*, but still more blunt and rounded. The entire ventrals will not allow this sort to remain in the genus *Raya*, and brings it in with the *Trygon*; but the absence of a caudal spine does not allow it to be placed with this. If these views are adopted I propose calling this new genus *Neotrygon*. It would come, in the system, after *Sympterygia*.

CONTRIBUTION

TO THE

ICHTHYOLOGY OF AUSTRALIA.

No. VIII.—FISHES OF WESTERN AUSTRALIA.

The Rev. Mr. Bostock, the learned clergyman of Freemantle, has most kindly forwarded me a considerable number of the fishes that live in the part of Western Australia where he resides.

Mr. Bostock deserves the greatest praise for the zeal, activity, and intelligence that he has, for many years, shown to the cause of natural science, and all parts of zoology owe him much. The number of new insects and rare shells he has discovered is very considerable, and it will be seen that his ichthyological researches have been no less valuable.

EDELIA.

Seven branchiostigals; teeth, all similar, rather large, slender, arched, crowded on each jaw and on the palatine bones; no canine; two dorsals only continuous at the base; the first with seven spines; the anal with three; præoperculum smooth; operculum with two spines; scales rather large and rather adherent; lateral line interrupted.

This new genus of *Percidæ* comes near *Microperca*, and has the general form of *Psammoperca*. It has also some connection with *Ambasis*, but has no recumbent spine in front of the dorsal.

EDELIA VITTATA.

Form, oval; rather high; the height being contained three times in the length without the caudal; back, convex, but the anterior profile running almost straight to the snout; head rather pointed; lower jaw considerably longer than the upper one, which makes the cleft of the mouth oblique; all the parts of the head covered with rather large scales similar to those of the body; the head is contained a little less than three times in the length without the caudal; the præorbital is strongly serrated; the eye is equal to the snout and contained about three times and a-half in the length of the head; the præoperculum is rounded, and the operculum also; but this has two rather strong spines separated by an emargination; scales rather large, deciduous, numbering about thirty-two on the longitudinal line, and about fourteen on the transverse one; the dorsal is rather remote on the back; being inserted at a distance very nearly equal to the snout, and the insertion of the caudal fin; the spiny part is formed of seven strong spines; the first is the shortest; the second more than twice its length, strong, flat, curved and pointed; the others become shorter as they are inserted further on the back. The second portion of the dorsal is formed of one spine and of nine rays. These fins have the height of one-half the body; the tail is rather long; the caudal is long, rounded, and formed of sixteen long rays; the anal has the form of the second dorsal, and is composed of three strong spines, the first much shorter, and the two others nearly equal between themselves; the soft part is composed of seven rays; the ventrals are rather long, inserted below the pectorals; these are placed rather low on the body, and are formed of twelve rays. The lateral line follows the profile of the back, but stops a little before the end of the second dorsal; it begins again below, and follows to the centre of the insertion of the caudal. After having been preserved in liquor the colour is of an olive-green, with a broad, straight, longitudinal band of a fine red colour extending from the posterior part of the operculum, at the height of the eye, to the base of the caudal; below this the body is silvery, each scale being bordered

with olive; the belly is pink; the fins of the same olive-green as the head and body.

My largest specimen is two inches and eight-tenths long.

These very pretty fishes were found by the Rev. Mr. Bostock in the fresh waters of the interior of Western Australia.

EDELIA VIRIDIS.

Height of body contained twice and eight-tenths in the length without the caudal fin; head rather pointed, three times and one-fifth in the same; lower jaw longer than the upper one; the form of the body is oval, and the upper profile descends in a regular, slightly convexed way, to the snout; the præoperculum is rounded; the opeculum has two points, the lower being longer than the other; the upper part of the head and all the opercular pieces are covered with scales similar to those of the body; these scales number twenty-eight on the longitudinal line from the end of the operculum to the base of the caudal, and thirteen on the transverse one. They are rather large, punctulated, covered with concentric lines, and their edge is ciliated. The first dorsal is placed rather more in front than in *E. Vittata*. It is formed of seven spines of the same form as those of that species; the second dorsal has one spine and nine rays; the last of these rather prolongated; caudal pointed, the central rays being longer than the others; anal of three spines; the first of which is the shortest, and the other two nearly equal; the soft portion is formed of eight rays, and has the same form as the corresponding dorsal; ventrals and pectorals placed as in *Vittata*, the latter of thirteen rays.

The colour is of a dark olive-green, with the lower parts lighter. There is in some specimens a black blotch behind the operculum, over the insertion of the pectorals, and in others a rather oscellated spot on the base of the caudal fin; the fins are of an obscure yellow.

The largest specimens are less than an inch and a half long. They were found in fresh-water in the interior of King George's Sound by Mr. Maxwell.

Nota.—The interruption of the lateral line is a character very rarely met with in the *Percidæ*, and, I believe, only observed in some sorts of *Ambassis*—in fact, the fish I here describe comes very near to that genus, but I can find no trace of the recumbent spine of the dorsal.

BOSTOCKIA.

One dorsal fin formed of two parts; the first rather short, and composed of eight spines; anal with three spines; tongue smooth; teeth very numerous, small, viliform, forming a transverse band on the vomer, and extending backwards on each side to the throat; opercules forming backwards, a bifide spine; præoperculum with spines at its lower edge; scales small; head cavernous, without scales.

This genus of *Percidæ* appears nearly allied to *Glaucosoma*.

BOSTOCKIA POROSA.

The upper profile is convex and rather gibbous on the back; the head is rather elongate and pointed with the snout inflated; the lower jaw is longer than the upper one; the height of the body is contained four times and one-third in the total length, or three and a-half times in the same without the caudal; head less than three times in the last dimension; eye as long as the snout, and contained four times and a-half in the length of the head; the nostrils are very large, and the upper surface of the snout very uneven, covered with short ridges and deep pores and holes; similar ones are seen below the eye and on the lower jaw; all the opercular pieces are covered with scales similar to those of the body; the lower edge of the external limb of the præoperculum is armed with strong spinous teeth directed forwards; a bunch of smaller, but similar ones, at the anterior edge of the upper limb; there are two larger pores on the posterior part of the præoperculum; between its two limbs and the edge of the internal one there are corresponding notches; scales of the body small, numbering about forty-five on the longitudinal line, and twenty on the transverse one; those on the belly very small; the lateral line

follows regularly the profile of the back to base of the caudal; dorsal having a spinous portion, shorter than the other and formed of eight spines; the first of which is short, the second about twice its length, the third the longest of all, and the others becoming shorter as they are situated further backwards; the soft portion of the fin composed of sixteen rays; the first seven going gradually on increasing; the following at least one-third longer; these are about one-half the length of the head; the caudal is rather large, rounded, and is formed of sixteen rays; the anal has three spines; the first of which is very short, and the two others about equal; the soft part is formed of eleven rays; they grow longer as they extend backwards and become as long as those of the correspondent dorsal; but the last are rather shorter; the ventrals are below the pectorals, and have a rather long spine and five rays; the pectorals are rather large, with twelve rays.

Colour of an uniform dark brown, with the fins black.

Length of the largest specimen, a little over five inches.

Found by Mr. Bostock in the small water-courses of the interior of Western Australia.

ARRIPIS TRUTTACEUS.

Centropristes? Truttaceus, *Cuv. and Val.*, iii., p. 50.

Two specimens about ten and eleven inches long.

Called at Freemantle *Sea Herring*.

THERAPON ELLIPTICUS.

Therapon Ellipticus, *Rich., Ereb. and Terror, Fishes*, p. 118, pl. 52.

I received with much pleasure several specimens of this fish, as it allows me to ascertain that I was right in separating it from the sort inhabiting the Murray (*Th. Richardsoni*).

In *Th. Ellipticus* the body is more elongate; the back less convex, and the head more so and much higher; thus the upper profile is more of a regular elongate oval than in the Murray sort.

The height of the body is contained less than three and a-half times in the total length; the head a little more than four

times in the same; the eye is three times and a-half in the length of the head. The præorbital spines are very small; those of the præoperculum very large, but further apart than in *Richardsoni*, and some of them are much larger than the others; the spines of the caracoid are not visible externally on specimens preserved in liquor. The scales of the body are smaller, and number about eighty-six on the longitudinal line, and forty-seven or forty-eight on the transverse one; the fins are very similar in both sorts; the caudal is more truncated in the Swan River fish.

The colour after having been in spirits, is very silvery; some specimens have round black spots dispersed over the back and the head; there is always a longitudinal band of the same colour below the eye; the fins are reddish, with the caudal and the soft parts of the dorsal and anal covered with black rounded spots. In some specimens the pectorals have transverse obscure lines.

THERAPON CAUDOVITTATUS.

Datnia Caudovittata, *Rich., Ereb. and Terror, Fishes*, p. 24, pl. 18.

Therapon Caudovittatus, *Gunther, Cat.*, vol. i., p. 284.

Body higher and rather shorter than in *Richardsoni*; the height is three times and one-quarter in the total length; the head is three times and two-thirds in the same, and the eye a little less than four times in the length of the head; the upper profile is very convex, and extends regularly to the mouth; the teeth are rather short and thick; the præorbital is finely denticulated; the caracoid strongly denticulated; the præoperculum is rather strongly but regularly denticulated; the scales are rather large and number about fifty-eight on the longitudinal line, and about twenty-eight on the transverse one, nine of these are above the lateral line.

The dorsal is formed of thirteen slender spines; the first four ones being shorter than the others, which become themselves shorter as they are situated further back; the soft portion is rather short, but much higher than the last spines, of nine

rays; the caudal strongly emarginated, of eighteen long rays; the anal has three spines, the first of which is short and the other two nearly equal; the second being rather the longest; the soft portion much longer than the spines of seven rays; the pectorals of fifteen rays; the spine of the ventrals slender.

The general colour is silvery, with some faint small dark spots on the body; the fins are of a bright reddish yellow, with a few marmorated dark spots on the membranes of the spines, and round black ones forming transverse lines on the soft part of the dorsal. The caudal has similar spots disposed transversely, and a large black blotch on each lobe of the caudal placed transversely; the other fins have no spots.

Length of specimen from eight to nine inches.

Nota.—I believe this to be the *Caudovittatus*, but the dorsal fin is very strongly notched, and the last spines are much shorter than the soft portion, contrary to Dr. Gunther's description, and it may prove a different species, which I should then call *Bostockii*.

Mr. Bostock says that this sort is known under the name of *yellow tail* at Freemantle, and that its flesh is firm and very savoury; that it is rarely offered for sale, and that it is caught with line and net near rocks in the Swan River.

HELOTES.

This genus is very nearly allied to *Therapon*, but is easily distinguished by the teeth, which are trilobated.

HELOTES SEXLINEATUS?

Therapon Sexlineatus? *Quoy. et Gaim. Uranie. Poiss.*, pl. 60, fig. 1.

Helotes Sexlineatus, *Cuv. and Val.*, vol. iii., p. 149, pl. 56.

Helotes Octolineatus, *Jenyns, Beagle Fishes*, p. 18.

Silvery, with the back blue; eight longitudinal and obscure bands on each side; the upper part of the head is black, and there are two longitudinal bands of the same colour on each side of the head; the upper one crossing the eye; fins reddish;

a few transverse narrow obscure lines on the caudal. This is certainly the *Hel. Octolineatus* of Jenyns, but I believe it to be only a variety of *Sexlineatus*, as the two lower longitudinal lines are very subject to disappear.

UPENEUS VLAMINGII.

The specimen, similar to those of Victoria, is about eight and a-half inches long.

PAGRUS UNICOLOR.

Already known, from New South Wales, Queensland, Victoria, and North Australia; it also extends to New Zealand, and seems to inhabit all the Australian Seas, but I do not believe that it is found either at the Cape of Good Hope or in China as stated, with doubt, by Dr Gunther.

CHRYSOPHRIS AUSTRALIS.

Is also called *Bream* at Freemantle.

NEOCHÆTODON.

One dorsal with eleven spines; no canines; a small pre-eminence with a bifide tooth on the palate; operculum not denticulated, but strongly emarginated behind; præoperculum strongly serrated at its posterior edge and at its rounded part; anal with three strong spines, the second very large; scales small, adherent; body high; the teeth are very long, arched, and pointed, crowded on several lines; mouth small.

The strong denticulations of the præoperculum separates this genus from *Chætodon*, and with its palatal tooth would place it with *Percidæ*, if it was not for all its other characters.

NEOCHÆTODON VITTATUM.

Form oval, high; back gibbous; height only about twice in the length without the caudal; head three times and one-third in the same dimension; eye large, of the length of the snout, and contained three times and one-third in the length of the head; this last is entirely covered with small scales; præorbital serrated; operculum strongly emarginated. Dorsal

having its spinous portion much longer than the other; the first spine is rather short, the second about twice as long, the following about one-third longer; the fourth being the longest of all, and the following becoming shorter as they are situated more backwards. The longest spine is equal to the distance between the extremity of the muzzle and the centre of the eye. The soft portion of the dorsal is incomplete in my specimen; caudal emarginated, of seventeen long rays; anal with three spines, the second very large, flat, and arched, the soft portion incomplete; the pectorals are slightly in front of the ventrals, they are rather small, and have fifteen rays; the spine of the ventrals is long and slender.

The body scales are very small, and number about forty-five on the longitudinal line, and about twenty-two on the transverse one; there are no scales on the spinous portion of the fins (the only one preserved on my specimen).

The colour is of a light yellow, with six broad longitudinal streaks of a fine black on the body; the two inferior ones curved downwards; the dorsal has also a blue band, but the other fins are of a uniform yellow.

The specimen is not quite three inches long and very incomplete.

This sort must be very nearly allied to *Chæt. Strigatus*, and I should have united it with it if it had not been that the operculum is not rounded but has a strong emargination, and that the denticulations of the operculum seem still stronger in the Australian than in the Indian species; its scales appear also to be less numerous than in the latter. In all cases they both belong to the same genus.

TRIGLA AMŒNA.

Scales very small, those on the lateral line without any armature; snout elongate; upper profile concave; the anterior part of the head rather bilobed; the space between the eyes is very concave, and is less than the diameter of the eye; this space has on each side several longitudinal striæ; a cranulated ridge in front of the orbit; the cheeks granu-

lated and covered posteriorly with radiated striæ; the posterior part of the upper surface of the head strongly granulated; the inferior portion of the præoperculum forming a prolonged angle but no point; the operculum pointed. The lateral line is straight and prominent, like in *Polyommatus*; the first dorsal formed of nine spines; the first rather shorter than the second, and of about the length of the fourth; the second dorsal has fifteen rays; the caudal is emarginated and is formed of eight long rays and numerous shorter ones; the anal of fourteen rays; the pectorals are very large like wings, and attain the root of the tenth anal ray; they are formed of ten rays; the ventrals are large, of six rays.

According to Mr. Bostock's notes, the fish, when alive, was of a lavender grey, with its lower parts silvery and of a light milky blue; the dorsal spines pink, a black blotch extending on the upper and anterior part of the fin to the third spine; the fins pink, with the posterior part of the caudal of a similar but darker colour; eyes blue; the large pectorals of an olive green, with numerous oblong spots of a dull cobalt; the eyes of the same colour; a very large black blotch near the inner side; this blotch is also covered with spots; the three free pectoral filaments of the colour of the belly.

I have received two specimens, preserved in liquor, each six inches long, and this is said to be the usual size of this sort, which is said to be very scarce; but since, Mr. Bostock has sent me a dried specimen measuring eight inches.

PENTAROGE MARMORATA.

Apistus Marmoratus, *Cuv. and Val.*, iv., p. 416.

Mr. Bostock says that it is called at Freemantle *Devil fish*, that the spines cause intense pain, and that it is dreaded alike by the native and the white population.

PLATYCEPHALUS FUSCUS.

Similar to the specimens from Victoria, the specimen is twenty-one inches long.

PLATYCEPHALUS LÆVIGATUS.

Also similar to those from the Victorian coast, and of the same size.

SILLAGO CILIATA.

Sillago Ciliata, *Cuv. and Val.*, vol. iii., p. 415.

———————— *Cuv. Règn. An. Ill. Poissons.*

———————— *Gunth.*, vol. ii., p. 245, pl. 13.

The præoperculum is very finely cranulated; no silvery band on the sides; the lateral line has seventy scales.

Several specimens in the liquor averaging about twelve inches long, and a dried one fourteen. Mr. Bostock says it is "found on patches in river and at sea; esteemed very delicate, some are spotted; only found in the river in summer."

This sort was first discovered at Cape York, and as Dr. Gunther has seen it from Tasmania and Sydney, it appears to be found all round the continent of New Holland, but I believe it must be very scarce on the southern coast, and it seems to be very common on the northern and western parts.

NOTA.—The absence of the silvery band on the sides makes me have some doubt about this being the real *Sil. Ciliata*, and the character of the serrated or rather finely cranulated præoperculum is to be observed in several other species. If this should prove different, I propose calling it *Sillago Bostockii*.

SPHYRÆNA NOVÆ HOLLANDIÆ.

Mr. Bostock has sent me a specimen twenty-six inches long, which is absolutely similar to those of the Victorian sea. The dentition appears to be subject to much variation in this species, probably according to age.

CARANX GEORGIANUS.

Caranx Georgianus, *Cuv. and Val.*, ix., p. 85.

Specimens similar to those from Melbourne; the largest was nine inches in length.

TENNODON SALTATOR.

Scomber Saltator, *Bl. Schn.*, p. 35.

Large specimens, one near sixteen inches long, and the other twenty-two; they also bear in Western Australia the name of *Skip Jack*.

ELEOTRIS OBSCURUS.

In division, "snout of moderate length; head as in *Gobius*; no black spot on the root of the pectorals." Præoperculum without a spine; head large and broad; its length being four times in the total length of the fish; the space between the eyes is contained four times and two-thirds in the length of the head; the orbit in its greatest breadth is six times in the total length; the head is naked; some elevated longitudinal lines are seen on the præoperculum. The lower jaw is rather longer than the upper one; the teeth are small and disposed on each jaw in numerous rows; the throat is very much inflated; the body is narrower than the head; the cleft of the mouth is rather oblique; there are thirty-seven or thirty-eight scales on the lateral line, and eleven on the transverse one; these scales are ciliated on the edge, and entirely striated longitudinally.

First dorsal with nine rays; second dorsal with nine; anal with eight; these two last fins are high, and their rays are rather longer than the others; the ventrals and pectorals are of the same length, and end a little before the posterior root of the first dorsal; the last have thirteen rays; the caudal is contained five times in the total length; it is elongated, rounded, and formed of fourteen rather long rays and of several shorter ones.

The colour of the specimen, after preservation in liquor, is a dark brown. The largest specimen is a little over three inches long.

ATHERINICHTHYS EDELENSIS.

Very nearly allied to *A. Modesta Cast.*, but body more elongate; its height being contained near seven times in the total length, or six times and a-quarter in the same length

without the caudal fin; the head is three times and three-quarters in the last dimension; the first dorsal is inserted at an equal distance from the anterior part of the snout and the upper base of the caudal.

For all the rest, the description of *Modesta* applies to this sort.

The specimens are very numerous, but after preservation in spirits, their colours are entirely destroyed; the silvery band on each side is however very visible. The largest specimens are a little over two and a-half inches long.

MUGIL OCCIDENTALIS.

In Dr. Gunther's very able division of this difficult genus, this sort must be placed in the group characterised by "orbit with the adipose eyelid well developed; upper lip not very thick; anal fin with eight soft rays; lateral line with forty-three or forty-four scales;" the maxillary is visible.

General appearance of *Mugil Waigiensis* and the head of the same form; height of the body contained four times in the total length of the fish to the centre of the tail; head not quite as long as the height of the body, contained nearly four and a-half times in the same dimension; snout longer than the diameter of the eye, but contained nearly four times in the length of the head; the breadth of this, behind the eyes, is contained once and a-half in the length of the head and the space between the eyes is contained a little more than twice in the same dimension; the teeth are very numerous and rather large, for the genus, on both of the jaws; the space extending behind the eye and also the adipose eyelid are covered with strong and numerous arched striæ; the head is covered with scales of large size, but these become very minute towards the lips; the longitudinal line has forty large scales, and three or four smaller ones near the caudal. From the transverse line that would pass over the centre of the eye to the root of the dorsal there are twenty scales; the body is very high, and its lower profile very convexed; the scales number fifteen on the trans-

verse line; they are plain, rather rouguous, with a short ridge that does not extend to the root, neither to the margin; the first dorsal is placed at equal distance from the extremity of the snout and the upper base of the caudal fin; it is formed of four spines; the first of which is the longest, and is equal to the space between the eyes; the second dorsal is placed behind the root of the first at a distance rather less than the length of the head; it is formed of a spine and eight rays; the first is not longer, of one half of the height of the first ray; the last is prolongated and pointed; there are a few very minute scales between the rays; the caudal is strongly forked; it is scaly and formed of fourteen long rays; the anal is opposite to the second dorsal, and has the same form; it has three spines and eight rays; the ventrals are inserted at equal distance from the base of the pectorals and the first dorsal; the pectorals are short, broad and scaly; their length is contained one and a-half in the head; they are very far from attaining the vertical from the first dorsal, and their extremity only covers the base of the tenth scale of the longitudinal line; they have fifteen rays. The eleventh and twenty-third transverse lines of scales originate at the root of the first and second dorsal; there is a very large pectoral scale.

The fish seems to have been silvery with the upper parts of an obscured grey; the longitudinal lines are well marked on the specimens preserved in liquor; there is a large golden blotch behind the eye; the length of my specimens, which are said by Mr. Bostock to be of the average size; is about twelve inches; but a dried one he also sent me is fourteen. This sort inhabits the rivers of Western Australia, all the year round, and is a good edible fish.

AGENOSTOMA DIEMENSIS.

Dajaus Diemensis, *Rich., Proc. Zool. Soc.*, 1840.

Very common on the coast of Western Australia.

Mr. Bostock says it is called *Pilchard* in Western Australia, but I think that there must be some mistake.

LABRICHTHYS PARILA.

Tautoga Parila, *Rich.*, *Proc. Zool. Soc.*, 1850, p. 70.

——————— *Rich.*, *Ann. and Mag. Nat. Hist.*, 1851, vol. vii., p. 286.

The head is silvery, marked with brown; the body of a silvery white, with each scale broadly bordered with chocolate-brown. On some specimens there are large blotches of this last colour on each side of the body; the fins are of a light brown; the anal spotted with white.

LABRICHTHYS BOSTOCKII.

This sort enters in Dr. Gunther's division *B*, characterised by: cheeks with only one or two series of small scales.

I at first thought it was *Labrus Tetricus* of Richardson; but I believe it is distinct; the caudal in my species when moderately opened is truncated, but, it is true, that when entirely opened it takes a somewhat rounded appearance, the upper ray being always longer than the others; the dorsal and anal are rather prolongated at their posterior end, and not rounded as in Richardson's figure; the arbuscules of the lateral line are also more complicated in *Bostockii*; the colour of the vertical fins is described in *Tetricus* as having a fine blackish edge, and the pectoral as having a black spot over their base; neither of these exist in the new species. There is a small posterior canine tooth; two anterior large canine ones at each jaw; cheeks with a double series of very indistinct scales, and the largest portion being naked; as in many other species the head is covered with small tubercules; the operculum scaly; the colour after having been in spirits is of an uniform dark purplish red; the fins are lighter, and the base of the dorsal black; the scales are large disposed on twenty-five transverse series; the height of the body is contained a little over three times in the total length.

The specimen is seven and a-half inches long.

LABRICHTHYS EDELENSIS.

This species is very nearly allied to *Lab. Punctulata*, Gunth., and has also the scales of the operculum as large as those of

the body; the præoperculum is almost naked, and has only one line of scales; the arbuscules of the lateral line are very ramified and cover the scales; no scales on the base of the dorsal and anal; a posterior canine; the body is evidently more convex than in most species of this genus, and the body scales are covered with strong transverse striæ.

The colour is uniformly brown with the fins yellow, and there is no appearance of spots on the body.

My only specimen, which is in a bad state, is eight inches long.

LABRICHTHYS PUNCTULATA.

Labrichthys Punctulata, *Gunth.*, *Catal.*, iv., p. 118.

A posterior canine tooth; two strong ones in front at each jaw, the other teeth strong, pointed, becoming shorter as they are situated more backwards; the head higher than long, covered with pores; a series of very indistinct scales on the cheek; those of the operculum as large as those of the body, and having very faint transverse lines; body covered with large scales numbering about twenty-nine on the longitudinal line; the lateral line marked by a series of numerous but very faint arbuscules which cover almost entirely the scale on which they are placed; the last scales at the base of the caudal long and oval.

The general colour of the specimen is, after preservation in spirits, of a very dark brown, entirely covered with small, round, white spots, which have probably been blue in the living animal; these spots do not extend to the head nor over the fins.

The specimen is thirteen and a-half inches long.

PSEUDOJULIS LINEATA.

I only place this sort in the above genus on account of its dorsal having nine spines; it is otherways a real *Julis*, and I consider this character as of little importance in this family, where the spines and rays are so much alike.

The height of the body is contained a little over four times in the total length, and is about equal to the length of the

head; the teeth are conical and directed forwards, they become regularly smaller as they are placed more backwards; in front are two long and rather canine ones at each jaw.

The scales are all equal; the dorsal has nine spines and twelve branched rays; the last are a little longer than the first, and when the fin is not extended, they attain the base of the caudal; this is rounded and formed of fourteen long rays with several shorter ones on each side; they are covered with scales to about one-half of their length; the anal is composed of three spines and twelve of rays; it has the same form as the dorsal; the pectorals have thirteen rays; the ventrals are pointed.

The general colour of the fish, preserved in liquor, is of a uniform light brown, with numerous longitudinal and regular lines of a darker colour extending all along the body; the dorsal and anal appear to have been yellow, and on the first there is a narrow black spot after the first spine.

Total length a little over eight inches.

I have also received from the Rev. Mr. Bostock a dried specimen that I consider to belong to the same species; it is fourteen inches long, and, having been prepared very carefully, and but a short time since, has preserved remarkably well its fine colour; the fish is of a fine red; a black blotch at the end of the operculum and another at the end of the pectoral; there is no trace of the longitudinal bands; the fins are red at their base and yellow on their second half; on this portion there are numerous longitudinal and narrow stripes; the black spot on the dorsal behind the first spine is very visible. The pectorals and ventrals alone have no lines.

GERRES OVATUS.

Gerres Ovatus, *Gunth. Catal.* 1, p. 343, vol. iv., p. 256.

Height of the body about twice and a-third in the total length without the caudal fin, or twice and two-thirds to the centre of the latter; the diameter of the eye is longer than the snout; the dorsal is formed of nine spines and ten rays; the spines are feeble, the first is very short, the three following

about equal, and longer than the others; the fifth, sixth, and seventh grow shorter, and the others are about equal, and not much more than one-half the height of the longest; the caudal is deeply forked; the anal has three slender spines; the first of which is very short and the third the longest of all; the soft rays are seven in number; the colour is silvery, with the upper parts rather blue; the fins yellow.

Nota.—In none of the numerous specimens I have seen does the præorbital form the short spine visible on each side, on some of the specimens of *G. Melbournensis*. I believe this to be *Ovatus* of Dr. Gunther; it is immediately distinguishable from *Melbournensis*, by the height of the anterior part of its dorsal.

CNIDOGLANIS BOSTOCKII.

Head very broad and depressed, its length being a little over five times in the total length of the fish; barbels rather short, the maxillary ones extending a little behind the eye, but those of the nostril only attaining the centre of these organs; lower lip broad, very thick, rather pendant and lobed; the lips are covered with large papillæ; the teeth are rather small, rounded at the end, and form in front at each jaw two small bunches, each of two or three teeth; at the lower jaw there is also an interior row more numerous but of the same form; the vomerine teeth are large, molar-like, and disposed in a triangular way; the eyes are about one-seventh of the length of the head; the skin of the body is transversely riddled; the first dorsal is not prolongated, but rounded at its extremity, and formed of a strong barbed spine and of five rays; the large fin which forms the dorsal, caudal, and anal united, has about two hundred and twenty rays; the ventrals ten.

The colour is, after having been in the liquor, of a black, becoming rather brown on the lower parts.

I have seen two specimens, both about twenty-one inches long.

This sort must be very nearly allied to *Plotosus Megastomus* of Richardson (*Ereb. and Terror, Fishes*, p. 31, pl. 21), and

the principal difference between them consists in the length of the nostril barbels, which are shorter in my species; if I had not seen two specimens absolutely alike, I should have considered this as accidental; the *Plotosus Macrocephalus* of Cuv. and Val., xv., p. 428, pl. 449, seems also to be very nearly allied to these species, but differs by its colouring if the plate is correct; it is said to have been probably found at Timor by Péron, but it is possible that it comes from the Australian coast, which was also visited by the same naturalist.

The Freemantle name of this sort is *Cobbler*; it is said to be dangerous to catch, as it inflicts with its dorsal spine wounds which have sometimes caused death, and always great agony, which lasts, the natives say, "till sun sets."

PLOTOSUS UNICOLOR.

Eight barbs about as long as half the space from the anterior margin of the snout to the base of the first dorsal, and those of the nostrils extending considerably behind the eye; head contained a little over four times and two-thirds in the total length of the fish; it is rather pointed in front; the height of the body a little over six times in the same; eye considerably less than twice in the snout.

The body entirely naked; the lateral line well-marked; the spine of the first dorsal straight and acute; it is equal in length to the space from the anterior end of the snout to two-thirds the length of the orbit; the soft part is much longer than the space, and formed of four rays; the second dorsal begins at a distance from the first, nearly equal to the one which extends from this last to the snout; this fin is united with the anal and caudal; the latter rather rounded at its extremity.

Ventrals rather long, of twelve rays; pectorals also rather long, and formed of a long spine and of nine rays.

Colour of a uniform dark brown, almost black. My largest specimen is seven and a-half inches long.

Found by Mr. Bostock in the small water holes of the interior of Western Australia.

BELONE GAVIALOIDES.

Belongs to the division characterised by "anterior dorsal rays forming a lobe; no lateral edge to the tail; middle and posterior rays short."

Head three times and a-half in the length without the caudal; the snout much longer than the other part of the head; it has a longitudinal sulcate on its upper surface; teeth very fine and very numerous, with a line of large conical ones on each side of both jaws; these are placed far apart one from the other, but on the back part of the mouth they are smaller and near one another; no vomerine teeth; tongue smooth; upper part of the head flat and impressed with two large radiated impressions. The diameter of the eye is contained twice in the interocular space. The upper surface of the head is smooth, but an elongated space in front of the eyes is covered with small scales.

Body rather compressed; its height is less than the length of the pectorals; dorsal with twenty-two rays; anal with twenty-three; caudal strongly emarginated, the lower lobe longer than the other; the pectorals with twelve rays; scales small.

The colour, after preservation in spirits, is of a dark brown, with the lower parts silvery; the snout black; the fins yellow.

The following measurements were taken on the smallest of my specimens :—

	INCHES.
Total length	34
Id. without the caudal	32½
Id. of the head	10½
Id. of the snout	5⅞
Diameter of the eye	⅞
Length of the pectorals	3⅝
Distance from the end of snout to the anterior edge of the dorsal	26½
Id. to the centre of the caudal	8
From the base of the ventrals to the pectorals	7

From base of ventrals to anal	$3\frac{3}{4}$
From base of anal to the central base of caudal.....	8
Length of first dorsal ray	$2\frac{2}{3}$
Id. of caudal to the centre	$1\frac{1}{2}$
Id. to the end of lower lobe	$3\frac{2}{3}$

My largest specimen is forty-one inches long.

HEMIRHAMPHUS MELANOCHIR.

Hemirhamphus Melanochir, *Cuv. and Val.*, vol. xix., p. 41.

Is called *Gar-fish* at Freemantle, where it is only thought edible at certain seasons and not at others; the vertebræ are at times green.

CHATOESSUS EREBI.

Chatoessus Erebi, *Gunther*, *Cat.* vii., p. 207.

———— Come, *Richard.*, *Ereb. and Terror*, p. 61, pl. 38.

Several specimens of a *Chatoessus* are in the collection, which is different from the one I thought to be *Erebi* in the Proceedings of last year; it can be distinguished easily by its much smaller size, the largest being only seven inches long, and they are said to be the average size of the fish, and also by its form, longer and much less elevated; the upper profile is oval, and forms a regular arched line; the height is contained three times in the total length to the centre of the caudal fin, and the head a little over four times in the same; the caudal is very deeply forked and its lobes pointed; the prolongated ray of the dorsal is much longer and is contained three times in the total length; the ventrals are placed a little behind the vertical from the insertion of the dorsal.

The colour is still, after immersion in liquor, very silvery, with the upper parts of the body of a fine light blue; the pectorals, ventrals, and anal are very obscure, and the other fins are yellow.

Mr. Bostock says that it is known under the name of *Perth Herring*, "quantities being smoked with Banksia or sawdust, and sold in the fruit stores; it is so called because it is found mostly about Perth, ten or twelve miles from the sea."

Richardson had thought that the Australian sort of *Chatoessus* he described, might be the *Come* of Russel (*Fishes of Coromandel*, pl. 196), but at the same time he points out several characters which did not agree with the Indian fish. Dr. Gunther places this amongst his doubtful sorts, and gives the Western Australian one the name of *Erebi*.

In the Proceedings of this Society for last year, I considered the Victorian fish as being this *Erebi*, but having since received the above-mentioned specimens from Freemantle, I find that the sort from the rivers of Western Australia is different from the one of the Murray, and that, the name of *Erebi* belonging to the first, I propose calling the other *Richardsoni*.

OPHICHTHYS.

OPHICHTHYS SERPENS.

Ophichthys Serpens, *Lacép.*, vol. ii., p. 198.

Leptorhynchus Capensis, *Smith, South Africa; Fishes*, pl. 6.

The colour is brown; the fins seem lower, and the body proportionately longer than in the European specimens, but I have none of these to compare with the Australian ones.

PHILLOPTERYX ELONGATUS.

One specimen, which seems similar to those from Adelaide.

HIPPOCAMPUS ELONGATUS.

Dorsal fin with eighteen rays standing on three body rings; body elongate; the broadest ring of the body not being one-fifth wider than the first two; tubercules moderately acute; no tentacles; snout as long as half the head; a short thin ridge in front of the eyes; supraorbital spine conical,

rather long, sharp, and pointed; a single conical and rather notched spine in front of the coronet; this with its terminal five points well marked; eleven body rings; the part supporting the dorsal very little higher than the back.

In a dried state the fish is of a light greyish yellow, covered with more obscure brown, irregular, marbled spots.

Length of specimen, three inches in a straight line.

HIPPOCAMPUS SUBELONGATUS.

Dorsal fin with eighteen rays standing on three body rings; body rather elongate, the broadest part not being more than one-third thicker than the narrowest; snout up to the anterior edge of the eye longer than the other part of the head; tubercules moderately acute; a short, thin, rather rounded ridge in front of the eyes; supraorbital spine broad, arched, and rather notched; a single short, blunt, and notched spine in front of the coronet; this rather elevated, directed very obliquely, and ended by five well marked but blunt spines; eleven body rings.

Colour of dried specimen yellow, with transverse brown narrow bands on the snout.

Length, in a straight line, four inches and three-eighths.

Nota.—It is not impossible that this may be a more developed age of *Elongatus*; but the spines of the head are so different as not to allow me to unite them before I see more specimens.

MONACANTHUS BRUNNEUS.

Enters in the division characterised by: anal with less than forty rays; dorsal spine with four series of barbs; the front series much closer together than the hinder series, and formed by small barbs; but does not agree with any of the sorts described by Dr. Gunther.

Skin covered with small spines, truncated at their extremity; body high; its height being only contained a little over twice in its total length; the upper profile of the head is considerably concave; the portion of the back profile, extending from the spinous dorsal to the base of the soft one, is straight or rather

concave ; the ventral spine is rather large, and covered with strong spines disposed in a starlike way ; the diameter of the orbit is contained twice and a quarter in the snout ; the teeth are large and pointed ; the spine of the dorsal is rather arched ; its length is equal to the distance from the extremity of the snout to the centre of the eye ; it is granulated, and the posterior barbs are long ; there is a second ray to the first fin ; the second dorsal is high and formed of thirty rays ; the anal of the same form with twenty-seven rays ; the caudal is rounded and formed of twelve rays ; its length is equal to the distance from the extremity of the snout to the anterior margin of the eye ; the pectorals are formed of thirteen rays ; they are inserted on the vertical of the dorsal spine, which would pass over the centre of the orbit ; no extra spines on the tail.

The colour in spirits is of a dark brown, with the lower parts rather lighter ; the fins yellow.

The size of the specimen is about six inches ; found in the rivers.

MONACANTHUS DISTORTUS.

I have only seen one specimen, in a very incomplete state, of this most singular fish ; the upper part of the skin of the head has been eaten by some insects, and the bone only remain ; the fins are also very incomplete.

The form has something of the one of *Sternoptyx Hermanni* on account of its oblique form ; the upper profile of the head being about straight and oblique up to the dorsal spine ; behind this is a very strong gap or emargination, and from this the profile is very gibbous and elevated ; this part of the body being much higher than the head ; the tail is short and high, almost square ; the lower profile is very much developed in a large rounded ventral pouch, which ends on the vertical from the dorsal spine ; there is no starlike ventral spine ; the profile becomes all at once almost perpendicular inwardly, forming a gap corresponding to the one of the back, and from thence it extends with a rounded form to the tail ; the height taken at the base of the dorsal spine is equal to nine-tenths the

length of the body; the same taken a little backwards, at the two corresponding depressions, is only two-thirds that length; the eye is nearly as long as the muzzle.

The dorsal spine is slender, arched, pointed, covered with short spinous bristles and inserted over the posterior third of the eye. The imperfect state of the specimen does not allow me to state if there is a second ray or a membrane to this fin; the second dorsal has twenty-seven or twenty-eight rays; the caudal is about as long as the head to the base of the dorsal spine, and has fifteen rays; the anal has the same number of rays as the second dorsal; the pectorals are small, formed of ten rays; the body is entirely covered with very short spines, which become longer and more slender on the tail.

The colour is entirely brown, with the fins yellow; the single specimen is two and a-half inches long.

MONACANTHUS PENICILLIGERUS.

Balistes Penicilligerus, *Péron in Cuv. Règn. Anim.*, vol. iii., p. 433, pl. 10, fig. 2, vol. ii.

This most remarkable fish is entirely covered with short spines, and has on its body and fins long filaments; it forms the genus *Chætodermis* of Bleeker. It seems to inhabit all the northern and eastern seas of Australia, and extends to Eastern India.

The specimen from Freemantle is near nine inches long.

Nota.—The filaments in Cuvier's figure are represented much longer than they are in my specimen.

DIODON SPINOSISSIMUS.

Similar to the Victorian specimens.

ARACANA AURITA.

Ostracion Auritus, *Rich., Trans. Zool. Soc.*, vol. iii., p. 184, pl. 9.

According to Mr. Bostock's description, the colours are very splendid on the fresh specimens; the upper parts are of a fine yellowish brown, changing on the head and sides to a beautiful pink-red; the lower parts are of a pale brick colour;

the stripes and bands are of an olive-green ; at the base of the first dorsal spine there is generally a cobalt patch ; the fins are yellow.

The specimens are five and a-half inches long.

ARACANA LENTICULARIS.

Ostracion Lenticularis, *Rich.*, *Proceed. Zool. Soc.*, 1841, p. 21.

I have had two specimens of this fish from Western Australia—one from Mr. Evans, of St. Kilda, and the other from the Rev. Mr. Bostock. They are both in a dried state, and show numerous black spots on the body ; they also have two longitudinal bands of the same colour, one running from the eye to the snout, and the other from the base of the pectorals to the lower jaw. They are both three and a-half inches long.

CRAYRACION.

This genus has been established by Dr. Blecker for *Tetrodons*, having on each side only one nasal opening, and a spiny body.

CRAYRACION MARMORATA.

The upper anterior part of the body, from near the end of the pectorals to the head, covered with rather strong spines placed at considerable distance one from the other; the remaining portion of the body and head is smooth ; dorsal of eleven rays ; caudal of eight long ones; ventrals of ten; pectorals of sixteen ; the upper parts of a dark brown, covered with very numerous, irregular, round, whitish spots ; lower parts and fins of an uniform yellow colour in liquor.

Length of specimen five inches and a-half.

CESTRACION PHILIPPI.

Small specimen, similar to those from the Victorian coast.

RHINOBATUS DUMERILII.

Snout very obtuse, rounded, broad, with semicircular outline. The distance to the outer angles of the nostrils is

three-fourths of that between the mouth and the end of the snout; no spines on the eyes nor shoulders; a median line of strong, compressed, arched spines, placed far apart one from the other; the rostral ridges are arched inwardly, and on their anterior part they are only separated by a narrow groove; the two dorsals large, as long as the interocular space; the dorsal tubercules very feeble between these fins, and not visible at all behind the second. The upper surface is rough, and the back is covered with small rough tubercules. The upper surface is entirely of a light brown, with the snout of the same colour. The lower surface is of a light yellowish white.

The specimen is over fourteen inches long.

Nota.—This sort appears to have a shorter, broader, and more rounded snout than any other of the genus; the distance from the posterior angle of the pectorals to the extremity of the snout, is very little superior to the breadth of the fish. It is named in honour of my late friend, August Duméril.

CONTRIBUTION

TO THE

ICHTHYOLOGY OF AUSTRALIA.

No. IX.—NEW SORTS FOR THE VICTORIAN FAUNA.

During the publication of this paper, I have obtained three fishes that I had not observed previously; two are new to science, and the third already described.

One belongs to the genus *Oligorus*, which was formed by Dr. Gunther on a species of *Grystes* of Cuvier, but as I already mentioned in the first vol. of these Transactions, p. 53, he adds to it a large New Zealand sort, which evidently cannot remain in the same generic division. Having since obtained more information on this latter, which is the *Hapuku* of the natives of New Zealand and the *Oligorus Gigas* of Dr. Gunther, I proposed forming on it a genus that I named *Hectoria* in honour to the celebrated Dr. Hector (*Notes on the Edible Fishes of Victoria in the Melbourne Exhibition Essays*, 1872).

The genus *Oligorus* is thus restricted to the *Murray Cod*, but I believe that two distinct species are confounded under this name.

OLIGORUS MITCHELII.

The head much broader; the eye considerably larger, being contained only six times in the total length of the head and twice in the length of the snout to the anterior edge of the eye; the upper jaw is longer than the lower, which is not the case in *Macquariensis*. The distance between the eye is not contained quite three times in

the total length of the head. The operculum is much more rounded, and the second ridge of the præoperculum is not hardly visible ; the greatest breadth of the head is contained once and two-thirds in its length ; the caudal is rather longer and more rounded.

The height of the body is contained three times and two-thirds in the total length, or three times and one-third without the caudal ; this height is rather less than the height of the head. The upper profile is more convex than in the usual sort.

The colour is of a livid grey, covered entirely with small round obscure spots.

The fishmongers consider this fish as distinct, and give it the name of *Murray Perch* (not the *Golden Perch*, which is a *Dules*).

The specimen is near thirty inches long, it was caught in the Murray in the beginning of April.

Nota.—I find that the small spotted specimen I mentioned in the beginning of the present paper, belongs to this sort.

MUGIL PERONII.

Mugil Peronii, *Cuv. and Val.*, vol. xi., p. 138.

In the beginning of this century, the learned naturalists, Péron and LeSueur, who accompanied Captain Baudin in his exploration of Australia, found at Western Port a sort of *Mugil*, which does not appear to have been observed since, and to which Cuvier and Valenciennes gave the name of *Peronii*.

A few days ago (5th March, 1873), my attention was called by a fishmonger to a *Mullet*, which seemed different to the *Sand Mullet* (*M. Waigiensis*), and on examining this fish, I soon found that it was the long forgotten Péron's sort ; having seen such large quantities of *Mullets* from Western Port, I had come to the conclusion that the locality mentioned by Cuvier and Valenciennes was a different one from the Bass's Straits Port, and I was confirmed in this opinion by the erroneous

statement made by these naturalists, that the Western Port they mention is situated on the *North Western Coast* of New Holland. It is certainly strange that Baudin's naturalists should have observed, during the few days they remained in that Bay, a fish that seems so rare.

The adipose eyelid is not developed; the anal fin has ten soft rays; the longitudinal line is formed of thirty-five large scales, and of six small caudal ones, making forty-one; there is no scale behind the base of the pectorals; the upper lip is not thick; the vertical fins are not scaly; the first dorsal spine is longer than the other, and half the length of the head; the anal inserted on the vertical of the second dorsal; the head as long as the breadth of the body; the diameter of the eye contained nearly once and a-half in the snout; the space between the eyes contained twice and two-thirds in the length of the head. Maxillaries visible; height of the body contained four times in the length without the caudal; this fin is as long, at its centre, as the space from the posterior edge of the eye to the extremity of the operculum; ventrals inserted nearer to the pectorals than to the first dorsal; the depth of the tail is equal to the height of the head at the posterior edge of the orbit; the space at the chin between the mandibles is strongly emarginated.

Upper parts of a slate colour; sides and belly white and silvery; on the first, some very faint longitudinal streaks formed by the lines which are on the middle of the scales; a golden spot at the upper angle of the operculum; eye silvery.

The specimen is ten inches long.

This sort is very much like *M. Waigiensis*, but is shorter; the tail higher; the lobes of the caudal are more pointed, with its centre longer; head more pointed when seen sideways, but at its upper part it is not quite so broad, and rather angular in front; pectorals longer, extending to the ninth scale of the longitudinal line, and of a lighter colour, with a dark spot on their base; second dorsal not emarginated but pointed upwards and white; anal higher, and having its upper part shorter and its lower one much longer than the upper.

GALAXIAS ORNATUS.

Body elongate; its height contained seven times in the total length; head as long as the height of the body; lower jaw rather longer than the upper one; eye rather shorter than the snout, and contained four times in the length of the head; the dorsal of ten rays, the first of which is very short; this fin is inserted at a distance from the snout double to the one up to the base of the caudal; this last strongly emarginated; anal placed a little behind the dorsal of eleven rays; the ventrals are inserted at an equal distance to the base of the pectorals and to the one of the anal; they have seven rays; the pectorals are as long as the space between the posterior edge of the eye and the extremity of the operculum; they have twelve rays.

The colour of the living specimen was of a light green, with the lower parts of a golden yellow; the back has numerous transverse bands, rather narrow, but well defined, of an obscure green. These bands are not agglomerations of fine points, as in many other species; eyes yellow; fins of a light yellow.

The largest of my specimens measures four and a-half inches. From the Cardinia Creek, Victoria.

LIST OF AUSTRALIAN FISHES

MENTIONED IN THIS PAPER.

ANGORA GOATS.

THE ANGORA GOAT;

WITH AN ACCOUNT OF

ITS INTRODUCTION INTO VICTORIA,

AND A REPORT ON THE FLOCK BELONGING TO THE ZOOLOGICAL AND ACCLIMATISATION SOCIETY OF VICTORIA, NOW RUNNING AT LONGERENONG, IN THE WIMMERA DISTRICT.

BY

SAMUEL WILSON,

Vice-President of the Zoological and Acclimatisation Society; President of the National Agricultural Society; and President of the Wimmera District Pastoral and Agricultural Society.

From a very early period in the world's history after its occupation by the human race, the goat as well as the sheep has been subjected to domestication. A great part of the wealth of the patriarchs consisted of their flocks of sheep and goats. From the greater docility, intelligence, and courage of the goat as compared with that of the sheep, as well as from its capability of adapting itself to many different climates, it has been a constant attendant on civilized, as well as on many savage races of man in most parts of the globe. In Switzerland, during the early Stone period, the goat was commoner than the sheep (Rutimeyer).

The species from which the domestic goat is believed by most naturalists to be derived, is the Paseng or Ægagrus, the wild goat of the mountains of Caucasus and of Persia. By some, however, the Ibex is supposed to be the wild prototype of the animal.

The differences between some species of sheep and goats are less than might be supposed, and naturalists find some difficulty in clearly defining these distinctions. To ordinary observers perhaps the most marked characters which distinguish the goat are, the peculiar odour of the male, the beard, and the boldness, caprice, and curiosity of the animal, in complete contrast with the timidity, staidness, and incurious character of the sheep. Their mode of fighting is also quite different. The goat raises itself on its hind legs, and lets the weight of its body fall on its adversary, while the sheep runs a tilt, adding the force of its momentum to its weight. On this question Youatt remarks that the differences between them are chiefly these: "Many sheep are without horns. The horns of sheep have a spiral direction, while those of the goat have a direction upwards and backwards. The forehead of the sheep is convex, and that of the goat concave. The sheep has, except in one wild variety, nothing resembling a beard, but the goat is bearded, while the goat in his highest state of improvement, and when he is made to produce wool of a fineness unequalled by sheep, as in the Cashmere breed, is mainly, and always externally, covered with hair; the hair on the sheep may, by domestication, be reduced to a few kemps (coarse hairs), or got rid of altogether; and finally, the pelt or skin of the goat has a thickness very far exceeding that of the sheep."

The goat loves to browse on the sides of rugged hills, and can leap with ease and safety from rock to rock amongst the most dangerous precipices, with a courage which is surprising. In some parts of Russia a few goats are kept with each flock of sheep, to lead them

over dangerous passes, and show the way when any difficulty occurs. In parts of France, goats precede the flocks of sheep as pioneers, and supply the place of well-trained dogs. The sheep learn to follow them, and look to them for guidance.

Pliny relates an instance of the intelligence of the goat:—Two of these animals, coming from opposite directions, met on a very narrow bridge, which would not admit of either of them turning round; and in consequence of its great length they could not safely go backwards, there being no sure footing on account of its narrowness; while at the same time an impetuous torrent was rapidly rushing beneath. Accordingly, one of the animals lay down flat while the other walked over it.

The veneration in which the goat was held in ancient times is shown by the fact of Pan, in the heathen mythology represented as the supreme power over nature, being invested with the likeness of this animal; while the ægis, or goat-skin, was the breastplate of Jupiter.

The goat is of the genus Capreæ, a sub-tribe of the family Bovidæ, amongst the ruminant mammalia.

There are many varieties of goats, and they are found in all parts of the world, and bear with little inconvenience all extremes of climate and temperature. They are found as far north as Wardhuys, in Norway, where they feed on moss, bark, and even on logs cut for fuel (Pennant), and thrive equally well in the tropics. They are not natives of the American Continent, although the Argali or wild sheep was found there. The goat will live, and do well on pastures where most other animals would starve, and

will do admirably on scrubby, wet, or wooded countries unsuitable for sheep. The time of gestation of the goat differs from that of the sheep, by being about two weeks shorter.

The cross between the goat and the Merino sheep has been tried, and the progeny was not unfertile, though it reproduces with difficulty. Professor Cretzschmar, a learned naturalist residing near Frankfort-on-the-Main, experimented upon twelve Merino ewes, and a Cashmere buck, with the hope of establishing a breed of animals intermediate between the two. It was not until the third season that the experiment succeeded, and the progeny so closely resembled the Merino that little difference could be noticed in their external characters. My authority does not state the final result of this interesting experiment.

Amongst all the very numerous breeds of goats the variety called the Angora goat (*Capra Angorensis*) stands pre-eminent. It is so-called from the place where this beautiful breed is found. Angora, the ancient Ancyra, is a town of Natolia, in Asia Minor, and lies about the fortieth parallel of north latitude. It is estimated to have about 40,000 inhabitants. Ancyra was one of the earliest Christian churches, and is noted in Scripture as a place where Paul preached to the Galatians. Early in the fifteenth century, Bajazet was here defeated and taken prisoner by Tamerlane, the famous Tartar conqueror, but afterwards the place fell into the hands of the Turks, who still retain it in their possession.

Angora has long been celebrated for its breed of goats, which yields the valuable mohair of commerce, and which exists only in a tract of country extending

for about a distance of 30 miles round Angora. The annual export of mohair from the district is estimated at 500,000 okes, equal to 1,254,400 lbs. If we estimate the annual fleece of each animal at 3lbs., it would show that there are about 400,000 of this breed of goats in that district. Of these, some flocks are said to excel even those of Angora. Goats with fleeces of the highest lustre are found at Castambul, those of Angora being only second in quality, and those of Beibayer third, the breed being nearly the same in all the three places mentioned.

The climate of this district, which lies nearly 2000 feet above the sea, is peculiarly favourable to the growth of long silky hair, so much so, that greyhounds and even cats found there are said to have remarkably long silky coats.

The colour of the Angora goat is invariably pure white, and its long silky fleece, which hangs in curly locks, grows with wonderful rapidity, it being no uncommon thing in the best specimens for the full fleece to hang so low as to touch the ground. I have before me some specimens of hair of about six months growth, produced in the Wimmera district, and which measure $6\frac{1}{2}$ to 8 inches in length.

The produce of some of the superior flocks was so highly valued at one time, that its exportation was a capital offence, it being preserved for the manufacture of fabrics for the seraglio of the Grand Signor. The common kind is used in the manufacture of camlets in the Levant, and a large quantity is exported in the form of thread, and sent in caravans to Smyrna, to be shipped to Europe. A prohibition formerly existed against the export of the hair in a raw state, probably

with a view to afford additional employment to the population of the country, but now a large quantity is sent to England, France, and America. The fleece of the Angora goat is called at Angora 'tiftik,' Turkish for goats' hair.

In a paper written by Captain Conolly, read before the Asiatic Society, in January 1840, the country in which the Angora goat reaches perfection is described as "consisting principally of dry chalky hills, on which there are bushes rather than trees, and these chiefly of the dwarf oak, or else of valleys lying from 1,500 to 2,500 feet above the level of the sea, which are quite bare of trees, and but scantily covered with grass. In this expanse of country there are districts that produce finer fleeces than others, such as Ayash, Beybazaar, and Yoorrook. These are districts where the goats are mostly kept on hills, and the natives attribute a general superiority to mountain flocks, which live in a rarer atmosphere, have more leaves and a greater choice of herbs, for which nevertheless they are obliged to range widely, and so are kept in health, on which the quality of their coats mainly depends. The finest fleeces are said to come from the Yoorrooks, roving tribes who keep their flocks out day and night throughout the year, except when an unusual quantity of snow falls, so that their fleeces are not soiled. The fleece of the two-year-old she goat is considered the best, that of the males being somewhat inferior. Good common tiftik sells at Angora (1840), at 8d. per pound, and the finest picked fleece at 1s. per pound. Skins well cured, with the curly fleece, sell for rugs and saddle cloths, at about £1 at Angora, and £1 10s. at Constantinople."

Great care is taken by some flock-masters in

combing out all burrs, seeds, or other impurities, and in a careful washing of the fleece. The processes of spinning and weaving, as described by Captain Conolly as usual at Angora, are very primitive. The yarn is said to be much superior in the melon season, from the mucilaginous quality imparted to the saliva by eating that fruit. The spinning of the thread is done by women, but the fabrics made from it are manufactured by men, who stretch their warp in the open air, on a level space by the bank of the river, and prepare it for the loom by a dressing of a glutinous liquor called "chirish," made from a plant of the Asphodel family, which grows plentifully on all the high lands of Armenia. The chirish liquor is squirted or blown on to the web. It has a sweetish and not disagreeable taste, but is said to destroy the teeth.

Socks and gloves of the finest texture are knitted by the women, from the tiftik yarn. Some of these were so ingeniously wrought as to puzzle the English manufacturers to know where the work had been begun or ended. Permission is now freely given by the Turkish Government to export raw tiftik, and a large quantity is annually sent away to various European and American ports.

A mistaken impression exists in Australia, and also in America, that the Angora and Cashmere goats are identical. The two breeds are as distinct, however, from each other as the Leicester sheep is from the Merino. The Cashmere goat is valued for the production of a very small quantity of extremely fine wool, called "*pushm*," a sort of downy undergrowth, which lies at the roots of the long coarse hair with which the

animal is covered, and which hair is of little value. The wool on the contrary is exceedingly valuable, and worth from 5s. to 7s. per pound. The wool sheds naturally in the spring of every year, and is then carefully combed out, but is much matted and intermixed with the coarse hair of the outer coat. The hair is afterwards shed. In some breeds the goats yield two fleeces in the year.

This variety of goat is found on the highland slopes of the Himalayas, and in the valleys of Thibet and Cashmere. It is a very handsome animal, and is more prolific than the Angora goat, the female generally producing twins. Its colour is white, with bluish or reddish patches on the neck and shoulders, or sometimes almost pure white, with a rich reddish or golden tinge on the surface of the fleece. The wool is white or a light brown colour.

From the recorded results of experiments in crossing the Angora and Cashmere goats, I at one time intended to try this cross, with a view to increase the yield of shawl wool or under-down, and get rid of the outer hairy coat. That this is no chimerical idea may be inferred from the fact that nearly all the wild breeds of sheep have a double coat of hair and wool. Some breeds of African sheep have skins covered with short hair like that of a horse, with scarcely any wool. The Moufflon of Corsica, and the Argali of the Caucasus, or its near relative the Argali or wild sheep of the Rocky Mountains, have long coarse hair with an undercoat of wool. Some domesticated breeds, such as the Orkney and Shetland sheep, still retain their outer coat of coarse hair. Kempy hairs on some of the best Merinos occasionally appear

CASHMERE AND THIBET GOATS.

and indicate their descent from an ancestor with a double coat of hair and wool. When, by man's skill in selection, together with other influences to which the sheep has been subjected, the outer hairy coat has altogether disappeared in our best sheep, why may not the Cashmere goat be similarly modified, so as to be more suited to the wants and requirements of man? From the great value of both pure breeds, I have hitherto refrained from making this most interesting experiment until they should increase to a larger number, when a few could be spared for this object. In the Cashmere goats, I have endeavoured to obtain by selection one uniform colour, by the use of pure white bucks with the golden tinge referred to. I have hitherto kept the breed scrupulously pure.

I have on the Wimmera a small flock of these beautiful animals, descended from an importation of a male and two females, brought from India by the agent for the Peninsular and Oriental Company, at a cost of about £200. I have at various times combed out small quantities of the shawl wool or under down, but, from having only a small number, did not obtain a sufficient quantity to enable me to test its market value.

A number of Cashmere goats were introduced into Victoria about the year 1863. The animals were brought by Dr. Chalmers from Chinese Tartary, and travelled a distance of 2,000 miles overland to Calcutta, having been nine months on the road. One-half of the flock was lost through being delayed at Calcutta in waiting for a vessel, the moist heat of the tropics proving fatal to them. Of the other moiety, only 49 were landed in Melbourne, and more than one-half of these perished soon after from the effects of the con-

finement, the long sea voyage, and the hardships to which they had been subjected on shipboard.

The half of the cost of this experiment was borne by Mr. McCullough of Maryborough, to whom the whole of the goats of this breed were afterwards sent. In the Annual Report of the Acclimatisation Society, for the year 1866, it was stated that the attempt to acclimatize the Cashmere goat had proved a failure, from which I conclude that this flock had not proved successful at Maryborough.

The exquisitely fine Cashmere shawls imported from India, in which ladies so much delight, are manufactured from the wool of the Cashmere goat. A first-class pair of Cashmere shawls will cost £300 to produce. Baron Hugel gives the items of cost as follows:— "Labour of 24 artisans for 12 months, £180; materials and dyeing, £30; duty, £70; and charges of the establishment, £20; total £300."

British and French manufacturers are now competing successfully against cheap Asiatic labour, by the extensive use of labour-saving machinery, and shawls little inferior to the real ones from Cashmere are sold at a much less cost. The scarcity of the material is a great difficulty, but much of the finest description of Australian Merino lambs' wool is believed to be used instead of or mixed with the real Cashmere shawl wool.

An attempt was made by a French gentleman, M. Ternaux, who, assisted by the intrepid traveller Jaubert, selected and purchased a flock of the pure Cashmere goats, and introduced them into France, with the object of doing away with the necessity of importing the raw material. M. Ternaux not being able to give that attention to the flock which they required,

and which the importance of the experiment demanded, it was sold and dispersed, and the best specimens were picked up by M. Polonneau, who desired to experiment upon the cross between this breed and the Angora. His object in making the experiment was to produce an animal with the wool or down more abundant than that of the Cashmere breed, and with the hairy coat more silky and finer. The experiment was said to be successful. The wool or down of the first cross had twice the length of staple of that of the pure Cashmere goat. M. Ternaux was of opinion that the fleece of the cross between the two breeds, in consequence of its special qualities, would have produced fabrics superior to the most beautiful of those hitherto introduced. Unfortunately, the final results of this interesting experiment are not recorded.

Mr. Southey, the author of a valuable work on Colonial sheep and wools, is of opinion that the fleece of the cross between the Angora and Cashmere goat would be extremely valuable for various purposes.

The late Prince Albert had a small flock of the pure Cashmere goat at Windsor. With the enlightened foresight for which he was distinguished, he was always in the van when any good work could be done for the benefit of agriculture or the increase of the prosperity of the people of England. Desiring to have some fabrics manufactured from the fleece of his Cashmere flock, a quantity of the wool and hair as it was shorn from the goats was sent to a large manufacturer. The separation of the wool from the hair being at that time, from the imperfection of the machinery in use, a very difficult operation, a great number of ladies assisted the manufacturer, by taking small portions of

the fleece and picking by hand the wool from the hair. Such was the enthusiasm caused by the experiment, that over a thousand persons of all grades and conditions were engaged in the work. Each person so employed received, as remuneration, an elegantly engraved certificate, stating that the holder had assisted in bringing to a successful result the experiment of His Royal Highness in the manufacture of Cashmere goats' wool. Some brocades and two beautiful shawls were produced by Messrs. Haley, the manufacturers, and the hair was also made into a coarse fabric, which was shown in contrast with the finer textures.

Notwithstanding the success of this experiment, and the high value of the exquisite textures made from Cashmere wool, I am far from thinking the Cashmere goat of equal value, in an economic point of view, to the Angora. The immense amount of labour required to free the Cashmere wool from coarse hairs, and the very small quantity of wool produced by each animal, are difficulties that are not to be surmounted easily.

I do not think it impossible for a skilful breeder to improve the Cashmere goat, so as to clothe it with a fleece all of which should equal the shawl wool "pushm," or under down. There is little doubt that, by selection, the wool might be increased by slow degrees, and the kempy hairs lessened, until a wool-bearing animal with a fleece finer than the finest Merino wool, and as free from the kempy hairs of its early progenitors as is the champion Merino at Skipton or Mudgee (where the best specimens of the Merino in the world are to be seen), from the hairy mantle of his ovine ancestor, the Argali of the Caucasus.

Possibly the result might sooner be reached by a

cross of the Angora, producing a variety of intermediate forms and making the breed more plastic, and lessening the force of heredity, giving more scope for selection. Of cross breeding, however, I am not an admirer, and think the desired end is to be attained in a more satisfactory way, by a long course of selection, carried out in an intelligent manner, and with a fixed purpose kept constantly in view. Have we no skilful breeder in Australia who will undertake this task, and bequeath it to his children, if incomplete in his lifetime? But let us return to our main subject, the Angora goat, many of the good qualities of which have yet to be told. We have it on the authority of M. Polonneau, that the milk of the Angora is superior in quality to that of any other breed of goats, besides being produced in greater quantity. It makes an excellent cheese, and the butter from it is free from the rank flavour of that made from the milk of the common goat.

A comparative analysis made by M. Barruel, principal chemist to the Faculty of Medicine, Paris, of the milk of the half-bred Angora and that of the common French breed, shows conclusively the ameliorating influence of the cross. This may be partly due to the increased vigour which the first cross usually gives. The butryaceous, caseous, and saccharine properties of the milk from each breed are given below.

HALF-BRED ANGORA.

Butter - - - -	7.85
Cheese - - - -	37.00
Saccharine matter - -	33.25
Extractive matter - -	8.50
Water - - - -	913.40
	1000.00

THE COMMON GOAT OF FRANCE.

Butter - - - -	5.00
Cheese - - - -	32.50
Saccharine matter - -	24.25
Extractive matter - -	7.50
Water - - - -	930.75
	1000.00

Mr. W. E. Riley, who has written a pamphlet on the subject of the introduction of the Angora, says of this animal, "that it is content with food that the sheep or cow rejects, and is capable of thriving on land and in situations not adapted to other stock. The Angora may be considered an interesting as well as a valuable addition to every farm, and when the common goat can be replaced by a variety possessing not only all its own ordinary qualities in a superior degree, but also producing so desirable a material for manufacture, landed proprietors may be induced to consider the propriety of acquiring the Angora for its own merits, as well as for crossing with the whole of their at present comparatively useless breeds. Hereafter, the wool of the goats of Australia, if their improvement be pursued with any portion of the zeal and perseverance with which the squatters have ameliorated and advanced the worth of their flocks, may become an additional and remunerating export that will annually increase in quantity and value, the benefit of which is open to every agriculturist in Australia."

Having now given the Angora its due meed of praise, it is only right that something should be said as to any drawbacks there may be connected with it. The chief difficulty in its management consists in the

great activity of the animal, rendering its confinement to any field or pasture difficult. I have known a number of Angoras brought into a woolshed to be shorn; they came in quietly enough, but when the shearers commenced to catch them for shearing, they speedily bounded over all the divisions between the pens, and were outside the woolshed, over gates and fences in a few seconds. I have brought a small flock into a yard or pen, of which a slab hut with bark roof formed one fence: on commencing to earmark the kids, which were two or three months old, one of them made two or three bounds, and in as many seconds was calmly looking down on me from the ridge of the hut. To get on the top of a post and rail fence, and walk along it for a few panels, would be no difficult feat for them.

Their ability to subsist on poor pastures, has been mentioned, but in my experience, no animal that has not sufficient nourishment will produce either a good fleece or much profit to the owner, and it is poor economy to keep any animal on an insufficient supply of food.

In the year 1856, the first importation of Angora goats into Victoria was successfully accomplished. They were seven in number, being the survivors of a larger number shipped. Mr. Sichel, a merchant of Melbourne, had heard of their successful introduction at the Cape colony, and learning that they had increased and thriven well in that climate, he determined to introduce them into Australia, and after considerable difficulties, a small flock was secured by an agent at Broussa, near Trebizond, which was shipped by way of Constantinople to London, where the goats were transferred to a vessel sailing for Port

Phillip. Soon after their arrival they were purchased by Baron von Mueller for the Zoological Committee, and afterwards transferred to the care of the Acclimatisation Society. In 1863 this Society, in return for some specimens of the fauna of Australia, including a wombat, was presented by the Imperial Acclimatisation Society of France with 12 pure-bred Angoras of a very high class. These arrived safely, and were added to the little flock at the Society's grounds at the Royal Park. The flock was too small, however, to be of much practical use to the colony, and soon after the Acclimatisation Society took the matter warmly in hand, and Dr. Black, the President at that time, by his energy and perseverence, succeeded in inducing the Council to vote a sum of £600 towards the cost and expense of importing a sufficient number to establish the breed in the colony within a reasonable time. Mr. McCullough, of Maryborough, a gentleman who had taken a great interest in the introduction of both the Cashmere and Angora goat, added a like amount of £600, for the purchase of a number on his own account.

In 1865, a special agent, who was acquainted with the qualities of the Angora, was sent by Mr. Philpott, who acted as agent in London for the Acclimatisation Society, to Asia Minor, to select and purchase as many pure Angoras as the funds at command would permit. The goats were obtained in the neighbourhood of Broussa, and were driven to the port of Smyrna for shipment. Before their embarkation at Smyrna, the cholera unfortunately broke out at that port, and caused great delay, besides adding considerably to the expense of the undertaking. Ultimately, the goats were landed in London, and re-shipped for Melbourne, where they

arrived early in the year 1866, after a tedious voyage of 127 days, with a loss of only two on the voyage. Mr. McCullough sold his moiety of the flock to the Acclimatisation Society, the number landed being 93 in all, costing the Society an average of about £16 per head.

It will thus be seen that the introduction of the Angora goat into Victoria is mainly due to the exertions of the Acclimatisation Society.

The flock originally imported has now increased in numbers very considerably. At various times, sales of pure-bred males and females were made, with the object of introducing them into different parts of the country, and there are now several small flocks of these valuable animals doing well and giving great promise of success.

In selecting animals for sale the improvement of the original flock has always been kept in view, and the result of careful selection, not only of the best of the bucks for use in the flock, but of the best of the does as a stud flock, has been to greatly improve the high quality which the flock had already possessed.

In 1870 it became evident that the limited pastures at the Royal Park were insufficient for the rapidly increasing numbers of the flock of Angoras, and it was decided by the Council to send them to the Wimmera. A large number were sold and some were exported to the neighbouring colonies, where several large flocks are now established. The price at which they were disposed of, £5 5s. each, though much less than their actual value, was fixed at that amount with a view to their being distributed over the country, and to place them within the reach of settlers of limited means.

The amount realised was also of service in furthering the other important objects of the Society.

It is in my opinion a matter to be regretted that the Council adopted this course, instead of retaining the whole flock under their own control. From an estimate of the probable increase which may be obtained by careful management, to be found further on in this report, it will be seen that great results might have been attained much sooner had the Council retained the whole of the flock in their own hands. Scattered pairs of Angoras get mixed up with the common breed, and are practically lost as regards any benefit to be derived from them, but if kept together in a body in one district, the great value of their fleece will enable them to drive out and supersede the comparatively worthless common goat.

The flock was carefully culled by Mr. Jonathan Shaw, an experienced and skilful classer of Merino Sheep, and all inferior animals were taken out and disposed of. The choice animals, in number about 50, a magnificent flock, were sent off by railway to Ballarat, and were driven by easy stages to Longerenong, in the Wimmera district, where they arrived about the middle of December, 1870. They were in low condition on their arrival, from the effects of a parasite with which they were infested, and I had them twice dipped in a solution used for sheep similarly affected. They rapidly improved in condition, and have since then always been in the most thriving state.

The system adopted by me in the management of the flock, was to number all the bucks and does, each goat having a permanent number to distinguish it from every other. This was effected by a system of marks

on the ears of the animals, which system I had already adopted with my pure Merino flocks. It is essential, where great care in breeding is requisite, to be able to distinguish individuals having noteworthy qualities, whether desirable or the reverse. It is not always possible to distinguish individuals in a flock of sheep or goats after being shorn. The qualities which make them remarkable, lie, as a rule, in their fleeces, and when shorn, a permanent distinguishing mark is of great service. Various systems have been tried to effect this object. With rams, a plate with the number engraved or stamped upon it, is sometimes inserted in a horn of the animal, but this plan is unsuited for ewes or sheep without horns. A small brass plate stamped with the number has also been tried, suspended from an ear-ring, but in practice the ring was found to cut the ear, either from the weight of the plate with the number, or from being torn off by twigs or bushes. A plan adopted by the late Captain Macarthur, of Camden, who was the first in Australia to appreciate the value of the Merino, was to have a leather strap with a metal number attached. This was liable to the objection that the buckle and strap got worn and fell off, and if not, it was somewhat in the way of the growing fleece, and also at shearing time.

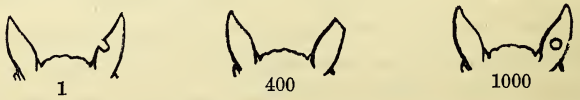
I once hit upon an invention which seemed to meet all the difficulties of the case; it consisted of a pair of brass pincers, with numbers and letters which could be inserted, like type in a composing stick, to four figures. The letters or figures were tattoed into the inside skin of the ear. The outline of the letters or figures were made by needle points, and a tattoo mark was left, by rubbing Indian ink or gunpowder into the punctures. I tattooed

my pure Camden flock of sheep in this way, but found that although the numbers were quite distinct on the ears of some of them, the brown freckled skin in the inside of the ears of others prevented the numbers from being legible, and I was obliged to give up the plan.

The system I finally adopted is the invention of a German breeder of the Merino, named Von Thaer, and like many valuable inventions, it is remarkable for its simplicity. By the use of three simple marks made on the sheeps' ear with a knife, and pincers something like those used by railway guards, and by combinations of these marks, numbers from 1 to 10,000 can be indicated, and the system when properly understood is so simple, that an intelligent shepherd or boundary rider can learn to read the numbers in twenty minutes, and with almost as much ease and certainty as if written in figures. As this statement may seem puzzling to some, I will explain how it is effected.

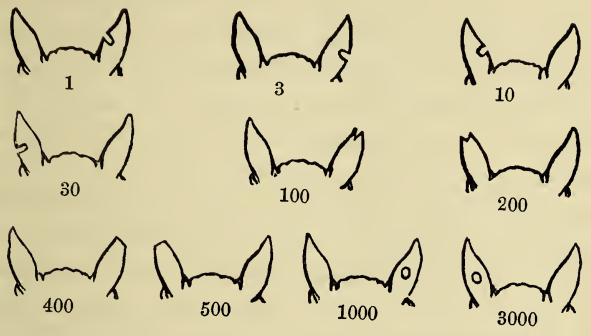
The three marks consist of: 1st. A notch such as a railway-guard makes in a ticket. 2nd. The tip of the ear cut square off. 3rd. A hole in the ear. To each mark an arbitrary value is given, according to its position on the ears of the sheep, and the sum of such values represents the distinguishing number of the individual.

The three marks and their values are given below, in a rude drawing of a sheep's ears.

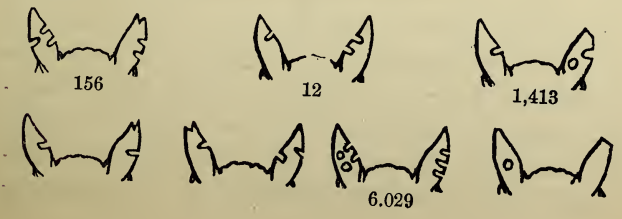


By varying the position and increasing the number of these marks, different numbers are indicated. I

will give below the leading numbers from which all the others are made up by addition.



From an inspection of these figures, it will be seen that any number up to 10,000 can be readily indicated. The position of each mark gives its value, that is, whether a notch be on the back, front, or top of the ear, or on the right or left ear. Two back or front notches have double the value of one. Two back notches on the left ear count 6. Two back notches on right ear, 60, or 30 each. The low numbers begin at the animals left ear, and the high numbers go from left to right, or from right to left looking at the animal's face. A few examples of ears numbered as in actual practice are given below, and three left without figures attached, that the system may be clearly understood by actual practice.



A notch on the front of the left ear stands for number one; two front notches on the same ear signifies number two; a back notch on the left ear is three; one notch in the front and one in the back of the left ear signifies four; the other numbers up to nine are made up by combinations of the front and back notches on the left ear. A front notch on the right ear signifies ten, and a back notch on the same ear thirty. Combinations of these two notches signifying ten and thirty respectively, brings the number up to ninety-nine. A notch on the tip of left ear stands for 100; a notch on the tip of right ear 200; these two together, 300. The second mark now comes into use, which is, the tip cut square off the left ear, for 400. The tip cut off the right ear is 500; this mark, with the notch on the top of the left ear, makes 600. The tip square off both ears, is 900. The third mark is then required, which is one punch hole in the left ear for 1,000, and a hole in the right ear for 3,000. Combinations of these two, and the other marks, brings the numbers to 10,000 or more if required.

None of these marks interfere with the others, each having its own proper place. If neatly done, with a suitable pair of pincers, which I have had made to order, there is little noticeable mutilation of the ears. In practice, it would not be found necessary to number more than a few hundreds of the choicest animals, but the system is perfect up to the number mentioned, and for ingenuity, simplicity, and effectiveness, cannot be surpassed. I need not point out to the breeder of high-class stock the benefit to be derived from this system of numbering. It enables him to identify each individual in a flock with certainty, and to select any

particular strain of blood in the progeny of any remarkable male or female. Along with the numbering a register must be kept. This should have columns for the number of sire and dam, and for the qualities of each individual, as a guide to selection. The leading qualities may be those for which the breed is valued, as for instance, density, length of staple, lustre or silkiness, weight of fleece, size, form, &c. &c. The relative proportion of each quality may be expressed by numbers, ranging from one to five, the average or medium proportion of each quality being expressed by three.

The ears of the Angora do not appear as shown in the woodcuts. The animal is lop-eared, this peculiarity being a proof of its long domestication; the muscles which are called into play in erecting the ear having become comparatively powerless by a lengthened disuse. The ears of the Angora vary very much in size in different individuals, being very small in some, as occurs in what are called "mouse-eared" sheep, and varying through all the intermediate gradations up to a very large size. There is also a kind of suture, or keel-like seam, which runs up the centre of the ear of many of them. Some breeds of goats have ears 19 inches in length and 4¾ in breadth.

I am aware that at least one eminent breeder of stock in this colony is of opinion that selection amongst pure-bred stock is of little or no benefit, but the practical experience of all great breeders, from the days of Jacob down to the present time, testifies strongly in favour of its value. In skilful hands, it is the magician's wand which brings to light new forms of animal and vegetable life. A Bakewell gives us by its aid a

Leicester sheep formed after an ideal pattern, and so well adapted to the wants of the sheep-breeders of the place and time, that one individual of the breed is let for £1,000 for one year's use. A skilful florist, by selection, creates a double geranium unknown before. A rare combination of two superior strains of racehorses produces an 'Eclipse.'

A few instances of what has actually been done by selection may here be of service. They are taken from the *Gardener's Chronicle*, and from the *Transactions of the Horticultural Society*. The Rev. W. Williamson, after sowing the seed of the *Anemone Coronaria* for several years, found a plant bearing flowers with one additional petal; by sowing the seed of this and continued selection, he obtained several varieties, with six or seven rows of petals. The single Scotch rose was doubled, and yielded eight good varieties in nine or ten years. The Canterbury bell (*Campanula Medium*) was doubled in four generations. The beet-root, grown for the production of sugar in France, has yielded since its improvement in cultivation almost exactly double the percentage of sugar. This improvement has been obtained by testing the specific gravity of the roots, and retaining the heaviest for the production of seed.

It is recorded in the *Poultry Chronicle*, that Mr. Wicking, a pigeon fancier, in thirteen years, put a clean white head on an almond tumbler's body.

These and many other triumphs of the selector's art prove the potency of skilful selection in obtaining and perpetuating any desired quality.

The numbering of pure stock and registering of their pedigree has the advantage, from any point of view,

that it is a guarantee that care has been exercised in their breeding.

The great fundamental rule in the breeding of stock is, that *like produces like or the likeness of some ancestor.* It is found that the offspring generally bears a resemblance to the parents, and where these differ materially, the offspring is intermediate between the two, in their specific qualities and in general appearance. It often happens, however, that the progeny resembles neither of the parents, but is like the grand parents or some still more remote ancestor. Instances of this are frequently seen in the black and spotted sheep that occasionally appear in flocks that have not been long subjected to rigorous selection, and which are instances of *reversion* or *throwing back* as it is called, to some remote progenitor, which existed before the race had been so far improved as to breed true to one colour. This principle is also called *Atavism*, from *Atavus*, an ancestor.

Careful selection and breeding to one type for a long number of generations, will, in each generation, increase the chances or probabilities that no departure from the selected type will take place. It is not to be supposed that, although we look upon the matter as a subject of chance, that it is any such thing in the proper acceptance of the term. All events are regulated by natural laws, instituted by the Creator of the Universe. The turn of a die is regulated by the amount of force expended upon it in a particular direction, the friction it is subjected to, and other causes. From want of knowledge of these causes, we are accustomed to call the result chance. It is but rarely that future events can be predicted with certainty, but

mathematicians tell us that the chance of an event happening when the operating or controlling circumstances *as far as we can know them* are given, is always susceptible of an accurate evaluation, and a numerical measure can be determined of the degree of the defect from absolute certainty. This theory is called the Doctrine of Chances or Probabilities. This doctrine has its origin in our want of knowledge of all the causes operating to produce certain effects, and would not exist were these causes fully known to us. Let us apply this theory to the question of breeding by selection.

If each ancestor of any pair going back for thirty generations, has been carefully selected to one type, the progeny of this pair must "throw back" thirty-one generations, if any variation from that selected type takes place. If we calculate the number of ancestors that an individual can have in thirty generations, which is a problem in geometrical progression, and by the algebraic formula for ascertaining the sum of the series, we find that they reach the enormous number of 2,147 millions, and according to the doctrine of probabilities, the chances are 2,147 millions to one that no departure from the selected type will occur. But the chances are in a still greater proportion in favour of the selected individual remaining true to the desired type, because out of the 2,147 millions of ancestors, some of the same individuals would probably be repeated over and over again in the pedigree, as we see in the pedigrees of pure short-horn cattle, and thorough-bred horses.

All carefully selected stock are of necessity closely bred, the best individuals being usually selected for continuing the breed. In most cases in-and-in breeding

is also more or less practised. The effect of this obviously must be to concentrate the desired quality in the progeny. Suppose a case of a champion ram of great excellence ; he is put to a number of the best ewes selected out of the flock, and probably related to him in a more or less remote degree, his progeny, according to the rule of inherited qualities, are one-half at least of his breed. If he is again put to the ewes of his progeny, the lambs from these will be three-fourths of his breed. If this be continued to a third generation, the progeny would be seven-eighths of his breed. The chances of obtaining the desired type would in the last instance obviously be greatly increased.

Thorough-bred or pure-bred stock are valued because they have a greater pre-potency or power of marking their likeness or the likeness of the breed upon their offspring, than have the best looking specimens of ordinary stock. Pure-bred animals are those that have descended from a long line of ancestors, carefully selected to one type, which has, by such continued selection, become the fixed type of the breed.

In regard to the question of the various breeds of domestic animals and their origin, I would desire not to be considered as ignoring the effects of climate, food, and other circumstances, and those principles of natural selection so well illustrated by Darwin in his writings, and which are so potent in changing and modifying the different forms of animal and vegetable life, but these processes are slow in their effects in comparison with the changes man can and has effected by selection. The careful breeder should, however, study to have the natural agents on his side if possible, otherwise the

attempt to improve the breed will be a very tedious and difficult undertaking.

The question of in-and-in breeding is one which has caused great discussion amongst breeders of stock. The subject is beyond the scope of this paper, but has been very fully treated in Darwin's very valuable work, entitled, "Animals and Plants under Domestication."

I would not here be understood as endorsing Mr. Darwin's deductions and conclusions in every instance. He is, however, entitled to the highest honour for the amount of labour he has expended in the collection of facts bearing upon the subject of which he treats. As Professor Tyndall well remarks, in one of his latest lectures, "A very high value should be attached to ideas which spring from the patient and profound thought of superior minds, and not mere guesses without the warrant of careful study or natural capacity."

Darwin's conclusions on the subject are, "that the consequences of close inter-breeding carried on for too long a time, are, as it is generally believed, loss of size constitutional vigour and fertility, sometimes accompanied by a tendency to malformation. It should however be clearly understood, that the advantage of close interbreeding as far as the retention of character is concerned, is indisputable, and often outweighs the evil of a slight loss of constitutional vigour. Manifest evil does not usually follow from pairing the nearest relations for one, two, three, or even four generations. It is a great law that all organic beings profit from an occasional cross with individuals not closely related to them in blood, and that on the other hand, long continued close interbreeding is injurious. The opinion of Mr. Bates, a celebrated

breeder of shorthorns, was, that to breed in-and-in from a bad stock is ruin and devastation, yet, that the practice may be safely followed within certain limits, when the parents are descended from first-rate animals."

The great value of the Angora goat consists chiefly in the high quality of the beautiful fleece in which it is clothed. This sometimes realises as much as 4s. per pound for the choicest portions. The last clip from the flock belonging to the Zoological and Acclimatisation Society, now running at Longerenong, sold for 3s. 6d. per pound all round, including pieces and locks. There was also a proportion of inferior quality from breeding does and old crones included in this average. With proper classification, which can be done to better advantage when the flock has increased sufficiently to give a bale of each sort, a better price would no doubt be obtained, especially for the higher qualities.

The annual fleece of the Angora is from 3 lbs. to 9 lbs. of mohair washed snow white. There is very little grease or yolk in it before it is washed, and the discolouration arising from dust adds but little to the weight of the greasy fleece, as compared with the same when spout washed.

If we compare the Angora and Merino sheep as regards the comparative value of their fleece, it will be seen that the comparison is greatly in favour of the Angora, were both obtainable at the same cost. The average fleece of the Angora, if estimated at 4 lbs. at a price of 3s. 6d. per lb., would make the value of the fleece equal to 14s. per head, while a Merino, which would give a fleece of spout washed wool of say $3\frac{1}{2}$ lbs. worth 2s. 6d. per lb, would only yield 8s. 9d. per head, showing 5s. 3d. per head in favour of the Angora. From

experiments carefully made to ascertain the quantity of food consumed by each animal, it was found that six Merino sheep eat as much as seven goats.

A large quantity of mohair is imported into France, England, and the United States. One mill alone in New York imported in one year from Constantinople 210,000 lbs., and the supply is quite inadequate to meet the demand. The export of this article might become of great value to Australia, were the many thousands of almost valueless goats which are found scattered over the country and at every township, replaced by the Angora. That this change will in time be made there is little doubt, but it would hasten this very desirable object if the managers of town and other commons were to obtain pure bucks of the Angora breed for the use of the goats running on these commons, and allow no other males to mature.

It is found in practice that the progeny of the fourth cross produces a very marketable fleece. In theory, no grade of the cross-bred goats can equal the pure breed. When the tenth cross is reached, however, only about a thousandth ($\frac{1}{1024}$) part of the common blood remains, and it would require a very skilful eye to distinguish between this grade and the pure Angora.

A very valuable importation of Angora goats has recently been made into South Australia for Mr. Price Maurice. These are said to include specimens of the most noted breeds. It would, I think, be advantageous to the flock belonging to the Zoological and Acclimatisation Society, if a few specimens of the best of Mr. Maurice's flock were obtained to renew the breed, provided that on their arrival they should prove superior to

those in this colony, and in any case, it would be interesting to compare them with the Society's flock. Mr. Maurice could get a similar number in exchange.

The flock of Angora goats now on the Wimmera is 108 in number, besides a few young kids. From calculations carefully made, and which, as well as other figures in this paper, have been verified by Professor Strong of the Melbourne University, this small flock, if carefully managed, and sufficient pasture allowed to it to graze upon, will, at the ordinary rate of increase, reach in thirty years, the very large number of 442,368. This number should be sufficient to displace most if not all the common goats in the colony. In forty years, at the same rate, the pure flock would increase to over seven millions.

The pure flock should, if possible, be kept in one district and not scattered about. From this point, as a centre, the great profit to be obtained from them should enable them to push their way and drive out the common goat. The above estimate of increase I arrive at by the simple calculation of doubling the number of the flock every two and a-half years. This was found to be about the rate of increase which sheep were observed to make on their first introduction into Australia. I have reason to believe that the Angora will, with care, increase in an equal ratio.

The calculation is as follows, showing the estimated number at each period of two and a half years :—

Present number of flock	108
	2
Estimated number in 2½ years	216

Estimated number in		$2\frac{1}{2}$ years	216
			2
,,	,,	5 ,,	432
			2
,,	,,	$7\frac{1}{2}$,,	864
			2
,,	,,	10 ,,	1,728
			2
,,	,,	$12\frac{1}{2}$,,	3,456
			2
,,	,,	15 ,,	6,912
			2
,,	,,	$17\frac{1}{2}$,,	13,824
			2
,,	,,	20 ,,	27,648
			2
,,	,,	$22\frac{1}{2}$,,	55,296
			2
,,	,,	25 ,,	110,592
			2
,,	,,	$27\frac{1}{2}$,,	221,184
			2
,,	,,	30 ,,	442,368
			2
,,	,,	$32\frac{1}{2}$,,	884,736
			2
,,	,,	35 ,,	1,769,472
			2
,,	,,	$37\frac{1}{2}$,,	3,538,944
			2
,,	,,	40 ,,	7,077,888

By calculating the rate of increase at eighty per cent. yearly on the number of does of an age to produce kids, and making the proper allowance for deaths from age and other causes, the result would be still greater, and the above calculation would seem moderate in comparison. As a matter of fact, the flock has actually been doubled in number by natural increase in the first two years, and with sufficient pastures and proper care and management, would doubtless reach the large number of 442,368 in the year 1903, and upwards of seven millions in the year 1913, or forty years hence.

The value of the clip at present prices, and estimating each fleece at 4 lbs., would reach the large sum of £309,657 in 1905, and in 1915, the enormous amount of £4,954,521, or nearly five millions sterling. Any great increase in the number of Angoras over the number of goats at present in the colony, would naturally cause a proportionate decrease in some other description of stock. A lessened value of the staple would also no doubt be established by such a great increase in the production of mohair, which would lessen the value of the annual production of the article.

Herewith is given a table showing weights of fleece of each individual in the flock. On account of the shearing having been delayed the second time, through fear of causing injury to the does that were heavy with young, a good deal of hair was lost. This will be seen by the very small yield given by some of them, while some had cast their fleeces and were not shorn at all. When this is taken into account, the average clip will considerably exceed 4 lbs. annually of spout-washed mohair. Care will be taken to prevent loss

from the cause mentioned in future, but at this stage of the experiment, a slight loss of the fleece is of less consequence than a good increase and the safety of the flock.

STATEMENT SHOWING WEIGHT OF FLEECE OF THE PURE ANGORA GOATS.

SHORN MAY 11TH, AND OCTOBER 28TH, 1872, AT LONGERENONG.

Shorn October 28th, 1872.			Shorn May 11th, 1872.		
No. of Goat.	FEMALES.	Weight.	No. of Goat.	FEMALES.	Weight.
		lbs. ozs.			lbs. ozs.
1	...	1 12	1	...	1 5½
2	...	2 7½	2	...	1 6
3	...	2 13	3	...	0 8
4	...	4 6	4	...	2 4
5	...	2 1½	5	...	0 15½
6	...	2 3½	6	...	1 5
7	...	2 8	7	...	2 11
8	...	3 1	8	...	1 8
9	...	3 5½	9	...	0 9½
10	...	2 15	10	...	1 5
11	...	1 4½	11	...	0 5½
12	...	2 15	12	...	1 5
13	...	1 8½	13	...	0 13
14	...	1 14¾	14	...	1 1
15	...		15	...	0 7
16	...	2 8	16	...	1 1½
17	...	2 14	17	...	2 8
18	...	3 2	18	...	2 5
19	...	2 5½	19	...	1 2
20	...	3 5	20	...	2 0
21	...	1 4½	21	...	0 6
22	...	2 9	22	...	1 7½
23	...	2 3	23	...	0 14½
24	...	2 11½	24	...	1 0½
25	...	3 5	25	...	1 2
26	...	15½	26	...	0 5
27	...	2 5	27	...	0 4¼
28	...	3 2	28	...	
29	...	1 12	29	...	0 9
30	...	3 5	30	...	1 5
31	...	3 9	31	...	2 6
32	...	2 5	32	...	1 9
33	...	1 13	33	...	1 0
34	...	3 0	34	...	1 0

Shorn October 28th, 1872.			Shorn May 11th, 1872.		
No. of Goat.	FEMALES.	Weight.	No. of Goat.	FEMALES.	Weight.
		lbs. ozs.			lbs. ozs.
35	...	2 14½	35	...	1 1
36	...	2 5⅓	36	...	1 14½
37	...	2 11	37	...	1 1½
52	...	1 8	52	...	0 7½
53	...	2 6	53	...	1 13
54	...	1 14	54	...	
55	...	1 2	55	...	0 8
56	...	2 5	56	...	2 9½
57	...	2 4½	57	...	0 9
58	...	2 0½	58	...	0 14
59	...	2 11	59	...	
60	...	1 10	60	...	0 15½
61	...	2 3	61	...	1 12½
62	...	1 14	62	...	1 0½
63	...	2 14	63	...	1 5
64	...	2 0½	64	...	1 8
65	...	1 3⅓	65	...	
66	...	2 5	66	...	2 2
67	...	1 15	67	...	2 1½
		123 12½			61 13

Shorn May 11th, 1872.			Shorn October 28th, 1872.		
No. of Goat.	MALES.	Weight.	No. of Goat.	MALES.	Weight.
		lbs. ozs.			lbs. ozs.
1	...	4 12½	1	...	2 9
2	...		2	...	4 10
3	...		3	...	1 6½
4	...	3 8	4	...	2 4½
5	...	1 9½	5	...	1 11½
6	...	1 7	6	...	0 1½
7	...	1 11	7	...	2 14
8	...	2 12	8	...	2 10
9	...	2 5⅓	9	...	1 4½
10	...	2 2½	10	...	1 7½
11	...	2 4	11	...	1 9½
12	...	2 1	12	...	1 3
13	...		13	...	
14	...	2 5⅓	14	...	1 6½
15	...	2 7⅓	15	...	2 0
		153 0½			88 15

64 head, averaging 2 lb. 6¼ oz. 63 head, averaging 1 lb. 6¼ oz.
General average, 3 lb. 12½ oz. for twelve months' clip.

I have considered it expedient to shear the flock twice in the year, for the following reasons: The fleece has a tendency with many of the animals to fall off in the Spring and during the month of September. It usually gets somewhat matted also, if left on the animal for the whole year, and is consequently less valuable. By shearing twice in the year, the hair is free from felting and is not so much liable to damage from burrs and seeds, or from dirt, as when hanging to the ground or nearly so. The growth is probably stimulated also, by their being twice shorn, as nature makes an effort to provide for the wants of the animal. The second clip was not so heavy as the first, from having been delayed by the does commencing to lamb, and some hair was lost in consequence. Shearing twice in the year is not therefore a complete preventive of the loss of the fleece. It is better, however, on the whole to do so. The fleece being fully six inches long at six months growth, is long enough in the fibre for any purpose to which it may be applied by the manufacturer.

At Angora, the goats that are carefully tended, are combed occasionally to keep the hair disentangled, and their fleeces washed, to free them from impurities. I found it necessary on the Wimmera, to comb out the burr of the yellow clover and other seeds, which are very detrimental to the fleece. At the time when the does are having their kids, a good deal of attention is required. The latter are usually hidden by the mothers, and are very liable to be attacked by hawks, crows, or native cats. They are also somewhat delicate when young, and if the weather be wet and cold, they require some attention.

Judging by the prices obtained for the last clip sold, the quality of the fleece does not seem to deteriorate in the climate of the Wimmera. Mohair bears something of the same relation to wool that silk does to cotton, but its growth does not necessarily interfere with the production of wool, as the Angora will replace the worthless goat seen about every gold-field and town in the colony. The Angora will also thrive on barren ranges, scrubs, and heaths, where the sheep could not be depastured with profit. The beautiful fabrics made from its lustrous fleece are far more handsome and durable than those made of common wool. Its freedom from disease, its activity and endurance, and its ability to feed on shrubs, bushes, weeds, and even poisonous plants with impunity, give it a special value as the animal suited to the selector or the small freeholder with limited means.

Besides the fleece obtained annually or semi-annually from the Angora, its flesh, when in good condition, is not inferior to mutton. I have eaten the flesh of the half-bred, which could not be distinguished from mutton, even in the carcase, and which, on the table, was considered quite a luxury.

With a careful and scientific system of breeding and management, such as has been adopted with some of the best flocks of Merino sheep, a great improvement can no doubt be effected in the quality and weight of the fleece, thereby considerably increasing the profits to be derived from its cultivation. At times when the market for wool may be dull, mohair, from its length of staple, lustre, strength of fibre, and other valuable qualities, would realise considerably more in proportion than wool, and be a more reliable article of export.

Few countries are so favourably situated as Australia for an industry of this kind. The great extent of natural pastures for the feeding of stock, without the need of clearing or other outlay; the absence of beasts of prey, and the mild climate, rendering housing in winter or artificial feeding unnecessary, make this fair land well-named Australia Felix, the very *beau idéal* of a pastoral country.

It is stated by Mr. V. A. Niessen, that the hair from the half-bred Angora is worth a shilling per pound, that from the three-quarter bred one shilling and sixpence per pound, that of the third cross or seven-eighths bred would nearly equal in value that from the pure bred, and the fleece of the fifteen-sixteenths or fourth remove, would be quite equal to that of the sire in purity, lustre, fineness, and length of fleece.

The following letter to the President of the Acclimatisation Society, from the Hon. Robert Simson, a large sheepowner and a distinguished breeder of the Merino, will show his estimation of the value of the Angora.

"Leura, Toorak, 18*th February*, 1873.

"To the President of the Acclimatisation Society, Melbourne.

"Dear Sir,

"Herewith I enclose for your inspection, four samples of Angora wool, from my flock of Angoras now running at Langikalkal; they were shorn on the 15th Sept., 1872, and these samples were taken from the shoulders of four bucks on the 15th inst. No. 1 being the ram purchased from the Acclimatisation Society, and 2, 3, and 4, from his progeny.

"My flock of Angoras commenced with a few does, said to be three-quarter bred, imported from the Cape of Good Hope some years ago, which have been invariably put to one of the Society's rams; as a rule I have found the does bad mothers, as they will leave their kids when newly dropt to follow the flock, but if they are penned up for a few days, as I did with them this year,

they are excellent mothers; and had this practice been adopted from the first, my flock would now have been double its present number.

"I weighed the fleeces of the three best goats at last shearing, and they gave 17lbs. of spout-washed wool as white as snow, and last winter I killed two wethers full mouthed, which each weighed when dressed 80lbs., the flesh of which when put upon the table was pronounced most delicious, being more rich and juicy than the best Merino mutton.

"These goats are very hardy and require no looking after, except at lambing time; at all other seasons they take good care of themselves, and if one had a good sized flock of them, I believe they would prove more profitable than sheep.

"Knowing the interest you take in acclimatisation, I have taken the liberty of enclosing you these samples of wool from a private flock, to lay before the Society.

"I am, my dear Dr. Black, yours very truly,

"Robert Simson."

The samples of mohair enclosed with this letter were sent to me by Dr. Black for examination and comparison with that from the pure flock. The specimens were all of excellent quality, and excepting a greater degree of lustre, which those from the pure-bred Angoras exhibited, they appeared so equal in value as scarcely to be distinguishable from each other. On the question of the cross between the Angora and common goat, I am ready to admit that crossing with the Angora, with a view gradually to improve the common goat, may produce valuable results; I wish it to be clearly understood that such animals or their progeny, even if pure sires be used for a thousand generations, can never become pure bred. The stain can never be washed away. Each cross with the pure blood reduces it by one-half, but as division is infinite, it never entirely disappears. As the asymptote in its curve

approaches nearer and nearer, yet, though produced to infinity never touches, so does the stain of base blood remain to all eternity, diminishing with every cross of the pure breed, yet never wholly extinguished.

Dr. Randall, a distinguished American sheep-breeder, who has written several valuable works on the Merino, says, that "to suppose the produce of the fourth or of the twentieth cross will equal pure and properly bred Merinos, is what no breeder of ripe experience ever dreamed of. Base blood runs out rapidly by arithmetical calculations; but practically *it stays in*, and is ever and anon cropping out by exhibiting the old base characteristics in a way that sets all calculation at defiance."

It is evident that if a pure breed has been once obtained, the greatest care should be taken to prevent any deterioration by crossing with an inferior race. *Grade* flocks may be allowable for a time, till a sufficient number of the pure blood can be obtained to replace them, but the males used to such flocks should always be of pure blood. In a stud flock, absolute purity should be the *sine quâ non*, and any cross with an alien race would be the height of folly, and destruction to the purity of the breed would naturally ensue. I would not here condemn any well considered and properly conducted experiment made with a fixed and definite object in view, such as that made by Lord Western, a celebrated English breeder, with the view of obtaining a sheep intermediate between the Merino and the large English breeds. His attempt to put a Merino fleece on a Leicester carcase, was not however successful. In making an experiment of this kind, another

natural law comes into operation, which is, *Diversity begets Variety.* The more frequently individuals of various breeds differing from each other are united, the greater diversity of offspring results from these unions. The result of frequent crosses of several breeds is, that the force of heredity is weakened or lost, the breed becomes more plastic, and many intermediate types are produced. From these intermediate forms, by selection, a breed may be built up which, by rigorous selection and in-breeding, may be made to possess the main characteristic of a distinct variety, which is the uniform production of individuals of one fixed type.

Of the origin of the Leicester breed of sheep little is known; Bakewell, the founder of the flock, with an amount of illiberality unworthy of so distinguished a breeder, has carried his secret with him to the grave. In whatever way his success was obtained, the great fattening qualities, fineness of bone, and early maturity of the breed, have caused it to be used more or less with most of the best long-woolled English and Scotch breeds, such as the Lincolns, Cotswolds, and Cheviots, to impart these qualities in some degree to the breeds mentioned. In this instance, crossing has been resorted to with a defined object in view, and the breeds being not dissimilar, the cross has resulted successfully, but cross-breeding with no definite plan, and in the vague hope that something good may result from it, is simply imbecility. In all cross-bred animals there is a strong tendency to revert to the original wild type of the breed. It would seem as if the artificial bonds of domestication were removed, and the race reverts to the original wild type of a common ancestor; as the savage, born beyond the reach of civilization, who has

been taken in his youth, and clothed and schooled into conformity with the outward forms of civilised life, at some sudden caprice throws off with his irksome garments all the restraints which the adopted habits had imposed, and returns to his savage state, in like manner, the cross between two dissimilar races, causes a return to the original wild type common to both. For instance, a cross between almost any two of the highly artificial breeds of fancy pigeons, causes an immediate reversion to the blue rock pigeon (*Columba Livia*), which is believed to be the wild type of all the domesticated varieties. The result of a cross between any two distinct breeds of the domestic fowl is usually that the progeny shows a likeness to the *Gallus Bankiva*, which is looked upon as the wild form from which all the domestic varieties are descended. The same thing has been observed to be the result of crossing different breeds of domestic rabbits, the progeny usually reverting to the grey colour of the aboriginal form of the animal. Did space permit, many similar instances of this might be given, but the fact may be accepted without further proof, and it will be seen that very serious divergencies from the intermediate forms between the two breeds may be looked for in crossing dissimilar races.

It will sometimes occur that one race has a much greater pre-potency than another, from having been carefully bred for a long period to one type. In this case, the progeny instead of being intermediate between the two, in their general qualities will show a greater likeness to the purer race. This is seen where the pure Angora is put to common goats. Whether the common goats were black, brown, or

spotted, in my experience the progeny to pure Angora bucks have invariably been pure white.

In conclusion, I would desire to acknowledge my indebtedness to the writings of Dr. Randall, Professor Low, Southey, Youatt, Morton, Bischoff, Captain Conolly, Van Niessen, and various other writers, of whose works I freely availed myself in the foregoing pages. The frontispiece is from a drawing from life of a pure Angora buck, now at the Royal Park. The wood engraving of the Cashmere and Thibet goats is from Professor Low's *Domestic Animals of Great Britain.* My inexperience in literary labours may perhaps be pleaded in extenuation of the doubtless many faults and blemishes of the work. I will not offer the poor apology of my time being fully occupied by other affairs as an excuse for any shortcomings in this paper. The negligent performance of a work voluntarily undertaken does not admit of such an excuse. It is my desire less to write well, than to write what may be of some practical value. If this result be attained, my object will have been accomplished and my labours rewarded.

The following statement, which I have just received, showing the weight of fleeces shorn from the Angoras on the 16th May, I think it well to insert here. The Council will thus have three half-year's returns to judge by. The clip just taken off is the best we have yet had. From the great difference in weight in the individual fleeces, the advantage of selection will be clearly apparent. I also beg to submit, for the inspection of the Council, a sample card with twenty specimens of the mohair, and the numbers of the

animals, with weight of each fleece. The specimens are from seven to eleven inches in length.

WEIGHT OF FLEECE OF 114 PURE ANGORA GOATS.

SHORN AT LONGERENONG MAY 16TH, 1873.

Shorn May 16th, 1873.			Shorn May 16th, 1873.		
No. of Goat.	MALES.	Weight.	No. of Goat.	MALES.	Weight.
		lbs. ozs.			lbs. ozs.
1	...	5 5½	23	...	1 13
2	...	4 10	24	...	2 15½
3	...	6 1	25	...	3 9
4	...	3 5	26	...	2 1½
5	...	3 14½	27	...	3 0½
6	...	4 10½	28	...	2 8
7	...	4 3½	29	...	3 8
8	...	4 8½	30	...	2 10
9	...	2 2	31	...	3 0
10	...	3 2½	32	...	2 7½
11	...	3 7½	33	...	2 4½
12	...	3 9½	34	...	1 7
14	...	3 13	35	...	3 11
15	...	4 13½	36	...	1 7
16	...	2 8½	37	...	2 2½
17	...	3 13	38	...	1 15½
18	...	4 2½	39	...	2 6
19	...	2 9½	40	...	2 13
20	...	2 7	41	...	1 3
21	...	3 9½			
22	...	3 5½			126 7½

Shorn May 16th, 1873.			Shorn May 16th, 1873.		
No. of Goat.	FEMALES.	Weight.	No. of Goat.	FEMALES.	Weight.
		lbs. ozs.			lbs. ozs.
1	...	1 11	13	...	2 5½
2	...	2 12½	14	...	1 8½
3	...	1 10	16	...	3 2
4	...	4 5	17	...	2 14
6	...	2 2	18	...	3 2
7	...	2 15	19	...	2 8
8	...	2 6	20	...	2 14½
9	...	2 7	21	...	1 6
10	...	2 2	22	...	2 12
12	...	2 12½	23	...	3 3½

Shorn May 16th, 1873.			Shorn May 16th, 1873.		
No. of Goat.	FEMALES.	Weight.	No. of Goat.	FEMALES.	Weight.
		lbs. ozs.			lbs. ozs.
24	...	2 9	66	...	2 15
25	...	2 13½	67	...	2 14½
26	...	1 4½	68	...	1 3½
27	...	2 11	69	...	1 2½
28	...	1 14½	70	...	2 0½
29	...	3 5	71	...	2 15
30	...	3 5	72	...	2 2½
31	...	3 7½	73	...	2 5½
32	...	1 14½	74	...	2 1
33	...	1 11½	75	...	1 12
34	...	2 13½	76	...	2 0
35	...	2 9	77	...	1 14½
36	...	2 1½	78	...	2 0½
37	...	2 9	79	...	1 6½
52	...	1 6½	80	...	2 6
53	...	2 6	81	...	2 7
54	...	2 0½	82	...	1 10
55	...	1 8½	83	...	2 14½
56	...	1 6½	84	...	1 11
57	...	1 13½	85	...	1 4
58	...	1 7½	86	...	1 10
59	...	2 12	87	...	1 2
60	...	2 5	88	...	0 13
61	...	2 5½	89	...	2 0½
62	...	2 12	90	...	2 9
63	...	3 11½	91	...	2 2
64	...	2 8½			
65	...	1 7			167 4

		AVERAGE. lbs. ozs.	GROSS. lbs. ozs.
Fleece of 40	Males, weighing	3 2½	126 7½
„ 74	Females „	2 4¼	167 4
114			293 11½

Averaging 2 lbs. 9 ozs. per head.

The four best bucks' fleeces give an average money value for the whole year of £1 5s. 5½d. each; the four best does', £1 0s. 0¾d. each. The best buck, No. 1, which was used in the flock for stud purposes, yielded

a fleece weighing 7 lbs. 14½ ozs., worth £1 7s. 8d. These weights are the growth of one year and five days.

Average value of fleeces of six months and eighteen days' growth :

Bucks -	11s. 0½d.	Does -	7s. 8d.

Fleece of best buck	-	18s. 8d.
„ „ doe	-	15s. 1d.

REPORT ON THE OSTRICHES

BELONGING TO THE

ZOOLOGICAL AND ACCLIMATISATION SOCIETY,

NOW RUNNING AT LONGERENONG.

ALSO

Some Letters and other Information regarding the Management of this Bird in South Africa.

The Ostrich is of the genus *Struthio*, of the family of the *Struthionidæ*, of the tribe *Brevipennes*, and of the order of the *Grallatores*.

The ostrich has been looked upon as the largest of all existing birds. The New Zealand Moa is, however, very much larger, being probably three times the size. It is now asserted that living specimens of the moa are still in existence, and have been seen recently; but the statement is somewhat doubtful, and requires confirmation. If extinct, however, it is only within a very recent period that it has become so, as legs of the bird are still to be seen with the Maories with the dried skin and tendons in good preservation, and complete skeletons together with the shell of the egg, have been forwarded to some of the European museums of natural history.

The ostrich has been called the feathered camel, from its habits being somewhat similar, and from some resemblance it bears to that quadruped. Its home is the desert and the open plain. Ostrich hunting is not without its difficulties and dangers. It requires the

greatest care to get within shot of the bird owing to its constant vigilance, and its great power of vision. Its wings are very short, and almost useless, as aids to locomotion; but the muscles of its legs are extremely powerful, enabling it to run with a swiftness equalling that of the greyhound or racehorse.

The male is generally black in colour when full-grown, and the female brown. Both have usually white feathers in the wings and tail, being those for which the bird is principally valued. At one time its brains were considered a great delicacy, and like peacock's tongues were valued more from their rarity and the difficulty of procuring the dish than from their flavour. Hundreds of ostriches were slaughtered that their brains might furnish a choice dish for the luxurious table of Heliogabalus. Their flesh, when young, is considered palatable.

In northern Africa, at Fezzan, ostriches are kept in stables, and three crops of feathers are taken in two years. It takes about eight months for a crop of feathers to come to perfection. In Fezzan, many of the natives subsist by hunting the wild birds. The Arabs scare away the birds from their nest, and dig a hole in the ground, where they place a loaded gun with a slow-burning match. When the ostriches take their place on the nest, the gun kills one or both birds, which are found dead beside the eggs next morning.

Ostriches are gregarious and polygamous. Sometimes three or four females will join in depositing their eggs in one nest, as many as fifty-one eggs having been found together in one place. It is said that a number of eggs are left outside the nest, to serve as food for the young birds when they are hatched.

I regret to say that the Ostrich has not, up to the present time, proved very successful in this colony. Whether caused by want of knowledge of the habits of the bird, and of the best mode of management, or whether the climate be unsuitable, yet remains to be proved. The first importation of Ostriches, five in number, not being found to increase at the Royal Park, it was determined by the Council of the Acclimatisation Society, to send them to the Wimmera, as it was considered a more suitable climate than that of Melbourne.

Whether this was done, as was insinuated by our witty Agent-General (at that time a member of the Council of the Acclimatisation Society), to get rid of these somewhat unamiable birds, or whether a warmer climate was considered more suitable, the result was that they were consigned to my care. With the limited information I could gather as to the best mode of management, I endeavoured, with some success, to increase their numbers, and obtained from them at various times a quantity of very good feathers.

Of the original importation, two were males and three females; of the females one proved barren. The first summer, two of the females had nests. These were simply a natural hollow in the ground, trampled into a saucer-shaped nest about six feet in diameter. There was no attempt made to collect grass or any kind of rubbish to line the nest with. One of them was on hard clay soil, and had about ten eggs in it, the other contained thirteen eggs. Unfortunately, heavy rains came and flooded the nest which was on clay soil, and, although the water soon disappeared, the eggs were afterwards found to be

addled. Out of the other nest twelve young ostriches were hatched, which were carefully attended to by the parent bird, and all of which lived and grew to a large size. The ostrich, contrary to the received opinion, hatches its eggs by sitting on them, in the same way as most other birds; both are seldom absent from the nest at any time; the male sits even more closely than the female, and takes rather more than his share of the parental duties. While the eggs are being deposited in the nest, and during incubation, he is exceedingly pugnacious, and an enraged male ostrich is about as formidable looking an animal as one would care to meet. I have known one to break a rail in a strong four-rail fence by a kick of its powerful legs. Several people were attacked by one of them, and some rather badly hurt. One man who persisted in crossing the paddock in which the birds were kept, though warned of the danger, had his trousers torn from waistband to foot by the toe of the ostrich, which was inserted under his belt. Fortunately, the man sustained no serious injury. It is only at the breeding season that ostriches are dangerous, and the nest can always be approached on horseback without risk.

The second year, only one nest was made, and the selection of the place was so unfavourable that rain filled the nest and spoiled the eggs, preventing increase for that year. Various accidents occurred to the birds, causing losses. One got killed by running against a fence, when an attempt was made to drive them into a yard; one died from rheumatism, and several from cold in winter. In the third season, two nests were made, and a number of birds were hatched in one

of them, but they all disappeared, and were found with their heads eaten off. It was supposed that native cats had killed them. During the summer just ended, two nests were made, and a number of birds were hatched, which were taken away from their parents, housed and fed, and of these only three are now alive. Of two sent to the Royal Park of this year's birds, one has died from rheumatism. One of the old birds got hurt in a wire fence and died; one strayed away and was supposed to have been killed for the feathers; a reward of £10 was offered unsuccessfully for such information as would lead to the offender being punished. The number now left is fourteen in all, including one at the Royal Park; only one of the originally imported birds being left.

The following interesting letter from Sir Henry Barkly, Governor of the Cape Colony, who, while Governor of Victoria, always took a warm and active interest in Acclimatisation, contains some valuable information on the management of the ostrich in South Africa:—

"Government House, Cape Town,

"14*th May*, 1872.

"My Dear Dr. Black,—Your letter of the 6th November, making inquiries as to ostrich farming, reached me when I was at Graham's Town, and I asked Dr. Atherstone, of that city, whose brother is one of the most successful farmers in that line, to get me full particulars for transmission to the Victorian Acclimatisation Society. This he promised to do, and I know he took steps subsequently for the purpose, but unfortunately I have not yet received the paper

from him, and though I wrote to remind him directly I heard there was an opportunity of a ship direct to Australia, his reply has not yet come to hand. When it does, it shall be forwarded to you. Meanwhile, I can only tell you what I have myself heard. Ostrich farming continues to be most profitable, and the feathers, now that the art of stripping them out has been acquired, sell as well as those of wild birds. The great source of increase arises from the farmers watching, by means of natives, where the wild ostriches make their nests, and capturing the young ones directly they are out of the egg; but the domesticated ostriches also breed freely, though they often wander to a distance before they build a nest. In the Eastern Province, however, the incubator is used in preference to leaving the eggs to be hatched in the natural mode, and there are several patents, but that most approved is the invention of Mr. Douglas, formerly a squatter in Australia, and now an ostrich farmer here, and Dr. Atherstone promised to get from him full particulars. I hear that it costs as much as £40. It is said to be thoroughly successful, since a sort of gimlet has been used to aid the young birds to come out of the shell. This is done in nature by the bill of the parent, and it was at first attempted to imitate the process by the tap of a hammer. It was found, however, that the young birds, though they came out alive, died directly afterwards, and on examination this was found to result from concussion of the brain. I have seen young birds just hatched by the boring process perfectly healthy. If the society desire to possess a Douglas's incubator, I shall be happy to procure and ship one of them. Perhaps it will be better to wait until they hear

what Dr. Atherstone has to say on the subject. I am very glad to hear that the objects of the society have been so successfully attended to in other respects.

"Believe me, yours truly,

(Signed) "HENRY BARKLY."

From the account given in the foregoing letter of the success attending the use of the incubator at the Cape Colony, I would strongly recommend that one should be obtained, as without some artificial means of hatching the eggs, no great increase can be relied on.

The following letter on "Ostrich Farming at the Cape" will also be of interest. It is an account of a visit made by Mr. J. B. Hellier of Graham's Town to Mr. Douglass' Ostrich farm :—

"Hilton lies some twelve miles from Grahamstown, some two miles or less off to left or west of the Cradock road. The house stands in the middle of a lawn-like flat, what we should call in England a meadow, and in relation to the house, the 'home ground.' We were quite surprised to see such a building—three stories high, and quite a contrast to the usual farm houses of the colony. To those who know the hospitalities of the country we need not detail what happened on our arrival. After breakfast we began on foot at first to make our round of the various ostrich flocks and troops, scattered or located as they are over a farm of some 3,000 morgen; and as we shall require the aid of the artificial memory afforded by the recollection of the way we went we will tell our story in that order, beginning where we began with the first flock of this year's chickens we came to. The first chickens of this year

were hatched in the early part of the month of August, and these, with others hatched during the following month or six weeks, now run together and form a flock of forty-four fine, healthy, growing birds. Some of them are very large for their age, and all are remarkably lively and in good condition. It was very amusing to see how they gathered round the coloured boy who looked after them. They ran away to him if startled in any way, and came eagerly at his call. It was evident that their instincts had accepted him in the place of their original parents. These birds are now housed every night, and though this will no doubt be prudent for some time to come, on account of storms, yet some of the oldest look quite able to take care of themselves. In fact, were they with their parent birds they could not be gathered many of them under their wings or otherwise much defended from the cold. This group of young birds are kept in the home field, and we believe occasionally get a little lucerne. The condition and health of this flock of birds is a most satisfactory state of things. It proves most triumphantly that ostriches hatched by machine, when the operation is properly conducted, are equally healthy with those that come into the world by the old established and ordinary process; and that the same set of conditions must have been complied with, and the various necessary manipulations which instinct teaches the old birds to perform must have been successfully imitated in artificial incubation. We think Mr. Douglass told us he had lost but one since they were hatched, and this by accident. The next troop of this year's birds is a flock of sixteen. They looked to us about a month old—we were not told their age. These, too,

looked exceedingly healthy. A boy was in attendance, which will be continued a little longer till they are strong enough to join their elder brothers and sisters. This little family is carefully housed every night in a warm covered stable. We forgot to say the older flock are put in a kind of kraal within the shed, into which they can run when it rains. By this plan they get gradually accustomed to sleep out at night. The next flock we saw was the baby flock of fourteen, some of which were only a day or two old, while some were a week or ten days; for, as we shall see when we come to speak of the 'incubator,' like some of our committees, there is 'power to add to their number.' These were exceedingly pretty little things, like giant young partridges, but with the special peculiarity of having little bristles all over them, mixed with their down. They were very lively, and gathered round their guardian, and were some of them fed with a little cut lucerne. We were told that for the first day or two after their birth they do not eat, but seem to be looking about curiously upon the great world they have so strangely come into. Then after two days they begin to attend to the duties of life by setting up a mill. This is precisely the fact. The little things, taught by instinct, eat no food till their gizzards are prepared, for which purpose they go about picking up little hard stones of no doubt the exact kind required. After this preparatory process is completed, they eat a little soft green food. This infant flock is gathered into a warm room at night; some of the youngest are put into the 'mother' crib of the incubator, while others are accommodated with a lodging between blankets, or otherwise comfortably provided for. We found by adding to-

gether the above flocks we have some seventy-five chickens, all hatched since August by the incubator—all alive and well.

"We next mounted our horses and proceeded to an enclosure separated by the river from the home ground. In this enclosure we found fifteen full-grown birds, or mostly full-grown, among which were an old cock and two laying hens, and possibly a pullet, which Mr. Douglass told us he thinks is just beginning to lay. The old cock is very savage and fightable, and was given some mealies (maize) to amuse him while we rode quietly by. The old fellow attacked his master while on horseback some little time ago; he succeeded in getting his breast up to the horse, and kicked most furiously, but owing to the unusual position he had attained, his kicks went for nothing, except once when his toe ripped open the skin of the horse's flank, which set the horse going in turn. The fact is, if the old birds only knew how to use their beaks as well as their feet, they would be most dangerous animals—as it is, though they peck off your hat and pull your ears, their operations in this way are nothing much. These fifteen birds have a large enclosure all to themselves. And here we may as well say that there are no sheep on the farm, and in the enclosures dedicated to the ostriches, except in the home field, there is no other kind of stock. We next, after a mile more or less, came to an enclosure in which were a very fine old cock and two laying hens. Here we were shown a nest, after due precaution having been taken to decoy the old monachee into a pen with some mealies, and safely shut him up, but we must confess we gave one or two rather anxious looks towards the pen aforesaid,

thinking it just possible he might get out of that and come and look after us. The two hens were both sitting down, which we were informed they do; also, that when the one goes to lay the other goes to keep her company, though we did not inquire whether that was the etiquette of ostrich life—shall we say good breeding, or the special habits of these two birds. We were informed that the hens lay their eggs somewhere about round the nest, that is within a few yards, and that the cock bird trundles them along and places them in due order in the nest. In fact, the male ostrich seems the very antipodes of roosters and drakes, for he takes all chief solicitude about the future of the eggs, placing them in the nest, and always sitting on them by night, with warding and divers other little attentions and performances necessary to a successful issue of incubation, which our good friend, Mr. Douglass, has carefully observed, after much patient watching, and duly made a note of. Here we saw a fine nest of eggs, and proceeded to count them, but were stopped with the information that they would never hatch. No, never; and for why? simply that they were artificial, and so good is the imitation that they deceived not only novices like ourselves but even the ostriches, who ought to have known better.

"Out of the enclosure given up to the exclusive use of this polygamus family of three, we entered through a locked gate into a large enclosure or paddock, in which were fifty-eight one and two year old birds. They all looked exceedingly well, and though they did not dance, they seemed full of life. They do sometimes favour the spectators with a dance, and it is one of the funniest of all the freaks or habits of animals that

evidence a sense of the jokeful we ever beheld. We once saw some twenty nearly full-grown birds waltzing together. They began with a sort of sidling slow revolution on their toes, moving their wings gently up and down, and presently they seemed to get into the spirit of the thing without the aid of any fiddler that we saw, and spun round at a rate that would have astonished any one but a dancing dervish. In dancing they swept round and round without ever coming into contact with each other. Our fifty-eight young friends soon seemed anxious to make our acquaintance, or perhaps more especially to see if there were any mealies, and they came up all round us, some two or three at a time poking their little and long necks right into one's face. Quite docile and quiet, yet they seemed very inquisitive, and we should fully have expected, had we indulged in such vanities, to have seen our diamond breast-pin disappear, as a specially valuable stone to furnish grinding power for the gizzard of the bird 'wot prigged it.' 'Tis a queer feeling to be in the middle and under the inspection of some fifty pair of eyes or more, with a good sharp bill between each pair that could easily appropriate—say borrow—any little thing they take a fancy to. 'Twas queer, but it was most satisfactory, for here were birds two years old, machine hatched, and in health, size, and quality, everything that could be desired.

"This completed our round of observation, in which we saw a good many contrivances for feeding, plucking, and general management, the result of much thought and patient investigation. Since the farm has had no sheep on it, the veld has very much improved, and no doubt is still progressing in the same satisfactory direction.

"We have spoken of various enclosures; there must be at Hilton several miles of fencing completed, and we saw another mile or more under operation. The difficulty in getting sneezewood posts has hindered the operation; but the fence is being put up with occasional sneezewood, the other more perishable posts to be supplemented with sneeze when it can be procured. There is, in addition to the river running round it, in the body of the farm, a good dam, from which the water is led by a syphon, which implement or operation is no end of a puzzle to the natives, and, we believe, one or two besides. For water to run up a hill is all against their notions.

"We saw the incubator, and in it forty-five eggs in the process of hatching. This operation is now performed almost to perfection, quite equal to anything the parent birds can do themselves, even suppose they are unmolested, and escape all kinds of accidents to which they are exposed. Out of the forty-five eggs we saw, we may safely conclude forty-two would produce live and healthy chicks. The result now of several batches is for fourteen out of fifteen to be hatched. And Mr. Douglass does not see why, in fact seems pretty sanguine, that he shall presently hatch all the eggs placed in the incubator, provided they are fertile. And certainly we don't see why not, for it is all a matter of intelligent knowledge and experience.

"The number of ostriches at Hilton is as follows:—

BREEDING BIRDS.

Males - - - - -	2
Four hens, one pullet - - -	5
	7

Full grown and nearly full grown birds	14
One and two year old birds - -	59
This year's chickens - - -	75
Total - - -	155

"And, though we have every respect for the old proverb, yet with the experience aforesaid, we have every confidence in adding forty-two more for the eggs now in the machine, besides which some of the hens are laying every day. They laid last year up to May, when they were permitted to hatch a small clutch of eggs themselves, as it was thought they ought to have a rest—we mean a rest from laying. We must leave it to the imagination of our readers to add up the total amount of one year's produce from say seven birds—though it is only six in reality—through the intervention of artificial incubators. And we think that he must be not only an unimaginative man but something else who tries to carry on ostrich farming without an incubator. One other fact, we think, is established, that ostriches must have plenty of room."

The waltzing described by Mr. Hellier is a most amusing sight; I have often witnessed it at the Wimmera, and the performance generally took place when the birds were about to be fed, and was only to be witnessed when they were in high condition.

The airs which they play off when domesticated are most interesting, running round in a circle and then turning round half a dozen times, playing with their own shadow, using their wings like fans, lying down on the ground, and rolling about in an ecstacy of enjoyment, then getting up and rushing round the enclosure and past the intruder with the speed of a railway train,

and repeating the performance with many curious evolutions. When a number are together at play in this way, it is certainly a most amusing sight to witness. Dr. Shaw gives an account of a person whose abdomen was ripped up by a stroke from the pointed and angular talon of an ostrich. Their strength is enormous, and they have even been trained to carry a rider. Adamson mentions the rapidity with which a tame one ran, first under the weight of two little blacks, and afterwards, under two full-grown negroes, while a smaller bird carried with equal facility one full-grown negro.

Unless fed daily, and accustomed to come to a yard, ostriches are the most difficult creatures in the world to manage. From their swiftness, it is most difficult to turn or head them on horseback, and they will run headlong against any obstacle, and receive fatal injuries from their stupidity. I have seen one being driven alongside of a post and rail fence, and the stupid bird put its head through every panel of the fence, and ran full tilt against every post till its breast was raw and bleeding.

The native-bred birds are considerably larger than those imported, standing more than two inches taller in the back.

The following notes on ostrich farming at the Cape of Good Hope, have been sent to the Council of the Acclimatisation Society. They are written by a gentleman who has resided for a long time in South Africa, and who had many opportunities of observing the mode o management of this bird in that colony.

OSTRICH FARMING AT THE CAPE OF GOOD HOPE AND IN AUSTRALIA.

"My attention has been drawn to a recent number of *The Australasian*, containing an account of a meeting of the Acclimatisation Society, at which an allusion was made to the subject of ostrich farming in this country, and showing the deep interest which the present Governor at the Cape (Sir Henry Barkly) takes in the matter. As a resident in South Africa for eighteen years, in the districts lying north of the Orange River, where, in fact, the ostrich country begins, I beg to offer a few remarks for the general information of those who are not aware of the pecuniary advantages to be derived from the prosecution of this novel enterprise.

"I was particularly impressed with the idea of such a scheme on my first visit to the Western District some four years since. Previous to my departure from Africa in 1867, the experiment had been tried in various localities in the Eastern Province, between Grahamstown, Algoa Bay, and Cape Town. Doctor Atherstone took a prominent part in impressing upon the farmers generally the possibility of such an enterprise proving successful. The only outlay requisite (a far more serious one than Victorians imagine, from the scarcity of timber, and the expensive land transport) being the cost of enclosing a portion of their farms, the whole area of which is generally from three to 5,000 morgen, or six to 10,000 acres. Many years ago, the ostrich, and other kinds of large game, such as the giraffe, koodoo, gnu, blesbok, hartebeeste, &c., &c., were indigenous to that part of the country; but the influx of settlers and the consequent erection of

numerous villages and towns, caused the game to emigrate across the Great Orange River, where they still continue to recede as the white man advances.

"The ostrich is now being domesticated by a nomadic people who are aware of the value of these birds. A full-grown male ostrich will yield about one pound of first-class feathers, of which it takes from 90 to 100 to the pound, the value of which, in Port Elizabeth or Cape Town, would be from £42 to £50 per lb. The second class feathers, which are neither so long nor so broad, and have not got the spotless purity of the first quality, realise from £20 to £30 per lb. The small black tips from the back and breast are exported chiefly for the regimental bonnets worn by highland regiments, the plumes of hearses, and various other purposes of a less grave character, and are sold at nominal prices; of course, all these are taken from birds that have been destroyed by native and other hunters, and some idea may be formed of the extent of this pursuit, when I state, that some few years since, at the village of Hope Town, almost bordering on the present diamond fields, I saw offered for sale in one lot 8 cwt. of feathers that had just arrived from the interior, from Mr. Moffatt, a trader, the brother-in-law of Dr. Livingstone; and at the present day it is by no means uncommon to meet a wild untutored Kaffir or Hottentot boy with three or four first-class feathers stuck jauntily through his ears, or fastened in his woolly head, of a length and beauty which would be calculated to excite the envy and admiration of many a European belle; but I am digressing. My reason for considering that ostrich farming would prove a success in this country is

the compact and secure manner in which the majority of the stations here are fenced in; it is an erroneous idea that because the ostrich is an unusually long-legged bird, that it would require a very high fence to keep it in bounds; such is not the case, the substantial wire-fencing that I have seen at most well-kept stations, is, in my opinion, quite high enough. An ostrich in motion does not rise upon the wing; he skims, as it were, along the surface of the ground, and if he meets with any obstacle, such as a fence, he will skirt along it, but never attempt to cross it; although he will cross a creek, the two banks of which are nearly on a level with each other, by flying. The pace of an ostrich in full speed, going before the wind, with his feathers standing erect, is killing; and I never saw the horse, the rider of which could with truth say that he ran his game down fairly. The ostrich is a solitary bird, and of lonely shy habits; ostriches are never found in large troops like other game, seldom more than six are seen together, and they run more frequently in pairs or singly. Their sense of smell is very acute, as well as their sight, and their powers of digestion are truly astonishing; I have seen a tame one snatch a bunch of keys attached to a steel ring from a man, and swallow them with the greatest gusto, and I have given young birds, when about the size of turkeys, a few small nails (tacks) occasionally, which they seemed to relish amazingly, and would follow me about for more, so that it would appear essential for them. Sir Henry Barkly, in his letters, recommends an incubator, but it appears to me that this method would not be required here for this reason, if you have the bird to lay the eggs, why not let them finish their work?

This they most assuredly will do if left undisturbed to themselves. The process of hatching is performed by the male and female sitting alternately, one keeping a vigilant look out as sentry as well as procuring food. The only reason that I can assign for the use of incubators in the Eastern Province Districts at the Cape, is from the fact of the almost universal system adopted by the Dutch Boers and the natives, of robbing every nest that they find of all the eggs it contains, which are generally from eighteen to twenty-four in number. These are brought by the farmers in their waggons, when they come to the Nacht Maal or Sacramental Services, to such towns or villages as can boast of a Dutch Church, when they exchange them in the stores for trifling necessaries. Their selling value in Africa is about sixpence each, and they find their way into the other parts of the colony amongst the farmers, who would then resort to artificial means of hatching them, and of so obtaining a troop of birds. This system of robbing the nests will rapidly cause them to be almost exterminated, and will prove a grievous loss to the colony, which it can ill afford.

"Ostrich farming will eventually prove remunerative in this country, and become more general as the birds increase in number. They should have a good *open* country, free from the shade of timber, and if the soil be sandy, or has sandy patches about it, so much the better, as it will be the more natural to them, and in those sandy places they will generally deposit their eggs. Before concluding, I may state that I examined some feathers from the Australian birds that were offered for sale by Messrs. Gemmell, Tuckett, and Co., some time ago, on account of the Acclimatisation Society,

but not one presented the appearance of even second class feathers, and yet they realised very high prices, that would astonish an African dealer. Subsequently I saw some that are exhibited in a glass case at the Technological Museum, and they are much about the same quality. Why they should be curled artificially and dyed I am at a loss to imagine, as it destroys the natural drooping beauty of the feather, and, as specimens for exhibition in a Museum, they should have been left in their natural state. The eggs, also, are very much smaller than any I ever saw in Africa from birds in their native state. I fear that over-eagerness was displayed in order to realise something from the imported birds, as the feathers appear to have been taken from them before they reached maturity; and some that I noticed were so small, that to strip them from living birds was, if not cruel, unwise, as it was calculated to expose the creatures to chill and cold, which, if it did not prove fatal, was very likely to weaken the ensuing crop of feathers, not only in the length of shaft, but in one of the chief beauties of good feathers—its breadth. The average length of a really good feather is about two feet, and eight to nine inches wide.

"In bringing these few remarks to a conclusion I would merely recommend any society or individual desirous of importing ostriches to endeavour to procure them when they are about the size of a turkey cock, they will not then be so unwieldy or unmanageable as full-grown birds, and can be more readily provided for and protected on ship-board. By offering a small bonus to some of the officers there would be very little danger of their failing to come safely to hand. The

best persons to apply to in furtherance of such an object would be Messrs. Thomson Watson & Co., Daniel Ebden & Co., or Blaine Brothers & Co., all of Port Elizabeth. These merchants have large business transactions with the traders in the interior, and, doubtless, would be willing to carry out the wishes of any one communicating with them on the subject.

"It will afford me much gratification at any time to give persons who take an interest in the subject every information in my power in furtherance of this novel but important industry.

"I remain, your obedient servant,

"WA. H. E.

"July 27th, 1872."

In the foregoing letter the weight of feathers which one bird would yield must be very much exaggerated, unless small and comparatively worthless feathers were taken. Some of the Wimmera grown feathers he refers to were of the first crop taken from young native birds, and the plumage had not acquired the richness and fulness of those from the mature ostrich. Notwithstanding this writer's objection to the use of the incubator, the account given of its success at Hilton, compared with the slow rate of increase of the birds when left to hatch their eggs in the natural way on the Wimmera, shows clearly that its use would be advantageous if a large increase be desired.

I cannot say that I am very sanguine as to ostrich culture proving a successful or remunerative pursuit. There is however little difficulty in keeping these birds within enclosures, as a two-rail fence will generally prove

sufficient to prevent their straying; their pugnacious habits, and the difficulty of yarding them when required are the great obstacles to their successful management. With care, no doubt, these obstacles can be lessened or overcome. If the bird could be established in the interior of the continent, I have little doubt that it would increase rapidly and become as numerous as it is in those parts of Africa where it is found in a wild state. Many parts of the interior would, I think, be better suited to this bird than Longerenong. Probably the sandy heaths of the Lower Wimmera around Lake Hindmarsh, or the arid plains on the Darling or Cooper's Creek, where the emu abounds, would be found more similar to its native habitat, and better suited to the habits of the bird.

There is a somewhat curious misapprehension in the popular mind as to habits of the ostrich. It is generally supposed that the bird covers its eggs in the sand, and that they are hatched by the heat of the sun, and some passages of Scripture not properly understood are supposed to countenance this error. In the Book of Job it is said that the ostrich "leaveth her eggs in the earth and warmeth them in the dust, and forgetteth that the foot may crush them, or that the wild beast may break them." This habit of the ostrich, of covering up her eggs in the dust is not, as is commonly supposed, that they may be hatched, but to hide them until incubation commences. I have found it to occur in one instance, where the nest was on a sand-hill, the eggs being covered up by the birds until the number was completed. After incubation began the nest was scarcely

ever left by both birds at one time, each sitting in turn, and sometimes both birds at once.

The charge of cruelty made against this bird in the treatment of her young is not so well borne out by their habits in this climate.

In the Book of Job (xxxix. 16), we read "She is hardened against her young ones as though they were not hers. Her labour is in vain without fear, because God hath deprived her of wisdom, neither hath he imparted to her understanding. What time she lifteth herself up on high she scorneth the horse and his rider." And in Lamentations (iv. 3), "The daughter of my people is become cruel, like the ostriches in the wilderness." The description of the ostrich lifting herself up on high, and scorning the horse and his rider, is a wonderfully graphic picture of the attitude of this bird when disturbed and driven from her nest. The parent birds on the Wimmera, were, however, exceedingly attentive to their young, so much so that if man or dog ventured into the enclosure in which the birds were kept, they were instantaneously attacked, and speedily driven out by the infuriated animals. The ostriches, while incubating, came up regularly to be fed; but after the young birds were hatched, they did not leave them to come for food for many days, and then only when driven to the feeding place with the young birds. Probably their habits have undergone some modification from the change of climate.

Pliny says of this bird, that "it exceeds in height a man sitting on horseback, and can surpass him in swiftness. They have cloven talons very similar to the hoof of the stag, with these they fight, and they also employ them in seizing stones for the purpose of

throwing at those who pursue them. They have the marvellous power of being able to digest every substance without distinction; but their stupidity is no less remarkable, for although the rest of their body is so large, they imagine when they have thrust their head and neck into a bush that the whole of their body is concealed. Their eggs are prized on account of their large size, and are employed as vessels for certain purposes, while the feathers of the wing and tail are used as ornaments for the crest and helmet of the warrior."

This description of the bird is less incorrect than may appear at first sight. Its height is probably exaggerated, or the horses of those days were much smaller than ours are now. The foot has two toes, but has little resemblance to that of the stag, one toe being much longer than the other. In fighting, they strike forward with their powerful legs, and endeavour to use their talons. It may occur that when they are pursued, earth and stones are thrown behind them as they run, in the face of their pursuer. Their digestive powers are, no doubt, very great, and nothing of a small size comes amiss to them; but they sometimes fall victims to their insatiable appetite, one that died on the Wimmera having its stomach filled with an indigestible mass of stones, nails, corks, glass, and other rubbish. Cuvier mentions cases in which the stomach was ruptured by nails which the bird had swallowed, or dreadfully torn by pieces of glass; and one in the gardens of the Zoological Society of London died from swallowing part of a parasol.

The supposed habit of thrusting its head into a bush when pursued is what many other animals will do

when hunted to the last extremity. The dingo will run into a bush or under a log when exhausted, and allow itself to be caught. The head of the ostrich being the most defenceless and vulnerable part, it is doubtful whether it be not its wisest course to protect it in this way.

The egg of the ostrich is three and a-half times larger in capacity than that of the emu, and twenty-five times larger than a hen's egg. The shell is used by the natives of Central Africa for carrying water in the desert, a hole being made in one end, and when the eggs are filled the orifice is stuffed with a bunch of grass, and the eggs carried in nets on the backs of the native women. The flavour of the ostrich egg is somewhat coarse, but an omelette made from it is very palatable.

The taking of the feathers is rather hard work. To effect this object, I had a strong yard made, with a smaller one leading out of it to a narrow lane or crush pen. The ostriches were accustomed to the large yard, by being fed in it every day. When wanted, they were driven into the crush and the gates closed. On one occasion, after trying for a great part of a day to drive them from the yard into the crush-pen without success, and being about to give it up, a little terrier happened to come into the yard, and immediately the birds ran into the pen in the greatest alarm. The plucking is done from a platform outside the pen, on which the operator stands. The wing is caught by one hand and the ripe feathers pulled by the other. A man assists by keeping the bird up to the place where it is wanted, and preventing its turning. They never attempt to peck with their

beak, and the long snake-like neck winds under the arms and round the neck of the operator in a somewhat alarming way, while the work is going on. It is very rough work to handle them, and bruised hands, arms, and fingers, are generally exhibited after a day's ostrich plucking. As only a few feathers are taken from each, the bird does not suffer much from cold in consequence.

The only feathers of any great value, are the large feathers of the wing, of which there are about twelve in each. These should be taken before they are quite matured, or the delicate plumage gets worn and scanty; if too soon taken, they are not fully developed and are of less value. Their growth should be watched, so as to get them at their best, but I could not manage this well, as the birds, from not being fed regularly, got too wild, and could not be got into the yard except after a month's feeding, and some of them have seldom or never been plucked, and cannot be got to enter the yard.

The food of the ostrich consists of vegetable substances, seeds, and grain; that best suited to them being maize, but they are not at all choice in their food, and scarcely anything is rejected by them. They manage to subsist very well on the natural pastures, except when moulting, when they become weak and require feeding.

It is said that, in Arabia, the swiftest greyhound is not a match for the ostrich in speed, and that the Arabs are obliged to trip the bird by throwing a stick between its legs, or disabling it otherwise, before they can overtake it with their swift horses. In running, it spurns the small stones behind it, greatly to the annoyance of its pursuer.

The feathers from the ostriches on the Wimmera have been sold for high prices at various times, and large numbers have been obtained and forwarded to the Council of the Acclimatisation Society; but the greater part of them have, I regret to say, been of little value from being left too long on the birds, owing to the great difficulty of getting them decoyed into the yard. The pugnacious habits of the bird renders its complete domestication a matter of some risk and of considerable difficulty. I would recommend that some of the selectors be encouraged to attempt ostrich farming, and with this object a few might be sold at a moderate price. Their personal care and attention would probably lead to a more complete domestication of the bird than has been possible under my care.

I have prepared these notes, partly in the hope that the information here collected together about the ostrich, may be of service to any person who intends to try this novel industry, and partly that the Council of the Acclimatisation Society may know the cause which prevented a more decided success from being the result of my management of this interesting bird. Besides enthusiasm in the cause of acclimatisation it requires no little physical courage at times, when these birds are to be handled or driven, and the want of knowledge of the proper mode of management, and of the natural instincts of the bird, greatly increases the difficulty. Should the experiment at Hilton continue to be a success, we have at any rate in this colony the nucleus of a breeding flock, upon which to make experiments to ascertain whether the climate be suited to the bird or otherwise. Perhaps the gentleman, whose letter is given in this paper, signed

"Wa. H. E.," from his knowledge of the subject, might desire to experiment with a few of them. I regret to say that my present residence being in Melbourne will prevent me from being able to give that personal attention to this matter which its importance demands. The Society may, however, rely upon my active co-operation and assistance where my services can be of use, and upon the warm interest which I shall always take in the cause of Acclimatisation.

ON COLONIAL WINES.

By J. J. Bleasdale, D.D.

Having been requested by the Council of the Acclimatisation and Zoological Society of Victoria, to contribute to their transactions a paper on the Wines of these Colonies, but chiefly on our Victorian kinds, I have accepted the honor with pleasure, the more so, because I firmly believe that every means ought to be used to make the nature of this industry and the character of the wine as universally known as possible.

Whether the present generation will witness the full development of the wine interest in all its leading branches or not, must rest mainly with itself; but that it will one day equal if not surpass, as a source of national wealth, any other needs not a prophet to foretell. Much yet remains to be done for it, and I take this opportunity to point out to the Council of the Society, that they have it now in their power to render champion service in forwarding the vineyard interest. Every facility for accomplishing a really great and beneficial work is at the present time at their very doors. The grounds of the Society are quite good enough for the work:—where shelter will be needed it can be easily created;—and to supplement the work in the Society's grounds, there is plenty of fenced and sheltered places at the experimental farm; so that there might be established at once at a cost of

a few pounds, the materials for the systematic study of our vines, the testing of newly introduced kinds,—and the introduction of such as are known to be proof against prevailing diseases.

This most important work has hitherto never been attempted in Australia, and as it is to all intents and purposes one of Acclimatisation, I beg to urge that it may be taken in hand by the Society, and I can give assurance that the country will thoroughly appreciate the boon.

Everything cannot be done in one year, but a good deal may be effected this season; cuttings of the Hermitage, Chasselas, Verdeilho, Burgundy, &c., could be got from each best vineyard in our various wine districts and planted, so as to keep the several kinds together. There is abundance of time to obtain specimens of the same varieties from South Australia and New South Wales. I venture to say that for a purpose of this nature, the vineyard proprietors of those colonies would be but too glad to contribute to the success of such an experiment, as important to them as to us. Later on, many vines found by experience in Europe and Asia, and still more in America, to be proof against the present class of vine diseases, might be obtained and acclimatized in Victoria. The sooner the line of investigation, found to be successful in the instance of apple blight, is applied to the vine the better, as it appears founded on reason and easy of working.

There are in vineyards in South Australia, many varieties of Spanish and some Hungarian vines that we have not yet introduced, and such as these might be provided for at Echuca.

There is another reason for establishing educational nurseries. There is to be in all probability an industrial school erected at the Experimental Farm, and in that event, a collection, such as I am advocating, would form an integral part of the instruction of the lads. The method of treating vine cuttings as cuttings and scions of the apple tree are managed, is simple enough, and would be of real value to the lads when apprenticed to vignerons.

No inconsiderable portion of the following essay was drawn up for the Official Record of the late Exhibition held in Melbourne by the Royal Commissioners for the London International Exhibition of 1873; much of what constituted my direct investigation, was embodied in that essay on Colonial Wines. Still much more of importance to the wine interest of this Colony might have been added, not without a hope of benefiting the producer, the trader, and the consumer, had time, and the limited amount of money for the purpose of printing essays, been, as it should have been, in closer conformity with the importance of the interest concerned.

At any rate, the money was not to be had, so that essays in more than one instance had to be either not written, or done at odd times, with little or no clerical assistance; and when the time, during which they must be got ready for the printer, was necessarily limited.

Now, I trust, these two matters will be kept in mind by the reader. Moreover, I have made no attempt at "fine writing," but own to the plainest speaking and explaining.

BENEFICIAL ACTION OF THE ACCLIMATISATION SOCIETY.

That the Acclimatisation Society has already rendered most inestimable service by introducing into this new country many valuable kinds of foreign birds, beasts, and fishes, all having a direct bearing on the wants of human life, is beyond doubt; might I without offence direct the attention of the Council to one or two other matters of scarcely less importance than the above, to human life and happiness, viz., to introduce the best South European habits of life; South European manners of living and dressing; of out-of-door recreation in the evenings, and proper public walks and gardens as places for such recreation. In your own already beautiful and interesting garden suitable accommodation for the people, whom you wish to attract thither, must be provided, where simple food, fruit, and a bottle of pure wine could be had cheap, and you will set an example that will soon be followed elsewhere to the advantage of public morals, the healthful enjoyment of all, but especially the artizan classes at first, and the diminution of larrikinism. It will be something for the Society to be able to say that they were the first to make the grounds of the Royal Park the means of putting down juvenile ruffianism, by making them attractive for all kinds of suitable outdoors recreation, after the day's work is over, and, under suitable regulations, supplying their reasonable wants at the lowest possible price; while, as in the countries of Southern Europe, their parents and sisters would amuse themselves for hours under the strict regulations of your enclosed gardens.

Call the whole arrangement by the Spanish name "Alameda," an institution everywhere in full force in Spanish towns and cities, and found to be indispensable to the health and comfort of the people.

In 1867, I concluded my first essay on Colonial Wine with the following remarks, which I think may be appropriately introduced in reference to the present subject:—

"In the interest, then, of health and morality, and cheerful and happy homes, may I be pardoned for recording my heartfelt wish that I may live to see the time, when even the humblest labourer, at the close of his hot day's toil, will stroll into our fine parks and public gardens, and there, with his happy family around him, enjoy his hour of relaxation, and drink his bottle of wholesome wine at the cost of a few pence, without either the reproach of extravagance, or the danger of intoxication."

In the following pages will be found an account of such studies and analyses of colonial wines as I have been able to make during the last five or six years, which is now thrown out as a very small contribution to our common fund of information concerning this interesting and valuable new industry. I venture to call it, still, a "new industry," for the colony has hardly yet been prospected fully as to its whole capabilities for yielding wines; while the vines, best suited to each locality, are by no means clearly ascertained, and while the systems of making and maturing wine must for some time longer be experimental rather than fixed; as will be readily understood when it is remembered that between the Barrabool Hills and the valley of the Murray, Victoria possesses every variety

of climate, exposure, and soil that is to be met with between Neufchâtel and Lisbon.

And as the industry itself is, in my belief, but in an infantile state, though making fair progress, and as the products of vineyards of the same district are known to vary so markedly, I conclude that very much remains to be learned by those, who are about to establish vineyards, and by makers and treaters of wine as well as by the student of œnology. Of course, I hold myself alone responsible for any opinions, statements, or deductions here laid down. I would premise, however, that the matter of this essay has been collected, and the remarks recorded from time to time, as opportunity offered, so of course I have made no attempt at literary composition.

Circumstances, to which I may have to refer hereafter, induced me, many years ago, to make the study of vines and wines an occupation for my leisure hours; the results of which I have, now and then, laid before the public of the Australian colonies. I would refer briefly to some of these. In 1861, I was appointed chairman of the experts of the wine jury, and had a fair chance of judging of our native pure wines at that time. As chairman and reporter of the wine experts of the Intercolonial Exhibition, 1866-7, I drew a somewhat lengthy account of the introduction of the vine into Australia, and the fortunes of colonial wine to the end of 1866. Subsequently I had opportunities of making more lengthy and detailed inquiries into several matters affecting the making, keeping and maturing of our wines—to say nothing of efforts to remove prejudices against them. Though those investigations were by no means as

thorough and complete as I could have wished, yet they appeared to me then, and do so still, useful in clearing the path of the vignerons.

The wine industry differs in multifarious ways from nearly all others, because the subject matter of it is so various, and the methods of treating the same materials so different in different places. Hence there need be no wonder at the same substance, when pure, presenting so many variations.

WINE IN RELATION TO CLIMATE, &c.

Climate, soil, aspect, any one or more of the hundreds of varieties of grapes which by chance may enter into the formation of a wine—the duration of fermentation, the temperature of the cellar, racking, fining, &c.—all have to do with modifying the ultimate product, the wine. Then, again, the properties of nearly all the European vines change very much in Victoria. No one can doubt for a moment that the excellent judges, to whom were submitted recently some hundreds of samples of Australian wines in Germany and France (the remainder of the samples sent for competition at the last Wine Exhibition, held by the late Board of Agriculture), expressed their conscientious convictions of their merits or defects. But this is remarkable, especially as regarded the white kinds, that in several instances where they ventured to name the grape or grapes a wine was made from, they were wrong.

It must be borne in mind that wine is a very compound fluid; among its principal constituents, such as are always present in it, are water, spirit of wine, tannic acid, tartaric acid, phosphoric acid, racemic acid,

malic acid, sugar, oxide of iron, and potash, with generally a small quantity of lime. These are the principal, but by no means the only, ingredients of pure wine. The bouquet, as it is called, is a true æther, and is formed by the action of the acids on the alcohol in a nascent state, and the flavouring principle of the grape, from which each distinctive bouquet is derived. The iron, potash, phosphoric acid, and the lime are taken up from the earth; the elements of the other acids, sugar, alcohol, &c., from the air and water. A glass of genuine wine contains a varying quantity, generally about one-fifth or a little more of its bulk, of proof spirit and four-fifths water, when not fortified.

WINE IN RELATION TO THE HUMAN SYSTEM.

Wine, not *must**, fortified to any considerable extent, say 5 per cent. or upwards, produces in its action on the human system an effect somewhere between that of pure wine, and brandy, or some less pure spirit, diluted with water. Hence the *headiness* of *fortified* wines. The Portuguese, and probably the general Spanish, practice of adding 2 or 3 per cent. of proof spirit to the fermenting musts, in order to arrest a too great production of spirit and waste of body, is *a totally different affair;* because the added spirit merely destroys the albumen and other nitrogenous matters, and along with them is itself deposited as an *almost* insoluble compound, the murk; thus leaving the wine with a material to feed upon—a little of the natural sugar of the grape—and less spirit than it would otherwise

* *Must*, the unfermented, or only partially fermented, and new juice of the grape.

have formed for itself at the expense of the gummy and other quasi-saccharine matters contained in and precipitated from the must. Wines, so made, seldom become "*ropy*," and hardly ever take "*the flour*."

The proof spirit, however, in the case of wine, differs widely in its action on the human system from so much distilled spirit and water, for in wine it is not a mere mixture, but a combination, and it stands in chemical relations with the tannic and tartaric acids and iron. Tannic acid is a powerful astringent and tonic, while tartaric acid, combined with potash and iron, has its own peculiar action on the human economy. It is evident, then, that pure wine must be slowly digested before it can get into the general circulation; and it is also plain that it more nearly resembles the nicely-adjusted prescription of a physician than aught else. And it is a prescription prepared by the greatest of all physicians, not alone as a restorative or alterative for the deranged functions of the body, but one meant primarily to strengthen and promote the well-being of the healthy frame, and at the same time intensify the sense of enjoyment of life. It is both an element of food and a luxury. Had I time, nothing would be more pleasing to myself than to illustrate by examples the wonderful and merciful providence of God in maintaining His creatnres in existence, health, and comfort, through every zone, from the equator to the poles, supplying them with whatever is needful under the very altered conditions in which their existence has to be carried on. What animal fat, and oil, clothing of skins or feathers, are to the Laplander; what his starch, no matter whence derived, and his

almost naked skin are to the equatorial African; what his bitter beer is to the inhabitant of Northern Europe; *that* is wine, and a moderate quantity of animal and vegetable food, to the inhabitants of sub-tropical climates all over the world. Again, if time allowed, it would be delightful to take up the line of illustration, so exquisitely drawn by Mr. Babinet, of the Institute of France, and trace the action of Providence in the wool, hair, feather, skin, and other integuments of animated nature in the several zones. But we can do no more now than allude to it. And so, if we reason consecutively, we shall find that every climate has its own appointed conditions, under which alone the human economy will be healthy and vigorous. You cannot here subsist on the starch food, which maintains in health and strength the inhabitants of equatorial regions, nor can you think of sustaining life for any length of time on the fish oil, tallow, and dried flesh of the Laplander, or man of Kamschatka. The beers and ardent spirits, so much a *necessary* in moderation in cold and damp regions, and the strong tea of China, when taken constantly and in excess, produce diseases here, on which learned physiologists become eloquent, and from which are derived in no small degree the need of the physician, and the waste of health and the expense of sickness, to say nothing of the miseries of declining life. Health depends much upon the vigorous tone of the nervous system; the enjoyment of life wholly on that great instrument in the human laboratory, the liver. Tea, and such like, act strongly on the nervous system, but are comparatively harmless. Malt liquors and ardent spirits load the system with carbon; well enough for the production of animal heat,

but not needed here, since the atmosphere supplies it abundantly.

When the temperature is not low enough to require a large supply of carbon to maintain animal heat, then, as the carbon must go somewhere, and be got rid of somehow, the liver and kidneys have to do the work, when they are, perhaps, already overworked.

I trust I am neither a theorist nor a quack. I hate quackery of all kinds, and my education has taught me that theories are worth little more than that they serve to arrange and harmonise a certain number of facts. The fact in this case is that liver and kidney diseases, nearly unknown in wine-drinking countries, are almost universal in these colonies, and either form the basis of prevailing complicated diseases, or are complicated with them. Beer and spirits have their work to do in cold and damp climates, not such as ours—intensely hot and dry. Wine has its beneficial work to do in Victoria, and it is gratifying to watch the steady progress hitherto made, mainly during the last five or six years.

PREJUDICES TO BE OVERCOME, EVEN AT THIS DAY.

I have taken a fair amount of trouble to ascertain the depth of prejudice against pure natural wine, formerly entertained by almost every grade and class of society in this and the neighbouring colonies. It is fast dying out. I find in this city abundance of evidence on all hands supplied by the daily experience of the wine-shops, that labouring men soon acquire a taste for it, and use it in preferance to beer. Gentlemen put on their tables, sound, good, pure wine, and they and their guests enjoy it ; but there are two great bars in the way of the

native pure wine obtaining all the reputation it is justly entitled to, and its legitimate use as food or a stimulant; and those are the customs and habits of society in relation to "the *properties* of the conduct of ladies," and the backwardness of the Medical faculty in the matter of prescribing it for their patients, when the proper time for the exhibition of wine has arrived. And to my knowledge, while some doctors occasionally recommend, and advise its use in private practice, they seem afraid to order it for hospital patients.

Against this backwardness the argument seems to hold good in this way, *i.e.*, if the patient need wine, let it be *pure, ripe wine*, not this brandied stuff of from 30° to 40° per cent. of indifferent alcohol. If the patient need a stimulant, begin with brandy and ammonia, &c.

The customary reply is, the patient will not take *that* wine of yours; I reply, by the same rule that they take cubebs, and salts and senna. They will take it, if you order it; but don't order it, where a mere stimulant is wanted.

But the real misery is in the case of the middle and poorer classes of patients in private practice; members of clubs and their families. A case, needing to be supported and strengthened occurs, and the medical attendant says "get a bottle of Port Wine." What, I may ask, do these people know about "*Port.*" They probably in their hurry give five or six shillings to a servant girl or a member of the family, with orders to run to the grocer or the nearest public house, and get a bottle of "*Port Wine!*"

It is got, and the nauseous stuff, most probably compounded in cellars, not 25 miles from Melbourne

Post Office, is entrusted to do for the patient what, in charity, let us suppose, only pure fine wine *could* do. I am writing no imaginary story. More than 22 years of sick rooms and hospitals, have taught me something in this matter of "Medical comforts and restoratives in Victoria."

A gentleman, now no longer in business, Mr. James Phillips, formerly my neighbour in Lonsdale-street, at that time a wine merchant, always had in his cellar a pipe of the *best* port wine for the *convalescent*, and none others. And though he would at that time more than fifteen years ago, sell *one* dozen to a convalescent patient for the small sum of 30s. or 35s., money could hardly tempt him to part with a second dozen to the same patient. This was real unpretending charity, and I regret that this catholic practice is not universal among us here in Victoria.

BRITISH-BRED LADIES IN RELATION TO WINE.

Ever since 1862, when colonial pure wine began to be pretty generally talked about, the lady portion of our community made no pretence of disguising their dislike of it. Taking it as they had been accustomed to take a small glass or two of port or sherry, with fruit or a sweet cake, it did no doubt taste thin, poor, and sour; and as long as it is so used it will taste *thin*, *poor*, and *sour* to British-bred ladies, and to not a few gentlemen as well.

In the case of ladies, there are two obstacles in the way to be removed before they will take to the pure wholesome beverage; and these are first and strongest by far, the custom or fashion of British Society, arising

out of the fact that, for more than a century, only highly fortified kinds were to be met with, such as made it imperative on all who valued a character for sobriety, to use them with the greatest moderation. Habits are soon formed and become universal, and are still in nearly full force in this community at the present day. "Wine," they tell us, "is *wine* everywhere." No distinction is made between what, as Druit writes, pp. 9, 10, "I will venture to call *pure virgin wine*, the refreshing beverage which a man *drinks at a draught*, with its 18 to 22 per cent. of proof spirit, and *strong* or *fortified* wine, the stimulating dram which he *sips*, pregnant as it is with its 35 to 45 per cent. of spirit. The two things differ *toto cœlo*." The sooner Victorian ladies realise the fact that they are inhabiting a country of sunshine and hot winds, situated at an average of more than 16 degrees nearer the equator than that of their native land, the better for their own health. Still, I fear, habit and prejudice are stronger than reason and instinct. Yet, with a view to preparing the way, I will now pass on to the second obstacle, to which I alluded just now as necessary to be removed: Ignorance of what the proper taste of pure wine is, arising out of not knowing *how* to drink it, or not daring to drink it as it should be taken, with a view to quenching thirst and sustaining energy, and satisfying a natural demand. This natural demand for something is felt by all and every day; but of course most during hot winds and sudden changes of weather. Recourse is then had to spirits, "a little and strong," and I fear then a little more!

Let it be premised that the gustatory organs of

women are more sensative than those of men. We all have two sets of these organs, one set at the front of the tongue, the other at the back, or near the root. With the first, we perceive sweetness and sourness mainly—but it soon overpowers the peculiar functions of the latter.

I am not sufficient of a physiologist to consider myself fit to explain the nature and peculiarities of the human gustatory organs; yet, while I leave it to the Faculty to assign the causes, I have no hesitation in recording facts of every day's experience, and which can, at a moment's notice, be brought home to the senses of the most ignorant. I will select one example out of hundreds that might be adduced, because it is both most simple in itself, and the materials employed about it are within every one's reach; that of tasting (and I might say proving and testing) olive, or as it is generally called, *salad oil*; a substance that in this climate ought, in one shape or another, to enter every day into the food of every one of us. Moreover, what I am going to say has as much to do with the grocer who purchases, as with the customer, who consumes the oil.

To perform this testing of the goodness or badness of salad oil (pure olive oil), it is desirable, when possible, to dry the tongue well towards the base or root with a fine cambric handkerchief, for the obvious purpose of preventing the fluids of the mouth from preventing the oil coming at once in contact with the surface of the tongue. Then dip the point of the little finger in the oil to be tested, and apply it as far back as possible on one, or still better, *both* sides of the root of the tongue. Having done this, allow the mouth to

remain open for a few seconds, when, if there be anything wrong with the oil, a well-marked sense of bitterness will be experienced, and the worse the oil, the deeper will it be. Yet, if a teaspoonful of the same oil were put first on the fore part of the tongue, no such bitterness would be felt, showing that the first taste of sweetness had deadened the other sense. The proof then of the suitability of salad oil for human consumption has to be sought in every instance in the above simple experiment. Reject all that gives a sense of bitterness on the root of the tongue; it is not fit for wholesome human food.

Supposing the above illustration to be beyond doubt; let it be applied to the present custom among ladies when taking wine. They *sip*, and find it sour. But if they took a good mouthful and swallowed it at once, all the *aroma*, the bouquet, &c., would be pleasantly experienced, and the sense of having a *mouthful of wine* unmistakably felt.

Though digressing a little from the purpose for which I instituted the above illustration of the two senses of taste, I will venture to add (as we British are not more an oil-using than a wine-drinking people in our native land, and therefore, can hardly be acquainted with the experience and practice of nations where it enters so largely into daily consumption, and holds the place of butter among us), that it should be carefully kept from sun-light; never put on our tables in glass cruets, as is the universal custom, but in either suitable glazed earthenware, or silver, or tin vessels; neither lead nor unglazed pottery should be in contact with it.

EARLY STUDY OF AUSTRALIAN WINES, FROM 1859 TO 1866.

I think, then, that any contribution to the further knowledge of this important branch of colonial industries will be of some use; and that I need no further apology for placing before the readers an outline or *resumé* of my investigations, chiefly since 1866-7, in the plainest manner I know how.

In the month of May, 1867, I read an essay on Colonial Wine before the members of the Royal Society of Victoria, which was afterwards published in the Transactions of that body, circulated in pamphlet form by the late Board of Agriculture, and subsequently found worthy to be translated into German, which was done by Mr. Methe, and circulated among his countrymen. That essay, or paper, referred, in the first part, to certain studies of, and chemical investigations into, most of the leading characteristics of Australian Wines that came to my hand between the latter months of 1859, and December, 1866. Many of the samples tested were the produce of well-known vineyards in New South Wales, the first and by far the largest number and variety being either "Camden Park" or "Irrawang or Kaluda" brands, introduced into Victoria by Mr. Blake, to whose enterprise in 1860, when colonial wine was another synonym for anything detestible, the Victorian vignerons owe no small debt of gratitude.

These investigations comprised the specific gravity of each sample, its amount of absolute alcohol, unchanged sugar (if any), percentage of residue after evaporation, power of keeping and resisting acidity,

and change of colour, and especially its total amount of free acids, which was determined by alkalimetry, the standards of reference being port, sherry, hock, and tokay, supplied by the agent of the Messrs. Macarthur, of Camden, the late Mr. Ralph Hutchinson, an educated and able judge of wine.

I record the above outline of the points I inquired into, that others may follow the same, and, I trust, record their results.

With reference to the experiments to determine the power a wine had of keeping, after exposure to the air, and of resisting acidity, I would mention in this place, next after determining the quantity of alcohol, I sought for the amount of tannic acid that it contained. In the case of white wines, this was an easy matter; but difficult in the red. The following was the plan I adopted with the whites:—I took samples of good sound sherry, as nearly as possible of the same shade of colour as that of the colonial wine I was going to test; and after putting about equal quantities of each in wine glasses of the same size, I added to each an excess of carbonate of soda—say, a small teaspoonful; a little too much makes no difference. After standing a few minutes, it will be easy to observe the depth of dark colour shown by the sherry. Now, compare this with the samples to be tried, and the greater or lesser depth of colour in the samples will show how this important point in the keeping of wine stands. If the wine be paler than the standard of sherry, eggs or isinglass must on no account be used for fining. If the sample is perceptibly darker after adding the carbonate of soda, even then much caution is needed in using eggs, or any other albuminous substance; for these abstract

the tannic acid by the chemical action they exert upon it.

Not living in a wine-producing country, the English people have no proper terms to express accurately many operations on wine, and thus such terms as "*fining*" have a more or less confused meaning. We say when wine is rough, austere on the palate, bitter—"*fine*" it. White of egg, isinglass, bullock's blood, and milk, &c., will do the fining such wine requires. They will remove the tannic acid, and probably some others. Again, a wine, smooth and sweet to the palate, is muddy, off colour, &c.: we say, "*fine*" it—and that means, clear it; but in this case albumen, isinglass, &c., would ruin it, and sand or Spanish clay is alone admissible. All fining is a sort of filtration; and as you cannot put the wine through an ordinary filter, you put a filter through the wine. The insoluble compounds formed by albuminous matters and tannic acid on one hand, and the sand or Spanish clay on the other, constitute such a filter.

SOME PERSONAL MATTERS.

I have been twitted at times by teetotallers with devoting too much attention to these matters; and certainly I can say with Cicero, "*Licuit otioso esse mihi;*" but I preferred to fill up my time in a way that was pleasant and instructive to myself, and not without showing a prospect of future utility to the country of my adoption. Mingled with the above was, very likely, a little harmless vanity; for in a new country, and in a limited population, a little man is apt to delude himself by thinking that he is a big one;

and I honestly admit that, while there might have been more experienced judges of wine and abler analysts than myself, I could hear, in 1860, of hardly one who knew anything of the young, unmatured wines of Europe, and not one, who at the same time could bring a chemist's knowledge to bear upon our produce. And, furthermore, I thought the vignerons would trust my statements, seeing that I had a character and public position to maintain, and, also, that I had not a pennyworth of personal interest in any vineyard, or its produce. But I had another motive for taking up this subject—one not unworthy of a clergyman. Many years' experience had impressed on my mind that wine-producing countries, where wine is plentiful and cheap, are invariably remarkable for sober, healthy, and cheerful populations; that drunkenness is all but unknown, and many distressing diseases, common among drinkers of beer and spirits in warm climates, utterly unheard of.

It must also be conceded that there is a freshness and charm about the first investigations of objects, such as wines, which are liable to indefinite and almost innumerable varieties. In the circumstances, under which the vine has been introduced into Australia, on one hand from old vineyards in the south of Spain and south of France, and on the other by Swiss and Germans from their own countries, mainly the Rheingau and the Tyrol, changes in the produce must of necessity occur. Change of climate, perhaps, more than anything else, affects the vine and its produce. Vines, introduced by the Messrs. Macarthur, of Camden, into New South Wales, and Mr. Gilbert, of Pewseyvale, into South Australia, originally from near

Jeres de la Frontera, and a few varieties common about Roussillon, found themselves in climates not very different from those they had been taken out of. But when these same kinds made their way into Victoria, circumstances were materially altered. As a rule, the vine brought from a warmer into a colder climate, deteriorates for some years, both in its growth and produce; and, on the other hand, those removed from a colder to warmer, improve. One remarkable instance of this is the Chasselas. It was brought to us, I think, originally from the northern, or at any rate from the central, parts of France, on account of its being a good table grape and a prolific bearer. But in France it yields a wine, generally poor in quality, bad in colour, weak, and with a mousey odour. And, indeed, for a length of time it retained most of these peculiar properties in the colder regions of Victoria. At a time, when it was considered the correct thing to run down our native wines, I remember reading in *Melbourne Punch* a receipt for making colonial wine, much like the following:—"No. 1 Chasselas.—Take one gallon of cold water (Yan Yean will do), one pint vinegar, 2 lbs. sugar, mix, and add two dirty, well-seasoned mouse-traps. Product equal to the ordinary run of this variety."

ANTICIPATION OF FUTURE SUCCESS IN VICTORIAN WINES.

Yet this same Chasselas vine produces in our warmer climates—such as from Sunbury to Sandhurst

—and with careful making, one of our very best wines; while in the medium and cooler ones I note its improvement in all the best vinous properties from year to year. This is due, no doubt, to the vines having become acclimatised, and to more extensive experience in the making and maturing of the wine. If this colony ever produces novel wines that will distinguish it in the market of the old world, Chasselas will be prominent among them. Another instance of a vine that we have received from France is the Aucarôt. This pre-eminently requires a warm climate —such as from Sandhurst all along the valley of the Murray—and produces a wine that will most likely be the first to attract attention as a peculiar product of our country. Properly made, it yields a *medium* sweet wine, of good body, of a dark, golden yellow, and having a bouquet that resembles that of a *handful of new sweet hay.* It is, moreover, one of the few kinds that can be safely used in moderate quantity for blending with either white or red wines. But all the samples I have seen of it from our colder climates have been poor and hard, as have also been some from about the Murray, where the attempt had been made to render it prematurely a *dry* wine. The awards of the late wine jury of the Board of Agriculture, 1870, bear out my observations on this head, and those samples still in my possession are sweety-sour, one of the worst of bad properties. This is due to bad making. Many other varieties of imported vines from different parts of Europe will, no doubt, show, if they have not already shown, marked changes; and let us hope for the better.

I extract the following from the jurors' report, 1870 :—

"As prize-takers for Victoria, the wines at the Great Agricultural Wine Show, 1870, rank as follows :—

Hermitage (pure or mixed),	6 prizes,	7 honourable mention.	
Mataro - - -	2 „	1 „	
Gamai - - -	1 „	1 „	
Reislings - - -	4 „	1 „	
Chasselas - - -	2 „	1 „	
Verdeilho (pure or mixed)	2 „	1 „	
Pineau (or mixed) - Rousette and Tokay	each 1 honourable mention.		

"It will thus be seen that the Hermitage, Mataro, Reisling, and Chasselas stand most prominent; but it is evident that the wines of the same name had changed their character in each district, thus producing many varieties. This is the most important point in the Exhibition to the vignerons; and although it cannot be denied that many of the wines are very fine, this variety is a great drawback, which it is for the vignerons to remedy. To make their wines marketable for foreign countries, the first condition is uniformity; and to attain this, the vignerons should set to work without delay. We would suggest that in each district an association be formed, whose sole object should be to ascertain, by careful examination over two or three years of the wines produced, the most suitable grape for their particular district. Having ascertained this, they should lose no time in reorganising their vineyards, according to their means, by planting no other than the grape selected for their

district, and by grafting it, a certain proportion in each year, on to their old vines. By this means, in ten, twelve, or even fifteen years, each district would excel in its particular kind of wine, as the Rhine produces hock; Bordeaux, claret; Burgundy, burgundy; the Douro, port, &c.; and our wines would then, through the agency of our wine merchants, be introduced into the home markets, which will never be done to advantage, unless what we have recommended is carried out."

The peculiarity of our red wines, and the same may be said of Australian red wines generally, is a slightly earthy taste. Now this I believe to be due to the faulty manner of making, and the want of knowledge in maturing the wine, more than to anything derivable either from the air or the soil, or the variety of grape used. I have noted, however, that Mataro is generally the least affected by it, and Malbec the most. Red wines made by Mr. C. Maplestone, at Ivanhoe, from grapes well matured in a small, well-sheltered vineyard, and carefully chosen, on a plan substantially the same as that recommended for a like class of wines by M. Casalis Allut, were as nearly free from this objectionable taste as any I have met with. It may, however, be said that much might be done in making fine wine in a small vineyard, and under all the most favourable conditions, and to a certain extent this is true. But by adopting a plan in many of its points the same as that of Casalis Allut, and on the large scale, S. Baldini, the able feitor of the Hon. J. G. Francis, at Sunbury, has produced red wines that commanded the admiration of the judges

who examined the Victorian wines at Sydney in 1870. I know not the plans adopted by Weber Brothers, August Heine, Heine and Greiffenhagen, whose red wines were nearly free from this *gout de terrain*, but think it cannot be very dissimilar. As the red wines have to be fermented on the skins to give them colour and tannin, there is reason to fear they mostly receive more or less injury from the thick "cap," as it is called, which is formed by the husks and stalks on the top of the vat. To obviate this, the best French makers keep this "cap" pressed down below the surface of the fluid so as to prevent any air from touching it, by means of a false lid, a little smaller than the diameter of the vat. This lid should be forced down a few inches below the surface of the must, and the vat finally covered with some thick cloth, such as a horse rug or two. I state this, because, as a precautionary measure, it is of value, and the cost of it is trifling. I have for several years been trying to ascertain if this earthy taste is due to any change in the tannic acid, such as oxidation of a portion of it into some higher form, such as gallic acid. But I am not yet prepared to say with certainty that it is. My opinion, based on some results obtained within this year, inclines to this change. It must be remembered that fermentation frequently becomes very violent in Victoria, and when matters are in their transition state, it is hard to tell what may happen. Moreover we are not yet certain as to the part played in the tumultuous fermentation by gummy matters and others in a transition state from acid to sugar. Mr. Baldini acts, in my judgment, wisely, by gathering his red grapes only when warmed by the sun and

perfectly dry, breaking the bunches as little as possible, packing them in the vats, covering the vats when full with thick woollen rugs, and leaving them so for a few days "to sweat." In this interval much of this transition matter, and many not perfectly ripe grapes, will be brought into a perfect condition.

There is now no doubt on my mind that the red wines of Victoria may be vastly improved by the careful study by intelligent vine-growers of the conditions of ripeness of grapes, methods of crushing, vatting, and storing of their produce, in relation mainly to climate. The French methods of making red wine in most places south of the dividing range seem the best. The German methods, as in use on the Rheingau, turn out the best white wines south of the dividing range, and the Spanish and Portuguese ones suit best the north. Of course there will be spots, north of the dividing range, that will yield some varieties of dry wines; but, as a rule, it is merely torturing the musts of high saccharine strength, in a necessarily hot climate, to attempt to make of them wines of the hock and sauterne character. The Spanish grapes, which produce the manzanilla, would probably yield a dry wine there.

WINES LEFT AFTER THE EXHIBITION OF 1866-7 FOR FUTURE STUDY AND REPORT.

There were sent to the Intercolonial Exhibition of 1866-7 not a few samples of red wine from the north of the dividing range—Hopwood's of Echucca; Guppy's, of Benalla; one or two of Piper's, and some others—that obtained no distinction whatever at the time.

These were pure and simple wines—well made, but, being young and full-bodied, they needed care and keeping. But after lying quiet for five years, they proved to be quite equal to the very best sent to the Exhibition—wines quite ripe at, say, six or seven years old, that would be a credit to the colony in any country in the world.

It is frequently remarked that the produce of young vineyards becomes drinkable, and matures sooner, than that of old ones; and all my observations go towards confirming it. There are no old vineyards in Victoria, and very few in Australia. There can be but three or four in all, that date back twenty-five years; but there are a good many of ten or twelve years. Now I understand by the produce of young vineyards those not older than their third year of bearing. The produce of such as these does soon ripen, and it also soon passes its best, deposits colouring matter, and becomes thin and poor, though it may retain its distinctive bouquet. It is, perhaps, providentially so arranged, that the cultivator may not lay long out of a return.

One important object which I proposed to myself in studying the samples left with me at the close of the Intercolonial Exhibition, 1866-7, was to watch from time to time, and ask the opinion of good judges *when* they considered a sample was at its best. The declared ages of all were marked on the labels. This has been done. Not one of them, whether red or white, *improved* after its eighth year, and but very few showed decided signs of decay at that age. In every instance those which held their own were from *rather* sweet to sweet kinds; and were, with two or three

exceptions, from South Australia. The whites kept their properties longer, and in higher perfection, than the reds.

Prominent among the old white wines were those of Messrs. Patrick Auld (Auldana); Gilbert's Verdeilho and Reisling; Peake's Reisling, Verdeilho, Palomino Blanco, and Pedro Ximenes, and one sample of strong sweet Gouais; Greig's, of Dirlton; Smith and Son's Sherry; one Highercombe white, and two, known only at the time as AB and AZ, afterwards found to be the produce of Morialta, the vineyard of the late Hon. John Baker; and last of the South Australians, Messrs. Winkel's and Charlesworth's samples of pure Tokay. With the two exceptions of the Highercombe and Morialta, the rest all partook of the character of sweetish wines, and two only contained less than twenty per cent. of proof spirit.

The commissioners for New South Wales and for Western Australia removed their samples remaining at the close of the Exhibition of the wines from those colonies, and I had to do the best I could with a bottle or two of Bukkulla, a few of Carmichael's, and one or two of Doyle's Kaludah. No doubt all these were fine wines, and I regretted then and since that I had no chance of thoroughly studying the king of New South Wales wines—the Bukkulla white.

The Victorian wines, up to six years of age, held their own very fairly, but hardly more than three could be said to be on the improving side at the end of another year, that is, when about eight years old. Of these three, one is a white wine of the late Mr. Hopwood's, of Echuca, a notoriously

bad sample *originally*, and not good even now; one or two of Weber Brothers'; De'Pury and Langdon's white Hermitage; and one of August Heine's. These seemed to improve to the last. Of the rest, one or two of Mr. Trouett's, of St. Peter's Vineyard, Great Western; one of Dunoyer's, a few of Mr. Kitz's, one of Heine and Greiffenhagen's, and one of Galland and Junod's, of Pollocksford, Geelong; two of Meredith's, of Chewton; two of Dr. Hope's, of Batesford; and Billing's Shepherd's Reisling, held their own up to about six years, but, for the most part, were then quite up to, if not past, their best.

Owners of vineyards and traders in colonial wines, who are looking for foreign markets may, I think, not unprofitably make themselves acquainted with the above results obtained in wines sent for exhibition; and, naturally, the best only in each owner's estimation would be sent. Nay, more, all these were bottled, and have been carefully put aside in a cellar of equable temperature, in the foundations of the Exhibition Building. It is not unfair to conclude that the circumstances I have just mentioned place these samples in a far more favourable condition than they would have been had they been shipped to Europe in wood, tumbled about after arrival, and finally bottled and put aside.

The details on next page of distillation of a few bottoms of bottles show the power of several of these samples to resist acescence. That is a great matter truly. But what I wish to state here is, that few showed any striking likelihood of improving after six years of age.

OPENED 1866. DISTILLED IN 1869-70.

Name of Grower.	Name of Locality.	Name of Wine.	Spirit Strength.	Retained Color Fairly.	Lost Color.	Age of Vintage.
Randall	Glen Para, S.A.	Hermitage	19·3	very fairly	..	1865
,,	,,	H. and Carbinet	18·9	..	lost a good deal	1863
,,	,,	Reisling ..	20·3	color good	..	..
,,	Randallsen	Mataro ..	18·2	good red	..	1864
Auld ..	M'Gill ..	Auldauer	22·3	white ..	..	1863
,, ..	,, ..	,,	20·6	,, ..	..	1863
,, ..	,, ..	Mixture B. Portugal Carbinet	18·1	..	lost color to B. Sherry	1862
Peake ..	Clarendon	Palonimo Blanco	20·3	white ..	..	1862
,, ..	,,	Verdeilho	23	,, ..	..	1863
,, ..	,,	Pedro Ximenes	20·2	,, ..	..	1863
Noltenius	Adelaide ..	Red ..	17·2	kept color	..	1863
,,	,, ..	White ..	..	..	..	1863
Sangar, N.S.W.	Wahgunyah	Aucarôt ..	15·3	kept color yellow	..	1863
,,	,,	Reisling ..	18·7	white ..	..	1864
,,	,,	Hermitage	19·3	kept color fairly	..	1863

SPECIAL REMARKS ON WINES FROM CLARENDON VINEYARD, S.A.

The interest I took in the produce of a vineyard, belonging to a fellow-collegian, made me subject his wines to an especial study on his own account. But after I had made personal inspection of nearly all the vineyards, lying within a radius of fifty miles around Adelaide, I arrived at the conclusion that Clarendon was a fair representative district for that portion of South Australia. Situate in the gentle hills looking over the pretty hamlet of Clarendon, and bounded on one side by the Onkaparinga River, the vineyard rises somewhat steeply to at least 150 feet from the cellar, which is placed at the lowest part. It is about 50

acres in extent, and, with its surrounding of olive trees, realises fully what one writer called it, "a gigantic pyramid of luxuriant verdure." Far cooler than the plains surrounding the capital, and by no means so cool as many vineyards on the Barossa Range, it is, to my mind, a fair exponent of the average wine districts of South Australia. Hence I have studied Clarendon wines because of that characteristic, also.

I trust I shall not be misunderstood by wine men, either in South Australia or Victoria, because I have selected the wines of a personal friend for especial study. It must be borne in mind that the examination of wine (though but partial) involves much time and some expense, both of which fall on me personally, and that in such cases extreme and exceptional defects, or excellencies, must give way in the main to a fair average.

In the tabulated statements next following those of the Clarendon wines, will be found the detailed record of the spirit strength of a few samples from New South Wales and Western Australia, and a considerable number of samples of South Australian and Victorian.

The following are the Clarendon Wines, distilled by E. J. Peake, Esq., in 1869, and nearly all by me in 1870-1; the instruments used being Saleron's smaller and larger still; spirit strength estimated, in some instances, as will be observed, according to tables calculated by Gay-Lussac, in others, according to Sykes' (the English Standard), and in a few according to Long's balance, and mostly the mean of the three given. Those results, obtained by me, are recorded according to Sykes' strength only, and where a mean

is given, it is the mean of two or three distillations of the same samples with the same instruments.

Name of Wine Distilled.	Hydrometer Used.	Percent. of Proof Spirit.	Mean.	Age of Wine.
1. Temprana ..	Gay-Lussac ..	27·1	26·86	1867
	Sykes' scale ..	27·5		
	Long's balance ..	26·0		
1. Temprana, No. 1 hhd. for England	Gay-Lussac ..	23·6	24·66	—
	Sykes' scale ..	25·7		
No. 2 hhd. ..	Long's balance and slide ruler	24·7		
3. Do. No. 3 hhd. ..	Gay-Lussac ..	25·3	25·46	—
	Sykes' scale ..	25·8		
	Long's balance ..	25·3		
Verdeilho, No. 1 ..	Gay-Lussac ..	23·6	22·9	—
	Sykes' scale ..	22·6		
	Long's balance ..	22·7		
Do. No. 2	Gay-Lussac ..	23·6	23·3	—
	Sykes' scale ..	23·0		
	Long's balance ..	23·4		
Do. No. 3	Gay-Lussac ..	23·6	23·3	—
	Sykes' scale ..	23·0		
	Long's balance ..	23·4		
Temprana, No. 4 ..	Gay-Lussac ..	25·3	25·3	1867
	Sykes' scale ..	25·7		
	Long's balance ..	25·9		
Red Wine, No. 1 ..	Gay-Lussac ..	21·9	21·5	1867
	Sykes' scale ..	21·2		
Do. No. 2	Gay-Lussac ..	21·9	21·5	1867
	Sykes' scale ..	21·2		
Grenâche, No. 1 ..	Gay-Lussac ..	23·6	23·4	1867
	Sykes' scale ..	23·2		
Do. No. 2	Gay-Lussac ..	21·9	21·8	1867
	Sykes' scale ..	21·8		
Reisling	Gay-Lussac ..	23·6	22·9	1869
	Sykes' scale ..	22·2		
Verdeilho	Gay-Lussac ..	28·8	28·3	1869
	Sykes' scale ..	27·8		
Palomino Blanco ..	Sykes' scale ..	21·0	21·4	1869
	Long's balance ..	21·8		
Temprana	Gay-Lussac ...	27·0	25·9	1869
	Long's balance ..	24·8		
Temprana, soon after its first fermentation	Gay-Lussac ..	23·6	23·3	1869
	Sykes' scale ..	23·1		
Red Wines, Nos. 1 & 2	Long's balance ..	23·3	23·0	1869
	Sykes' scale ..	22·7		
Grenâche	Gay-Lussac ..	25·3	24·9	1869
	Sykes' scale ..	24·6		

Taking the total as obtained by all the several instruments used, it is 24·265; but if we pick out

those reported at Sykes' strength, it is found to be 23·625. Now, this is just ·955, or substantially one per cent. higher than the general average of South Australian wines hitherto studied.

ELEMENTS AFFECTING THE KEEPING OF WINE.

Now, as the spirit and tannic acid have so much to do with the keeping of wine, upon which depends, in no small degree, its power of travelling, and therefore its fitness to be sent into any foreign market; I thought it most desirable that these two points should be well attended to. And to them I have directed my attention, as the following tables will show. I premise, however, that in the instance of white wines, the standard of tannic acid was that of good old sherry and Madeira for the sweeter kinds, and Deinhard's hock for the harder Reislings, Chasselases, and Pineau Blancs. I treated only such as were free from any taint of acetic change. Now, I found hardly one that fell below the above-named standards.

For the red varieties I had to adopt other and more complicated methods of forming a fair rough estimate of that element—white of egg, in some instances; filtration through animal charcoal, and subsequent treatment; the examination of the residue after distilling off the spirit, &c. In fine, I am satisfied that nearly all of them contained tannic acid enough for home purposes, but hardly enough for exportation to distant countries. Red wines to be sent abroad in bulk should be rough to the taste.

In considering the excellent effects of tannic acid on wine meant for long voyages, I am bold to advise that

all such should on no account be "*fined*" with white of egg, or any albuminous matter, but well separated from the natural deposits of dregs by racking at proper seasons; nay, more, I feel certain that if ordinarily-prepared tannic acid, that may be procured from any druggist, were dissolved in wine brandy, and a proportion (say, a bottle) to a hogshead of wine added, instead of the two or three per cent. of spirit, the consumers at home would find a more agreeable article. Of course the quantity per hogshead of tannic acid added should be made known to the agent, that he might have it removed to suit his customers, in the ordinary way, by "fining" it with a proper proportion of white of eggs. Nothing is more certain than that the quantity of superadded tannic acid can be completely removed from the roughest or the most delicate wines. The above observations apply to wines sent in bulk, not in bottle.

Were the above directions made the subject of an experiment or two on pipes or hogsheads to be sent to Europe, I feel all but certain the result would show how needless it is to fortify wine for exportation, and what a saving in the cost of spirit alone it would prove to the exporter.

These tables relate to wines sent in to the Intercolonial Exhibition 1866-7, and were operated on from time to time since, as opportunity proved favourable, not a few having been distilled several times over, and different bottles used. The end in view was to test how great were the differences observable in the produce of all the colonies.

Name of Maker.	Name of Wine.	By Sykes' Hydrometer. Spirit Strength.		Mean.
NEW SOUTH WALES.				
Wyndham, Messrs. ..	Bukkullah Red ..	19·6	20·4	20·
,, ,, ..	Bukkullah White ..	23·	22·4	22·7
Doyle, J.	Kaludah	19·5		
Marie, Louis	Muscatel	24·3		
Carmichaels, — ..	White	23·5		
Fallon, J.	Reisling	22·3	24·	23·6
Lindeman, H. J. ..	Cawarra	20·4		
Macarthur, Sir W. ..	Reisling, 1856 ..	24·5	24·2	24·3
	General mean of samples treated			22·16
WESTERN AUSTRALIA.				
Hardy, Joseph ..	Red Wine	24·1		
Clifton, —	Verdeilho	23·5		
Wayler, Dr.	Muscatel	24.35		
		General mean		23·983
SOUTH AUSTRALIA.				
Peake, E. J.	Red and White ..	15 samples		22·13
Auld, Pck.	Auldana, 1864 ..	17·4		
,, ,, ...	,, White ..	23·	23·6 24·8	23·8
,, ,, ...	,, Red ..	20·3 22·4 22·7		21·46
Baker, John	A.B. Morialta ..	23·	23·6	23·3
,, ,, ...	A.Z. White	23·5	22·8	23·15
Fisher, D.	Roussillon	26·3	21·3	26·3
Scott, R. and J. ..	Hermitage, 1864 ..	25·	24·8	24·9
Randall, David ..	Glenpara, White ..	18·8	19·	18·9
,, ,, ..	,, Red ..	17·3		
,, ,, ..	Marked F. Red ..	25·7	26·3	26·2
,, ,, ..	,, G. Red ..	26·1		
,, ,, ..	Reisling	20·	19·2	19·6
Callender and Co. ..	Auldana, 1863 ..	22·6		
Smith and Son ..	Sherry	23·3	23·	23·15
,, ,, ..	Hermitage	24·		
Ross, R. D.	Highercombe, White	22·8	22·5	22·56
,, ,, ...	,, Red..	21·6	21·7	21·65
Martin, W.	Dulcetta, Red, 1864	24·2	23·7	23·9
Stead, J.	Hermitage	24·	23·9	23·93
Greig, A.	Verdeilho and Frontignac	25·	24·3	24·6
Greig, W.	Reisling, 1862 ..	24·	24·1	24·05
Hunt, F. R.	Madeira	23·		
Charlesworth, T. W. ..	Tokay (a fine Wine)	22·1	22·6	22·35
,, ,, ..	Reisling	23·4	23·5	23·45
Gillard, J.	Hermitage, 1863 ..	25·2	24·9	25·05
,, ,, ...	Mataro, 1861 ..	24·6	24·	24·3
Winckel, F.	Old Tokay (a splendid Wine)	23·9	23·3	23·6
,, ,, ...	Newer Tokay ..	24·	22·9	23·45
Gilbert, J.	Reisling, 1860 ..	20·	20·3	20·1
,, ,, ...	Verdeilho, 1860 ..	21·5	21·	21·25

Name of Maker.	Name of Wine.	By Sykes' Hydrometer. Spirit Strength.		Mean.
South Australia–*cont.*				
,, ,, ...	Reisling, 1864 ..	21·6		
,, ,, ...	Carbinet	22·4		
,, ,, ...	Scyras	23·	23·3	23.15
Green, W.	Reisling, 1862 ..	23·8	22·9	23·35
		Genl. average		22·67
Victorian.				
Guppy, —	Hermitage, 1865 ..	23·	23·3	23·15
Hopwood, —	Echuca, Red ..	25·2	24·8	25·
Galland and Jarrard ..	Hermitage	22·1	22·6	22·35
Weber Brothers ..	Hermitage, 1865 ..	21·3		
Hope, Dr.	White Wine ..	22·6	22·1	22·3
Dardell, J. H. ..	Shiraz, 1865 ..	20·7	20·2	20·4
Adams, R.	Hermitage	21·6		
Bear, T. H.	Mataro	20·1		
Knight, G. W. ..	Hermitage	23·3	22·9	23·1
,, ,, ..	Pineau Blanc ..	21·5		
Piper, W.	"Perseverance," White	19·	19·5	19·25
,, ,, ...	White Muscat ..	20·4		
Richmond, J.	Chasselas	18·8	18·2	18·5
Reid, Curtis	Muscat	23·1	23·	23·05
Heine, A.	Reisling, 1866 ..	21·8		
,, ,, ...	Chasselas, 1865 ..	20·3	20·6	20·4
Klemm, —	Reisling	19·9	20·2	20·05
Heine & Greiffenhagen	Hermitage	24·1	23·4	23·75
,, ,,	Burgundy	23·	22·4	22·7
Panton, J. A.	Hermitage	24·1	24·	24·05
,, ,, ...	Mataro, 1866 ..	21·4		
,, ,, ...	Burgundy	22·7	22·3	22·5
Vlaeminick Brothers ..	Red Wine	24·6		
Meredith, T.	Tokay	23·8	24·1	23·95
Depury and Langdon	Verdeilho	20·3		
Ross, J., and Co. ..	Hermitage	18·9	19·4	19·1
Pin, J. B.	Chasselas	19·3		
Elliott, S.	S.E. in diamond ..	20·4		
Everest, T. J.	Mataro	19·6	19·3	19·4
Maplestone, C. ..	Hermitage	21·8		
Murray, A.	Mataro	21·4		
Moody, Fred. A. ..	Burgundy	22·5	22·	22·25
		Genl. average		21·77

It will be remarked, from the above tables of spirit strength, that the highest average strength is found in the produce of Western Australia, it attaining nearly 24 per cent., actually 23·983. Next comes South

Australia with 22·67. Third in order is New South Wales, 22·16. Lastly, Victoria shows only 21·77.

Western Australia.—Probably the average for Western Australia would have stood somewhat lower, had a larger variety of samples been available. Still, it is not much matter for wonder that the produce of that colony stands so high for pure wine, if we remember its geographical situation, and the fact of the great radiation of heat from the sands near Perth, in which vicinity the vineyards above mentioned are situated.

New South Wales.—The eight samples of New South Wales wines distilled, though but few for so old and so large a wine country, represent fairly the best-known varieties; and from the different districts whence they were obtained, may not unfairly be said to be representatives of the produce generally. They were, without exception, first-class wines in their several kinds. Average strength, 22·16.

South Australia.—By far the largest and most interesting collection of wines sent to the Intercolonial Exhibition 1866-7, came from South Australia. Their variety was striking, their *range* of spirit strength surprising, and their general character very good indeed.

It was to these wines that I looked for information for our Victorian vignerons; for though no inconsiderable number of the South Australian vineyards have been formed in situations, whose annual average heat is, perhaps, higher than any Victorian, yet those, situate on the high and exposed hills, are as cool as the districts about Geelong or Yering; so that there is

not so very great difference, on the whole, as regards the vineyards now in existence in the two colonies. The Auldana, Morialta, Highercombe, and Pewsey Vale growths find analogues, if not their counterparts, in the Barrabool Hills and Yering, and their equals at Ivanhoe, near Melbourne. The difference in spirit strength, as obtained from the general average, is 0·39 in favour of South Australia.

As to the keeping power of South Australian wines, it was excellent wherever the tannic acid was present in its normal quantity. But with the exception of very sweet, luscious wines, like those of Mr. Stead, I cannot say that any of them continued to improve after the sixth or seventh year. I have no means of knowing how they would improve in bulk. I can only speak about bottled samples.

Speaking of the white wines very generally, I found in the prevailing character of the bouquet something to remind me of the faint odour of apples. Could this be malic æther, formed by a portion of the malic acid on the spirit in a nascent state? And if it be disliked, could it not be removed by the use of small quantities of partially calcined gypsum during the pressing.

Not a few of the reds either had already, or soon after the bottle was opened, acquired a very distinctive smell and taste, which were not pleasing to every palate. Some persons, not professed judges, called it smoky, others leathery. But the acquiring of this in no way affected the *keeping* of the wine. Both in the instance of South Australian and Victorian produce I conducted a long series of chemical experiments, with a view of determining whether this peculiarity was

due to some alteration in the tannic acid or not; for instance, the oxidation of it into some higher form, as gallic acid. It very generally occurs in Victorian red wines, but at first has more of an earthy quality. But my results hitherto are not conclusive. I have also consulted all the best and most recent works of the Portuguese œnologues, and find Senhor Lapa, Professor of Chemistry, and Royal Commissioner for Vineyards and Wines, attributes it in Portugal to the conversion of a portion of the tannic acid into alcohol! To whatever cause it is due, the vineyard proprietor should never rest till he has found means of getting rid of it. The French method of fermenting red musts advocated by Mr. Casalis Allut, and to be found *in extenso* in the last useful volume which Dr. Kelly has contributed to our scanty libraries of works on "Vines and Wines," seem, from points of reason, to be by far the best, and if needed in any one colony more than another, I should consider that one to be South Australia.

Last in the relation of average spirit strength, comes the products of Victoria with an average of 21·77. Though not quite so numerous as the South Australian, it represents not inadequately the produce of this colony. Stated in general terms, the Victorian wines are wonderfully good in their several kinds. But it must be observed *in limine*, that whether light or full-bodied, they are the produce of French or German vines. Hardly any other, except the Verdeilho (Madeira vine), is to be found as a standard sort. Not a few vineyards in South Australia, such as that of Sir George Kingston, Mr. White, &c., contain nothing but Spanish kinds; and Clarendon, Pewsey Vale,

Morialta, and Highercombe have mixtures of these with French; so it is impossible to institute exact comparisons. Yet from the circumstance of the Spanish vines being grown for the most part in hot situations, with plenty of lime in the soil, and the mode of treating the musts being more German than Spanish, these vineyards turn out white wines as fine and delicate as any that have been produced at Yering or the Barrabool Hills, but of course of a different bouquet, and slightly higher alcoholic strength. No matter how remote Victorian wines may yet be from the glorious bouquet of Deinhard's or the Johannisberg Hock, the produce of the south side of our dividing range comes the nearest to them of anything south of the equator. But if the treaters of the Spanish produce in South Australia only understood the requisites for managing their musts as such are treated in the instances of manzanilla (the bitter, fine, hard wine, so called from the *bitter* partaking of the character of camomile); the montilla, another dry wine; and the paxarete, a medium sort, it is hard to understand why these light, firm sorts might not be supplied abundantly.

In the valley of the Murray all the Spanish vines would have a fine chance; for there a deep gravelly soil, heat and shelter, and no hot winds, would indicate their natural home. And if ever the produce of this colony is to rapidly supersede the hot brandied sherries, and retain the pure sherry flavour without the adventitious impure alcohol, it is clear that from Sandhurst and Benalla to the Murray the requisite conditions must be looked for.

SPECIAL REMARKS ON CERTAIN MATTERS AFFECTING VICTORIAN WINES.

Among the kinds to which I have devoted time for a more than ordinary study in this colony are as white wines the Chasselas, the Aucarôt, the Shepherd's Reisling; and in reds the Mataro, the Grenâche and the Donzellinho (black Portugal). The Chasselas is in this colony one of the most useful grapes; it is a first-rate table grape, and will await the convenience of the wine-maker without complaining for a week or two, and the produce is frequently excellent.

If ever Victoria gains a name in the world's markets for any distinctive growths, the two first I prophecy will be Chasselas and Aucarôt, and the third, Shepherd's Reisling, or some blend of it. As yet nothing has come to my knowledge sufficient to mark a distinctive character upon any of the red kinds, except perhaps Grenâche. It yields enormously; and in rich soil and warm localities appears to have improved in the quality of the wine. I have met with a few samples from Echuca and South Australia, that possessed a well-marked character; and in 1866-7 a medal was awarded to a sample, grown at Clarendon, South Australia.

Concerning the blending of wines for the production of better results and greater varieties, and also for supplying a *uniform article*, when one has been found to suit a particular market, much remains to be said, which cannot, however, be attempted in a short essay like the present. Thus much, however, may be placed on record—that until this branch of the art of wine-making and preparing is carried out, the present universal complaint will continue to be as universal as

ever, both among our own and foreign consumers: "We can never rely on getting the same colonial wine twice together." "We have no sooner become accustomed to a particular kind that suits us, than we are informed there is no more of it." Now, on the other hand, when a Portuguese or Spanish house finds that an article has "taken," the very same can be supplied for ever, if it continue to be popular in the market. Duff Gorden's sherry, Hunt's and Offley's ports, &c., come to us year after year the same. To do more than hint at this point would inevitably lead me beyond my limits. Hitherto I have found by experiments only two white wines that I consider perfect for blending with red kinds—Aucarôt and Shepherd's Reisling.

One cause of the want of uniformity in the produce of many of our vineyards is the great variety of kinds of vines to be found in not a few of them. It is a mistake to allow this practice to continue one season longer than is necessary to ascertain two things—1st, which of two, three, or four kinds yield the best wine in the particular locality? 2nd, which, bearing the above in mind, resist disease best? Graft all the rest with these kinds. Were something of this nature done, and a distinctive character stamped on the produce, and consequently an almost regular demand created for it by customers at home or abroad, there would remain no reason why the banks should not advance upon the stock in cellar as they do in Spain and Portugal, and as they do here on wool aud other merchandise.

I would now direct the attention of the reader back to the "tables of spirit strength" and to the general averages which I have recorded. I hardly need say

that I took all care, when distilling, that lay in my power. From time to time one or two were subjected to actual balance-weighing, to satisfy my own mind that the hydrometer was correct, and that I was not led into error by such a thing as air-bubbles, produced when diluting the spirit with water, or by plunging in the hydrometer—the two fruitful sources of error. In either case the spirit strength would be altered. In thus directing attention to this important element in wine, I would add that I know I am open to much criticism—still, facts are facts. Exceptional samples, made rather from raisins, than naturally ripe grapes, when their elements are all nicely balanced, I have found yield over 26 per cent. I take the following from Dr. Druit's fine little work on wines :—"When we look through Mr. Keen's report on the wines which were sent to the International Exhibition, London, from almost every country *except Spain and Portugal* (from which *no samples were analysed*) we shall see that, although from southern countries, as Italy and Algiers, the average is a little higher, and on the Rhine and Moselle a little lower, still the fact remains, that of the 569 samples of liquid sent to the International Exhibition as *Wine* from France, Italy, Germany, Austria, and our own colonies of Australia—all, in fact, but a few exceptional specimens—yielded 18 to 22 *per cent.* of proof spirit." (Druit, pp. 9-10.) Now, in order to fully appreciate any question about cheap wine, we must fully realise the distinction that exists in composition, properties, uses, and doses, between what I will venture to call *pure virgin wine*, the refreshing beverage that a man *drinks at a draught*, with its 18 to 22 per cent. of proof spirit, and *strong* or *fortified*

wine, the stimulating dram, which he *sips*, pregnant as it is with its 35 to 45 per cent. of spirit. The two things differ *toto cœlo*.

I could have wished to insert a complete list of vines which yield the wine best known to Englishmen, but have been able to verify only a few kinds, either here or in South Australia.

SPANISH VARIETIES OF VINES KNOWN IN THE COLONIES.

The grapes which enter into the Spanish wines we call sherries are, as the *basis* of sherry—

1. Palomino Blanco.
2. Pedro Ximenes.
3. Temprana (meaning *early*); it differs apparently from palomino Blanco only in ripening earlier.
4. Doradillo, a capital bearer.
5. Jaen.

With the solitary exception of Pedro Ximenes, I am not aware if any of the above kinds of vines have been successfully planted in Victoria. But there are plenty of places north of the Dividing Range where they would succeed—the old diggers' spoil-heaps about Huntly, for example—and probably yield a fine light wine in character not unlike Manzanilla. In South Australia they produce light wine somewhat of the above character and strength; and to my mind, are among the most agreeable and distinctive in character, as white wines, that I remember to have seen from that colony.

FRENCH VARIETIES OF VINES.

There is hardly a popular variety of vine in France that has not been introduced into Victoria, all of which succeed south of the Dividing Range. Hermitage (often called *Scyras*), Miller's Burgundy, Carbinet, and Sauvignon, with now and then Malbec, are common and yield well. The Pineaus grow well, and some day will be the foundation of Champagne and other effervescent sorts.

PORTUGUESE VARIETIES OF WINES.

The district whence come the finest Port wines is that of Traz os Montes, and they are made from the following kinds of grapes. I translate from the report of the Viscount Villa Maior, Professor of Chemistry in the Polytechnic School, to whom was deputed the examination of the processes of wine-making of the above-named district, called also the *District of the North.* In passing, I would submit that the Portuguese Government Departments might help us, in these colonies, to a bit of common sense in the selection of members for appointment as Royal Commissioners, in the matter of agriculture at any rate :—

"His Majesty the King of Portugal has vouchsafed to appoint, through the Minister of Public Works, Commerce, and Industry, a Commission, composed of the Viscount Villa Maior, Professor of Chemistry in the Polytechnic School ; John Ignatius Ferreira Lapa, Professor of Agricultural Chemistry in the General Institute of Agriculture ; and Antonio Augusto de Aguiar, Professor of Chemistry in the Polytechnic School and Industrial Institute, in order to visit, during the time of the vintage, and of the wine-

making, the principal wine districts of the kingdom. The department allotted to Viscount Villa Maior is that of the districts north of the Douro; Antonio Augusto de Aguir, the district comprised between the Douro and the Tagus, except that of Lisbon; and John Ferreira Lapa, the district of Lisbon and the other districts lying south of the Tagus. The Commission will draw up a report embodying its labours and studies, and forward it to the Government not later than 15th November. Commission dated 10th August, 1866."

I consider the above a model of a working Royal Commission! Work, report, and all, finished in three months. Returning to the "*studies and labours*" of Viscount Villa Maior, he says:—"The predominating kinds of grapes in this region are, among the reds, one called Alvarelhaõ, the Bastardo, and some deep red kind they call Molle (soft). And among the white varieties the Arinto, which they call *Bual* (our Reisling), the Terrantez, and D. Branca. The red kinds are far more abundant than the white; and the wine they make is red." The lagares (places in which the grapes are *trodden* and pressed) are rectangular tanks of ordinary masonry (and such are in common use in the province), mostly small, affording little accommodation, and seldom clean, not to say that they are often deplorably dirty. Formerly the vintage took place not before the 29th of September; there being usually made a proclamation of the time by authority. At the present time the vintage takes place earlier, and, as a consequence, the wine is, as they say, inferior to that made in former times. The better class of cultivators, even still, hold their vintage later, and succeed in making excellent wines."

The method followed in the making of wine by the greater part of the cultivators is the following :—

"As soon as the lagar is full of the *mixed* grapes, without any attempt at separating the dry, rotten, or green berries, all together is trodden out for wine, and plenty of men put on at once, so that the first part of the treading may be done in the shortest space of time ; afterwards the work is carried on with fewer men during two days and the halves of two nights.

"When the fermentation has been well set up, they wait to ascertain how the wine offers to turn out. The fermentation is allowed to go on from two to eight days. The proof which is required is its having a vinous taste and smell, and a certain roughness of flavour on the palate. When it arrives at this point it is put into large casks, without any addition of brandy, until it is racked previous to being sold, and even then only a small portion is added. The Senhor Campilho, one of the best vignerons in these parts, and whose wines are made with more than customary care, gives two almudes of brandy to every 700 gallons."

REMARKS ON WINES SENT TO THE EXHIBITION, MELBOURNE 1872-3.

It would be out place now to trespass on the report of the wine experts, further than to add that during the period that has elapsed since I had an opportunity of personally judging of any large collection of Victorian wines (1867), there is the most unmistakable evidence of vast improvement in nearly all their vinous properties. Most of our red wines then had, when young, a well-pronounced disagreeable earthy taste ; but with more care, and improved methods of fermenting, and after-

attention, that has in many instances disappeared. And while our Victorian wines will have a character of their own, it is now certain that it will be a pleasant one. Young wines from new vineyards on the valley of the Murray were quite clean on the palate—in one instance remarkably so. From a vineyard near Echuca there came, in 1866, two lots of white and red wine, so offensive from this earthy taste, that the experts could find no terms strong enough to characterise it. In the instance of the reds, after four years they become good, but the whites, some of which remain, are still simply execrable. Yet a German vigneron, Mr. Vettler, has shown that by care and attention all these bad qualities can be avoided. None of his wines were more than two years old, yet the number of medals awarded him by experts, who had not the remotest knowledge whose wines they were judging, shows his complete success in wine-making.

I often hear persons interested in wine talking about foreign markets for their produce; but it has always seemed to me that our own people form the best customers of our produce. One thing is certain, that we are gradually and steadily becoming a wine-drinking people. The city is well spotted over with shops that deal in little else than colonial wine, which they retail at 2d. a large glass and 6d. a bottle! Now, I have had many years experience of wine, as taken by the Portuguese, and I am bold to say that such wine as is retailed in Melbourne at 6d. per bottle cannot be had for twice the money in either Lisbon or Paris at this day.

In the absence of any official information, I take the following from the *Argus* of 15th February, 1873:—"The decrease in the import of wines from £213,852

in 1862, to £64,766 in 1871, is clearly to be traced to the manufacture of wines forced upon us by the extension of our vineyards, and to *a change in the drinking habits and tastes of our people.* Our import of wines of all kinds in 1871 was 188,150 gallons, against 629,219 gallons of colonial manufacture, which increased to 713,589 gallons in 1872." The italics are mine, and I am delighted at seeing these statistics. They are all in favour of health and sobriety. What is now to be desiderated is the utter expulsion of bad brandy and worse "square gin," and one or two other "evil spirits" —which, let us hope, time will soon effect, and substitute in their place both a taste for, and the needful supply of, wine brandy. Wine brandy does not ordinarily create any craving for it, but all this raw manufactured stuff does.

In an essay read before the Royal Society of Victoria in 1867, I said :—"Experience has long ago convinced me that pledges and resolutions to abstain from ardent spirits are but 'poor safeguards of unstable virtue;' and that, to effect a lasting cure, the natural instincts must be not violently assaulted with resolves, but steadily and gently turned towards sources of reasonable and healthy gratification, while the danger of excess is effectually removed."

Am I wrong in thinking now that our pure native wines are doing their share in effecting a change in the *drinking habits and tastes of our people?*

The following is a list of a portion of the Victorian wines, sent to the Exhibition just closed in Melbourne, and left with me for further study and report, which have been already distilled, and their spirit strength, according to Sykes's tables, determined by me. They

have been drawn from the representative wine districts of Victoria, viz.:—North of the dividing range is represented by August Heine, Bruhn Brothers; Castlemaine, by Mellon; the Loddon River, William Botten; Sunbury, by Hon. J. G. Francis; Yering, by Hubert de Castella; Melbourne district, by Charles Maplestone and John Davis; Geelong wine districts, by the Hon. Dr. Hope and Mr. Jacob Weber; and the high country about Daylesford, by M. Jean Merle.

The necessity of having this essay printed in time for the Official Report of the Exhibition Commission prevents me from carrying on my inquiry further into the character of the wines sent to the Exhibition; but I trust to be able to continue it, and publish my results in a paper for the next volume of the Acclimatisation Society's Transactions. Meanwhile, I will just add that they show, as a whole, great progress in the arts of making and treating wine.

If the Victorian vignerons will make their wines carefully, and sell them cheap, they will clear out all but the very best from year to year, and have no need to look for exorbitant prices in foreign markets.

GOVERNMENT STATISTICS OF ACREAGE UNDER VINES, AND ITS GRADUAL INCREASE FROM 1863 TO MARCH 1872.

Year ending 31st March.	Vines.
	Acres.
1863	2,006¾
1864	3,076
1865	3,594
1866	4,078
1867	4,111
1868	4,340
1869	4,046
1870	4,950
1871	5,466
1872	5,523

RETURN OF VINES GROWN AND WINE AND BRANDY MANUFACTURED IN THE COLONY OF VICTORIA, FOR THE YEAR ENDING 31ST MARCH, 1872.

COUNTY.	Number of Vines.	GRAPES GATHERED.		Wine Produced.	Brandy Manufactured.
		Not Made into Wine.	Made into Wine.		
		cwt.	cwt.	galls.	galls.
Anglesey ..	10,450	150	—	—	—
Benambra ..	8,700	68	106	460	—
Bendigo ..	821,095	7,083	9,508	58,234	—
Bogong	1,504,286	898	26,786	172,198	—
Boruck	317,933	1,787	2,813	17,410	—
Bourke	1,560,570	9,293	9,923	65,784	—
Buln Buln ..	12,330	17	99	675	—
Croajingolong ..	—	—	—	—	—
Dalhousie ..	59,710	247	385	2,206	—
Dargo	—	—	—	—	—
Delatite	127,215	259	2,911	19,448	—
Dundas	12,435	326	47	230	—
Evelyn	777,000	125	10,741	78,515	1,500
Follett	—	—	—	—	—
Gladstone ..	226,307	1,756	3,076	17,271	—
Grant	2,423,811	2,464	15,461	108,233	79
Grenville ..	40,167	202	722	4,323	—
Gunbower ..	4,000	—	35	200	—
Hampden ..	1,208	6	—	—	—
Heytesbury ..	—	—	—	—	—
Kara Kara ..	60,350	413	251	1,829	—
Karkarook ..	—	—	—	—	—
Lowan	—	—	—	—	—
Millewa	—	—	—	—	—
Moira	572,650	312	8,872	66,980	—
Mornington ..	73,530	243	673	5,260	—
Normanby ..	19,875	239	90	430	—
Polwarth ..	33,000	460	650	3,000	—
Ripon	57,410	319	547	3,780	—
Rodney	222,746	205	2,508	17,420	—
Talbot	688,376	4,458	10,242	68,383	—
Tambo	—	—	—	—	—
Tangil	2,588	17	—	—	—
Tatchera ..	6,000	60	—	—	—
Villiers	44,550	89	345	1,340	—
Weeah	—	—	—	—	—
Wonnangatta ..	3,000	—	—	—	—
Total ..	9,691,292	30,896	106,791	713,609	1,579

According to the above tables the number of acres under vines has been substantially trebled in nine years—from 1863 to 1872. Yet this is hardly in keeping with the history of most of our new or localised

industries. The rule is that we look on and say nothing until an industry has got well into the experimental scale, and then we rush madly into it. For many a year prior to 1866, a few colonial breweries struggled on, and their beer was tolerated by a small portion of the people; by some because it was cheap, by the patriotic because it was native produce; but it was generally decried and detested. But in 1866-7, at the Intercolonial Exhibition, it was brought into really public notice; and the dissertation upon it by Mr. Foord, and the medals awarded by the jurors to Carlton and Castlemaine ale, and one or two others, awoke in no small degree the attention of the public; and forthwith came the "rush" of brewers, and, as a result, the practical expulsion of the European article. It is so with woollen cloth making, and generally with other industries in Victoria; they struggle hard and finally flourish.

But there have been, and still exist, heavy obstacles in the way of the wine interest. Firstly, we are not, as a people, wine-drinkers as yet; else we should consume the produce of the colony in less than a month. Secondly, every vigneron has a pet idea of his own, that his little patch of vines is the real Australian "*Cote d'Or*;" and his wine must soon bring a guinea a bottle. Thirdly, we want two or three merchants of large means, or two or three companies of not more than four or five partners, with ready cash, to the amount of (say) £50,000, and suitable cellars not far from the city, and if possible on the river, who would buy anything, even the *worst* at its brandy value, and the better sorts at higher prices. Thus every grower of a hogshead or a pipe of wine could bring it in, have

it tested, and obtain at once, in cash, its fair value, as he could for a load of wheat or oats. Such companies would soon supply the whole of the retail shops, and from the quantities in their cellars something like a uniform article might be supplied. Fourthly, in the instance of the more wealthy owners of vineyards, while their stock of middling wines would be kept down by selling to the companies, their experiments on their better growths would be carried on with more care and less anxiety about money matters. And lastly, the banks would be brought to the ordinary common sense of banks in Portugal, and make advances on wine in the cellar, on the report of competent judges, just as they now do on gold or station produce.

I have caused the following samples of Victorian wines to be distilled, and have determined their spirit strength according to Sykes' (British proof) strength.

VICTORIAN DISTILLED WINES.

Name of Maker.	Name of Wine.	Vintage.	Colour.	Proof Spirit.	Average
August Heine ..	Reisling	1869	..	20·0	Sandhurst, 20·26
,, ,, ..	Hermitage ..	1869	..	22·7	
,, ,, ..	Mataro	1868	..	18·1	
Bruhn Brothers	Carbinet Sauvignon	1869	..	23·3	Sandhurst, 23·92
,, ,,	Carbinet	1869	..	21·8	
,, ,,	Reisling	1869	..	23·0	
,, ,,	Verdeilho ..	1870	..	25·3	
,, ,,	,, ..	1869	..	26·2	
F. Mellon ..	Muscat	1870	..	20·2	20·2
,, ,, ..	Pineau	1870	..	23·10	
,, ,, ..	Esparte (Mataro)	1870	..	17·4	
,, ,, ..	Pineau	1871	...	20·1	
H. de Castella ..	Chasselas ..	1869	..	22·10	Yering 22·1
,, ,, ..	Hermitage ..	1871	..	21·2	
Chas. Maplestone	Large and small Reisling	1868	..	20·6	Ivanhoe, 20·5
,, ,,	,, ,, ,,	1870	..	20·4	

Name of Maker.	Name of Wine.	Vintage.	Colour.	Proof Spirit.	Average
Hon. J. G. Francis	Chasselas ..	1869	..	20·8	[Sunb.
,, ,,	Gouais	1869	..	23·8	22·3
Franz Schmidt ..	Reisling	1868	..	22·0	Ber-
,, ,, ..	,, ...	1869	..	23·8	wick,
,, ,, ..	,, ...	1866	..	26·3	24·03
John Davis ..	Ngarveno (White)	..	..	18·6	Ngar-
,, ,, ..	,, (Red) ..	..	..	22·2	veno,
Jacob Weber ..	Hermitage ..	1871	..	20·0	20·4
,, ,, ..	Chasselas ..	1871	..	25·5	22·75
The Hon. R. C. Hope, Geelong	Hermitage ..	1870	..	24·4	
,, ,,	Second sample ..	1870	..	22·6	23·98
,, ,,	Gouais & Reisling	1871	..	25·1	
,, ,,	Reisling	1871	..	24·4	
,, ,,	Hermitage ..	1871	..	23·4	
Jean Merle, Daylesford	Gamais	1871	..	19·8	
,, ,,	,, ...	1870	..	16·2	18·7
,, ,,	Another bottle do.	1870	..	19·1	
,, ,,	Another sample ..	1870	..	19·7	
William Botten, Loddon	Shiraz	1868	..	24·4	
,, ,,	White Hermitage	1871	..	22·6	23·0
,, ,,	Shiraz	1869	..	22·0	
August Mueller ..	Muscatel	..	..	23·2	
,, ,, ..	Shiraz	..	..	22·0	23·4
,, ,, ..	Verdeilho ..	..	..	25·0	
J. G. Francis ..	Mataro	1869	..	16·2	
,, ,, ..	Hermitage ..	1866	..	22·0	22·3
,, ,, ..	,, ..	1867	..	22·0	
,, ,, ..	Verdeilho ..	1868	..	24·4	
Otto Jung ..	Rousette	1871	White	21·8	23·05
,, ,, ..	Hermitage ..	1871	Red	24·3	
Carl Pohl (857) ..	Mataro, Hermitage and Pineau	1871	Red	21·8	
,, ,, (855) ..	Verdeilho ..	1872	White	24·9	23·7
,, ,, (861) ..	Cabinet and Hermitage	1869	Red	22·6	
,, ,, ..	Verdeilho ..	1871	White	25·5	
J. S. Johnston, Sunbury	Reisling	1869	White	20·0	
,, ,,	Verdeilho, a little mixed	1869	White	21·8	20·9
Messrs. Docker, Bontharambo	Reisling	1869	White	19·8	
,, ,,	Hermitage ..	1869	Red	22·4	22·1
Fred. Egli ..	Hermitage ..	1872	Red	21·8	21·8
John Vettler, Echuca	Gouais	1871	White	23·2	
,, ,,	Sherry	1871	White	20·0	
,, ,,	W. Morillion ..	1871	White	22·4	22·46
,, ,,	Gloria Australiæ	1871	Red	24·9	
,, ,,	Mataro	1871	Red	21·8	

Name of Maker.	Name of Wine.	Vintage.	Colour.	Proof Spirit.	Average
Joseph Best ..	Burgundy & Black Pineau	1871	Red	22·4	
,, ,,	Muscatel, Chasselas and Tokay	1871	White	23·6	23·0
Jacob Deppeler ..	Hermitage ..	1870	Red	23·6	
,, ,, ..	Reisling	1870	White	22·4	23·0
Wm. McDonald	B. Muscat ..	1867	Br'wn	32·2	
Trouetti	Reisling	1870	White	20·4	
,, ...	B. Custer ..	1871	Red	17·5	18·95
Cowan Paton ..	Reisling	1870	White	21·6	
,, ,, ..	Shiraz	1870	Red	19·5	20·55
Robinson ..	Burgundy ..	1871	Red	21·6	
T. Creppa ..	,, ..	1871	Red	16·2	
,, ,, ..	Hermitage ..	1871	Red	18·5	17·35
Seidd	Muscat	1871	..	21·0	
,, ...	Pedro Ximenus ..	1871	White	22·6	22·48
,, ...	Verdeilho ..	1871	White	23·8	

I conclude, then, as I began, saying that hopeful as our colonial wine industry is, it is not as yet quite out of its nonage.

NOTE.

For the guidance of persons testing the spirit strength of liquids, the following will be useful, as there were until within the last two years hardly any other than Gay-Lussac's tables to be had, with Saleron's small stills. Lately hydrometers and tables calculated on what is known as "Sykes," or English proof spirit, have been procurable :—

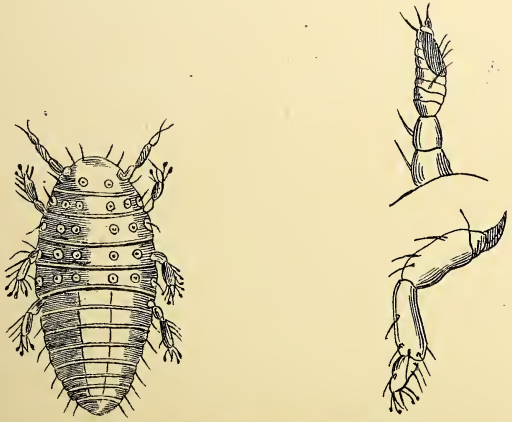
Comparative Value of French and English Degrees of Alcoholic Strength.

The different modes of expressing the strength of liquors adopted in England and France, is the source of much inconvenience and confusion. In both countries the operation of testing or trying the strength is by distillation of a determinate quantity, and then taking the temperature and density of the distillate by thermometers and hydrometer, but here the similarity ends. The instruments, as used in the two countries, differ

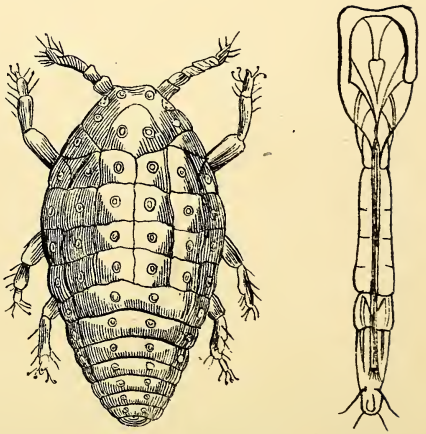
essentially, and therefore the results are shown in different terms. In England, Fahrenheit's thermometer and Sykes' hydrometer are used; in France, the Centigrade thermometer and Gay-Lussac's hydrometer. These thermometers differ in the fact, that the range between the temperature of frozen and boiling water is divided in the latter (Centigrade) into 100 parts or degrees, and in the former into 180. Gay-Lussac's hydrometer is graduated to show 100 divisions or degrees between absolute alcohol of ·796 specific gravity, at 15·5 Centigrade or 60° Fahrenheit, and pure water; while the scale of Sykes' hydrometer starts from a definite mixture of water and pure alcohol, nearly in equal volumes, having a specific gravity of ·920 at 60° Fahrenheit, and called proof spirit, and the instrument shows whether the spirit under test is of greater or less strength than such proof. In various scientific works tables are given of the equivalent degrees of these two scales, but none of them exactly correspond. The following figures are very nearly exact:—

Sykes.	Gay-Lussac.	Sykes.	Gay-Lussac.	Sykes.	Gay-Lussac.
1	0·5	9·5	6·5	21·5	13
2	1	11	7	23	14
3	2	13	8	24	15
4	3	15	9	25	16
4·5	3·5	16·5	9·75	26·5	17
5	4	18	10·5	28	18
6·5	5	19	11·5	30	19
8	6	20	12	32	20

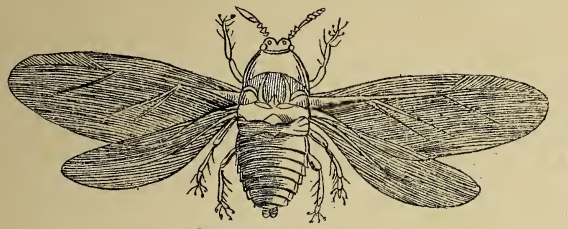
Under the excise laws of France, wine generally is not allowed to be fortified for home consumption; but, under certain limitations, spirit to the extent of 5 per cent. may be added to the produce of the eastern Pyrenees, the Aude, the Tarn, the Hérault, the Gard, and the Rhône. All wines for exportation may be fortified without restriction, and most vintages are so strengthened before being shipped—Roussillon wines for Brazil to the extent of 10 per cent., and for England from 5 to 8 per cent.



Phylloxera vastatrix—Wingless form.



Phylloxera vastatrix—Wingless form.



Phylloxera vastatrix

Phylloxera vastatrix—Galls.

PAPERS

RESPECTING THE

PHYLLOXERA VASTATRIX,

OR

NEW VINE SCOURGE.

No. 1.

Sir C. Murray to Earl Granville.—(Received 22nd June.)

Cintra, 12th June, 1872.

My Lord,

I know not whether your Lorship's attention has been called, either by the Embassy at Paris or by any of the British Consuls in France, to a new scourge that has recently attacked the vines in that country as well as in Portugal, and which threatens to be as desolating in its effects as the disease called *Oidium*, which for some years destroyed viniculture in Madeira, and has inflicted serious damages on it both in France and Portugal, notwithstanding the partial remedy that has been discovered and adopted in the free use of sulphur. The insect which has lately been making such ravages in the vineyards, and to which has been given the name of *Phylloxera vastatrix*, seems, according to the report of those who have examined it carefully, to be of the same species as the "aphis," long known in horticultural and vinicultural science as an insect most destructive to plants and vegetables, and it has received

the vulgar names of "puceron" in France and "plant louse" or "vine fretter" in England; but the *Phylloxera*, whose ravages are now causing so much damage and apprehension, appears to be not only particularly destructive, but also very difficult of extirpation. A printed paper, from which I gather some of the observations which I am now offering to your Lordship, states (I know not whether correctly or not) that the French Government has offered, and hitherto without success, a reward of 20,000 fr. to any one who can discover an effectual remedy for the ravages produced by this insect. According to the statement of the paper above referred to, the injury inflicted by this scourge on some of the vineyards in the Duro district has been terrible, and one vineyard is specified, the average produce of which had been seventy pipes of wine, and which last year only produced one; and a certain Senhor Avelino, who was sent into that district to examine and report upon its condition, estimates the total loss on last year's vintage there at 500 pipes.

The Portuguese Government has named a commission, under the presidency of the Director-General of Commerce and Industry, to examine into the progress of this dangerous evil, and to gather from all quarters (whether scientific or practical) suggestions for the best mode of extirpating it. One French vine-proprietor reports that he has tried with some success the expedient of digging a hole round the stem of the vine, which he half fills with chimney soot and then covers over with earth. If this should ultimately prove an effectual antidote to the malady, it is much to be regretted that the vine-growers of France and Portugal are not somewhat nearer to London, where it could be

cheaply and abundantly supplied; but if the description given of the *Phylloxera* be scientifically correct, and it is a species of aphis, it must probably, like most species of that order, be furnished with wings, in which case it would not seem likely that any substance placed around the roots could afford protection against its ravages.

Considering what a large proportion of the exports of Portugal and the South of France depends upon the fruit of the vine, I have thought it my duty to bring the subject under your Lordship's notice, in order that you may, if you think proper, desire further information concerning it to be supplied to you from other quarters.

I have, &c.,

(Signed) CH. A. MURRAY.

No. 2.

*Viscount Enfield to Lord Lyons.**

Foreign Office, 25th June, 1872.

SIR,

I am directed by Earl Granville to transmit to you, for your information, a copy of a despatch from Her Majesty's Minister at Lisbon, relative to the appearance of a disease among the vines of France and Portugal.†

I am, &c.,

(Signed) ENFIELD.

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* A similar despatch was addressed to Consul-General Monson.

† No. 1.

No. 3.

Sir C. Murray to Earl Granville.—

(*Received 15th July.*)

Cintra, 3rd July, 1872.

My Lord,

A few days after sending to your Lordship my despatch of the 12th ultimo, on the subject of the ravages reported to have been committed in the vine districts by the *Phylloxera vastatrix*, I addressed a despatch to Mr. Consul Crawfurd, at Oporto, desiring him to make all the inquiries necessary in his neighbourhood, and furnish me with such information as he could collect on the subject. I have received his report, and have the honour to enclose it herewith. Your Lordship will observe, on reading it, that Mr. Crawfurd seems of opinion that the fears, amounting almost to a panic in some districts, which have arisen concerning the ravages of this insect are very much exaggerated, and he attributes this very much to the recent publication of a pamphlet on this subject by Senhor Oliveira. I am inclined to agree in this opinion to some extent, for I have procured and read the pamphlet, on the inaccuracies of which Mr. Crawfurd comments in very severe terms. I am not sure, however, that Mr. Crawfurd does not underrate, as much as Senhor Oliveira may overrate, the damages caused or to be apprehended from this mischievous insect; for though Mr. Crawfurd may correctly designate the pamphlet as "a hasty and ill-judged compila-

tion from French authorities," it does not thence follow that the authorities from whom he compiled are unworthy of credit. So far from this being the case, I am inclined to believe, from the positions which several of them filled in the Bordelais and in the valley of the Rhone, that they were men selected on account of their practical or scientific knowledge to report on the subject. With this reservation, I agree with Mr. Crawfurd in considering both the tone and the statements of the pamphlet very exaggerated; and, moreover, as I now see that many of the articles in the local newspaper from which, as I informed your Lordship, I drew the chief materials of my despatch, were based upon the contents of this pamphlet, I trust that the grounds on which Mr. Crawfurd expects that the Portuguese vineyards will enjoy an immunity, total or partial, from the scourge may prove correct. In reference to the case specially mentioned in the 6th page of Mr. Crawfurd's Report, it is a curious circumstance that I have, within the last few weeks had one precisely similar in my garden in Lisbon. An old, strong, healthy, and hitherto very fruitful vine began suddenly to wear a sickly appearance, the leaves began to wither, and to assume first a yellow and then a reddish appearance. My gardener had never seen this or any other vine in my garden attacked in a similar manner (although we are obliged to sulphur all our vines several times yearly to preserve them against *Oidium*); so, thinking that I had received my first visit from the *Phylloxera*, I desired my gardener to uncover and carefully examine the roots, but they appeared perfectly sound and healthy, and the disease, which has destroyed this year's crop of fruit and leaves,

remains a mystery. I have surrounded the roots with a bed of soot, overlaid with earth; but whether the vine will recover or die remains to be proved.

I have, &c.,

(Signed) CH. A. MURRAY.

[Inclosure 1 in No. 3.]

Consul Crawfurd to Sir C. Murray.

Oporto, 30th June, 1872.

SIR,

I have the honour to enclose herewith, with reference to your despatch of the 12th instant, a Report upon the recently discovered vine-disease producing insect—*Phylloxera vastatrix.*

I have, &c.,

(Signed) OSWALD CRAWFURD.

[Inclosure 2 in No. 3.]

Report by Consul Crawfurd upon Phylloxera vastatrix.

The attention of the Portuguese wine-growers has not been called until the last two years to the existence of a new enemy of the vine in the shape of *Phylloxera vastatrix.*

The discovery in France of this supposed importation from America was not made till the year 1855, since which time its natural history and the effect of its ravages upon the vine plant have been industriously investigated by French entomologists and œnologues; and in the opinion of some persons the extent of these ravages has been not a little overstated.

There is little doubt however that, after making due allowance for the exaggeration common to those who make a long study of special subjects, the injury done by this insect to vineyards, in certain districts of France, and under certain circumstances of vine cultivation, has been considerable.

Phylloxera vastatrix is a small insect of the sub-order of *Homoptera*. The adult female only has, as yet, been discovered; it is found in the apterous and also in the winged state. The eggs would appear to be generally deposited in galls, formed by the insect on the leaf of the vine, and the newly-hatched grub finds its way to the roots of the plants, upon which it feeds.

The first symptom of the vine being attacked is the reddish-yellow colour of the leaf. No means of checking the progress of the insect has yet proved effectual.

Senhor Oliveira, junior, has quite recently published a pamphlet upon the subject, which, though a hasty and ill-judged compilation from French authorities, may, perhaps, have the effect of arousing observation on the part of the vine-growers. This work, however, is full of unpardonable exaggeration, tending only either to encourage undue alarm, or, as is more probable, to excite utter unbelief in the writer's assertions: *e.g.*, the author begins by stating that a plague has fallen upon the vine industry of the country one hundred times more destructive than the old vine disease—the *Oidium Tuckeri*.

The food of *Phylloxera vastatrix* being the roots of the plant, it is obvious that it is only where the young and more tender roots of the vine are near the surface of the ground that they can be destructively fed upon by so small and delicate an insect.

This is proved by the experience of French observers. In vineyards where the soil is of little depth, in those where the drainage is deficient, and, particularly, in those French vineyards where, quantity rather than quality of wine being sought for, cultivation by the plough and frequent manuring are employed, the presence of the insect has been found to be more or less accompanied by damage to the vine; for in all these cases the fine root-fibres are near the surface and within reach of the insect. The same, of course, applies to newly planted vines, which are especially liable to destruction.

On the other hand, *Phylloxera vastatrix* is never observed to attack vines allowed to creep over pollarded trees, or over trellis work; and vines so trained form probably nineteen-twentieths of all that are grown in North Portugal—the vines in such cases being usually well-established plants of many years growth, with deep reaching roots. Again, in the district in which port wine is produced, although the shape of the vine is bush-like, as in France, the roots descend to a great depth in the schistose soil—a depth, as I have myself had occasion to observe, sometimes exceeding fifteen feet.

The same holds good, though to a less degree, with regard to the vines of the Bairrada district, and elsewhere in the province of Beira, where they are grown in bush-shape; and it may be observed generally of this Consular district, that the wine cannot be profitably produced except in deep soils, on account of the frequency of long summer droughts, which cause the plant to send its roots far down in search of moisture.

It will easily be concluded from these facts that the conditions of the growth of the vine in Northern Portugal are by no means favorable to the development of *Phylloxera vastatrix.*

Senhor Oliveira, junior, mentions two instances of the ravages of the insect in the port wine district. In one of these cases, the yield of wine was reduced from sixty pipes to eight pipes in two years, but in neither case was it clearly proved that the destruction was the work of *Phylloxera vastatrix.* The roots of the plants in the above-cited instances were indeed found to be decayed, but no insects were discovered, and no particulars of the age of the vines, depth of soil, or character of the exposure, are given in either case. It is clear that such statements have no scientific value at all, and that the loss, in these cases, may have been due to other and older enemies of the vine.

I have inquired of several extensive vine-growers in the Alto Douro (the port wine district), and I can learn of no undoubted case of the appearance of *Phylloxera vastatrix.* One gentleman of great experience was inclined to think that the vine has for many years been subject to a disease, the symptoms of which correspond to the appearance said to be produced by the ravages of the insect. He had lately rooted up vines of his own, whose leaves were withered and yellow, but in no case were the roots in any way affected. He mentioned having seen, in the month of May of this year, a vineyard in which, in four days, the leaves had changed from a healthy green to the colour and appearance of the common zonal geranium, but here, unfortunately, no further examination was made.

The observation of the gentleman I have quoted is worthy of all attention, but the opinions of many of the wine-growers are fanciful beyond belief. One authority (quoted with approval by Senhor Oliveira, junior, and which may be cited here as a measure of the intelligence of others) is of opinion that the disease is in no case due to *Phylloxera vastatrix,* but the result of bad air, and all the proposed remedies he pronounces to be futile, except one—that of subterraneous fumigation of the roots with sulphurous acid gas; and this not because of any benefit to the plant, but because it would remove the prime cause of the disease—the foulnest of the air!

The conclusions to which I have come, after fully investigating this subject, may be summed up as being—

1. That no certain grounds exist for believing that any, or, at least, any serious damage has been caused in North Portugal by *Phylloxera vastatrix;* but, while no scientific observation whatever has been brought to bear upon the subject, it is impossible to pronounce definitely upon its existence or non-existence.
2. That the great majority of vineyards in North Portugal will, from their peculiarities of cultivation, escape entirely.
3. That it would be safe to predict that, if ever the insect becomes numerous here, its destructive influence will be felt first and chiefly in the vineyards which produce the Bairrada wine, and afterwards, and less extensively, in the district of port wine production.

This report is entirely confined to the limits of my Consular district.

(Signed) OSWALD CRAWFURD.

Her Majesty's Consulate,
Oporto, 29th June, 1872.

No. 4.

Lord Lyons to Earl Granville.—(Received, 17th July.)

Paris, 16th July, 1872.

MY LORD,

With your despatch of the 25th ultimo, your Lordship was so good as to send me a copy of a despatch from Her Majesty's Minister at Lisbon on the subject of the *Phylloxera vastatrix*, an insect which preys upon vines.

I have the honour to transmit herewith to your Lordship copies of two despatches which I have received from Her Majesty's Consul at Bordeaux, to whom I applied for information respecting this insect.

I have, &c.,

(Signed) LYONS.

[Inclosure 1 in No. 4.]

Consul T. C. Hunt to Lord Lyons.

Bordeaux, 2nd July, 1872.

MY LORD,

I have the honour to acknowledge the receipt of your Excellency's despatch of the 30th ultimo, inclosing the copy of a communication to Earl Granville by Her Majesty's Minister at Lisbon, on the subject of the insect *Phylloxera vastatrix*, which has attacked the

vines of France and Portugal, and instructing me to make a report upon it.

This insect, which seems to have been first observed in the course of the year 1868 among the vineyards of the Rhone, is said to feed on the juices of the most tender roots, and, by cutting off the flow of sap at its fountains, to cause the death of the vine.

I am not aware that it has been found in this part of France, although reports of its existence here were not wanting as far back as 1870. There can be no doubt that, as the situation of the evil is of very difficult access to any topical application, the introduction here of an insect of such enormous multiplying functions would have been a constant subject of reference by the local newspapers.

Not, however, to trust to my own accidental means of knowledge, I have addressed a letter to the Prefect of this department, and to the President of the Chamber of Commerce of Bordeaux, begging them to furnish me with any information upon the question that they may possess; and I will lose no time in forwarding their answers to your Excellency.

I return the copy of the Lisbon communication inclosed in your Excellency's despatch.

I have, &c.,

(Signed) THOMAS CAREW HUNT.

[Inclosure 2 in No. 4.]

Consul T. C. Hunt to Lord Lyons.

Bordeaux, 15th July, 1872.

MY LORD,

With reference to my despatch of the 2nd instant on the subject of the insect *Phylloxera vastatrix*,

which has attacked the vines of the east of France, I have the honour to transmit to your Excellency the inclosed copy of a letter received by me from the President of the Chamber of Commerce at this place, containing the information possessed by him respecting this new danger to vineyard owners.

The President, after showing that an insect of the kind was discovered at Floirac, near this town, four or five years ago, but has only been observed to a small extent on two or three other estates; that the Government of Paris has offered a reward for the discovery of a cure; that the cause of the malady is unknown, and that the destruction of the plants is recommended as necessary; questions the identity of the cases observed here with the disease of Languedoc.

So far as I have been able to learn from private inquiry, the insect is almost unknown in the neighbourhood of Bordeaux.

I have, &c.,

(Signed) THOMAS CAREW HUNT.

[Inclosure 3 in No. 4.]

* *M. Corti to Consul T. C. Hunt.*

Bordeaux, 11th July, 1872.

SIR,

I have obtained from persons of experience in *Phylloxera vastatrix* the following account, in reply to the questions on which you seek for information, viz. :—

1. Since the first appearance of the disease in the Palu de Floriac, now four or five years ago, its

* Translated from the French.

ravages have not spread to any notable extent. In only three or four vineyards has it killed a few vines in this commune.

2. The Government has entrusted to special commissions the study of the disease. It has offered the respectable reward of 20,000 francs (£800 sterling) to the inventor of an effective method of treating the disease, and has encouraged every investigation and experiment calculated to throw light on points in science and practice arising out of this new enemy of our vines.
3. No one knows what the causes are which have produced this malady, and no one has published anything that is satisfactory on the subject.
4. With reference to the means found to have been efficacious in warding off an attack of the evil, none have been yet discovered. The Agricultural Society of the Gironde has advised vignerons, as soon as the disease makes its appearance, to root up the dead or diseased vines, to dig the ground deep below the roots, to burn the vines in the holes, to pulverize the clods, and mix the soil with strong manure, and then plant fresh vines in their places. Some vineyard proprietors in the Palu de Floriac have acted on this advice, and at the present time the new vines are thriving well.

Now, on the other side, I have received some information also from good sources.

From what would appear, no official measures have been taken to determine the nature of the disease.

Once only, two years ago, the Prefecture desired the Professor of Agriculture to work it out, and report upon it.

Amongst us the causes of the disease would be very difficult to verify. Most particular attention should be paid to all the conditions of any locality in which it may happen to be dying out.

The means adopted to combat it offer nothing new, nothing local. The practice in this regard is the same as in the district of Gard, &c.—in all cases eradication of the infected vines.

Many other questions besides those answered above might have been put; *e.g.*,—Is the insect called *Phylloxera vastatrix* the cause, or only the consequence of the disease?

Again, do the cases which have occurred among us bear evidence of being the same malady as that which has been so general, so destructive, in Languedoc?

These points, the importance of which any one can see, are at present very far from having been cleared up.

Quite recently there has appeared a sort of resumé, with drawings of the insect, by M. Heuzé.

Such, Sir, is the information which it is in my power to transmit. I hope you will find it sufficient. At any time I shall be happy to render any assistance in my power.

I have, &c.,

(Signed) CORTI.

No. 5.

Lord Lyons to Earl Granville.—(Received 24th July.)

Paris, 23rd July, 1872.

My Lord,

With reference to my despatch of the 16th instant, I have the honour to transmit to your Lordship copies of a further despatch from Mr. Consul Hunt and its enclosures, relative to the insect *Phylloxera vastatrix*, destructive to vines.

I have, &c.,

(Signed) Lyons.

[Inclosure 1 in No. 5.]

Consul T. C. Hunt to Lord Lyons.

Bordeaux, 22nd July, 1872.

My Lord,

With reference to my despatch of the 15th instant, in which I transmit to your Excellency a communication from the Chamber of Commerce at this place, on the subject of the insect *Phylloxera vastatrix*, I have the honour to enclose the copy of a letter, with the papers accompanying it, received by me this morning from the Prefect of the Gironde.

These papers admit the existence of the insect in the neighbourhood of Bordeaux, but show that it has not been propagated beyond the part where it first appeared.

As in the more eastern districts of France its ravages have been widely extended as soon as it appeared, there must be great doubt whether the insect found here is the same that has done so much mischief there, or whether it is the true cause of the mischief.

In support of this view I enclose an extract from a local paper of the 19th instant, the result of an examination of some vineyards in this neighbourhood, where the insect was found, but in too small numbers to account for the effects attributed to it.

I have, &c.,

(Signed) THOMAS CAREW HUNT.

[Inclosure 2 in No. 5.]

* *M. Duval to Consul T. C. Hunt.*

Bordeaux, 19th July, 1872.

SIR,

In reply to the wish expressed in your letter of the second instant, I have the honour to communicate such information as I possess concerning the propagation of the *Phylloxera vastatrix* in my department.

From information supplied by the Agricultural Society in a report, a copy of which I enclose, you will see that up to the present time there have been only partial attacks of this disease, and which have been confined to the commune of Floriac, near Bordeaux, and some of the neighbouring communes.

As far as concerns the causes of this disease, and the measures adopted by the Government to stamp out *Phylloxera vastatrix*, the information which I enclose herewith will be found to contain suggestions useful for consideration, and which will at the same time assist you in replying to the questions asked by the Ambassador of Her Britannic Majesty at Paris.

I have, &c.,

(Signed) FERDINAND DUVAL.

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* Translated from the French.

[Inclosure 3 in No. 5.]

* *M. Dupont to M. Duval.*

Bordeaux, 9th July, 1872.

SIR,

In your letter of the 2nd July instant, you have asked from the President of the Agricultural Society some information on the subject of the new vine disease, the *Phylloxera vastatrix*.

The President is absent on business connected with the department of agriculture, which has been entrusted to him by the Honorable the Minister of Agriculture, and I think it is my duty to reply in his stead.

The disease of the vine known as *Phylloxera* has not spread to any great extent in the Gironde. The locality in which it has been observed for the last four or five years, limited to a few acres of vineyards, situated in one or two communes close to Bordeaux, is by no means extensive.

Were we to credit mere rumour without proof, this devastating pest might be found more or less everywhere. Superficial observers appear strongly inclined to lay at its doors the destruction of all vines.

This is a very great mistake. For the last four years the vines have suffered severely from extreme climatic changes, chiefly from frosts. In many parts of the Gironde, causes arising out of the nature of the soil and the cultivation have been added to the severity of the weather. This coincidence has left our vineyards in anything but a flourishing condition.

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* Translated from the French.

The spread or progress of *Phylloxera* is a small matter. All careful observations place these exaggerations beyond a doubt. While on one hand the original source of the *Phylloxera*, close to Bordeaux, has not gained on the country, on the other hand, the replanting with new vines has been a complete success, in the land and in the very places where the former vines had died—the same vines on which the existence of *Phylloxera* has been demonstrated.

These two facts are of great weight. From them we may draw favourable conclusions for the future.

The question of *Phylloxera* has been placed even at this day by certain publicists on grounds purely scientific.

The Agricultural Society of the Gironde, on the contrary, studied it, and endeavoured to solve the problem from the purely practical point of view. Without expressing any decided opinion, it has never ceased since the appearance of the presence of the malady to tender to vignerons advice showing the overwhelming importance it attaches to the success of replanting, to the preparation of the soil by pulverization, and the employment of manures. Results obtained in certain vineyards where the disease had broken out warranted it in this cousre. It will not cease to afford further information, by publishing the most careful observations tending to throw light on the part played by this insect on the vine plant. In conclusion, Sir, I am happy to be able to assure you that the *Phylloxera* is stationary in the Gironde.

As far as concerns the disasters that have befallen some of our vineyards, I think they should be attri-

buted for the most part to unusual atmospheric causes, and to others arising out of the geological formation, and the character of the cultivation.

I have, &c.,

(Signed) DUPONT,
Secretary-General of the
Agricultual Society.

[Inclosure 4 in No. 5.]

* *Report addressed to the French Minister of Agriculture and Commerce by the Commission appointed to inquire into the new disease which is afflicting the Vine.*

Several large vineyards in the South of France have been invaded during the last few years by a formidable and entirely new disease. The vines attacked by it succumb as a rule at the end of the second year.

This disease, the origin of which is unknown, appeared for the first time in the valley of the Rhone during 1864 or 1865, but it was not until 1867 that it attained sufficient proportions to excite alarm. In 1868 and 1869, however, it had become a regular scourge. Then it was that those wholesale desolations of extensive vineyard properties were seen which struck terror amongst the vignerons, and appeared to be so much the more dreadful because the first indications of the evil had perhaps been overlooked. From that time the disease did not cease to spread, and it now extends from the department of La Drôme to the confines of La Crau, more particularly on poor, dry, gravelly soils, and naturally wet lands. The district

* Translated from the French.

of Orange, one of the most severely visited localities on the left bank of the Rhone, had already lost during the last year 3,600 hectares (8,895 acres) of vines out of the 10,880 (26,884 acres) which it formerly possessed. The department of Basse Alpes, hitherto unattacked, is beginning to be infected.

On the right bank of the Rhone the progress of the disease has not been so rapid. The department of Gard has, however, been attacked in a great many quarters. The Ardéche has diseased vines, and L'Hérault already shows the early symptoms of the malady. The progress of the disease in the Bordeaux district, where it appeared some years ago, has been slower than in the valley of the Rhone.

The most characteristic external feature of the new disease, and that which has been mostly noticed by all observers, is the existence, in all recently affected spots, of a centre of attack which extends itself without intermission. The vines contiguous to the first seat of infection shed their leaves, and grow yellower and yellower until they become completely dried up. When the vineyard attacked is a large one and the disease sufficiently active, instead of one centre of infection there are several. From these facts it has been generally inferred that the disease is propagated in two ways—progressively and intermittently. The gradual extension of the various centres of attack, of which we have just spoken, reveals the first mode of propagation; their existence simultaneously at several isolated points is proof of the second. Experience has also taught us that the new vine disease progresses by irregular bounds, often appearing suddenly at great distances from the already ascertained centres of infec-

tion. When the roots of the infected vines are examined it is easy to perceive that they have undergone considerable change; they are always soft and rotten, and their tissues, hypertrophied and void of firmness, yield to the pressure of the fingers.

These serious disorders are due to a species of aphis, which has been named *Phylloxera vastatrix.* This insect, which is almost invisible to the naked eye, establishes itself upon the roots of the vine, and perforates them with its proboscis in order to feed upon their juices. These repeated perforations probably irritate the tissues and induce hypertrophy. They give rise to knots upon the fibres of the roots, which are quite peculiar to the new disease, and form a fundamental distinction between it and all other kinds of affections observed in the vine, such as the "pourridie" or "blanquet," a sort of rot produced by subterranean fungi, and the disease "camargue" which has already caused the destruction of a large number of vine plantations. It must at the same time be remarked that the *Phylloxera* never remain upon the roots which are beginning to decompose. When one part grows putrid they immediately remove to another. In fact, they cause putrefaction, always going before it, and never following after.

Hitherto none of our own varieties of vine has escaped this new disease, but it is reported that there are some American varieties in the outskirts of Bordeaux, which, although they have been surrounded by infected plants for three years, show as yet no signs of suffering from the new disorder. The insect which thus riots on the vines belongs to the genus *Phylloxera,* and constitutes part of the order of *Hemiptera,* and

more particularly of the sub-order *Homoptera*, the most commonly known of which are the grasshoppers, the lice, and the cochineal. It forms of itself a small family, which is a sort of connecting link between the lice or aphides, and the cochineal or coccideæ.

According to the recently made investigations, the *Phylloxera* exists under two different forms — the wingless and the winged; it is not viviparous, but during the whole season and under both forms it only lays eggs. We must add that the individuals hitherto observed, and they have not been few, have always been females. The male *Phylloxera* had not been found either in the winged or apteral state, although long diligently sought after.

The principal changes which these insects undergo are as follow:—They pass the winter on the roots of the vine in the wingless state, and never in the egg condition. So long as the weather is severe they remain in a state of perfect torpor; but as soon as the warmth begins to make itself felt, all those individuals which have survived the cold and the damp of the winter begin to waken to renewed life. They feed with great avidity, and immediately begin to lay eggs. The increase of them soon becomes terrific, and stops only in October. It is during this time, which extends over seven or eight months in the south of France, that the *Phylloxera* works the greatest havoc.

The Phylloxera is essentially subterranean in its wingless state, and in all probability makes its way along the roots of the vine, following the numerous fissures which it finds upon their surface. But it does not always remain in this state.

During the warm season a few individual insects can

here and there be seen with small appendages upon their corselet which are destined to become wings. These are the real nympha, which soon throw off their covering, and appear as perfect insects provided with wings, and having the eyes characteristic of their species. It is in all likelihood after it has taken this form that the *Phylloxera* is borne up and carried away by the wind to often very great distances, though it cannot be affirmed that even the wingless ones, in certain conditions, are incapable of being thus distributed.

We have said the winged *Phylloxera* is very rare. The number of these which have hitherto been observed bear no proportion to the myriads of wingless insects that can be seen on every part of the affected roots. Can this be natural? or is it a difference owing to the errors of observation made in ascertaining the fact which we now state? All the winged *Phylloxeras* which have been seen were females, who lay eggs and thus give birth to the wingless lice.

There is a fact of very great importance connected with the existence of the insect in the winged state. In the valley of the Rhine, and still more so in the vicinity of Bordeaux, some vines—it is true only few in number—were noticed during the summer, the leaves of which were covered with galls of a peculiar form, the warty protuberance being on the under and the opening upon the upper side of the leaf. This fixed character establishes a radical difference between the galls in question and all the other kinds of galls or excrescences which are found upon the leaves of the vine. These galls are nests filled with wingless lice, resembling very closely those which are found upon the

roots. It is thought that the formation of those galls and the insects they contain is due to the agency of the winged *Phylloxera.*

As we have seen, the *Phylloxera* has two different phases of life. It nearly always remains below the earth, though now and then a few individuals are liberated to the enjoyment of an existence in the open air. The subterranean life of the insect is well known, but not so that of the other form. It would, however, be very interesting and very useful if we could only ascertain precisely at what time of the year the transformation of the winged insect takes place, how long it remains alive, and upon what part of the vine or of the soil it has its abode. The various ways of propagation in the *Phylloxera,* its origin, and the conditions most favourable for its development, should also be better known than they are. We might express a similar opinion with regard to the existence of the males and the period of fecundation.

Let us hope that systematically and diligently prosecuted biological studies will soon enlighten us upon these strange and momentous questions. It will perhaps be possible to destroy this insect, which is so very troublesome to get at during the time it lives underground, if we could only obtain a favourable chance of catching it on its excursions in the open air.

Such are the conditions, then, under which the new vine disease manifests itself; and although from the time of its discovery a host of remedies have been suggested for it, as yet not one of them has proved thoroughly efficacious. Will some more active remedy be found? Shall we—and it is not improbable—derive more benefit from those already tried? We dare hope

so. It is, however, very certain that the effectiveness of the remedy will not merely depend upon the nature and efficacy of the substance employed; but the mode of application and the time at which it is used will also always be of very great importance. The substances capable of destroying these insects are very numerous; but, in order to produce beneficial results, care must be taken that they are not injurious to the plant, and that they can penetrate into the soil easily, to a depth of from sixteen to nineteen inches, so as to reach the insects beneath. And here comes the real difficulty. Applications capable of destroying the insect without hurting the vine, are what those persons who are seeking a remedy for the disease must endeavour especially to discover. Whilst awaiting that time when science shall have devised some means averting this evil, the Commission counsels vignerons and municipal bodies to follow the example given in l'Hérault and la Gironde, where the diseased vines have been rooted up and the soil disinfected by the clearing off and burning of the surface. The Commission also recommends the collecting together and burning of all gall-bearing leaves.

These remedial measures, which are analogous to those used in the case of the cattle plague, have the advantage of destroying a great number of insects, which would otherwise increase and communicate the disease to the surrounding vines. Applied in time, and systematically conducted under intelligent supervision they may impede the progress of evil and even repel it.

In instituting a prize of 20,000 francs (£800) for the discovery of a remedy for curing the diseased vines,

the Minister of Agriculture and Commerce has shown a deep anxiety for the interests of viticulture. His appeal to men of science will be heard, and it is to be hoped that we will soon be in possession of a complete history of the disease, and of an efficacious remedy that will restore confidence to our vignerons.

The rooting out of the diseased vines and their employment with other combustibles for burning the infected soil, the collecting and consumption of the leaves bearing the galls, will restrict the onward march of the evil and hasten the time of its arrest. Those persons who devote themselves to research in this direction should give themselves sufficient time for attaining their object, for it must not be forgotten that, in the solution of complex agricultural problems, it is not possible to improvise; and, more than that, it is allowed to no one to guess at nature.

(Signed) MM. DUMAS, Secretary of the Academy of Science, President,
DUCHARCRE,
MILNE-EDWARDS,
DE LA VERGNE,
VIALLA,
MARES,
PAUL GERVAIS,
LEFEBVRE DE SAINTE-MARIE,
PORLIER, Secretary.

This report was not published last year owing to the disturbances in France. The Administration does not intend now to alter it, but it must be observed that since 1870 the propagation of the evil has continued, and both in the departments of Gard and l'Hérault it is no longer symptoms only that are to be seen. The existence of the male *Phylloxera* has also been proved, at least in the winged state, as it is mentioned in a report addressed by M. Heuzé to the Minister in July last.

* *Conditions to be observed by Persons competing for the Government Prize for the New Vine Disease.*

Article 1. Every person wishing to compete for the prize of 20,000 francs, offered by the Government to the discoverer of a process sufficient to destroy the new disease of the vine, should in the first instance notify his intention to the Minister of Agriculture.

Article 2. No one will be permitted to compete unless he can furnish along with his application certificates to the effect that his plan has already been submitted to the test of practical experience, and can establish the presumption, on the basis of facts, that it would be found efficacious and economical in its application to the generality of lands.

Art. 3. The notification of intention to compete for the prize shall be communicated to the central commission. After the essays sent in have been examined, and even if possible a preliminary inquiry, the competitor shall give his advice as to all that is necessary for submitting his process to certain experiments which shall be carried out, and the effects of which shall be attested by the local commissions.

Art. 4. There shall be held a *vivâ voce* inquiry into the success or failure of each experiment. When this *vivâ voce* evidence has been put in order, under the supervision of the local commissions, it shall be forwarded by the Prefect to the Minister of Agriculture and Commerce, who will lay it before the central commission.

Art 5. This commission will examine the *vivâ voce* evidence submitted for its approval, and that commission will award the prize, if deserved.

* Translated from the French.

Art. 6. The memoranda, essays, and notices must be lodged either with the Minister of Agriculture (Direction de l'Agriculture) or at one of the prefectures of the Republic, at the very latest by the 31st December 1872.

[Enclosure 5 in No. 5.]

* *Extract from the "Gironde" of 19th July,* 1872.

Since 1865, at which period its first destructive effects were experienced; since 1868, when the first systematic study of *Phylloxera* was originated, the disease has made a little advance every year; but its march has been slow—one might even say very slow, when we remember the rapidity with which it has been propagated in the south.

The communes of Floriac and Pompignac are the only ones seriously attacked. Floriac shows at the outside—taking both those on the flats and those on the hills—100 acres attacked and destroyed. Pompignac offers about 4 à 5 hectares (8 or 10 acres) of diseased vines. Here it broke out only in 1868. It is worthy of remark that these two centres of the disease are at from 7 to 8 kilometers distant one from the other, and surrounded by vineyards, uplands, hills, and lowlands, the general vegetation of which is very beautiful.

The able correspondent who has furnished these details adds:—"I went on Monday morning to visit those diseased vines in company with several members of the Agricultural Society of the Gironde, and at Pompignac and Floriac our observations are but little different from those made at our last visit, and last

* Translated from the French.

year. The vineyards visited showed the disease to have broken out in several different places, and in these we found some hundreds of diseased plants. There was no *Phylloxera* on the roots of either the dying or the dead vines. On the roots of vines still possessing a certain amount of healthy growth we found the *Phylloxera* in groups, neither numerous nor near together; indeed the roots, even the long ones, upon which we were able to count one hundred individual insects were very rare. The general vegetation is normal, and vines quite close to diseased ones had no *Phylloxera* on their roots. In this state of things many members of the Agricultural Society naturally asked, 'Can it be that the destruction of a plant so robust and hardy as is the vine should be attributable to no other cause than the action of a microscopic hemiptera called *Phylloxera vastatrix*, and which is found here in numbers comparatively insignificant?'"

No. 6.

Dr. Hooker to Viscount Enfield. — (*Received 20th September.*)

Royal Gardens, Kew,

My Lord, 19th September, 1872.

Having examined the papers relating to the injury which the cultivation of the vine has already suffered in France and Portugal, or which is apprehended, from the attacks of the *Phylloxera vastatrix*, I have to request that you will lay before the Right Honorable the Secretary of State for Foreign Affairs the following remarks which have suggested themselves to me in their perusal.

Your Lordship will have gathered from these papers that the *Phylloxera* attacks the vine in a part —namely, the root—in which it is not only very sensitive to injury, but to which the application of any topical remedial agent is exceedingly difficult.

Considering the undoubted injury which the culture of the vine has already received from the *Phylloxera*, and our present ignorance of any effective means of arresting it, it is impossible to view without alarm its gradual extension in vine-growing districts. The extreme anxiety which is felt upon the matter in France is evidenced by the extensive literature which has already been devoted to it. A summary of this up to the end of last year, and dealing with no less than 500 separate papers and articles, has been recently published by MM. Planchon and Lichtenstein, under the form of an extract from the proceedings of the thirty-fifth session of the "Congrés Scientifique de France," held at Montpellier.

It appears from this that no remedy really effective has at present been devised, except that of flooding the vineyards during winter, by which means the insect is destroyed in its hybernating condition. Unfortunately, though this is practicable in the lower part of the Rhone valley, it is obviously not possible in others, and these the most important of the French wine-growing districts.

The attention of the Portuguese Government seems to have been thoroughly roused to the importance of the subject. A communication from the French Consul at Lisbon, published in the *Comptes Rendus*, for 9th September of this year, "signale la présence du *Phylloxera* dans quelques vignobles

non loin de Porto, dans le district de Villa Real, près des provinces de Douro et de Traz-os-Montes, ainsi que dans le voisinage de Santarem, à 70 kilom. de Lisbonne."

It is also stated that a Commission has been appointed by the Government to study the subject.

Mr. Consul Crawfurd in his report, dated 29th June (No. 56), was probably correct in his opinion as to the exaggeration of the statements current at that time. No harm can, however, arise from the vine cultivators being thoroughly warned beforehand as to the serious nature of the malady. There is reason to believe that, on the first symptoms of attack in isolated cases, the prompt destruction of the vine, its burning on the spot, and the subsequent treatment of the soil with some approved insecticide, such as carbolic acid, would be of great importance.

A communication from M. Louis Faucon, who has practised the method of submersion with success, was recently laid before the French Academy (*Comptes Rendus*, 9th September, 1872), in which the important fact, ascertained apparently with certainty, is announced that the *Phylloxera*, in migrating from diseased to healthy vines, comes to the surface of the ground during sunshine. Its dispersion is also, no doubt, in this case favoured by the action of the wind, by which it is blown along the surface with dust.

With respect to Mr. Consul Crawfurd's opinion that the deep-rooted vines of the port wine district will enjoy an immunity from the disease, it is proper to remark that even deep-rooted plants have superficial roots as well, and, as the vine is notoriously sensitive in cultivation to influences injuriously affecting its

root-action, there is reason to fear that if the superficial roots of a vine were materially affected by the *Phylloxera*, the health of the plant would not be altogether unaffected.

With reference to the despatches and inclosures (Nos. 405 and 416) relating to the Bordeaux district, it appears that the presence of the *Phylloxera* has been definitely ascertained there by the Commission appointed to study the subject by the French Academy (see *Comptes Rendus* for 9th September, above cited). Its ravages are, however, more slow in their extension than in the southern portion of the Rhone valley, and have taken a somewhat different form. A remarkable fact is the immunity which vines of American species appear to enjoy in this district.

Nor have the vines cultivated in this country under glass escaped up to the present time. There are now several well-authenticated cases of injury from the *Phylloxera*, and there is every reason to believe that it is present in many places where it has not as yet been recognised.

I have, &c.,

(Signed) JOS. D. HOOKER,
Director.

No. 7.

Consul-General Monson to Earl Granville.—(Received 11th November.)

Pesth, 30th October, 1872.

MY LORD,

I asked M. Szlavy, the Hungarian Minister of Commerce and Agriculture, to-day, whether the *Phylloxera vastatrix* (referred to in Lord Enfield's

despatch of the 25th June last), which had been so injurious to the vintages of France and Portugal, had been equally prejudicial to that of Hungary this year. His Excellency said that the Hungarian vintage was this year a very bad one, and, indeed, that the whole agricultural experience of the country, this summer and autumn, had been unusually depressing. With reference particularly to wines, M. Szlavy said that he hoped that the Exhibition at Vienna would be the means of giving an impetus to the exportation to England of those of Hungary, which he imagined would be found most attractive to the English palate. In that hope he had caused a Hungarian tavern ("vendégto") to be erected in the precincts of the Exhibition, at which not only the best specimens of native wines would be laid in for consumption, but such national Hungarian dishes as most provoked and stimulated thirst would also be provided; and His Excellency thought that this arrangement would prove particularly attractive to the English.

Speaking afterwards, on the subject of the vine disease, with the Director of the Agricultural Department, I was informed by that gentleman that as yet he had heard of no effectual remedy against the ravages of the *Phylloxera vastatrix*.

I have, &c.,

(Signed) EDMUND MONSON.

APPENDIX.

By the last mail has been received March papers containing valuable information regarding the cultivation of the vine, which is of vital importance to vine growers, more particularly M. Barrall's easy remedy for the Phylloxera, the blight now so much dreaded by vignerons. "M. Barrall has made public the nature of the composition of a powder adapted to destroy that devastating insect, the phylloxera. It is made of one part of native sulphur of mercury, five parts of sulphur or sulphate of lime, eight of chalk, and eight of flower of sulphur. This powder can be put on by means of the bellows which are used for cleaning the vines." M. Dumas and M. Cornu have also turned their attention to the same pest, which has already been pretty largely treated of by the Australian press.

1st July, 1873.

ON THE

PRODUCTION OF SILKWORM GRAIN.

By Mons. A. Roland.

(From the Journal of the Society of Arts, April 25, 1873.)

An unexpected opportunity has induced the writer of this paper to bring before public notice the following information, which he had intended to publish in the course of a few years.

Having occupied myself for ten years past with the education, in the open air, of silkworm "grain,"—having made, and still making every year, numerous experiments, I had thought, previous to writing this paper, of distributing, in countries fit for sericulture, several thousand ounces of good grain; thus enabling myself, at the time of publication, to bring forward a convincing proof of the excellence of the system which it explains, by adding thereto a great number of certificates from silk reelers and educators.

I do unquestionably possess a certain number of these certificates; but having, within a few years only, given a greater degree of extension to my magnanerie, I should have wished the number of ounces of grain, acknowledged to be good, by the result of education, to be more considerable, and consequently better known.

Mrs. Neill, widow of Colonel Bladen Neill, now residing in Australia, who came to Europe last spring

to procure some good silkworm grain, and who followed up an entire course of education at my establishment, has put me in communication with the Committee of the Sericulture Department of the International Exhibition of 1873, by the intervention of Sir Daniel Cooper, chairman of that committee, and they very obligingly proposed to me to exhibit my entire system of education in the open air in the grounds of the Exhibition.

I have considered it to be my duty, in the interest of sericulture, to profit by this unexpected opportunity, and thus anticipate, by some years, the date which I had fixed for making known what I was doing; for if the system be exhibited, it must, of necessity, in order to be well understood and made public, be accompanied by a complete explanatory treatise.

"Do not attempt to cure the disease in so minute an animal as the silk worm; it would be lost labour; prevent it by rational education, and you will succeed, for prevention is better than cure."

When I began to devote my attention to sericulture, and had, after a first season of rearing, familiarised myself with the larva and all its transformations, I read many books on the subject, in French, Italian, and German.

Among the number there are some which deserve all praise, both for the learning displayed as well as for the numerous experiments detailed by their authors, the minute attention bestowed on their search for the causes, and the actual nature of the diseases which for a long time past have proved so destructive to the magnaneries. Among others, I will mention the excellent works of Dandolo, Dr. Cornalia, Robinet, and

the splendid volume of M. Duseigneur-Kleber, "La Monographie du Cocon."

But of all these works the one which seemed to me especially worthy of the greatest attention is, as I have already stated, in a pamphlet formerly published in France, the distinguished production of one of my fellow-countryman, Dr. Chavannes, ex-Professor of Zoology at the Academy of Lausanne. His work on "The principal diseases of silkworms and their cure" was "crowned" by the Lombard Royal Institution of Arts and Sciences. I take this opportunity of offering my highest commendations to Dr. Chavannes; for to this day no work treating of the diseases of silkworms, and of a sure and easy mode of cure, has ever been so successful, and I strongly urge every one who wishes seriously to take up the subject of "sericulture" to study this book attentively.

Dr. Chavannes, altogether casting aside old traditions, and wishing, not only, in the interest of science, to determine and to study the nature of the different diseases of silkworms, which others had done already, but also with the philanthropic purpose of relieving the sufferings of the silkworm-rearing districts, wishing to discover the most efficacious means of obtaining healthy grain, Dr. Chavannes, I say, disregarding the old erroneous ways, inaugurated the plan of education in the open air, and, leaving the over-heated and almost always unhealthy magnaneries, approximated to nature, reared the larva on the mulberry tree itself, and gained results beyond his expectations.

As he himself says in his work, Dr. Chavannes was not the first to rear upon the tree. From the beginning of the eighteenth century some experiments

of open-air education were made in France; subsequently many more trials were made in the same country, in Italy, and in Austria; but the practical means were insufficient, and to Dr. Chavannes belongs the honour of having made this mode of education possible, and on my system even easy.

With rearing on the tree the diseases disappeared; there was no more "passis," "gattine," or "pedrine." If any worm is attacked by one or other of these forms of disease, of very rare occurrence, and which may happen to wild caterpillars, as my experiments have proved to me, it does not thereby infect the others, and, what is more, it nearly always cures itself. As for the "muscardine," the most terrible of all these diseases, it is quite unknown. Therefore, without paying attention to any other system of education, I set myself zealously to follow up the data of Dr. Chavannes, and, after some years' experience, I have succeeded beyond all expectation.

In practice I have gone further than Dr. Chavannes, as I shall explain below. As a physician and professor absorbed in numerous occupations, he has not had leisure to complete his work, but it is from him that the first idea has its point of departure. With education on the mulberry tree for the basis, and the magnanerie in the open air for the complement of the system, I am firmly convinced that we can restore this beautiful branch of industry to the highest state of prosperity. This I ardently desire, and have great hopes that the London Exhibition will successfully help to bring this system into general use.

By education on the tree, and especially by hybernation of the grain exposed on the branches, the worm

necessarily becomes more robust, and, after some years, returns to a state of nature. Ultimately the larva has nothing to fear from violent wind, heavy rain, or burning sun, and remains firmly fixed on the branches or on the leaves.

The pattern on the wings of the moth becomes more strongly marked, its movements are much more lively, and it makes use of its wings as much as its naturally sluggish nature will allow it to do.

The open-air magnanerie, which is the natural sequence, and the necessary mode of general application of the education on the tree, also affords results as satisfactory as may be desired.

We shall begin by succinctly studying the education on the mulberry tree, then proceed to describe minutely the open-air magnanerie and its education, and conclude with the method I have adopted for tending the cocoons, the coupling of the moths, the laying of eggs, and the grain.

The mulberry tree from which the leaves are to be gathered has the head lopped and the branches spreading out. The case is different for one that is to be covered with a manchon (muff-shaped hood). It is then cut in a similar manner to the willow, which it resembles in respect to its top; the pruning takes place every spring, as the shoots of the current year are sufficiently strong, and the manchon is not to assume exaggerated dimensions. Each branch of the preceding year is cut down to the head of the tree, retaining only one or two eyes; in this manner the head becomes covered with a great quantity of young shoots, which the young larvæ can easily reach.

The height of the mulberry tree, from the ground to the top, should not exceed two feet six inches. I have proved, by experience, that this size is most convenient for covering with, and removing the manchon.

The whole apparatus consists of a few feet of wire gauze and canvas, some cotton, and string. In order to enable the reader to comprehend accurately this procedure, of elementary simplicity, I will indicate the exact dimensions of the manchons which I make use of. I take some wire gauze of eight threads to the centimetre (*i.e.* twenty threads to an inch), on which a coat of oil paint is lain, to preserve it from rust. The breadth must be three feet six inches. If the gauze cannot be had of this size, two breadths may be fastened together with wire, or tarred silk. The length must be eight feet ten inches, and the two ends brought together will form the circumference of the manchon, with an interior diameter of 35 inches, sufficient for an ordinary sized tree.

All round the circumference of the top and bottom of this wire gauze tube I sew on some fine canvas, previously steeped in oil, and this must be two feet broad. As a matter of course the paint must be thoroughly dry before the manchon is used, and all green colour must be avoided, on account of its arsenical exhalations.

When the manchon has been made open at the top and bottom, it is slipped over the tree, so that the lower canvas may be tied round the stem of the tree, just below the branches, taking care to wrap some wadding round it, lest the string should injure the bark; and, in like manner, to put some at the point of junction of the bark and canvas; for the purpose

of preventing the passage of any noxious insect into the manchons. The silkworms are then placed on the top of the tree, by the upper opening of the canvas, which is then tied up with a string, care being taken to cover with wadding all the interstices which are left by the folds of the canvas where it is tied up. This operation being completed, two stakes must be firmly stuck in the ground, right and left of the manchon, and a strong string tied across, from the top of one to the other. To this string the top of the manchon must be fastened, so that it may not press upon the top of the tree; this contrivance will also prevent its displacement by the wind.

Dr. Chavannes, in his work, advises the placing of the silkworms in the manchons at the second age only, and their removal when they are at the fifth age, to make them cocoon in the magnanerie.

As I have stated above, I have carried my practical experiments much farther than Dr. Chavannes, and, after the convincing proof of several years' experience, I can maintain that in our climate the silkworm may be born, live, and cocoon, the moth be formed, couple, and lay its eggs upon the tree. I will also mention that every year I let a certain number of moths lay their eggs on the branches of the mulberry. This grain remains there during the winter, exposed to all external changes of weather, and simply protected by the manchon from noxious insects. In the spring this grain is hatched perfectly, and very vigorous silkworms are produced from it.

To this hybernation on the tree, which I have practised for several years past, I attribute the exceptionally robust health of the race which I rear.

Every spring the silkworms are hatched naturally with the appearance of the first shoots of the mulberry. When they have eaten nearly all the foliage of the tree on which they are hatched, I place them on another tree in full leaf. For this operation we must not wait until all the leaves have been eaten, for the worm needs some leaves to shelter it from the rain and the rays of the burning sun.

In order to change the silkworms from one mulberry tree to another, the leaves on which they rest must be delicately taken up one by one, and placed in a paper box, without crowding them together too much, to avoid injuring the worms; they are then to be carried to the tree on which they are to remain, and, as soon as the manchon has been fixed in the manner described above, they are distributed over the top of the tree. The manchons must be visited daily, and this is very easy, since the silkworms can be seen distinctly through the wire gauze. As soon as it is perceived that the leaves are nearly all eaten, the worms must be immediately placed on another tree.

I do not count the worms before they come out of their second moulting, that is to say, the beginning of the third age. Then, in order to obtain one ounce of grain, thirty-one grammes, I keep about 300 worms, taking care to select only the most equal in size, and during the fourth and fifth ages, put fifty in each manchon, to avoid the necessity of changing them too often. At the fifth age I leave only twenty-five in each manchon, so that they more easily form their cocoons. There is often great inequality among the worms reared on the tree, and after each moulting they should be selected according to their size, in order to obtain a

supply of moths of equal strength. It is for this reason that I advise the setting apart in the third age of 300, although 170 cocoons reared in this manner generally produce an ounce of grain.

Every year fifty cocoons must be left, twenty-five in each of the two manchons, from which will be hatched the moths that are to lay the grain on the mulberry tree. If the tree is too bushy, it is better to cut off some branches, so as to facilitate the coupling of the moths.

This grain will pass the winter on the tree, and will be hatched naturally in the spring; this is the store from which the worms are produced to be reared on the tree the following year. I propose two manchons, as a double provision to guard against accidents during the long lapse of time through the winter. It must be well understood that I speak here of the education needed to obtain one ounce only of grain; whoever wishes to obtain more will naturally have to make a greater proportional provision.

By the education on the mulberry tree every race of silkworm may be regenerated in a short time. At the end of three years of successive education and hybernation on the tree, the blood of the larva, under microscopic examination, becomes exactly like that of the wild bombyx. With a little practice this work is easily accomplished; the necessary materials are as we have seen, very simple, and may last many years.

Thirty mulberry trees, cut as explained above, and ten manchons, suffice to rear the silkworms which ought to produce an ounce of grain.

The period of education, from the time of hatching to that of forming the cocoon, necessarily varies,

according to the season ; the average duration is forty days, often less. By these data for raising one ounce, every educator will be enabled to raise the grain which he requires, according to the importance of his magnanerie, provided always that he bear in mind that the magnanerie which suffices to raise one ounce (if he is prudent and really wishes to maintain great uniformity on his *claies** by rejecting, at the time of moulting and *dédoublement*, all the worms which are of slow and imperfect growth) ought, for his own best interests, to contain at least one-half more grain than he can rear at the fifth age. With respect to the grain which is to serve for rearing the following year in the magnanerie, this is my mode of procedure.

Having left on the tree those cocoons, the grain of which is to pass the winter in the open air, I remove the rest to a dry and well-aired place. After having cleaned them of the external flue adhering to them, I weigh them separately ; the female cocoon is generally heavier than the male. I perform this operation in order to separate, as much as possible, the sexes, and thus prevent the coupling of moths of the quality of which I am not entirely satisfied.

Every moth which is not perfectly formed must be thrown away without hesitation. I then string the cocoons in chaplets of a hundred together, without crowding them, and hang them up so that they may be well aired on all sides.

Dark brown cloths, stretched on frames and in a sloping position, receive the moths. I allow the coupling to continue for twenty-four hours. The very

* *Claie*—the frame on which the silkworms are reared in feeding them. It is made of square deal laths.

few moths which, at the end of this time, remain still coupled, are gently separated, and the males thrown away. The females still remain on the frames for forty-eight hours. It is, therefore, necessary to have sufficient cloths ready to receive, every day, one or more new swarms, according to the importance of the issue of the moths from the pupæ.

The first year of education in the open air the silkworm has much difficulty in holding on to the tree in very windy weather, and often lets itself drop to the bottom of the manchon, for it often attacks the leaf at the leaf-stalk which holds it to the branch; the male moth has also a difficulty in finding the female among the branches, and therefore many of them die.

The case is very different after a few years; the caterpillar becomes stronger and more lively, the moth more alert, and the pattern on its wings more clearly marked. In a word, by returning to a state of nature, the *Bombyx serigena* becomes completely regenerated, and, its grain, exempt from disease, promises an unfailing return for the following year.

Education on the tree is the true criterion of the regeneration of the races of silkworms, but, although very simple, it cannot be carried on on a large scale, considering the minute attention required for it. Firmly convinced that in the actual crisis of affairs it was a matter of great importance to supply the educator for silk with an abundance of really good grain, and having, by a series of education on the mulberry tree, completely regenerated the race which I rear, I devoted my attention, during several years, to carry out more fully what was on too restricted a scale in the manchons.

Before all things, it was indispensable not to depart from the laws of nature, lest, through principles, tending to a rapid degeneration, I should lose the reward of all my labours. After a long series of minute and costly experiments, I have succeeded, as far as possible, in making education on the tree, with the help of the open-air magnanerie as its natural sequence, a matter of course; and in thus rearing a great quantity of silkworms by not depriving them of their essential element—pure air—the air being continually renewed; in a word, rearing them in the external circumambient air.

The splendid results obtained in the South from grain produced in my magnanerie have proved, to my own satisfaction, the excellence of my own system. And what is more clearly evidence of this lies in the fact that every year intelligent educators rear my grain without artificial heat, and obtain from it a supply of grain of the first quality. But nothing can last for ever, and it would be requiring too much of this open-air education to expect that it will, once for all, regenerate the race of silk worms from the moment that the system of education is changed, and this belief would only lead to great disappointment. It is absolutely necessary to have a firm conviction of the following principle: — The grain which has been regenerated on the mulberry tree and subsequently reared in the open-air magnanerie, and afterwards in the magnanerie not heated, cannot be reared for grain the following year. It will yield an excellent crop of silk; but the imprudent director of a magnanerie, whose education for the produce of silk has been conducted with the aid of artificial heat, and who would

wish to make a selection of cocoons for grain amongst his productions intended for silk spinning, ought to be prepared to find the following year not only that his hopes of a fine crop are not realised, but perhaps have ended in total disappointment. Education under heat, however necessary for obtaining a crop of silk in a short time, is an unnatural process, which infallibly engenders the principles of disease in the silkworm. Besides, the merest elementary data of a rational selection will easily lead anyone to believe the fact.

The magnanerie is a large shed, of good height, open on all sides, having the two sloping surfaces of the roof pierced with ventilating chimneys. The enclosing panels are entirely made of wire-gauze. Folding frames are used, with blinds stretched over them, that they may be let down when the sun's rays fall directly on the silkworms, or when the wind is too strong. These blinds are to be lowered only when absolutely necessary; in ordinary weather they remain open day and night, fixed by an iron hook to the ceiling. The roof must be lined with planking, to prevent the possibility of rain coming through, or the insects which may lodge in the interstices of the slates. It is of such a slope as will favour the free circulation of air, and pierced at intervals of two metres (six feet), with ventilating air holes, each capped with a tin tube, the orifice of which is covered with wire gauze. The floor, raised about six inches above the level of the ground, is to be covered with tiles or cement. The wire gauze, having twenty threads to the inch, nailed on the wooden cross-pieces and uprights which support the roof, is to extend from the ground to the eaves, which project beyond the walls about twelve inches, and are fitted with spouts

to keep the rain or snow from spoiling the wire gauze. A gangway, four feet six inches wide, is left all round the three rows of trays (*claies*), one above the other, which space is not more than sufficient for feeding and cleaning the silkworms. It will be necessary, at frequent intervals, to cover the external basement with a coat of gas tar, mixed with grease, to keep ants from making their way in. The magnanerie must be built in a locality where nothing hinders the free circulation of air.

The trays on which the worms rest are double, that is to say, in the middle, in the direction of their length, they are divided by the cocooning frames (*échelettes conconniers*). The worms are therefore to be tended right and left of the trays.

Three rows of trays placed one above the other, in sufficient number, 18 inches (45 centimetres) distant from each other, the lowest row being also the same distance from the ground, make up just the height which a middle-sized person can reach to feed and clean the topmost tray; it must be understood that a cocooning frame is to be placed above this latter.

A double flooring, by which means a great number of trays may be arranged, must not be thought of, as it would intercept the free circulation of the air. The division lengthwise of the trays being made by the cocooning frames (*échelettes*), their length is to be subdivided by other *échelettes*, so as to give compartments of 24 square inches (60 centimetres), with 18 inches in height from one tray to another, enclosed on three sides, and surmounted by cocooning *échelettes*. These dimensions I have found to be most practically useful. The silkworm, at the time of the mounting

(*montée*), easily reaches the laths between which it is to make its cocoon. I use exclusively Davril's system of *claies* which have been in general use in France for a long time past, and have the double advantage of allowing a free circulation of air and sufficient space for the silkworm to make its cocoon conveniently, and likewise of avoiding the annoyance attendant on the use of bunches of heather, which cause much damp, by interfering with the cleansing process (*délitements*), so important during the last days, prevent the circulation of air, and are exposed to the risk of fire.

There would be no difficulty in arranging two parallel rows of double *claies*, provided they are separated by a gangway 4 feet 6 inches wide; but I would not advise a greater number to be used. With two rows of tables the external air comes in freely over the silkworms, which cannot be the case if there are more.

By the open-air education the worms become more vigorous naturally, but they are also more disposed to crawl away; therefore a piece of muslin, or tulle, must be fixed on each *claie*, under the lower one, and at the two ends against the *échelettes* which divide the spaces, which, in no way intercepting the current of air, prevents the worms from decamping at the time of recovery from moulting, before the first meal, and especially at the mounting period. The worms in each compartment rest on a movable frame, having a piece of fine calico stretched over it; at each cleansing (*délitement*) this cloth is to be shaken clear of all litter, the process being thus facilitated. These frames are to be two feet square; there will then be sufficient space between the *échelettes* and the frame to enable one to take it up conveniently.

Three kinds of nets are required for the *délitements*. Tulle for taking up (*la levée*) the young worms when first hatched, and during the first age; of coarser tulle, or fine net, for the second and third ages; of net with larger meshes for the fourth and fifth ages. The meshes of these nets must be square, and of sufficiently strong thread not to break under the weight of the worms, which is by no means slight in the fifth age.

To prevent the worms from rolling into the middle of the net during the cleansing process, it must be stretched on four small laths, of the breadth of the mesh, so that they may be slipped into the outer meshes of the net, and then nailed at the four extremities.

These frames have the advantage of keeping the worms always on a level surface, of preventing all overcrowding, and of leaving a space at the time of cleansing between the net on which the worms rest and the one which receives the leaves, a space formed by laying one frame on the other. The nets of the two latter dimensions are to be two feet square.

I always cut up the leaf, having frequently observed that the worm, being less free in its movements in the magnanerie than on the tree, attacks the leaf more readily when cut up; besides, it can thus be more equally distributed over the *claies*. The leaf must naturally be cut finer for the first ages than for the latter ones. It must be cleanly cut, not chopped, which would spoil it, and the knife kept perfectly free from dirt.

The objection may be raised, it is true, that nature does not cut the leaf for the worm. Evidently not; but from the moment that the larvæ become domes-

ticated, that is to say, reared in the magnanerie, and, instead of being able to circulate freely on the branches, inevitably somewhat crowded together, it becomes a matter of necessity to facilitate the means of feeding. For the same reason the silkworm, which, on the tree, sustains with impunity the effects of pelting rain or burning sun, being able to take shelter under the leaves if it feels disposed, which, by-the-bye, it does not always do, cannot endure with impunity the rain or sun in the magnanerie.

The magnanerie, established in the manner described above, gives free access on all sides to the surrounding air ; the silkworms can be protected from the direct rays of the sun, from the rain and violent winds, and the needful attention can easily be bestowed on them.

Educators in the open air must not be hasty in their operations ; the worms must be set to hatch only when the mulberry has put forth abundant shoots and there is no cause to fear severe cold. In the latitude which I inhabit, about two miles from the Jura, I do not hatch my silkworms before the beginning of June, which is likewise the epoch when the worms reared on the tree begin to make their appearance. In a warmer climate and a less variable temperature there would doubtless be no objection to the hatching process being left to take place naturally in open air ; indeed, I think it would be preferable. But in the central and northern parts of Europe, and especially in the neighbourhood of mountains, this would be almost impossible. In short, if one could count on a fortnight of uninterrupted fine weather, the hatching would also go on regularly ; but in our country, at the desired season,

some few fine days are often succeeded by heavy rains and a return of cold weather; it is therefore impossible to carry on the hatching regularly elsewhere than in a room.

The hatching-room must be well aired, and provided with a stove of earthenware or iron-plate, but never of cast-iron.

The grain is to be regularly spread over a cloth stretched on a frame, hung from the ceiling, 1 metre (about 3 feet 3 inches) from the ground, so that one may easily examine it, and take up the worms as they are hatched; in this manner it will also be safe from mice. As soon as the external heat reaches 20° Centigrade 68° Fah.), a temperature which must never be exceeded by any artificial heat, the doors and windows must be opened. For the first days it is sufficient to heat the stove in the evening, taking care to put on it a vessel of cold water, to be renewed every day. After the lapse of a few days, the fire must be lit morning and evening, and when the proper degree of heat is attained, the floor must be sprinkled with cold water. This heating must be continued, morning and evening, until the hatching is complete, care being taken never to exceed 20° Cent. (68° Fahr.)

Hatching will take place, after an incubation carried on as we have just described, at the end of 20 days.

The first issue is insignificant, and the worms may be rejected, for which purpose a tulle net, on which some small shoots of mulberry are laid, is to be placed upon the eggs; to these the worms attach themselves, and the net is to be removed when the day's hatching is over.

The second day's issue is much more considerable,

and the net must be laid in its place very early ; as soon as the shoots seem to be sufficiently covered with worms, the net is to be raised, and immediately transferred to the magnanerie, whatever the weather may be, not forgetting to put another net, as before, to be removed as often as it is properly covered with worms. The same course must be pursued for the successive days ; on the last day the issue will be so trifling, that the worms may be rejected as on the first day. The entire process of hatching will be completed in five or six days.

In the magnanerie the worm must be fed six times a day, from the beginning of the first age to the time of mounting, a.m. at 5, 8, 11, and p.m. at 2, 5, 8 o'clock. The feeds should be given with great regularity, the leaves being spread equally over the trays, and at the fifth age in great abundance.

As the air is cooler at night, the worms naturally have less appetite ; besides, I have observed that on the tree they do not feed during the night.

The leaf must absolutely be gathered every day after the dew is evaporated. If the leaves are very wet from much rain, they are placed in a shed, and after being turned over several times are fit to be given to the worms for food.

During the entire period of the first three ages, I greatly prefer the leaves of the wild mulberry to those of any other species ; in the fourth and fifth ages I give them the leaves of the grafted mulberry, the *Lhou* (*Japonicus*), and even of the black mulberry.

If during the first age the worms seem to be too crowded on some of the nets, they must be separated ;

and this can easily be done by allowing about half the numbers to come up on the upper net covered with leaves. A similar process may be needful at the other ages, for it is a matter of the greatest importance not to allow the worms to be heaped one upon another.

After each moulting the worms must be thinned out (*dédoubles*) in this manner, in the first place, because of their increasing size, and secondly, in order to have a greater degree of regularity in the series.

After the third moulting, that is, on entering the fourth age, I count them; for, having set to hatch double the number in grain which my magnanerie admits of my rearing at the fourth age, purposely to have the series of the greatest regularity, by rejecting those which are behind-hand in growth, there still remain too many to spread put on the large nets. I put 400 on each net, which gives 100 silkworms to the square foot—the maximum never to be exceeded, for even this is a very high rate. This operation, which is not so long as one might suppose, is performed by very delicately taking up the worms, one by one, as they wake up, from the most advanced series, and placing them on a net covered with mulberry leaves. This operation has also the very great advantage of affording a means of keeping an exact account of the number of silkworms in the magnanerie; and subsequently, by counting the cocoons, of seeing the proportion of worms lost in the last two ages, which are, as is well known, the most critical.

The education is generally completed in the space of fifty days, though, of course, much depends on the weather.

As soon as the silkworms have mounted, the nets must be removed, and the magnanerie be cleaned out; but it must necessarily be kept as clean as possible throughout the whole period of education, for from the very beginning to the end of the time there must be no unpleasant smell in the place.

From the mounting to the removal of the cocoons a space of eight days should be allowed to intervene, so that the worms which mounted last may have sufficient time to finish their cocoons properly, and to transform themselves into chrysalides. This period having elapsed, the business of removing and cleansing the cocoons (*décoconnage et débourrage*) must be proceeded with. These operations, as well as the laying of eggs, may perfectly well be attended to in the magnanerie, but I prefer doing them in a large shed specially appropiated to the produce of grain, so that the magnanerie being left free, the *échelettes* may be immediately singed, in order to remove the thick flue which adheres to the laths, and to admit of the whole building being thoroughly cleansed. The cocoons, being cleared of flue (*débourrés*), must be weighed, an important operation to separate the sexes as much as possible, and thus prevent the coupling of imperfect moths. This somewhat tedious operation consists in weighing separately several hundred cocoons, as soon as the average weight has been obtained—two centigrammes; for example, all those cocoons which are over this weight are put on the side of the females, and the others with the males. The weighing being completed, the cocoons are to be strung in wreaths of a hundred, which, when they are arranged, will enable one to know the sum total of the crop. Each wreath

is to be hung on a peg, receiving the air on all sides, the males on one side the females on the other, a sufficient space being left between the chaplets to prevent them from touching each other. In describing the mode of education on the tree, I spoke of the cloths to be used for the laying eggs (*ponte*); similar ones are to be used in the magnanerie; but to avoid any loss of grain, for some always falls off at the time of laying, the bottoms of the cloths must rest in wooden boxes. A space of 30 centimetres (one foot square) of cloth, is sufficient for placing 25 couples of moths. Having already spoken of the coupling and deposit of grain, I shall not return to the subject. The same process exactly must be followed for moths reared in the magnanerie, as for those which are produced on the tree. The couples must be watched, and the refractory males brought back to the females.

The shed which I use for the incubation of chrysalides and the laying of the grain is large and well aired; openings pierced in the top and bottom of the walls allow a constant circulation of the air, and a suitable degree of light, for too strong a light disturbs the couples.

From the mounting to the issue of the moths from the chrysalides there are, on an average, 20 days, but much also depends on the state of the weather. The entire *ponte* is accomplished in about ten days.

When the grain is laid, the cloths are immediately transferred to the magnanerie, previously cleansed thoroughly. They remain there, freely exposed to the air, until the time when the grain is to be taken off. The frames on which the grain has been laid must be put in a sloping position towards the *claies*.

The result of numerous experiments has convinced me that the grain may be taken off a month after it is laid. An English naturalist, who lives in the neighbourhood of Sydney, confirms my opinion in this respect, for he writes to me that, as the result of many experiments, he has acquired the conviction that the eggs may be taken off the cloths 20 days after they are laid, without fear of adverse consequences. It is a fact that the grain taken up before the autumn fogs and the winter frost will dry in a shorter space of time. For my own part, I take it up in the course of the month of October. When the time is come to remove the grain, the cloths are to be taken off the respective frames, and plunged in a vessel of water that has been boiled the previous evening, and remains at the temperature of the surrounding air. To this water spirits of wine must be added in the proportion of one litre (one pint and a-half) of spirit to ten litres of water (15 pints)—one to ten, in fact. This is necessary to clear the grain of all contamination.

Each cloth, being well steeped in the water, is then to be stretched on a table, and two persons opposite to each other are to scrape off carefully with paper-knives the grain from the cloth. The grain thus detached is to be again plunged into a vessel of boiled water, mixed with spirit as before, at the temperature of the air. The good grain will fall to the bottom; that which is barren, or has been injured in removal, will float on the surface, and is to be skimmed off. The whole is then to be poured into a sieve of fine wire gauze, to let the water run off.

The last operation consists in spreading out the grain in thin layers upon muslin stretched on frames

hung from the ceiling; then it is to be frequently turned over carefully until it is quite dry, which, if the weather be fine, will be the case in three days.

When the grain is quite dry, I use, in order to preserve it, large boxes of wire gauze, having the inside fitted with drawers of fine perforated zinc, which are to contain a layer of grain, one centimetre thick. These drawers are so placed one above the other as to leave intervening spaces of three centimetres, so that the air may circulate freely. The boxes are hung from the ceiling of the magnanerie, being so fixed that the wind may not sway them about. The grain is thus preserved in the open air until the moment of incubation or of consignment for sale.

In this manner I preserve grain, which remains through the winter exposed freely to the air; and which has resisted—18° Cent. (2° above zero Fahr.), especially in the winters of 1869-70 and 1870-71. Notwithstanding this rigorous and prolonged exposure to cold, the subsequent hatching was on each occasion all that could be desired.

When the grain is to be sent to a comparatively short distance, as for example to the south of France, or to Italy, wooden boxes suffice for the purpose, care being taken to fill the space between the grain and the cover with very clean wadding. Each consignment must be made by express train. But if the grain is to be sent to a great distance, especially over sea, it is indispensably necessary to take various precautions. In this case, a contrivance of which I will give the description must be employed.

Take a box made of wire gauze, or perforated zinc, in the inside of which other boxes of similar material,

and fitting to the size, are made to slide in. The inside boxes are at intervening spaces of three centimetres, and contain a layer of grain only one centimetre thick. They are then to be closely shut up, having been filled to the top with grain, to avoid all shaking.

This box is then to be placed in a strong wooden case, pierced with several holes, covered with wire gauze, or perforated zinc. Between the sides of the outer case and those of the enclosed box, there must be a space of two inches, to be filled entirely with small pieces of charcoal. The charcoal will allow the air to circulate amongst the grain, and, what is equally important, will prevent any damp from getting to it. As soon as the grain reaches its destination, whether after a long or short journey, it must be immediately exposed to and kept in the air in boxes similar to those described in the first instance.

In drawing up this paper, I have been as concise as the subject would permit, avoiding all essentially technical terms, so that any one may understand my statements; and I sum up my system in these words:—"Do not attempt to cure the disease in the minute silkworm; it would be lost labour. Prevent it by a reasonable system of education, and you will succeed. Prevention is better than cure."

A few words on the difference between education for grain and education for silk. As the course of education in the open-air for grain must necessarily be long, so that for silk must be speedy. Education for grain should have but one object in view—the strength and health of its productions. That which is for silk, on the contrary, aims at obtaining, with the least possible

expense, that is, in the shortest space of time, the most abundant supply of cocoons. Anyone may, therefore, easily understand the immense difference which exists between the two kinds of education.

Artificial heat is required in the magnanerie which is to produce silk, for fear of the education being protracted too long, and the profits of the undertaking being absorbed in the attendant expenses.

Any one living in the country may, with good grain, easily obtain a profitable supply of cocoons; but, although the system is very simple, and, with the help of two *manchons*, any peasant may produce the grain he requires, still no chance speculator will ever make good grain in any considerable quantity, for the reason, simple enough no doubt, but, nevertheless, very true, that he rarely pursues art for its own sake; and the mercantile element will always prevail with the multitude over the scientific and the reasonable.

I therefore consider it a matter of great importance for the future advancement of sericulture that a considerable number of persons should devote their attention to this open-air education for grain. They will find in it both profit and satisfaction; profit—because the protracted and numerous cares which it requires are amply remunerated by the sale of good grain, always in great demand; satisfaction from the scientific and philanthropic side of the question; for, by furnishing the silk-producing population with the means of obtaining good supplies of our former beautiful indigenous races, great sufferings will be relieved.

I consider it my duty to append to this paper the honourable certificate, which I received from Monsieur A. Gaydou, of the house of Gaydou and Co., Turin.

The year 1872 was, as is very well known, most unfavourable to sericulture; the mulberry leaf, being too watery, in consequence of the incessant rain, caused an alarming extent of disease amongst the "educations;" however, M. Gaydou, who reared nearly a hundred ounces of grain, produced by my system of education in the open air, has nevertheless obtained splendid results. I quote his words :—

"The educations made this year (1872) with grain produced by the open-air system of M. Alfred Roland, of Orbe, Canton de Vaud, Switzerland, have given on an average 40 kilogrammes of cocoons for 30 grammes of grain—that is to say, 1 oz. troy-weight produced 107 lbs. troy. The yellow cocoons of M. Rowland yield one kilogramme of *grège* silk per twelve kilos. of cocoons. About 160 cocoons go to make up the kilogramme (2.2 lbs. avoir.) This race does not contain more than eight per cent. of double cocoons.

"(Signed) A. Gaydou and Co.

"Turin, September 12th, 1872."

If the data which I recently received from England are exact, and it is really a fact that in the environs of London alone there exists more than 30,000 mulberry trees, we have here a sufficient proof that this precious tree flourishes wonderfully well in the South of England; and wherever the mulberry thrives vigorously, the silkworm may be reared advantageously.

Whether for grain or for silk, from the moment when the production of silk, as a branch of commercial industry, can easily be introduced into any country, the opportunity of doing so should not be disregarded; for, as it is one of the most beautiful and most

interesting branches of agriculture, so is it also one of the most profitable.

England, by the production of good grain and fine silk, would add a brilliant flower to her agricultural and industrial chaplet.

STILLWELL AND KNIGHT, PRINTERS, COLLINS STREET EAST, MELBOURNE.

PROCEEDINGS

OF THE

ZOOLOGICAL AND ACCLIMATISATION SOCIETY OF VICTORIA.

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OF THE

Zoological and Acclimatisation Society

OF VICTORIA,

AND

REPORT OF THE ANNUAL MEETING OF THE SOCIETY,

HELD 26TH FEBRUARY, 1875.

"Omnis feret omnia tellus."

VOLUME IV.

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1875.

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REPORT OF THE COUNCIL.

The Council of the Zoological and Acclimatisation Society of Victoria has much satisfaction in submitting its Eleventh Annual Report to its members. The past year has been one of steady progress, and the condition of the Society is sound and prosperous. The gardens of the Society at the Royal Park have considerably increased in attractiveness during the last twelve months, and the large and increasing number of visitors plainly shows how such a place of resort is appreciated by the public.

Thanks to the liberality of Parliament, which last year raised the vote in aid from £1,000 to £2,500, it has been in the power of the Council to make many improvements in the grounds. The greater number of the aviaries have been almost re-built, and are now in good repair, and as a permanent addition a Bear-pit has been constructed in the most substantial manner at a considerable cost. Several other important additions are in contemplation, and will be steadily proceeded with. The Zoological collection has also received considerable additions, especially of specimens of the Fauna of the Colony, mostly presented by friends of the Society, to whom the Council tenders its thanks. The Tigers mentioned in last year's report (as having been promised by Mr. James McLachlan) have not yet arrived, but will be sent by that gentleman, from Java, as soon as a suitable pair can be obtained.

A few weeks ago two beautiful Great Crowned Pigeons were received from Mr. McLachlan, and have been added to the collection. These handsome birds were procured from New Guinea, expressly for the Society.

A Camel also has been added to the collection. A sort of melancholy interest attaches to this animal, as it was left on the north side of the Murray when about six months old by Burke on his disastrous expedition. Its presence having been reported to the Council, it was decided, if possible, to secure it for the gardens. It being very wild at the time, this was done at considerable risk and expense, but since its captivity it has become comparatively docile.

Since the last annual meeting a pair of Roe Deer arrived in the ship *Shannon* (Captain Stacpoole), but unfortunately died before they could be landed. Letters have, however, been received from England stating that another shipment on account of the Society would be made in the month of January, so that the arrival of these deer may shortly be looked for. Other additions of interest are also expected ere long. The Council feels assured that if the present liberal subsidy is continued by the Government and Parliament, it will be enabled by judicious expenditure of the funds entrusted to it, not merely to render the gardens increasingly instructive, but further to render them one of the most attractive sights in the Colony.

The work of acclimatisation has also steadily progressed; a large number of Pheasants have been reared, considerably larger than in any previous year, the greater part of the birds have been liberated at Gembrook (the Society's game breeding establishment), and

others have been presented to members of the Society who take an interest in the breeding and stocking of the country with game; some 300 Pheasant eggs have likewise been distributed to subscribers.

A large number of Californian Quail were procured from Nelson, N.Z., last winter and spring and liberated in various localities, and it is gratifying to be able to report that several broods of young birds have been frequently seen; it is therefore confidently anticipated that this fine gamebird is now thoroughly established, and will rapidly increase and spread over the Colony.

Both Pheasants and Californian Quail evidently thrive very well at Gembrook, no doubt principally from the abundance of insect and other food in the forest. The Council would again tender its warm thanks to Mr. Edward Wilson for his generous aid in assisting to keep up this necessary establishment, as without which the work of stocking the country with gamebirds would be almost hopeless, several previous attempts having proved unsuccessful.

The flock of Angora Goats in Mr. Samuel Wilson's charge are steadily increasing in numbers and value. A good many male and a few female Goats have been disposed of during the past year.

The Society's Ostriches are at Mr. Officer's station, Murray Downs, near Swan Hill. As several of the birds unfortunately died in transmission from the Wimmera to their present location, Mr. Officer has sent an order for a further supply from the Cape of Good Hope by the steamship *St. Osyth*. The Council trusts that next year it may be able to report some substantial progress in the direction of Ostrich breeding.

The Council regret to learn from a minute addressed to the President that the Government have no power to prevent the use of swivel guns. In the opinion of the Council it is highly desirable that a bill should be introduced as soon as possible, with a view of preventing the wholesale destruction of game, caused by the wanton use of these guns. If the use continue to be permitted it seems probable that wild ducks will shortly be exterminated in many parts of the Colony.

There is nothing of importance to mention with regard to the Trout ponds at Wooling, Mount Macedon. Mr. Robertson continues to take the most lively interest in the matter, which he has done from the first. It is hoped that the Society will have young fry to distribute in the coming season, numerous applications having been already received from various parts of the Colony, and the Council is most anxious to stock the various suitable streams of this country as quickly as possible. A number of Perch and Carp have, as usual, been distributed; some 600 or 700 of the latter were recently placed in Lake Colac, with every prospect of success.

The Council desire here to record its high sense of Mr. Samuel Wilson's liberality in placing the sum of £1,000 at its disposal for the purpose of making a further effort to introduce the Salmon. It is intended to procure a supply of ova from San Francisco, it being thought that the Californian Salmon is more likely to prove successful in Australian waters than the European variety.

The Council would also desire to record its hearty appreciation of the valuable services rendered to the

Society by the retiring president, Mr. Purchas, and also of the very successful effort on its behalf of the late President, Mr. Godfrey, M.L.A, who, on the occasion of the annual vote being discussed in the Assembly, kindly undertook to explain that if the vote were passed as proposed, viz, as a final vote, power must be given to make a charge for admission to the gardens, otherwise the required funds for maintenance would not be forthcoming. This obstacle the Assembly at once very generously removed by omitting the word "final" from the vote. At the same time the Council considers it would not be doing its duty if it did not record its best thanks to the Honorary Secretary, Mr. Le Souef, for his unremitting attention to the Society's affairs, and his untiring energy in promoting its interests.

The Balance Sheets for the past year, duly certified by Mr. Rucker, the Society's Auditor, are laid before the meeting, showing a total expenditure of £2,146 16s. for the past twelve months, and the Council wishes here to convey its thanks to the Honorary Treasurer, Dr. Joseph Black, for his attention to his duties as Treasurer.

According to the Rules of the Society Messrs. Were, Wilson, and Venables retire, being the three members of Council who have attended the smallest number of meetings during the past year; these gentlemen are, however, eligible for re-election.

It now remains for the meeting (in accordance with Rule 13) to elect a President for the ensuing year, also two Vice-Presidents and a Treasurer.

The President, in moving the adoption of the Report, said that it afforded him much pleasure to see that the Society was in such a prosperous condition, and was so well appreciated by the public. He had no doubt that the gardens would become a more popular place of resort year after year.

The Report was then adopted.

A letter was read from Mr. George Sprigg, resigning his office as a member of the Council, and a vote of thanks to that gentleman for his past services was carried unanimously.

Messrs. J. B. Were, S. Wilson, and H. P. Venables were re-elected members of the Council, and Mr. J. Chatfield Tyler was elected a member in place of Mr. Sprigg, resigned.

The meeting then proceeded to the election of officers, and Samuel Wilson, Esq., was elected President. Mr. Wilson expressed his regret at being unable to devote that amount of personal attention to the duties which, in his opinion, was required. He was, therefore, compelled to decline the honor, but as a member of the Council he would still continue to feel the liveliest interest in the welfare of the Society.

A fresh ballot was then taken, which resulted in the election of Frederick G. Moule, Esq., as President, and Albert Purchas and Curzon Allport, Esqs., as Vice-Presidents.

Dr. Joseph Black was re-elected Treasurer, and accorded a vote of thanks for his past services.

A vote of thanks to the Chairman and officers of the Society closed the proceedings.

ACCOUNT OF MONIES Received and Paid by the ZOOLOGICAL & ACCLIMATISATION SOCIETY OF VICTORIA,

During the period 1st January to 30th June, 1874.

RECEIPTS.

	£	s.	d.
Government Grant	300	0	0
Subscriptions and Donations	167	11	6
Sale of Stock	82	18	6
Refund (Freight)	5	14	2
Petty Cash in Hon. Secretary's hands, 1st January	5	19	7
Overdraft, 30th June	273	16	5
	£836	0	2

PAYMENTS.

	£	s.	d.
Premises	138	10	1
Food and Forage	188	8	5
Purchase and Transport of Stock	84	16	6
Printing	5	10	0
Farming Implements, Carts, &c.	11	6	0
Wages	215	5	0
Office Expenses	101	13	6
Incidental Expenses	34	19	11
Trout Ponds	11	7	6
Interest	5	6	10
Overdraft, 31st December, 1873	25	1	8
Petty Cash in Hon. Secretary's hands, 30th June	13	14	9
	£836	0	2

Audited and found correct,
W. F. A. RUCKER, *Auditor.*

MELBOURNE, 16*th July*, 1874.

J. BLACK, M.D., *Hon. Treasurer,*
ZOOLOGICAL AND ACCLIMATISATION SOCIETY,
17*th July*, 1874.

ALBERT A. C. LE SOUEF, *Hon. Secretary.*

ACCOUNT OF MONIES Received and Paid by the ZOOLOGICAL & ACCLIMATISATION SOCIETY OF VICTORIA,

During the period 1st July to 31st December, 1874.

RECEIPTS.

	£	s.	d.
Government Grant	1,250	0	0
Subscriptions and Donations	271	7	0
Sale of Stock, &c.	76	10	0
Petty Cash in Hon. Secretary's hands, 1st July ..	13	14	9
	£1,611	11	9

PAYMENTS.

	£	s.	d.
Premises	195	11	11
Food and Forage	165	6	8
Purchase and Transport of Stock	165	1	4
Printing	75	9	0
Wages	231	1	6
Office Expenses	93	13	9
Incidental Expenses	89	0	7
Fishery Committee	6	16	6
Interest	14	18	2
Bank Overdraft, 30th June	273	16	5
Balance at Bank of Victoria, 31st December	300	12	5
Petty Cash in Hon. Secretary's hands, 31st December	0	3	6
	£1,611	11	9

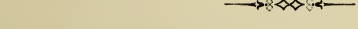
Audited and found correct,
W. F. A. RUCKER, *Auditor.*

MELBOURNE, 18*th January*, 1875.

J. BLACK, M.D., *Hon. Treasurer*,
ZOOLOGICAL AND ACCLIMATISATION SOCIETY,
18*th January*, 1875.

ALBERT A. C. LE SOUEF, *Hon. Secretary.*

LIFE MEMBERS.



Aldworth & Co., Sandhurst £10 10 0
Armitage, George, Ballarat .. 10 10 0
Armstrong, W., Hexham.. .. 10 10 0
Alfrey, Ernest, Fernihurst .. 10 10 0
Ayrey, Charles, Warranuke .. 10 10 0
Amess, Samuel, William-street .. 10 10 0
Armstrong, R. G., Salt Creek .. 10 10 0
Barkly, His Excellency, Sir Henry 42 0 0
Bear, Hon. J. P., M.L.C 21 0 0
Bear, Thomas H., Heidelberg .. 10 10 0
Black, Dr. Thomas, Melbourne Club 10 10 0
Black, W., Belfast.. .. .. 10 10 0
Borough Council, Sandhurst .. 10 10 0
Box, Henry, Little Collins-street West 10 10 0
Boyd and Currie, Collins-street West 10 10 0
Bright Brothers & Co., Flinders-Lane 10 10 0
Brown, Lindsay, Garramadda, Wahgunyah 10 10 0
Bushell, C., Chiltern 10 10 0
Bowen, His Excellency Sir George 10 10 0
Black, Hon. Neil, M.L.C., Mount Noorat 10 10 0
Bell, J., Geelong 10 10 0
Canterbury, His Excellency Viscount 10 10 0
Campbell, Finlay, Raywood .. 10 10 0
Catto, John, Newbridge, Loddon 10 10 0
Chambers, H. J., St. Kilda .. Services
Cooper, Sir Daniel, London .. 37 2 0
Coppin, G. S., Richmond.. .. 10 10 0
Creswick, Borough Council of .. 10 10 0
Colbert, Edmond, Rowena-parade, Richmond .. .. .. Services
Cumming, G., Mount Fyan .. 10 10 0
Cumming, W., Toorak 10 10 0
Curr, E. M., Queen-street .. 10 10 0
Calvert, John, Colac 10 10 0
Currie, J. L., Lara.. .. .. 10 10 0
Chirnside, A., Werribee Park .. 10 10 0
Clarke, W. J., Sunbury 10 10 0
Clarke, Joseph, St. Kilda-road .. 10 10 0
Chrichton, A., Berwick 10 10 0
Docker, F. G., Wangarratta £10 10 0
Dalgety and Co., Little Collins-street 10 10 0
Edols, John, Ingleston 10 10 0
Falconer, J. J., Bank of Australasia 20 0 0
Fellows, The Hon. T. H... .. 10 10 0
Firebrace, R. T. 10 10 0
Fraser, Simon, M.L.A. 10 10 0
Fussell, R. S. R., Fou Chou dols. 50.. .. .. .. 11 0 10
Fleming, J. W., Brunswick .. 10 10 0
Fisher, C. B., St. Kilda 10 10 0
Glass, R. J., Waiparella 10 10 0
Hoffman, W., Bush Back, Essendon 25 0 0
Highett, Miss 10 10 0
Henty, Edward, St. Kilda-road .. 10 10 0
Hay, W., Boomanoomana, N.S.W. 10 10 0
Jamieson, Hugh 10 10 0
Jenner, Hon. C. J., M.L.C. .. 10 10 0
Jones, Lloyd, Avenel 10 10 0
Joshua Bros., William-street .. 10 10 0
Ibbotson, Charles, Geelong .. 10 10 0
Lyster, W. S., Melbourne .. 10 10 0
Landells, G. J., Lahore, India .. Services
Layard, C. P., Colombo .. .. Services
Layard, E. L., Cape Town .. Services
Learmonth, Thomas, Ercildan-riley, Portland 10 10 0
Londesborough, The Right Honorable Lord, Carlton Gardens, London.. .. .. .. 37 10 0
Lyall, W. 10 10 0
Latham, E., Carlton Brewery .. 10 10 0
McEachern, D., Kangaroo .. 10 10 0
Mein, G. A., Moolpa, N.S.W. .. 10 10 0
Mackinnon, L., *Argus* Office .. Services
Mackenzie, John, Collins-street.. 10 10 0
Mackintosh, Alexander, ... 10 10 0
Marshall, Captain D. S. .. .. Services
Martin, Dr., Heidelberg 10 10 0
Matheson, J., Bank of Victoria .. 21 0 0
McGill, A. 10 10 0
McGregor, Samuel, Belfast .. 10 10 0
McHaffie, John, Phillip Island .. 10 10 0

McMullen, J., Union Bank £21 0 0
McKellar, Hon. T., M.L.C. .. 10 10 0
Molloy, W. T., Hawthorn .. 10 10 0
Mueller, Baron Von, Botanic Gardens 10 10 0
Municipal Council of Ballarat W. 20 0 0
Murray, S., Dunrobin 10 10 0
Murphy, J. R., St. Kilda Road .. 10 10 0
Nicholson, Germain, Collins-st... 10 10 9
North Eastern Agricultural and Horticultural Society .. 10 10 0
Officer, C. M., Brighton 10 10 0
Officer, S. H., Murray Downs, N.S.W... .. .. .. 10 10 0
Officer, W., Zara, N.S.W. .. Services
Purchas, Albert, Kew 105 0 0
Russell, Hon. P., M.L.C., Brighton Road 10 10 0
Ritchie, J., Streatham 10 10 0
Rostron, John R., Navarre .. 10 10 0
Russell, A., Matuwalloch.. .. 10 10 0
Rutledge, William, Belfast .. 10 10 0
Salmon, J., E. S. and A. C. Bank 21 0 0
Sargood, King and Sargood, Flinders-street 10 10 0
Shoobridge, E., Vallyfield, Tasmania 10 10 0
Simson, Hon. R., M.L.C., Toorak 10 10 0
Sloan, W. S., Fou Chou, dols. 50 11 0 10
Spowers, Allan, *Argus* Office £10 10 0
Stanbridge, W. E., Daylesford .. 10 10 0
Staughton, S. T., Little Collins-street West 10 10 0
Strachan, J., London Chartered Bank 21 0 0
Stewart, J., Emerdale, Streatham 21 0 0
Sladen, Hon. C., Birregurra ..
Sumner, Hon. T. J., M.L.C., Flinders-lane West 10 10 0
Shaw, Thos., Jun., Camperdown 10 10 0
Taylor, W., Overnewton, Keilor.. 10 10 0
Templeton, Hugh, Fitzroy .. Services
Ware, Joseph, Caramut 10 10 0
Wilson and Mackinnon, Collins-street East 42 0 0
Wilson, Edward, *Argus* Office .. 21 0 0
Wilson, Samuel, Ercildoun .. 10 10 0
Winter, James, Toolamba, Murchison 10 10 0
Winter, Thomas, Winchelsea .. 10 10 0
Winter, S. P. 10 10 0
Ware, J., Yalla, Y. Poora .. 10 10 0
Winter, W., Stanhope 10 10 0
Wilson, John, Woodlands .. 10 10 0
Wilson, John, Gala, Lismore .. 10 10 0
Watson, J. B., Sandhurst .. 10 10 0
Youl, James A., Clapham Park, London.. .. .. .. Services

ANNUAL MEMBERS.

Allport, C., Chancery-lane ..	£1	1	0
Anderson & Wright, Flinders-lane	1	1	0
Amess, S., William-street ..	1	1	0
Anderson, A., Tottington ..	1	1	0
Armstrong, J., Elizabeth-street..	1	1	0
Atkin, C. A., Hotham	1	1	0
Adam, J. (of Lawrence and Adam), William-street	1	1	0
Australian Mortgage Land and Finance Company	2	2	0
Alcock and Co., Russell-street ..	1	1	0
Armstrong, William, Hexham ..	10	10	0
Ayrey, Charles, Warranook ..	10	10	0
Argyle, E. A., Kyneton	2	2	0
Allen, J., Crusoe	1	1	0
Adams, J. and W., St. Enoch's..	2	2	0
Banks Brothers, Bell, and Co., Flinders-lane	2	2	0
Briscoe and Co., Collins-street ..	2	2	0
Barnes, W., Brunswick	1	1	0
Baines, E., Little Collins-street..	2	2	0
Bindon, Judge, St. Kilda.. ..	1	1	0
Bligh and Harbottle, Flinders-lane	2	2	0
Black, Dr. J., Bourke-street ..	2	2	0
Blair, Dr. J., Collins-street ..	1	1	0
Bright Bros., Flinders-lane ..	1	1	0
Blair, Jas., Toorak..	1	1	0
Balfour, Hon. J., M.L.C., Little Collins-street	1	1	0
Balmer, George, Ballarat.. ..	1	1	0
Benn, J., Flinders-lane	2	2	0
Buckley, E., New Bridge	1	1	0
Barry, D. M., Brunswick	1	1	0
Boscombe, J. H. K., Kyneton ..	1	1	0
Bury, Leech, and Co., Queen-st..	2	2	0
Booth, S., Kyneton	2	2	0
Bell, Joseph, Sandhurst	5	0	0
Buckley, J., Sandhurst	1	1	0
Buncle, J., Hotham	1	1	0
Curtain, J., M.L.A., Carlton ..	2	2	0
Crosby, W., and Co., Queen-street	1	1	0
Crooke, Dr., Gertrude-street ..	1	1	0
Cornwell, A., Brunswick	1	1	0
Cumming, Hon.J., M.L.C.,Toorak	2	2	0
Carson, J., Collins-street	1	1	0
Catto, J., Collins-street	1	1	0
Clarke, J. L., Elizabeth-street ..	1	1	0
Cumming, W., Toorak	£1	1	0
Carter, Edward, Collins-street ..	1	1	0
Christie, L. S., Ballarat	1	1	0
Clendinning, Dr., Ballarat ..	1	1	0
Cameron, Donald, Hamilton ..	1	1	0
Campbell, Jas., Ballarat	1	1	0
Chomley, A. W., Temple-court ..	1	1	0
Chenery, A., Delatite	2	2	0
Chenery, Mrs., Delatite	2	2	0
Cock, R., Kyneton	1	1	0
Carter, W., Kyneton	1	1	0
Caldwell, J. F., Eaglehawk ..	1	1	0
Clothier, S., Eaglehawk	1	1	0
Campbell, Allan, Brighton ..	2	2	0
Cleeland, J., Bourke-street ..	1	1	0
Cuthbert, Hon. H., M.L.C., Ballarat	1	1	0
Currie, George, Kaarimba ..	1	1	0
Dempster, A., Royal Park ..	1	1	0
Daley, J., Spring-street	1	1	0
Danks, J., Bourke-street	1	1	0
De Pass Brothers, Collins-street..	1	1	0
Dutton, George, Kyneton .	1	1	0
Dight, W. S., Albury	1	1	0
De Beer, S., Queen-street ..	1	1	0
Elkington, J., Education Office ..	1	1	0
Edwards, H., Bourke-street ..	1	1	0
Evans, G., *Argus* Office	2	2	0
Ellis, J., Royal Park	1	1	0
Elliott, George, Kangaroo Flat ..	1	1	0
Fanning, Nankivell and Co., Flinders-street	2	2	0
Frew, G., Royal Park	1	1	0
Finlay, J., St. Kilda	1	1	0
Foy, Mark, Smith-street	1	1	0
Fox, William, Tallarook	1	1	0
Fynn, J., Kilmore	1	1	0
Fergusson and Moore, Flinders-lane	1	1	0
Fleetwood, T. P., Chancery-lane	1	1	0
Ford, W., Swanston-street ..	1	1	0
Fitch and French, Collins-street	1	1	0
Findlay, J., Towong	2	2	0
Foxcroft, J., Elizabeth-street ..	1	1	0
Fiskin, A., Queen-street	1	1	0
Felton, A., Flinders-lane.. ..	1	1	0
Fairchild, J. R., Church-street ..	1	10	0

Gwynn, Henry, Geelong	£1	1	0
Gardiner, W. S., and Co., Elizabeth-street	1	1	0
Gordon, G., C.E., Mining Department	1	1	0
Goldsbrough and Co., Bourke-st.	2	2	0
Grice, R., Flinders-lane	1	1	0
Gibson, R., Royal Park	2	2	0
Glew, J., Brunswick	1	1	0
Gurner, H. F., Crown Solicitor ..	1	1	0
Green, J. R., and Co., Gertrude-street	2	0	0
Grant, J., Collins-street	1	1	0
Gunst, Dr., Collins-street ..	1	1	0
Graham, Hon. Jas., M.L.C., Little Collins-street	1	1	0
Gordon and Gotch, Collins-street	1	1	0
Godfrey, W., Collins-street ..	1	1	0
Guild, J., Seymour	1	1	0
Godfrey, F. R., M.L.A., Mount Riddley..	2	2	0
Griffin, M., Kyneton	1	1	0
Hinsby, F. G., Kyneton	1	1	0
House, Samuel, and Co., Queen-street	2	2	0
Heath, R. M., Kilmore	1	1	0
Hunt, Thos., M.L.A., Kilmore ..	1	1	0
Hoddle, R., Bourke-street ..	2	0	0
Highett, Hon. W., M.L.C., Richmond	2	2	0
Halstead and Kerr, Elizabeth-st.	1	1	0
Henderson, T., Elizabeth-street	1	1	0
Haege, H., Elizabeth-street ..	1	1	0
Harper, R., and Co., Flinders-st.	1	1	0
Henty, E., Queen-street	2	2	0
Haddon, F. W., *Argus* Office ..	2	2	0
Hepburne, B., Ballarat	1	1	0
Ham, C. J. and T., Swanston-st.	1	1	0
Hickling, F. J., Warrnambool ..	1	1	0
Hurry, H., Kyneton	1	1	0
Hughes, W. E., Kyneton.. ..	1	1	0
Holdsworth, J., Sandhurst ..	1	1	0
Horewood, Joel, Sandhurst ..	1	1	0
Hyne, J. F., Royal Park	1	1	0
Hutcheson, Jas., Kyneton ..	1	1	0
Hawkins, Joseph, Long Gully, Talbot	1	1	0
Inglis, D., Flinders-street ..	1	1	0
Irving, J. L., and Co., Elizabeth-st	1	1	0
Ingamells, J., Royal Park ..	1	1	0
Joshua Brothers, William-street	2	2	0
Jones, H., goldbroker, Sandhurst	1	1	0
James, J. R., Royal Park.. ..	1	1	0
Jacobs, F., and Co., Queen-street	1	1	0
Johnstone, E., Elizabeth-street..	1	1	0
James, Dr., Collins-street ..	1	1	0
Johnson, G. W., Kyneton ..	1	1	0
Jarrett, H., Kyneton	1	1	0
Jackson, H., Sandhurst	1	1	0
Jackson, George Ed., Sandhurst	£1	1	0
Kininmonth, Jas., Barunah Plains	1	1	0
Kinnear, R. H., Lower Moira ..	1	1	0
Keep, E., and Co., Elizabeth-street	1	1	0
King, S. G., Hotham	2	2	0
Kronhiemer, J., and Co., Queen-st	1	1	0
Knochenhauer, C. E., Swanston-st	1	1	0
King, A. H., Ballarat	1	1	0
Kirkwood, H., Eaglehawk ..	1	1	0
Keighley, E., Golden Square, Sandhurst	1	1	0
Loridan, J. B., Sandhurst ..	1	1	0
Longford, Dr., Kyneton	1	1	0
Lambert, T., Lonsdale-street ..	1	1	0
Lewis, W., Beaufort	1	1	0
Lister, Charles, Bourke-street ..	1	1	0
Larnach, J. M. D., Kilmore ..	1	1	0
Lobb, W. J., Brunswick	1	1	0
Laing and Webster, Flinders-lane	1	1	0
Long, D. R., Bourke-street ..	1	1	0
Lee, B., Bourke-street	2	2	0
Lang, Thos., and Co., Elizabeth-st	1	1	0
Lawrence, J. B. (of Lawrence and Adams), William-street ..	1	1	0
Lindley, A. B., Royal Park ..	1	1	0
Lermonth, W., Ettrick	1	1	0
Lewis, H. S., Geelong	1	1	0
Mackay and Co., Sandhurst ..	1	1	0
Manallack, Thos., Brunswick ..	1	1	0
McIlwraith, L., Little Collins-st.	1	1	0
McNaughton, Love, and Co., Flinders-lane	1	1	0
Martin, G. and Co., Market-street	2	2	0
Martin, P. J., Flinders-lane ..	1	1	0
Matheson, J., Collins-street ..	1	1	0
McDougall, C., Brunswick ..	1	1	0
Martin, T., Brunswick	1	1	0
Murphy, E. J., William-street ..	1	1	0
Malleson, England, and Stewart, Queen-street	1	1	0
McCoy, Professor, University ..	1	1	0
Municipal Council, Sandhurst ..	20	0	0
Moule, F. G., Market-street ..	1	1	0
Maplestone, H., Elizabeth-street	2	2	0
McLean, N., and Son, Swanston-street	1	1	0
McEwan, Jas., and Co., Elizabeth-street	2	2	0
McArthur, Sherrard, and Copeland, Flinders-lane	1	1	0
Michaelis, M., Lonsdale-street ..	1	1	0
Mitchell, Hon. Sir W. H. F., M.L.C., Melbourne Club ..	1	1	0
Miller, Edward, Market-buildings	1	1	0
Moloney, Dr., Lonsdale-st ..	1	1	0
Milvain, Thos., Kyneton	1	1	0
McFarland, R., Bourke-street ..	1	1	0
Mackay, J., Kyneton	1	1	0
McKenna, M., Kyneton	1	1	0

Macgillivray, Dr., Sandhurst .. £1 1 0
Moore Brothers, Sandhurst .. 1 1 0
Moorhead, Captain, Sandhurst .. 1 1 0
Mathieson, J., Eaglehawk .. 1 1 0
McPherson, L., and Co., Sandhurst 1 1 0
Mann, J. R., and Son, Eaglehawk 1 1 0
Myers, J., and Son, Cairnbank .. 1 1 0
McIntyre, J., Sandhurst 1 1 0
McGillivray, S., Kyneton.. .. 1 1 0
Murray, W., Kyneton 1 1 0
Madden, J., Chancery Lane .. 1 1 0
Maquirie and Cohen, Conally, N.S.W. 2 2 0
Nicholson, Germain, Collins-st... 1 1 0
Noyes, Capt. L. H... .. .. 1 1 0
Nelson, Jones J., Sandhurst .. 1 1 0
O'Connor, J. D., Kilmore.. .. 1 1 0
Overend, Best, Brunswick .. 2 2 0
Officer, C. M., Brighton 2 2 0
Osborne, James, Merton Lodge, Elsternwick 1 1 0
Oldfield, L., Royal Park 1 1 0
Oddie, James, Ballarat 1 1 0
Oliver, R., Coliban Park 1 1 0
Perry, J., Russell-street 1 1 0
Peterson, W., and Co., Queen-st. 1 1 0
Patterson, Ray, Palmer and Co., Flinders-lane 2 2 0
Ploos Van Amstel, J. W., Collins-street 1 1 0
Pitt, William, Bourke-street .. 1 1 0
Peters, James, Kyneton 1 1 0
Pearson, J. P., Kyneton 1 1 0
Russell, Thomas, & Co., Barunah Plains 1 1 0
Rudall, J. T., F.R.C.S., Collins-st. 1 1 0
Ryan and Hammond, Bourke-st. 2 2 0
Rowe and Stodart, Miller's Pond 2 2 0
Rocke, W. H., Collins-street .. 1 1 0
Rosser, Mrs. C., Brunswick .. 1 1 0
Robertson, G., Little Collins-st.. 1 1 0
Rosser, E., Brunswick 1 1 0
Rucker, W. F. A., Flinders-street 1 1 0
Robertson, W., Colac 2 2 0
Rigby, Dr., Kyneton 1 1 0
Ross, Henderson, and Fick, Sandhurst 1 1 0
Reade, George, Eaglehawk .. 1 1 0
Straw, T., Brunswick 1 1 0
Simson, Hon. R., M.L.C., Toorak 2 2 0
Smale, A. W., Queen-street .. 2 2 0
Sprigg, W. G., Market-street .. 1 1 0
Stevenson and Elliot, King-street 1 1 0
Simson, J., Waverley, Studley Park 1 1 0
Swallow and Ariell, Sandridge .. 1 1 0
Sloane, W., and Co., Collins-street 1 1 0
Sprigg, G., St. Kilda 1 1 0
Smith, C. and J., Albert-street .. 1 1 0
Sargood and Son, Flinders-street £2 2 0
Sands and McDougall, Collins-st. 2 2 0
Sanderson, J., and Co., William-st. 1 1 0
Stanford and Co., Bourke-street.. 1 1 0
Strong, Professor, University .. 1 1 0
Skene, Hon. W., M.L.C., Toorak 2 2 0
Somner, W., Swanston-street .. 1 1 0
Smith, George, Ballarat 1 1 0
Sharp, J., Collins-street 1 1 0
Salmon, J., Collins-street .. 1 1 0
Staughton, H., Exford 1 1 0
Swanwick, W., Kyneton 1 1 0
Stillwell and Knight, Collins-st. 1 1 0
Symington, J., Kyneton 1 1 0
Sanders, J. T., Sandhurst .. 1 1 0
Scott, J. R., Sandhurst 1 1 0
Steward, J., Eaglehawk 1 1 0
Taylor, J., Kilmore 1 1 0
Tinning, J., Brunswick 1 1 0
Terry, A., Royal Park 1 1 0
Taylor, W., Keilor.. .. .. 2 2 0
Taylor, T. H., Chancery-lane .. 1 1 0
Twentyman, R., Flinders-street 1 1 0
Twentyman, T., Dorcas-street .. 1 1 0
Tyler, J. C., Custom House .. 1 1 0
Taylor, J., Stone Granite Works, Sandhurst 1 1 0
Thunder, A., Sandhurst 1 1 0
Trumble, H., Eaglehawk.. .. 1 1 0
Taylor, Jas., California Gully .. 1 1 0
Vetter, J., Echuca.. .. .. 1 1 0
Venables, H. P., B.A., Education Office 1 1 0
Vahland and Getzschman, Sandhurst 1 1 0
Wilson, H., Kilmore 1 1 0
Wilson, Dr., J.P., Craigeburn .. 1 1 0
Watson, G., Burnett-street, St. Kilda 1 1 0
Wilson, E., *Argus* Office 2 2 0
Welch, Henry P., Queen-street .. 1 1 0
Wilshin and Leighton, Collins-street 1 1 0
Wood, J., and Son, Wellington-street 1 1 0
Whitney and Chambers, Swanston-street 2 2 0
White, J. H., and Co., Collins-street 1 1 0
Watson, Thos., Swanston-street 1 1 0
Watson, J., Garden Gulley, Sandhurst 1 1 0
Wells, G. E., Garden Gully, Sandhurst 1 1 0
Weddell, J. G., Sandhurst .. 1 1 0
Wakley, R. S., Sandhurst .. 1 1 0
Woodward, J. A., Sandhurst .. 1 1 0
Walker, J., Kyneton 1 1 0

HONORARY MEMBERS.

Allport, Morton, Hobart Town
Blanchard, W. Collins Street West
Bouton, A., Yahoue, New Caledonia
Buckland, Dr. F., London
Chalmers, Dr., New Zealand
Cleeland, J., Albion Hotel, Bourke Street
Coste, Professor, Huningue
Drouyn, de Lhuys, Paris
Francis, Francis, London
Gillanders & Arbuthnot, Calcutta
Godfrey, Captain J. B.
Grote, Arthur, Calcutta
Howitt, Ed.
Johnston, Clement, Crown Lands Office
Jones, Captain, "Superb"
Madden, Walter, Office of Mines
Mathieu, A., Yahoue, New Caledonia
Merryman, Captain, "Essex"
Michaelis, Moritz, Elizabeth Street
Michael, Major, Madras
McQueen, Captain, "Martha Birnie"
Mullick, Rajendro, Calcutta
Officer, Sir Robert, Hobart Town
Ramel, Monsieur, Paris
Ridgers, Captain, "Sussex"
Robinson, J., Calcutta
Salt, Sir Titus, Saltaire, England
Scholstein, Adolp., Flinders Lane West
Sclater, Dr. P. L., London
Shinner, Captain, "Northumberland"
Smith, Captain, "Dover Castle"
Squire, Surgeon John, Dinapore
St. Hilaire, G., Bois de Boulogne, Paris
White, J. H., Collins Street West
Conrad, Captain, "Herzog Ernst"
Grant, Charles Lyall, Shanghai
Stacpool, Captain, "Shannon"
Cooper, Captain, "Carlisle Castle"
Consul for Austria
,, ,, Belgium
,, ,, Brazil
,, ,, Chili
,, ,, Denmark
,, ,, France
,, ,, German Empire
,, ,, Hawaii
,, ,, Italy
,, ,, Netherlands
,, ,, Peru
,, ,, Portugal
,, ,, Russia
,, ,, Spain
,, ,, Sweeden and Norway
,, ,, United States

THE RULES AND OBJECTS

OF THE

Zoological & Acclimatisation Society

OF VICTORIA.

Objects of Society.

1. The objects of the Society shall be the introduction, acclimatisation, liberation, and domestication of innoxious animals and vegetables, whether useful or ornamental;—the perfection, propagation, and hybridisation of races newly introduced, or already domesticated;—the spread of indigenous animals, &c., from parts of the colonies where they are already known, to other localities where they are not known;—the procuring, whether by purchase, gift, or exchange, of animals, &c.;—the transmission of animals, &c., from the colony to England and foreign parts, in exchange for others sent thence to the Society;—the collection and maintenance of zoological specimens, for exhibition or otherwise;—the holding of periodical meetings, and the publication of reports and transactions, for the purpose of spreading knowledge of acclimatisation, and inquiry into the causes of success or failure;—the interchange of reports, &c., with kindred associations in other parts of the world, with the view, by correspondence and mutual good offices, of giving the widest possible scope to the project of acclimatisation;—the conferring rewards, honorary or intrinsically valuable, upon persons who may render valuable services to the cause of acclimatisation.

Membership.

2. A Subscriber of one guinea or upwards annually, which shall be payable in the month of January, shall be a Member of the Society; and contributors, within one year,

of ten guineas or upwards shall be Life Members of the Society; and any person who may render special services to the Society, by contribution of stock or otherwise, shall be eligible for life membership, and may be elected as such by the Council, or by any annual general meeting.

Property vest in the Council.

3. All the property of the Society shall vest in the Council for the time being, for the use, purposes, and benefit of the Society.

Executive Officers.

Council.

4. The Society shall be governed by a Council of twelve Members, to include a President, two Vice-Presidents, and an Honorary Treasurer, who shall annually retire from office, and three other Members (viz., those who have attended the fewest Meetings of the Council proportionately since their appointment) shall also retire annually, but shall be eligible for re-election, subject to Rule 13. Provided that if any sum of money be voted to the Society by Act of Parliament, or trusts conferred upon the Council by the Government, then it shall be lawful for the Chief Secretary for the time being to appoint, if he consider it expedient, any number of gentlemen, not exceeding three, to act as Members of the Council, and they shall have all the privileges as if otherwise duly elected.

Vacancy in Council, how supplied.

5. In case of a vacancy occurring by the death, resignation, or non-attendance of any Member of the Council for a period of two months, without leave of the Council, the remaining Members shall, in due course, appoint another Member of the Society to be a Member of the Council in the place and stead of the Member who shall so resign or absent himself; but such new Member shall be nominated at an ordinary meeting of the Council prior to the meeting at which he is elected.

Council to fill up Vacancies.

6. In case of a vacancy occurring by the death or resignation of the President, Vice-President, or Hon. Treasurer, the Council may appoint from amongst themselves, or the other Members of the Society, a person to fill the vacancy so occurring, and the person elected shall hold office only until the next Annual Meeting; but shall be eligible for re-election for the subsequent year. Provided that such

vacancy shall not be filled up unless seven days' notice in writing shall have been sent to each Member of the Council, stating the vacancies which it is proposed to fill up.

Eligibility of Members of Council.

7. No person shall be eligible as a Member of Council unless he be a subscriber to the funds of the Society of at least one guinea per annum; and any member of Council whose subscription shall be in arrear for three months after his subscription is payable, shall cease to be a Member of Council: Provided that this rule shall not apply to persons who may have become Life Members of the Society, by a payment of ten guineas, or who may be Honorary Members of the Society; and provided also, that a month's notice in writing shall be sent to the Member before his place can be filled up.

Meetings of Council.

8. The Council shall meet at least once a month, three Members to form a quorum, and transact the business of the Society.

Powers and Duties of Council.

9. The Council shall have the sole management of the affairs of the Society, and of the income and property thereof, for the uses, purposes, and benefit of the Society; and shall have the sole and exclusive right of appointing paid servants, as a Manager or Secretary, Collector, and such other officers, clerks, and labourers, and at such salaries as they may deem necessary, and of removing them if they shall think fit, and shall prescribe their respective duties. And such Council shall have power to consider and determine all matters, either directly or indirectly affecting the interests of the Society, and if they shall think fit so to do, shall bring the same under the notice of the Members of the Society, at any general or special meeting; and to make such bye-laws as they may deem necessary for the efficient management of the affairs and the promotion of the objects of the Society, and for the conduct of the business of the Council: Provided the same are not repugnant to these rules; to appoint one or more sub-committees, for any purpose contemplated by these rules; and generally to perform such acts as may be requisite to carry out the objects of the Society.

Branch Societies, &c.

10. The Society shall have power to associate itself with other Societies with similar objects, and to found Branch Societies.

Minutes of Proceedings.

11. Minutes shall be made in books kept for the purpose, of all proceedings at general and special meetings of the Members, and minutes shall also be made of the proceedings of the Council at their general and special meetings, and of the names of the Members attending the same, and such minutes shall be open to inspection by any Member of the Society at all reasonable times.

Moneys to be paid to Treasurer.

12. All subscriptions and other moneys received on account of the Society shall be paid to the Treasurer, or some person authorised by him in writing, who shall forthwith place the same in a bank, to be named by the Council, to the credit of the Society; and no sum shall be paid on account of the Society until the same shall have been ordered by the Council, and such order be duly entered in the book of the proceedings of the Council; and all cheques shall be signed by the Treasurer as such, and be countersigned by the President, or one of the Vice-Presidents, or by the Chairman of the meeting at which such payment is authorised.

Annual Meeting.

13. An annual meeting shall be held in the month of February in each year, and the Council shall report their proceedings during the past year, and shall produce their accounts, duly audited, for publication; and the meeting shall elect by ballot the office-bearers for the ensuing year, and fill up any vacancy which may exist in the Council: Provided that no person shall hold the office of President or Vice-President, for two years successively.

Special Meetings of Members.

14. The Council may, and upon receiving a requisition in writing, signed by twelve or more Members, shall convene a special meeting of the Members, to be held within fifteen days after the receipt of such requisition: Provided that such requisition, and the notices convening the meeting, shall specify the subject to be considered at such meeting, and that such subject only shall be discussed at such meeting.

15. The Council, or any general meeting of the Society, may admit, as Honorary Members, any ladies or gentlemen who may have distinguished themselves in connexion with the objects of the Society, and at such meeting any other business of the Society shall be transacted, of which one day's previous notice shall have been given to the Secretary by any member desirous of bringing the same forward. Honorary Members.

16. No Medal of the Society shall be awarded to any person except by the vote of at least seven Members of Council present at a Council Meeting, and after notice of motion for awarding such Medal shall have been given at the next preceding meeting of the Council.

17. It shall be lawful for any annual or special meeting of the Society to alter, vary, or amend the rules; or to substitute another for any of the same; or to make any new rule which may be considered desirable; if and after a notice specifying the nature of such alteration, variation, amendment, substitution, or new rule, shall have been given to the Secretary fifteen days before the holding of such meeting. And such alteration, variation, amendment, substitution, or new rule shall be valid if carried by a majority of not less than two-thirds of the Members present at such meeting. Power to alter Rules.

LIST OF ANIMALS AND BIRDS

IN THE

ZOOLOGICAL GARDENS, ROYAL PARK.

ANIMALS.

1 African Lion
1 African Lioness } *Felis Leo*
1 Hunting Leopard, *Felis Jubata*
1 Silver Jackal, *Canis Mesomelas*
2 Native Dogs—*Canis Dingo*
3 Marsupial Wolves—*Thylacinus Cynocephalus*
2 Tasmanian Devils—*Sarcophilus Ursinus*
1 Native Cat—*Dasyurus Viverrinus*
1 Tiger Cat—*Dasyurus Maculatus*
1 Moongus—*Herpestes Griseus*
1 Beelbah—*Paragalea Lagotis*
2 American Black Bears—*Ursus Americanus*
1 Chacma, or Ursine Baboon—*Cynocephalus Porcarius*
2 Papions—*Cynocephalus Sphinx*
15 Monkeys of different varieties
1 Native Bear—*Phascolarctus Cinereus*
2 Wombats—*Phascolomys Platyrhinus*
1 Porcupine—*Echidna Hystrix*
2 Red Kangaroos—*Macropus Rufus*
4 Large Kangaroos—*Macropus Major*
1 Bennett's Kangaroo—*Halmaturus Bennetti*
5 Yellow-footed Rock Wallabys—*Petrogale Xanthopus*
3 Gloved Wallabys—*Halmaturus Manicatus*
2 Black Wallabys—*Halmaturus Ualabatus*
1 Paddy Melon—*Halmaturus Billardieri*
2 Kangaroo Rats—*Bettongia Cuniculus*
2 Opossums—*Phalangista Vulpina*
3 Opossums—*Phalangista Canina*
1 Tangulung—*Viverra Tangalunga*
1 Camel—*Camelus Arabica*
35 Deer of different varieties
4 Sheep of different varieties
4 Zebu—*Bos Indicus*
2 Angora Goats—*Capra Angorensis*
3 Tortoises

114

BIRDS.

20 Ring-necked Pheasants—*Phasianus Torquatus*
8 Golden Pheasants—*P. Pictus*
28 Japanese Green Pheasants—*P. Versicolor*
2 Copper Pheasants—*P. Sæmmeringii*
1 Reeves' Pheasant—*Syrmaticus Reevesi*
4 Silver Pheasants—*P. Nycthemerus*
5 Emus—*Dromaius Novæ Hollandiæ*
4 Native Companions—*Grus Australasianus*
3 Nankeen Night Herons—*Nysticorax Caledonicus*
1 Kagu—*Rhinochætus Jubatus*
2 White Swans—*Cygnus Olor*
2 Trumpeter Swans—*C. Buccinator*
2 Black Swans—*C. Atratus*
4 Cape Barren Geese—*Céreopsis Novæ Hollandiæ*
2 Maned Geese—*Bernicla Jubata*
2 Bar-headed Geese—*Anser Indicus*
3 Egyptian Geese—*Chenalopex Ægyptiaca*
3 Magpie Geese—*Anseranas Melanoleuca*
5 Paradise Ducks—*Casarca Variegata*
4 Mandarin Ducks—*Aix Galericulata*
50 Ducks of different varieties
2 Australian Eagles—*Aquila Audax*
1 Sea Eagle—*Poliœtus Leucogaster*
4 Hawks of different varieties
1 Owl—*Bubo Bengalensis*
1 Owl—*Strix Castanops*
2 Ravens—*Corvus Corax*
2 Laughing Jackasses—*Dacelo Gigas*
4 Macaws—*Ara Araganza*
40 Parrots of different varieties
17 Cockatoos of different varieties
3 Crowned Pigeons—*Gaura Coronata*
2 Wonga Wonga Pigeons—*Lcucosarcia Picata*
7 Bleeding Heart Pigeons—*Calœnas Luzonica*
20 Doves of various sorts
2 Curassows—*Crax Alector*
2 Blackbirds—*Turdus Merula*
50 Canaries—*Carduelis Canaria*
8 Satin Bower Birds—*Ptilonorhynchus Holosericeus*
5 Grey Crow Shrikes—*Strepera Anaphonensis*
2 South Stone Plovers—*Œdicnemus Grallarius*
4 Native Turkeys—*Otis Australasianus*
1 Australian Magpie—*Gymnorhina Leuconota*
2 Maori Hens or Weka Rails—*Ocydromus Australis*
2 Californian Quail—*Callipepla Californica*
1 Kiwi—*Apteryx Australis*

340

AT MR. SAMUEL WILSON'S ESTATE, ERCILDOUN,

160 Angora Goats.

The Ostriches have been removed to Mr. Officer's Station, Murray Downs.

LIST OF DONORS

TO THE

Zoological and Acclimatisation Society,

1874-5.

AMESS, MR. S., MELBOURNE—1 Echidna, 4 Black Swans.
ACCLIMATISATION SOCIETY OF NELSON, NEW ZEALAND—30 Californian Quâil.
ACCLIMATISATION SOCIETY OF WESTLAND, NEW ZEALAND—1 Kiwi.
BOWEN, HIS EXCELLENCY SIR GEORGE—1 Tortoise.
BOSTON, MRS., CARLTON—1 Monkey.
BUCKNILL, MR. C., MORTON PLAINS—1 Native Dog.
COCKBURN, MISS, ST. KILDA—1 Monkey.
CRAIG, MR., CARLTON—1 Native Companion.
COOPER, CAPTAIN, Ship *Carlisle Castle*—1 Chesnut-faced Owl.
DENBIGH, MR., ELWOOD—1 Wallaby.
DAW, MR., HOTHAM—1 Echidna.
DEACON, MR.—1 Echidna.
DAWES, MR. ROBERT—1 Native Turkey.
EVANS, MISS, ST. KILDA—1 Mopoke.
FLEMMING, MR., CARDIGAN STREET—2 Leverets.
FLETCHER, MR., TOWN CLERK OF SANDHURST—2 Emus.
FLOWER, MR., TOORAK—1 Mopoke.
FENTON, SERGEANT, COLLINGWOOD—1 Turtle.
FOY, MR., COLLINGWOOD—2 Water Rats.
FERGUSSON, MR. J. D., EMERALD HILL—1 Paddy Melon.
GREVILLE, MRS., BRIGHTON—2 White Doves.
GARDINER, MR. ALEX., ESSENDON—1 Eagle.
GRAVES, MR. JAMES, TATONG, BENALLA—2 Wood Ducks, 2 Muscovy Ducks.
GRANT, MR. C. L., SHANGHAI—1 Pair Copper Pheasants.
GOOLD, MR. J. A.—1 Nankeen Heron.
GLASS, MR. ROBERT—1 Kangaroo, 1 Mountain Duck.
GUILD, MR. J., SEYMOUR—6 Native Water Hens.
GREEVES, MR., WOODEND—1 Echidna.
HEYDERICK, J.P., MR. P., BUNINYONG—2 Flying Squirrels.
INGLES, MR.—1 Eagle.
JONES, MR. B., SANDRIDGE—1 Native Companion.
KISSLEY, MR. GEORGE, NIEMUR—12 Kangaroos, 9 Black Swans, 5 Magpies, 5 White Cranes, 2 Mountain Ducks, 1 Native Turkey.
LOWE, MR., PORTLAND—1 Monkey.
LEWELLYN, MR., PRAHRAN—1 Native Bear.
LANG, MR. WILLIAM, ASCOT VALE—1 Native Bear.
LYALL, MR. WILLIAM, HAREWOOD—8 Black Swans.
LAMBERT, MR. R., SYDNEY ROAD—1 Eagle.
MCLACHLAN, MR. JAMES, CHELTENHAM—2 Great Crowned Pigeons.
MCCULLOUGH, MR., MARYBOROUGH—8 Mountain Ducks.
MILLER, MR. G., BERWICK—1 Wallaby.
OLIVER, MR., COLIBAN PARK—1 Tiger Cat.
POOLMAN, MR., SANDRIDGE—1 Kangaroo.
PATTERSON, MR. ROBERT, ST. KILDA—2 Eagles.

PURCHAS, REV. MR., NEW ZEALAND—1 Weka Rail or Maori Hen.
PAGE, MR. A. M. A., GEMBROOK—5 Grey Crow Shrikes, 8 Satin Bower Birds.
PATTERSON, MR., ST. KILDA—1 Native Turkey.
PURVES, MR. A. W., DAYLESFORD—1 Flying Squirrel.
ROWDEN, MRS., EMERALD HILL—1 Black Swan.
ROWAN, MRS. R.—1 Kestril
RAE, MRS. R. G., HOTHAM—1 Monkey.
RADDENBERRY, MR., CURATOR BOTANIC GARDENS, GEELONG—2 Echidna.
ROBERTSON, MR. J., MELBOURNE—1 Tangulung.
SUMNER, HON. T. G., STONEY PARK—1 Echidna.
SARGOOD, HON. F. T., ELSTERNWICK—2 Emus, 2 Native Companions.
STACKPOOL, MRS.—4 St. Helena Canaries.
SIMONDS, MR. A. B., ROYAL PARK—1 Echidna.
SADDLER, MR., GIPPS STREET—1 Platypus.
SMYTHE, MR. R. BROUGH, MELBOURNE—1 Black Swan.
STANLEY, CAPTAIN—1 Sea Eagle.
THOMAS, MR. J., CARLTON—1 Echidna.
TYLER, MR. J. C., TOORAK—1 Cockatoo.
TREGURTHA, MR., MACEDON—1 Echidna.
VETTLER, MR., ECHUCA VINEYARD—1 Kangaroo.
WILSON, MR. SAMUEL, ERCILDOUN—2 Tiger Cats.

STOCK ACQUIRED DURING THE YEAR 1874-5, BY PURCHASE, EXCHANGE, OR OTHERWISE.

1 Tasmanian Devil—purchase
2 Papion Monkeys—purchase
1 Wombat—purchase
2 Marsupial Wolves or Native Tigers from Tasmania—purchase
1 Camel—caught on the Lower Murray, where it had been running wild since the Burke and Wills expedition.
2 Land Tortoises—purchase
6 White Swans—exchange
7 Doves—purchase
36 Parrots—purchase
14 Cockatoos—purchase
19 Grey Partridges from India—purchase
122 Californian Quail—purchase
8 Satin Bower Birds—caught at Gembrook
5 Grey Crow Shrikes—caught at Gembrook

STOCK SOLD, PRESENTED, OR EXCHANGED, BY THE SOCIETY DURING THE YEAR 1874-5.

2 Formosan Deer—presented to the West Australian Government.
18 Angora Bucks—sold.
1 Zebu Calf—sold.
4 Kangaroos—exchange.
2 Ditto—presented to the Government of the Straits Settlements.
2 Ditto—presented to Captain Stackpool, ship *Shannon*.
2 Rock Wallabys—presented to the Government of the Straits Settlements.
2 Kangaroo Rats—ditto.
2 Eagles—ditto
8 Corellas—ditto.
1 Native Dog—presented to the Zoological Society of London.

2 Hares—presented to the Acclimatisation Society of Castlemaine.
6 Ditto—presented to Mr. Alexander Wilson, Mount Emu.
4 Ditto—presented to Mr. Trumble, Eaglehawk.
4 Ditto—presented to the Hon. G. V. Smith, for the Ovens district.
2 Ditto—presented to Mr. Charles Ayrey, Warranooke.
2 Echidna—presented to Captain Cooper, ship *Carlisle Castle.*
1 Silver Pheasant—presented to Mr. John Woods, M.L.A.
10 Common do.—presented to the Acclimatisation Society of Castlemaine.
10 Ditto—presented to Mr. Alfred Chenery, Delalite.
10 Ditto—presented to Municipality of Sandhurst.
9 Green Japanese Pheasants—presented to Mr. Samuel Wilson of Ercildoun.
7 Ditto ditto—presented to Mr. Charles Ayrey of Warranooke.
1 Emu—presented to Captain Stackpool, ship *Shannon.*
1 Native Companion—presented to Captain Cooper, ship *Carlisle Castle.*
2 White Swans—presented to the Municipal Council of Maryborough.
2 Ditto do.—presented to Sir Redmond Barry.
12 Black Swans—exchange.
3 Eagles—exchange.
8 Corellas—presented to Captain Cooper, ship *Carlisle Castle.*
1 Blackbird—presented to Municipal Council of Ballarat.
5 Magpies—presented to Mr. Edward Wilson, Hayes, Kent.
2 Kangaroos—exchange.
30 Californian Quail—presented to Mr. Samuel Wilson of Ercildoun.
2 Ditto do.—presented to Mr. E. Charsley, Melbourne.
6 Ditto do.—presented to Mr. William Robertson, Wooling.
10 Ditto do.—presented to the Hon. John Bear, Tabilk.
9 Ditto do.—presented to Mr. Charles Ryan, Mount Macedon.
28 Ditto do.—presented to Mr. Charles W. Buckland, Eurella, Shelbourne.
38 Ditto do.—liberated at Gembrook.
6 Water Hens—exchange.
24 Wild Rabbits—presented to Captain Champion, ship *Mary Wadley.*

STOCK LIBERATED IN 1874-5.

110 Pheasants	15 Indian Grey Partridges	3 English Partridges
120 Californian Quail		18 Hares

800 Carp and 300 Perch distributed.

300 Pheasant Eggs were distributed to Members of the Society.

In addition to the above about 50 Pheasants have been sold and distributed to Members of the Society.

2 Hares—presented to the Acclimatisation Society of Castlemaine.
6 Ditto—presented to Mr. Alexander Wilson, Mount Emu.
4 Ditto—presented to Mr. Trumble, Eaglehawk.
4 Ditto—presented to the Hon. G. V. Smith, for the Ovens district.
2 Ditto—presented to Mr. Charles Ayrey, Warranooke.
2 Echidna—presented to Captain Cooper, ship *Carlisle Castle.*
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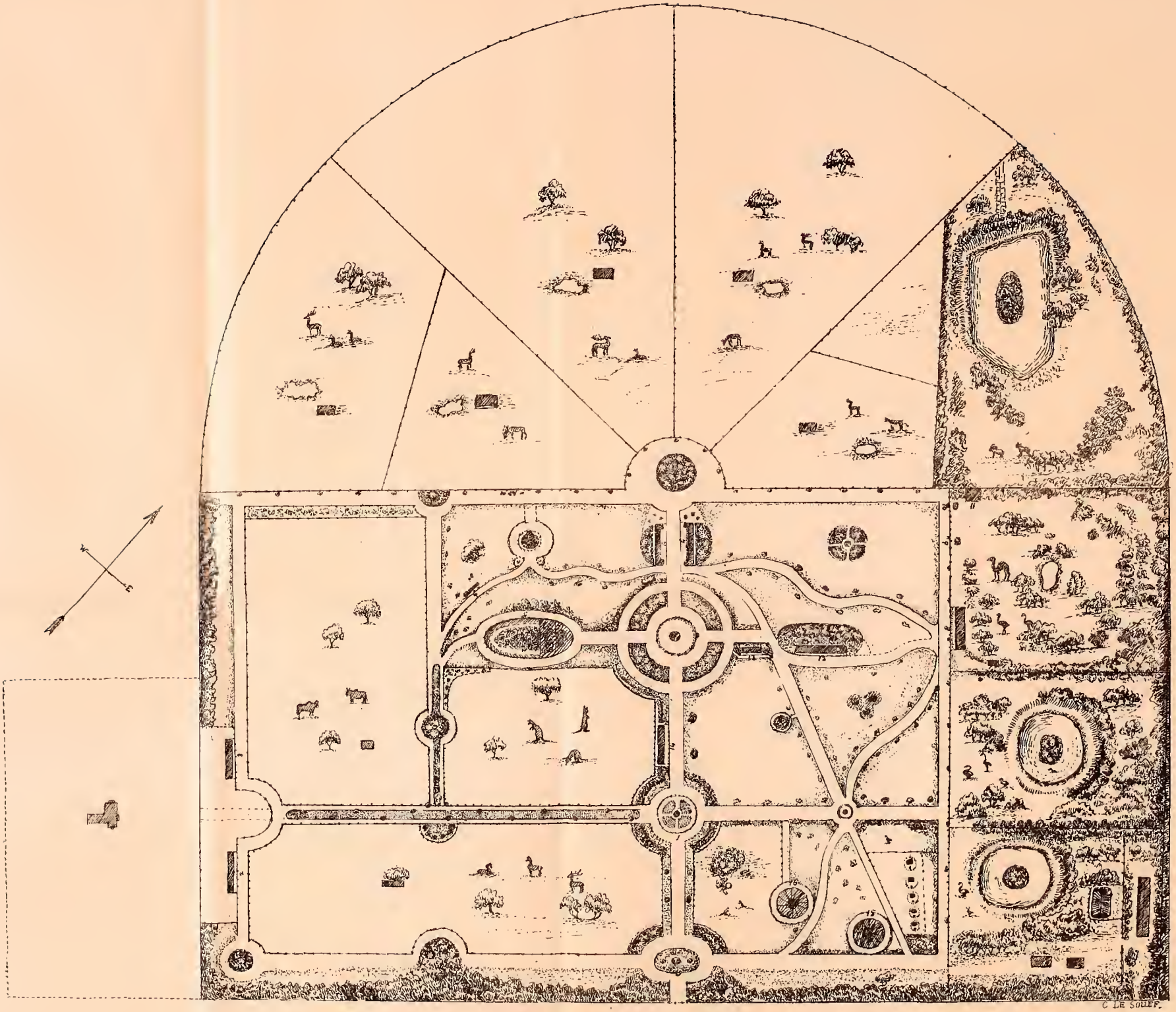

PLAN OF

THE GARDENS OF THE ZOOLOGICAL AND ACCLIMATISATION SOCIETY OF VICTORIA,

ROYAL PARK, MELBOURNE.

Scale 160 feet to 1 inch

0 40 80 100 160 320 420

GUIDE

TO THE

Zoological and Acclimatisation Society's Gardens,

BY THE

HON. SECRETARY TO THE SOCIETY.

The following description of the Zoological and Acclimatisation Society's Gardens is intended to accompany the bird's-eye view of the grounds in the frontispiece, and may be of some use as a guide to visitors. They comprise an area of about 40 acres, and are situated in the centre of the Royal Park, about a mile and a half from the General Post Office, and can be reached by cab or the Hotham omnibuses, which leave the Hobson's Bay Railway Station every few minutes and take passengers as far as the Park fence on the Flemington Road, and within a few minutes walk of the Gardens.

On entering the main gates the visitor will notice several paths which lead in different directions—with the reader's permission, we will proceed round the oval flower bed at the entrance, and so down the main walk.

The first building met with is a small aviary, No. 1, devoted to Canaries. It is placed in the centre of a circular enclosure prettily laid out, and filled with choice flowers, which, especially in spring and summer, have

a very pleasing effect. The right hand, or opposite side of the walk, is also gay with flowers and handsome shrubs. From this point several paths again diverge. For the present we will leave the main walk, and turn to the left along an avenue of young Grevillia trees. On the left hand is a paddock containing deer, the progenitors of which were sent some years ago to the Society by Sir Henry Barkly, from the Mauritius. It may be here mentioned that our late respected Governor has always been a warm friend to, and has taken a deep interest in, the Society, and that when here he was an active member of its council.

On the right hand side of this walk is the Kangaroo paddock, tenanted by specimens of the Great Kangaroo (*Macropus Major*); the handsome red Kangaroo (*M. Rufus*) of Riverina, and Bennett's Kangaroo (*Halmaturus Bennetti*) from Tasmania.

At the termination of the Grevillia walk, on the left hand, we come to Aviary No. 2. Here we have a couple of those splendid birds the Great Crowned Pigeon (*Goura Coronata*) of New Guinea, recently presented to the Society by James McLachlan, Esq., late of Java, but now of Cheltenham, England. In the other division of this Aviary are some beautiful Golden Pheasants (*Phasianus Pictus*), a present from Charles Lyall Grant, Esq., of Shanghai, another staunch friend of the Society; also some pretty White Doves.

Turning to the right at this point, and passing a private gate (which leads to the residence of the Hon. Secretary) in a few steps we reach Aviary No. 3, one division of which contains a number of Satin Bower Birds (*Ptilonorhynchus holosericeus*). These birds are very interesting and amusing. In the spring and

summer they construct small bowers of light twigs, about two feet in length, and amuse themselves all day in altering the position of the twigs and running through their bower, chasing each other and bowing in the most grotesque manner. The adult males are a glossy purple black, and the young males and females green; but in the male birds the mottled appearance produced by the gradual change of plumage and the intervention of a black feather here and there before the full glossy covering is reached is striking and peculiar. The eye is most beautiful, being of a deep brilliant blue. In a second division of this building are some Grey Crow Shrikes (*Strepera Anaphonensis*), captured last year at Gembrook, the Society's game breeding establishment. These birds in their wild state live on mice, moths, and insects of all kinds, and woe betide any unhappy mouse which invades their present quarters, as it is immediately pounced upon and eaten. In a third compartment are a pair of Curassows (*Crax Alector*), from Mexico, but they are shy breeders, and have only once reproduced in the Society's Gardens.

Opposite the Aviary last mentioned is a paddock devoted to Zebus (*or Brahmin cattle*). These animals breed freely every year.

Following round this paddock, the visitor is conducted to the small mammal's house, No. 4, recently erected. It contains at present Native and Tiger Cats, the Native Rabbit or Beelbah (*Paragalea Lagotis*), the Moongus (*Herpestes Griseus*), Kangaroo Rats (*Bettongia Cuniculus*), &c.

Close by is the Bear-pit, also a recent construction, inhabited by two fine specimens of the North American

Bear (*Ursus Americanus*); the orthodox pole rises in the centre, but the occupants are so well fed and lazy, that they seldom take the trouble to climb it.

Opposite to the Bear-pit on the east side, is a large Aviary, No. 5, divided into several compartments partly enclosed at the top and partly open. Here several varieties of Pheasants are kept, the breeding of which forms one of the principal features in the Society's operations year by year. Last season, as stated in the "Report of the Council," was the most successful yet experienced, nearly two hundred birds having been reared and liberated, the greater portion at Gembrook; a part of the country apparently well suited to their habits, and where it is hoped they will rapidly increase and spread over the country. The bird found to be the hardiest and best adapted for acclimatising purposes is the ring-necked variety (*Phasianus Torquatus*), known as the New Zealand Pheasant, from the fact of its having been most successfully introduced into that colony. In this Aviary are also some of the curiously marked bleeding-heart Doves (*Calœnas Luzonica*), from Manilla, presented to the Society some years ago by Captain Phillip Leigh; these birds now breed regularly.

On the opposite side of the Bear-pit, to the west, are the Deer paddocks. These enclosures, as will be seen on the plan, extend across the whole breadth of the grounds. They contain a number of Deer of the following varieties:—

The Formosan Deer (*Cervus Pseudaxis*). Formosa, a beautiful spotted Deer, the first of which were presented to the Society by R. S. Fussell, Esq., of Fou Chou.

The Japanese Deer (*C. Sika*).—This variety is very like the Formosan, being also spotted; but it is a smaller animal.

The Barasingha Deer (*C. Duvaucelli*), presented by Arthur Grote, Esq., late of Calcutta. This Deer attains a large size.

The Sambur Deer (*C. Aristotelis*), India.—Some years ago several of these fine animals were liberated at Harewood, near Cranbourne, the property of William Lyall, Esq., and have increased in a remarkable manner. Mr. Lyall estimates that there are now some hundreds running on a large swamp on his station.

The Fallow Deer (*C. Dama*).—At present there are only two females in the Gardens, but there are numbers in different parts of the colony, notably on the Upper Yarra, the produce of some liberated several years ago by P. De Castella, Esq.

The Hog Deer (*C. Porcinus*), India.—This is a small, hardy animal, about the size of a sheep. A number have been liberated at different times. The original stock was presented by the Rajah Rajendro Mullick, Messrs. E. Blythe and A. Grote, of Calcutta, and A. Layard, Esq., of Colombo.

Following the path leading north from the Bear pit, in about a hundred yards, the visitor reaches the Monkey houses, Nos. 6 and 7. These buildings are placed on each side of the main walk, and attract a great deal of attention, and cause much amusement among the juvenile visitors. The space in front of the cages is often crowded, especially on holidays. Ten Monkeys of different kinds are confined here at present.

A large number of beautiful Australian Parrots are to be seen in cages at each corner (of the Monkeys' buildings), and several animals, such as the Silver Jackal (*Canis Mesomelas*), the Native Dog (*Canis Dingo*), and some fine specimens of the Marsupial Wolf or Native Tiger (*Thylacinus Cynocephalus*) from Tasmania. Like the Dingo, these animals are very destructive to sheep, and they have in consequence been destroyed by the settlers, and are now becoming scarce. A pair of those hideous animals, the Tasmanian Devil (*Sarcophilus Ursinus*), are also accommodated here, in a cage made additionally strong to prevent their escape; for there are few animals in the world which possess the same strength in proportion to their size. Several other smaller animals are also confined in these buildings.

Still proceeding along the same path to the north, the next building reached is the Lions' house, No. 8. The specimens at present in the Society's possession from South Africa are splendid animals; they have hardly attained their full size, being only five years old. They were captured as whelps by a Dutch Boor, and purchased from him by Mr. Frank Thompson, now of the Zoological Gardens, Philadelphia, who sold them to the captain of a vessel leaving for Melbourne. Ultimately they were purchased by the Society, and now form the greatest attraction of the Gardens. They are fed daily at half-past three.

Their next door neighbour, in a cage under the same roof, is a Hunting Leopard or Cheetah (*Felis Jubata*). Close by are two small buildings, Nos. 9 and 10, one of which contains a pair of small Monkeys, and the other a collection of Opossums. There are several fine specimens of the short-eared variety (*Phalangista Canina*),

caught in the Gembrook Ranges, and which are much larger than the common Opossum (*Phalangista Vulpina*) of the low country.

Just at the back of this cage stands the Camel house, No. 11. The Camel is a comparatively new addition to the collection, having been recently caught by Mr. Officer, of the Murray Downs, near Swan Hill. It had been running on that gentleman's station for ten years or more, having been left there when quite young by Burke, on his ill-fated expedition; and at last it became such a nuisance, by frightening the station horses, that Mr. Officer determined to capture it. After some trouble he succeeded, and kindly offered it to the Society. A man was sent up, and led the animal down without much difficulty. It has now very comfortable quarters, though perhaps not so much to its liking as roaming over the salt-bush country of the Murray Downs.

In the same paddock are several fine Emus (*Dromaius Novæ Hollandie*), presented by different friends of the Society.

In a small paddock close by are several primitive-looking sheep, covered with hair instead of wool; amongst them an Abyssinian, with a black neck and head, brought by our ironclad, the "*Cerberus*," on her passage out; also a couple of Angora Goats. In this paddock is a large pond, stocked with fish and a few water-fowl.

The two enclosures to the east of the Camel and Emu paddock contain large ponds, each with a small island in its centre, and here the water-fowl and waders are kept. The present collection consists of—

Native Companions (*Grus Australasianus*).
Magpie Geese (*Anseranas Melanoleuca*).
Egyptian Geese (*Chenalopex Ægyptiaca*).
Cape Barren Geese (*Cereopsis Novæ Hollandiæ*).
Maned Geese (*Bernicla Jubata*).
Bar-headed Geese (*Anser Indicus*).
A fine pair of Trumpeter Swans (*Cygnus Buccinator*); a present from the Zoological Society of London.
The Mute Swan (*C. Olor*).
The Black Swan (*C. Atratus*).
The Shieldrake or Mountain Duck (*Casarca Tadornoides*).
The Paradise Duck, from New Zealand (*C. Variegata*).
The Black Indian Duck.
The Mallard (*Anas Boschas*).
The Australian Black Duck (*Anas Superciliosa*).

From the Lions house we will conduct our readers by a walk leading to the right to the largest Aviary, No. 12, in the Garden. A number of beautiful birds are collected here, viz.:—

The Golden Pheasant (*Phasianus Pictus*).
The Silver Pheasant (*P. Nycthemerus*).
Reeves Pheasant (*Syrmaticus Reevesi*).
The Wonga Wonga Pigeon (*Leucosarcia picata*).
Bleeding-heart Doves (*Calœnas Luzonica*).

And a variety of others, including a fine specimen of the Great Crowned Pigeon, and a number of smaller birds.

A little further on, and the Song Bird Aviary, No. 13, is reached, filled with Canaries and Linnets, which make melody the whole day long.

At the back of this building is a path leading to the fountain pond, in the centre of the main walk. It is stocked with English Perch and Goldfish, and

the only birds kept there are some beautiful Mandarin Ducks (*Aix Galericulata*), from China.

Turning to the left at this point along the main walk, the visitor reaches the Cockatoos' Aviary, No. 14, which is filled with those showy, but noisy birds. There are the White Cockatoo (*Cacatua Galerita*), the Corella (*Licmetis Tenuirostris*), Leadbeaters Cockatoo (*Cacatua Leadbeaterii*), and the Rose Cockatoo (*Plyctolophus Eos*). The Society lately possessed a specimen of the Black Cockatoo (*Calyptorhynchus Naso*), of Western Australia, but it died after a few months' confinement. In a separate division are some brilliantly-plumaged Macaws (*Ara Araganza*) from Brazil, a pair of which were presented to the Society by the Zoological Society of London. A little further on, and the circular Canary house is again passed.

We must now leave the main walk, and proceed in a northerly direction for a short distance to the Wombat's Cave. There are two specimens of this curious animal (*Phascolomys Platyrhinus*) at present in the Society's possession, but they study their own comfort more than the curiosity of visitors, and generally remain coiled up in their den during the day; for, like many of the Australian animals, they are nocturnal, and in their wild state only feed at night.

Between this point and the Song Bird Aviary stands a tree surrounded by a close fence, in which a Native Bear (*Phascolarctus Cinereus*) lives for the greater part of the year, though occasionally he denudes his abode so entirely of leaves that he has to be removed to another tree for a time. It has hitherto been found impossible to take specimens of these singular and interesting animals to Europe, as they require a constant

supply of fresh gum leaves to feed on, and even then, if confined in a cage, they will not live for any length of time. The only way of keeping them successfully is to put them up a gum-tree. They have a most peculiar cry, something between the grunting of a pig and the crying of a child. Of all the doleful sounds which break the stillness of night in the Australian bush, there is none so unearthly as that of the Bear. Within the close fence the Porcupine Anteaters (*Echidna Hystrix*) are kept; sometimes there are several, and at other times not a single specimen in the collection, for they are difficult creatures to keep alive for any length of time in confinement.

Close to the Wombat's Cave, on the east side, is a small enclosure containing some Native Turkeys (*Otis Australasianus*), and several Land Tortoises from Southern Africa, the largest of which was lately presented to the Society by His Excellency Sir George Bowen. Within this enclosure, but fenced off from the birds, are several Baboons and other Monkeys, all provided with small houses and poles in front, up which they delight to climb. The antics of these animals, especially of the large Chacma Baboon (*Cynocephalus Porcarius*), cause many a hearty laugh to the old as well as to the young.

There are still two circular aviaries to be visited; they stand close by, and the first, No. 15, contains only Pheasants—the ring-necked variety (*Phasianus Torquatus*), the silver (*P. Nycthemerus*), the Japanese green (*P. Versicolor*), and a pair of Copper Pheasants (*P. Sœmmeringhii*). The two last named were given to the Society by Charles Lyall Grant, Esq., of Shanghai, and are probably the only representatives of their kind at present in Australia; it is hoped that their numbers will be increased next breeding season.

The second round Aviary, No. 16, is also stocked with birds, but of a different kind. There are some fine specimens of the Australian Eagle (*Aquila Audax*); a large Fishing Eagle (*Poliœtus Leucogaster*), presented by Captain Stanley, R.N.; the Laughing Jackass (*Dacelo Gigas*); the English Raven (*Corvus Corax*); the Weeka Rail (*Ocydromys Australis*) New Zealand; the Kiwi (*Apteryx Australis*), New Zealand; the Kagu (*Rhinochetus Jubatus*), New Caledonia; The Nankeen Heron (*Nysticorax Caledonicus*); the Horned Owl (*Bubo Bengalensis*), India; the Chesnut-faced Owl (*Strix Castanops*), Tasmania; the South Stone Plover (*Œdicnemus Grallarius*), and other birds.

There now only remains the Wallaby paddock; it is close to the main gate, between the circular Aviary last described and the main walk. There are several varieties of these pretty little animals in the Society's collection, all of which breed regularly. Foremost among them is the Yellow-footed Rock Wallaby (*Petrogale Xanthopus*) of South Australia; it is of a light brown color, very prettily marked, and its long tail is striped or barred like a tiger's. Then come the Gloved Wallaby (*Halmaturus Manicatus*), the Brush-tailed Wallaby (*Halmaturus Ualabatus*), and the Paddy Melon (*Halmaturus Billardieri*), the latter generally found in the salt bush country.

It is the wish and intention of the Council of the Society to make its collection and gardens not only useful as a means of instruction for the young, but also attractive and amusing to all classes of the community; and with this object it desires, if possible, to make several important additions and improvements, such as a Reptile-house, where the visitor can personally, and

without injury, acquire the knowledge of the appearance of those venomous snakes whose bite would prove fatal, and those which possess no poison fangs. Unfortunately, however, the Council is much crippled in carrying out this desire from the want of funds. The Government, through the liberality of Parliament, gave the Society last year a grant of £2,500, and that sum at least will be required for the present year if it is desirable to maintain and add to the present Zoological collection. The Council is anxious to be permitted to close the gates on certain days to any but subscribers, or to make a small charge for admission to the grounds, as is the case with its celebrated namesake in London, and by this means to raise a sufficient revenue to maintain the Gardens in an efficient state without Government support, but there seems to be some hesitation on the part of Parliament to accede to this plan. It will be a matter for regret if the operations of the Society are reduced or crippled by insufficient means, and it must be apparent to all that a Zoological collection can only be maintained at considerable cost.

SECOND SUPPLEMENT

TO THE

SELECT PLANTS,

READILY ELIGIBLE FOR

VICTORIAN INDUSTRIAL CULTURE,

BY

BARON FERD. VON MUELLER,

C.M.G., M. & Ph.D., F.R.S.

Acacia Arabica, Willd.

North and Central Africa, Arabia. The stem attains a circumference of 10 feet. The astringent pods are valuable for tanning; the wood, known as "Sunt," is esteemed for planks of boats. *A. gummifera* (Willd.) and *A. Ehrenbergiana* (Hayne) are among the species, which yield Gum Arabic in North Africa.

Acacia Seyal, Delile.

In the Libyan and Nubian deserts. This thorny tree exudes a good kind of Gum Arabic. It is adapted for the most arid desert country. In any Oasis it forms a large and shady tree.

Acacia Verek, Guill. & Perrot.

From Senegambia to Nubia. Affords the best white Gum Arabic of the Nile region, and a large quantity of this commercial article. *A. Etbaica* (Schweinf.) from the same region produces also a good mercantile gum.

Acer dasycarpum, Ehrhart.

Much praised for street-planting; growth comparatively rapid. It produces no suckers, nor is the tree subject to disease. *A. Negundo* is used in California extensively as a shade-tree.

Acer macrophyllum, Pursh.

A beautiful shade-tree; delights on banks of streams. The inner bark can be utilized for baskets and superior mats; the wood is a substitute for hickory.

Acer saccharinum, Wang.

Bears a massive head of foliage on a slender stem. The autumnal coloring is superb. In the eastern states of North America the Sugar Maple is regarded as the best tree for shade avenues. The foliage of *A. platanoides* assumes in autumn a yellow tint, while that of *A. rubrum* turns red.

Ægiceras majus, Gaertner.

South Asia, Polynesia, North and East Australia. This spurious Mangrove-tree extends far south in New South Wales. It may be employed for staying the off-flow of mud by the tide, and for thus consolidating shores subject to inundation by sea-floods.

Æsculus Hippocastanum, L.

The Horse Chesnut-tree. The wood is free from insects. The tree ascends the Himalayas up to 10,000 feet. A variety occurs with thornless fruits.

Agave Americana, L.

The strength of ropes of this fibre is considerably greater than that of hemp ropes, as well in as out of water. The leaves contain *Saponin*.

Ailantus glandulosa, L.

Valuable also for reclaiming coast sands. Wood extremely durable.

Albizzia Julibrissin, Durazzini.

From Persia to Japan. A favorite ornamental Shade-Acacia in South Europe.

Aloe dichotoma, L. fil.

Damara and Namaqua land. This species attains a height of 30 feet and expands occasionally with its branches so far, as to give a circumference of 40 feet. The stem is remarkably smooth, with a girth sometimes of 12 feet. It is a yellow flowering species. *A. Bainesii* (Baker & Dyer) is almost as gigantic as the foregoing. Both doubtless yield medical gum-resin like many others. *A. Barberæ*, which is closely related to *A. Zeyheri*, attains in Caffraria a height of 40 feet, with a stem 16 feet in circumference at 3 feet from the ground.

Andropogon argenteus, Candolle.

Pronounced by Leybold to be one of the best fodder-grasses of the Cordilleras of Chili.

Andropogon pertusus, Willd.

South Asia, tropical and sub-tropical Australia. Perennial. Mr. Nixon, of Benalla, regards it one of the best grasses to withstand long droughts, while it will bear any amount of feeding. *A. Haleppensis* (recorded before) yields a very large hay-crop for mowing, as it may be cut half-a-dozen times in a season, should the land be rich. All kinds of stock have a predilection for this grass. It will mat the soil with its deep and spreading roots; hence it should be kept from cultivated fields.

Andropogon saccharatus, Roxburgh.

The stem can be used as a culinary vegetable.

Andropogon Sorghum, Brotero.

The panicles are used for carpet-brooms, the fibrous roots for velvet-brushes. A kind of beer called "Merisa" is prepared from the seeds.

Aponogeton crispus, Thunberg.

From India to New South Wales. The tuberous roots of this water-herb are amylaceous and of excellent taste, though not large. The same remarks apply to *A. monostachyus* (L. fil.).

Aquilaria Agallocha, Roxburgh.

On the mountains of Silhet and Assam. A tree of immense size, probably hardy in our warm forest-valleys. It furnishes the fragrant Calambac or Agallochum wood, known also as Aggur or Tuggur or the Aloe-wood of commerce, famed since ancient times. The odorous portion is only partially distributed through the stem. This wood is also of medicinal value.

Aristotelia Macqui, L'Heritier.

Chili. The berries of this shrub, though small, have the pleasant taste of bilberries, and are largely consumed in Chili. The plant would thrive in our forest-valleys.

Avicennia officinalis, Linné.

From the coasts of South Asia to those of South Africa, all Australia and New Zealand. It is proposed by Dr. Herm. Behr, to plant this tree for consolidating muddy tidal shores.

Berberis buxifolia, Lamarck.

From Magelhaen's Straits to Chili. This bush, according to Dr. Philippi, is the best among the South American species for berries, which are comparatively large, black, hardly acid, but slightly astringent. In Valdivia and Chiloe they are frequently consumed.

Brachychiton acerifolium, F. v. Mueller.

The East Australian Flame-tree. An evergreen shade-tree, with magnificent trusses of crimson blossoms. Like *B. populneum* (R. Br.), eligible for promenade-lines, when celerity of growth is no object. The mucilaginous sap, when exuded, indurates to a kind of Tragacanth.

Cæsalpinia brevifolia, Bentham.

Chili. The pods of this shrub are extraordinarily rich in tannic acid, and hence valuable for tanneries (Philippi).

Cajanus Indicus, Candolle.

Indigenous also to tropical Africa. Attains a height of 15 feet, and has yielded in the richest soil of Egypt 4000lbs. of peas to the acre. A crop is already obtained in the first year. The seeds can be used as peas in the green as well as mature state.

Carex Moorcroftiana, Falconer.

The Loongmur of the Alps of Thibet. One of the best of sedges for staying the shifting sand by its deeply penetrating and creeping roots. It forms an intricate network on the surface and beneath; outliving most other fodder-plants at its native places, in the season it becomes available for cattle and horse-food, particularly in the cold of winter, and is held to be singularly invigorating to pasture-animals.

Cereus Quixo, Gay.

Chili. This stately cactus attains a height of 15 feet, and is one of the hardiest species. The charming snow-white flowers are followed by sweetish mucilaginous fruits, available for the table (Philippi). *C. giganteus* (Engelmann), from New Mexico, which attains the stupendous height of 50 feet, with a proportionate columnar thickness, yields also edible fruits, and lives unprotected in our clime. It has been introduced by the writer many years ago.

Citrus Aurantium, Linné,

In Central India a peculiar variety is under culture, producing two crops a year. The blossoms of February and March yield their ripe fruit in November and December, whereas from the flowers of July mature fruits are obtained in March and April. To prevent exhaustion only alternate fruiting is allowed.

Copernicia cerifera, Martius.

Brazil. This magnificent Fan-Palm, like so many others of this noble order, may prove hardy in our latitudes. The stem furnishes starch, the sap yields sugar, the fibres of the leaves are converted into ropes, which resist decay in water, and can also be used for mats, hats, baskets and brooms, and many other articles are prepared from the leaves. The inner part of the leafstalks serves as a substitute for cork. Mainly however this palm is valued for its Carnauba-wax. Each tree furnishes about 4lbs. annually. In 1862 no less than 2,500,000lbs. were imported into Great Britain, realizing about £100,000.

Cryptomeria Japonica, Don.

In the Azores preferred even to the *Pinus Haleppensis* for timber culture, on account of its still more rapid growth in that insular clime.

Cupressus macrocarpa, Hartw.

California, from Monterey to Noyo, in the granite as well as sandstone formation, sometimes in Sphagnum-moors. Attains a height of 50 feet. One of the best shelter-trees on sea-sands, naturally following the coast-line, never extending many miles from the shores, and occurring in localities where the temperature does not rise above 80° F., nor sinks below the freezing point (Bolander).

Cupressus Nutkænsis, Lamb.

The Yellow Cedar or Cypress of Alaska and the neighbouring states. Timber hard, durable, tough and close, also scented, worked with ease. Can be trimmed for hedge growth.

Cycas Normanbyana, F. v. Mueller.

Another noble Queensland species, deserving introduction, and capable of being shipped to long distances in an upgrown state without emballage.

Dammara Australis, Lamb.

The wood is straight-grained, and much in use for boats, superior furniture, casks, and particularly sought for decks of ships, lasting for the latter purpose twice as long as the deal of many other pines. It is also available for railway break-blocks and for carriages, and regarded as one of the most durable among timber of *coniferæ*.

Diposis Bulbocastanum, Candolle.

Chili. The tubers of this perennial herb are edible (Philippi).

Eucalyptus diversicolor, F. v. Mueller.

Furnishes good timber for ship and boat-planks, particularly for masts, likewise for wheels. Rich soil serves this and other rapid-growing species best, although they live in inferior soil.

Eucalyptus gomphocephala, Cand.

Attains a height of 120 feet, the clear trunk up to 50 feet long. All the Eucalypts are valuable for the production of tar, pitch, acetic acid, potash and various dye-substances.

Eucalyptus marginata, Smith.

Instances are on record of the stem having attained a girth of 60 feet at 6 feet from the ground through the formation of buttresses.

Eugenia myrtifolia, Sims.

East Australia. A handsome bush with palatable fruits.

Fagopyrum cymosum, Meissner.

This and some allied species are utilized for obtaining a blue dye; they also serve for spinach.

Fraxinus Chinensis, Roxburgh.

It is this Ash on which a peculiar wax is produced by *Coccus Pela*, perhaps also on some species of *Ligustrum*. About 40,000lbs. are exported annually according to Mr. Bernardini. *F. ornus* is well adapted for a promenade-tree, and is earlier in foliage than *F. excelsior*, *F. Americana* and most other Ashtrees.

Hibiscus cannabinus, Linné.

Stems up to 12 feet high, without ramification, if closely sown. Rich soil on the Nile has yielded over 3000lbs. of clear fibre in one harvest. The bearing strength is often found to be more than of the Sunn-fibre.

Lupinus arboreus, Sims.*

South America. This and another somewhat shrubby species, namely *L. albiflorus* (Bentham), of California, have been used there for the reclamation of sand, on account of their long tap roots, the latter having been traced to depths of 25 feet, while the stems were only 3 feet high. The germination is easy and the growth rapid on the sand-downs. For aiding the young Lupins for the first two months, to get hold of the sand, barley is sown with them, as the latter sprouts in a few days and holds the sand in the second week; the Lupin subsequently covers the sand with a dense vegetation in less than a year.

Maclura aurantiaca, Nuttall.

It resists severe frosts. The saplings furnish stakes for vines, which are very lasting. The wood serves well for bows, buggy-shafts, carriage-poles and similar articles. The root yields an excellent dye. *M. tinctoria* (D. Don), which furnishes the Fustic-wood of Central and South America, may prove hardy here.

Medicago lupulina, Linné.

The Black Medick. Europe, Asia and North America. An annual or biennial pasture herb, easily grown and not without nutritive importance. A variety of *M. sativa (M. media,* Pers.*)* deserves preference for sand tracts.

Melilotus cœrulea, Lamarck.

South Europe and North Africa. An annual very odorous fodder-herb. It forms an ingredient of the green Swiss cheese, which owes its flavor and color chiefly to this plant.

Morus alba, Linné.

The Muscardine-disease is produced by *Botrytis Bassiana,* while the still more terrible Pebrine-disease is caused by a minute vibrio-like organism. Countries like ours, happily free of these pests, can thus rear healthy silk-ova at a high premium for exportation.

Musa simiarum, Rumph.

(*M. corniculata,* Lour., *M. acuminata,* Coll.) From Malacca to the Sunda-Islands. About half-a-hundred marked varieties of this species, called mainly Peesangs in India, are under cultivation there, especially on the Archipelagus, while *M. sapientum* occurs wild more frequently on the mainland. Though the latter is principally cultivated on the Indian continent, yet it never equals in delicacy the cultivated forms of *M. simiarum,* the fruit of which sometimes attains a length of 2 feet (Kurz).

Myrtus acmenoides, F. v. Mueller.

Queensland. The fragrant leaves of this and of *M. fragrantissima* used for flavoring tea, according to Mr. P. O'Shanesy.

Panicum brizanthum, Hochstetter.

From Abyssinia to Nepal. A large-grained perennial Millet grass.

Panicum latissimum, Mikan.

Brazil. A highly ornamental grass. Leaves extremely broad but hard; panicle very rich.

Panicum turgidum, Forskael.

Egypt, where this millet yields a bread-grain. *P. brizanthum* (Hochst.) is a large-grained perennial millet from Abyssinia and Nepal.

Panicum virgatum, Linné.

North America, South Asia and North Australia. A tall perennial species, with a wide nutritious panicle.

Papophorum commune, F. v. Mueller.

Widely dispersed over the continent of Australia, also in some parts of Asia and Africa. Perennial; regarded as a very fattening pasture-grass, and available for arid localities.

Pinus contorta, Dougl.

(*P. Bolandri*, Parlatore.) Also abundant on the mountains of Colorado, and very eligible for clothing rocky hill-sides (Meehan). In California it forms dense thickets along the coast, and is in this respect as valuable as *P. Laricio*, *P. Pinaster* and *P. Haleppensis* in Europe.

Pinus Douglasii, Sabine.

Called also the Yellow Pine of Puget-Sound, where it yields the principal timber for export, and is therefore of great commercial value in the lumber-trade. The maximum height known is 400 feet, the greatest diameter of the stem 14 feet. The timber is fine and clear-grained, splendid for masts and spars, also for flooring, being for that purpose regarded as the best of California (Bolander). It is the strongest wood on the North Pacific coast, both in horizontal strain and perpendicular pressure. Sub-alpine localities here should be extensively planted with this famous tree. It requires deep and rich soil, but likes shelter; its growth at the rate of the Larch, and passes in various localities as Black and Red Spruce. *P. Lambertiana* yields also much of the flooring-wood in California.

Pinus edulis, Engelmann.

The Nut Pine of New Mexico. Thrives best on dry limestone soil. Greatest height 80 feet. *P. rigida* is content with the driest localities, nor is it readily susceptible to injury from fire.

Pinus flexilis, James.

The White Pine of the Rocky Mountains, from New Mexico to British Columbia, ascending to 12,000 feet. A valuable Fir for cold regions. It attains a height of 100 feet. Wood pale and compact. *P. radiata* can be utilized for obtaining tar and pitch. It bears exposure to the sea at the very edge of the coast.

Pinus Haleppensis, Mill.

Although ascending mountains in South Europe to the height of 4000 feet, it thrives best in loose coast-sands, where in ten years it will attain to 25 feet, and finally will become a larger tree than on firm lands. We find the Haleppo-fir one of our best avenue trees, as here first proved by the writer.

Pinus Strobus, Linné.

Particularly adapted for deep rich soil in mountain-valleys; known to reach a height of 270 feet, with a stem of 8 feet diameter. The wood is much sought among other purposes for flooring, oars, &c.

Platanus occidentalis, Linné.

Its wood is not readily attacked by insects. It has been successfully planted in morassy places, to cope with miasmatic effluvia.

Platanus orientalis, Linné.

It resists, in large towns such as London, the smoke better than any other tree, growing even under such disadvantage vigorously.

Platanus recemosa, Nutt.

A good promenade-tree, which, according to Professor Bolander, grows more rapidly and more compact than *P. occidentalis*.

Poa aquatica, Linné.

It produces a large bulk of foliage, and may be disseminated in swamps for fodder purposes.

Poa nemoralis, Linné.

According to Lawson no better grass exists for displacing weeds on pleasure-lawns; the same may be said of *Poa compressa*, L.

Pupulus monilifera, Aiton.

It is recommended to obtain for planting along streets or near dwellings only cuttings from male trees, as the minute downy seeds of the female trees are copiously wafted through the air, and have irritant effects on the respiratory organs.

Priva lævis, Jussieu.

Chili and the Argentine Republic. A perennial herb, the small tubers of which can be used for food (Philippi).

Quillaja saponaria, Molina.

Chili. A colossal tree. The bark is rich in Saponin, and thus valuable for dressing wool and silk.

Rheum officinale, Baillon.

Western China and Eastern Thibet on the high tableland. It furnishes the most of the true Turkey Rhubarb, not merely from the root, but also from the woody stem. Suited for our Alps.

Rubus geoides, Smith.

Falkland Islands, Fuegia, Patagonia and Chiloe. A herbaceous kind of raspberry-plant with greenish-yellow fruits, resembling the Cloudberry, and of a very agreeable taste. Best adapted for our Alps.

Rubus rosifolius, Smith.

Tropical and sub-tropical regions of Africa and Asia, also throughout the literal forests of East-Australia. This shrub bears in woody regions an abundance of fruits of large size, and these early and long in the season.

Rubus rugosus, Smith.

South-Asia. The fruit, which ripens here all the year round, is nearly twice the size of the ordinary blackberry.

Salix alba, Linné.

With other large Willows and Poplars one of the best scavengers for back yards, where drainage cannot readily be applied; highly valuable also for forming lines along narrow watercourses or valleys in forests, to stay bush-fires. The charcoal excellent for gunpowder. The wood in demand for matches.

Secale creticum, Linné.

Though probably only a variety of *S. cereale*, L., it deserves specially to be mentioned as furnishing a bread of peculiar taste.

Sequoia sempervirens, Endl.

Furnishes the red deal of California. Measurements up to 360 feet are on record. Its growth is about 32 feet in 16 years. Often found on metamorphic sandstone.

Sequoia Wellingtonia, Seemann.

Traditional accounts seem to have overrated the height of the Mammoth-tree. In the Calaveras grove two of the largest trees, which may have been the tallest of all, were destroyed; the two highest now existing there are respectively 325 and 319 feet high, with a circumference of 45 and 40 feet at 6 feet from the ground. At the Mariposa-grove the highest really measured trees are 272, 270 and 260 feet high, but one of these has the enormous circum-

ference of 67 feet at 6 feet from the ground, while another, the height of which is not recorded, is 93 feet in girth at the ground and 64 feet at 11 feet from it; the branches of this individual tree are as thick as the stems of large Elms. The height of the Calaveras grove is 4760 feet above sea level.

Sesbania cannabina, Persoon.

South Asia. An annual herb of easy growth in wet localities, requiring less attention in weeding and otherwise than the Jute-plant. The crop for fibre ripens in about 5 months.

Taxus baccata, Linné.

It should be kept out of the reach of pasture-animals, as leaves and berries are deadly poisonous.

Thea Chinensis, Sims. (*Camellia thiefora*, Griff.)

The very troublesome tea-bug of Asia is *Helopeltis theivora*. Fumigation and the application of birdlime are among the remedies to cope with this insect. The third volume of the *Agricultural and Horticultural Society of India* is mainly occupied by Lieut.-Colonel Edw. Money's and Mr. Watson's elaborate essays on the cultivation and manufacture of tea in India.

Thuya gigantea, Nuttall.

The Oregon White Cedar wood, susceptible of high polish. The diameter of the stem attains 10 feet or even more. The timber is light. Canoes carrying 4 tons have been obtained out of one stem. The bast can be converted into ropes and mats.

Thuya occidentalis, Linné.

Northern White Cedar. It prefers moist soil. Valuable for hedge-copses; it can also be trained into garden bowers.

Tripsacum dactyloides, Linné.

Serves for binding sand. The seeds are available for food.

Tropæolum sessilifolium, Pœppig.

Chili. Among the species of this genus one of the most eligible for its tubers, which can be consumed even in a raw state, and are larger than those of most other Tropæolums, while the stems are short and procumbent (Philippi).

Vaccinium præstans, Rudolphi.

Kamschatka. A minute plant, but with large delicious fruits. It might easily be disseminated on our Alps.

Vitis vinifera, Linné.

It might be worthy of trial, how far the grapevine can be grafted on such other species of the extensive genus *Vitis*, as may not be attacked by the destructive *Pemphygus* or *Phylloxera*.

Vitis vulpina, Linné.

Extends also to Japan, Manchuria and the Himalayas. The Cotowba-grape, according to Mr. Meehan, does not belong to this species, but descended from *V. Labrusca* or *V. æstivalis*. The Clinton and Elsinboro-grapes, according to this eminent American horticulturist, seem to have had their origin with *V. cordifolia* and *V. riparia*. *V. Labrusca* extends also to the Himalayas. Dr. Planchon's important memoir, *Les Vignes Americaines*, published in 1875, should be consulted in reference to American grapes.

Zizyphus Jujuba, Linné.

Occurs also in East Australia to sub-tropic latitudes, and likewise in various parts of Africa. It attains a height of 40 feet.

GEOGRAPHIC INDEX.

NORTHERN AND MIDDLE EUROPE.

Acer campestre, A. platanoides, A. Pseudo-platanus, Achillea atrata, A. Millefolium, A. moschata, A. nana, Aconitum Napellus, Acorus Calamus, Actæa spicata, Agaricus auricula, A. cæsareus, A. Cardarella, A. deliciosus, A. eryngii, A. esculentus, A. extinctorius, A. giganteus, A. Marzuolus, A. melleus, A. mouceron, A. odorus, A. oreades, A. socialis, A. splendens, Agrostis alba, A. rubra, Aira cæspitosa, Allium Schœnoprasum, A. Scorodoprasum, Alnus glutinosa, A. incana, Alopecurus pratensis, Althæa officinalis, Anemone Pulsatilla, Anthemis nobilis, A. tinctoria, Archangelica officinalis, Arctostaphylos uva-ursi, Arnica montana, Artemisia Absinthium, A. Mutellina, A. Pontica, Asparagus officinalis, Atropa Belladonna, Avena elatior, A. fatua, A. flavescens, A. pubescens, A. sativa, Beta vulgaris, Betula alba, Brassica alba, B. Napus, B. nigra, B. oleracea, B. Rapa, Calamintha officinalis, Camelina sativa, Carex arenaria, Carpinus Betulus, Carum Bulbocastanum, C. Carui, C. segetum, Chæromyces meandriformis, Chærophyllum bulbosum, C. sativum, Cichorium Intybus, Cochlearia Armoracia, C. officinalis, Colchicum autumnale, Conium maculatum, Corylus Avellana, Crambe maritima, Cratægus Oryacantha, Cynosurus cristatus, Cytisus scoparius, Dactylis glomerata, Daucus Carota, Digitalis purpurea, Dipsacus fullonum, Elymus arenarius, Fagus silvatica, Festuca arundinacea, F. drymeia, F. duriuscula, F. elatior, F. gigantea, F. heterophylla, F. loliacea, F. ovina, F. pratensis, F. rubra, F. silvatica, F. spadicea, Fragaria collina, F. vesca, Fraxinus excelsior, Gentiana lutea, Helleborus niger, Holcus lanatus, H. mollis, Hordeum secalinum, Humulus Lupulus, Hydnum album, H. auriscalpium, H. Caput-Medusæ, H. coralloides, H. diversidens, H. erinaceum, H. fulgineo-album H. graveolens, H. Hystrix, H. imbricatum, H. infundibulum, H. laevigatum, H. subsquamosum, H. violascens, Hyoscyamus niger, Ilex Aquifolium, Inula Helenium, Juniperus communis, Lactuca virosa, Laserpitium aquilegium, Lathyrus pratensis, L. sativus, Lavatera arborea, Leersia oryzoides, Lolium perenne, Lotus corniculatus, L. major, Marrubium vulgare, Matricaria Chamomilla, Medicago falcata, M. sativa, Melica ciliata, M. nutans, M. uniflora, Melilotus alba, M. officinalis, Mentha citrata, M. crispa, M. piperita, M. Pulegium, M. rotundifolia, M. silvestris, M. viridis, Menyanthes trifoliata, Milium effusum,

Morchella deliciosa, M. esculenta, M. Gigas, M. patula, Onobrychis sativa, Origanum vulgare, Peucedanum officinale, P. Ostruthium, P. sativum, Phleum alpinum, P. pratense, Physalis Alkekengi, Pimpinella Saxifraga, Pinus Abies, P. Cembra, P. Larix, P. montana, P. Picea, P. silvestris, Poa angustifolia, P. aquatica, P. distans, P. fluitans, P. maritima, P. nemoralis, P. pratensis, P. trivialis, Populus alba, P. canescens, P. dilatata, P. fastigiata, P. nigra, P. tremula, Prunus Mehaleb, P. spinosa, Psamma arenaria, P. Baltica, Pyrus Germanica, P. nivalis, Quercus Robur, Reseda Luteola, Rhamnus catharticus, Ribes Grossularia, R. nigrum, R. rubrum, Rosa Gallica, Rubia peregrina, Rubus cæsius, R. Chamaemorus, R. fruticosus, R. Idæus, Rumex Acetosa, R. scutatus, Ruscus aculeatus, Salix alba, S. caprea, S. daphnoides, S. fragilis, S. lanceolata, S. purpurea, S. rubra, S. triandra, S. viminalis, Sambucus nigra, Saponaria officinalis, Scorzonera Hispanica, Sison amomum, Smyrnium Olusatrum, Solanum Dulcamara, Tanacetum vulgare, Taraxacum officinale, Tilia Europæa, Tragopogon porrifolius, Trapa natans, Trifolium agrarium, T. fragiferum, T. hybridum, T. incarnatum, T. medium, T. pratense, T. repens, Triticum junceum, Tuber æstivum, T. albidum, T. cibarium, T. magnatum, T. melanosporum, Ulmus campestris, U. pedunculata, Vaccinium Myrtillus, V. Oxycoccus, V. uliginosum, V. Vitis-Idæa, Valeriana Celtica, Valerianella olitoria, Veratrum album, Vicia sativa, Viola odorata.

COUNTRIES AT OR NEAR THE MEDITERRANEAN SEA.

Acacia Arabica, A. Seyal, A. tortilis, A. Varek, Acer Creticum, Achillea fragrantissima, Ægilops ovata, Æsculus Hippocastanum, Agaricus cæsareus, Agrostis alba, Aira cæspitosa, Alkanna tinctoria, Allium Ascallonicum, A. Cepa, A. Neapolitanum, A. Porrum, A. roseum, A. Scorodoprasum, A. sativum, Aloe vulgaris, Alopecurus pratensis, Althæa officinalis, Amarantus Blitum, Anacyclus Pyrethrum, Andropogon Haleppensis, A. Schoenanthus, Anthemis nobilis, A. tinctoria, Anthoxanthum odoratum, Apium graveoleus, Argania Sideroxylon, Artemisia Absinthium, A. Pontica, Arundo Ampelodesmos, A. Donax, A. Pliniana, Asparagus acutifolius, A. aphyllus, A. horridus, A. officinalis, Astragalus Cephalonicus, A. Creticus, A. gummifer, A. Parnassi, A. strobiliferus, A. verus, Atropa Belladonna, Avena elatior, A. fatua, A. flavesceus, A. pubescens, A. sativa, Balsamodendron Ehrenbergii, B. Mukul, B. Opobalsamum, Beta vulgaris, Betula alba, Bongardia Rouwolfii, Borrago officinalis, Brassica alba, B. campestris, B. Cretica, B. juncea, B. Napus, B. nigra, B. oleracea, B. Rapa, Buxus Balearica, B. longifolia, B. sempervirens, Cajanus Indicus, Calamintha Nepeta, C. officinalis, Callitris quadrivalvis, Camelina sativa, Cannabis sativa, Capparis spinosa, Carpinus Betulus, Carthamus tinctorius, Carum Bulbocastanum, C. Carui, C. ferulifolium, C. Petroselinum, C. segetum, Cassia acutifolia, C. angustifolia, C. obovata, Castanea

communis, Nelumbo nucifera, Nicotiana Persica, Ocimum Basilicum, O. sanctum, O. suave, Olea Europæa, Onobrychis sativa, Origanum Dictamnus, O. hirtum, O. Majorana, O. Mara, O. normale, O. Onites, O. virens, O. vulgare, Ornithopus sativus, Ostrya carpinifolia, Oxytenanthera Abyssinica, Paliurus Spina-Christi, Panicum brizanthemum, P. Crus-Galli, P. glabrum, P. maximum, P. prostratum, P. repens, P. sanguinale, P. spectabile, P. turgidum, Papaver somniferum, Pennisetum thyphoideum, Persea Teneriffæ, Peucedanum cachrydifolium, P. officinale, Phalaris brachystachys, P. Canariensis, P. minor, P. truncata, Phaseolus coccineus, Phleum alpium, P. pratense, Phœnix dactylifera, Physalis Alkekengi, P. angulata, Pimpinella Anisum, P. magna, P. nigra, P. Saxifraga, P. Sisarum, Pinus Abies, P. Canariensis, P. Cedrus, P. Cembra, P. Cilicica, P. Haleppensis, P. Laricio, P. Larix, P. montana, P. orientalis, P. Pinaster, P. Pinea, P. Pinsapo, P. Pyrenaica, Pistacia Atlantica, P. Lentiscus, P. Terebinthus, P. vera, Peucedanum sativum, Platanus orientalis, Poa Abyssinica, P. angustifolia, P. aquatica, P. cynosuroides, P. distans, P. fluitans, P. maritima, P. nemoralis, P. trivialis, Populus alba, P. canescens, P. dilatata, P. fastigiata, P. nigra, P. tremula, Prosopis Stephaniana, Prunus Amygdalus, P. Armenica, P. avium, P. Cerasus, P. domestica, P. Lauro-Cerasus, P. Mahaleb, P. Padus, P. Persica, P. spinosa, Psamma arenaria, Punica granatum, Pyrus communis, P. Cydonia, P. malus, P. nivalis, P. salicifolia, Quercus Ægilops, Q. Cerris, Q. coccifera, Q. Ilex, Q. infectoria, Q. Robur, Q. Suber, Q. Toza, Reseda luteola, R. odorata, Rhamnus amygdalinus, R. catharticus, R. Græcus, R. infectorius, R. oleoides, R. prunifolius, R. saxatilis, Rhaponticum acaule, Rheum Rhaponticum, Rhus Coriaria, R. Cotinus, Ribes Grossularia, R. nigrum, R. rubrum, Ricinus communis, Rosa centifolia, R. Damascena, R. Gallica, R. moschata, R. sempervirens, Rosmarinus officinalis, Rubia peregrina, R. tinctorum, Rubus fruticosus, R. Idæus, Rumex Acetosa, R. scutatus, Ruscus aculeatus, Ruta graveolens, R. silvestris, Sagittaria sagittifolia, Salix alba, S. Babylonica, S. daphnoides, S. purpurea, S. rubra, S. viminalis, Salvia officinalis, Sambucus nigra, Santolina cyparissias, Saponaria officinalis, Satureja Græca, S. hortensis, S. Juliana, S. montana, S. Thymbra, Saussurea Lappa, Scandix grandiflora, Scorzonera Astrachanica, S. crocifolia, S. deliciosa, S. Hispanica, S. lanata, S. ramosa, S. Scowitzii, S. semicana, S. tuberosa, S. undulata, Secale cereale, Sison amomum, Smilax aspera, Smyrnium Olusatrum, Solanum Æthiopicum, S. Dulcamara, S. edule, S. xanthocarpum, Spartium junceum, Spinacia tetrandra, Stenotaphrum Americanum, Stipa arenaria, S. tenacissima, Styrax officinalis, Symphytum asperrimum, S. officinale, Tamarindus Indica, Tamarix articulata, T. Gallica, T. Germanica, Tanacetum vulgare, Taraxacum officinale, Taxus baccata, Terfezia Leonis, Teucrium Chamædrys, T. Creticum, T. Marum, T. Polium, T. Scordium, Thapsia edulis, Theligonum cynocrambe, Thouarea sarmentosa, Thymelæa tinctoria, Thymus æstivus, T. capitatus

T. hiemalis, T. Mastichina, T. Serpillum, T. vulgaris, Tilia argentea, T. Europæa, Tinguarra Sicula, Tragopogon porrifolius, Trapa natans, Trifolium agrarium, T. Alexandrinum, T. fragiferum, T. hybridum, T. incarnatum, T. medium, T. pratense, T. Quartinianum, T. repens, T. subrotundum, Trigonella Fœnum-Græcum, Triticum junceum, T. vulgare, Tuber æstivum, T. albidum, T. cibarium, T. magnatum, Ulmus campestris, U. pedunculata, Urginia Scilla, Vaccinium Myrtillus, V. Oxycoccus, V. uliginosum, V. Vitis-Idæa, Valeriana officinalis, Valerianella olitoria, Veratrum album, Vicia Ervilia, V. Faba, V. sativa, Viola odorata, Vitis Schimperiana, V. vinifera, Zelkova crenata, Z. Cretica, Zizyphus Lotus, Z. Spina-Christi, Z. vulgaris.

MIDDLE AND TEMPERATE EASTERN ASIA.

Acer palmatum, A. pictum, Ailantus glandulosa, Albizzia Julibrissin, Allium fistulosum, Aralia cordata, Arenga saccharifera (under Zalacca), Aristolochia recurvilabra, Artemisia Cina, A. Dracunculus, Arundinaria Japonica (under Schizostachyum), Atriplex hortensis, Avena elatior, A. fatua, A. flavescens, A. pubescens, Balsamodendron Mukul, Bambusa Beechyana, B. flexuosa, B. tultoides (under Schizostachyum), Basella rubra, Betula alba, Bœhmeria nivea, Brassica alba, B. Chinensis, B. juncea, B. nigra, Broussonetia papyrifera, Buxus microphylla, Cæsalpinia sepiaria, Cannabis sativa, Caragana arborescens, Carpinus cordata, C. erosa, C. Japonica, C. laxiflora, Carum Bulbocastanum, C. Carui, Cephalotaxus Fortunei, Chamærops excelsa, C. Fortunei, Cinnamomum Camphora, Citrus Japonica, Corchorus capsularis, Cordyline Ti, Corylus hetrophylla, Cryptomeria Japonica, Cucumis Conomon, Cupressus obtusa, C. pisifera, Cycas revoluta, Daucus Carota, Debregeasia edulis, Dendrocalamus strictus (under Schizostachyum), Dioscorea Japonica, D. oppositifolia, D. quinqueloba, D. sativa, Diospyros Kaki, D. Lotus, Ehrharta caudata, Elaeagnus parvifolius, Eleusine Coracana, Excœcaria sebifera, Euryale ferox, Eurangium Sumbul, Fagopyrum cymosum, F. emarginatum, F. esculentum, F. Tataricum, Fagus Sieboldii, Flueggea Japonica, Fraxinus Chinensis, Ginkgo biloba, Gleditschia horrida, Glycine hispida, G. Soya, Heleocharis tuberosa, Hovenia dulcis, Illicium anisatum, Isatis indigotica, I. tinctoria, Jasminum grandiflorum, J. officinale, J. Sambac, Juglans cordiformis, J. Mandschurica, J. Sieboldiana, J. stenocarpa, Juniperus Chinensis, J. sphærica, Lespedeza striata, Ligustrum Japonicum, Livistona Chinensis, Magnolia Yulan, Morus alba, Musa Cavendishii, Myrtus tomentosa, Nageia cupressina, Nephelium Litchi, N. Longanum, Pachyma Hœlen, Paliurus ramosissimus, Panax papyrifer, Pennisetum cereale, Perilla arguta, Phœnix pusilla, Phyllostachys bambusoides, P. nigra (under Schizostachyum), Physalis Alkekengi, P. angulata, Pinus Alcocquiana, P. Fortunei, P. Kæmpferi, P. Koraiensis, P. leptolepis, P. Massoniana, P. parviflora, P. Sibirica, P. Tsuga, Planera Japonica, Polygaster Sam-

padarius, Polygonum tinctorium, Populus nigra, P. tremula, Prangos pabularia, Pterocarpus Indicus, Pterocarya fraxinifolia, P. stenoptera, Pyrus Japonica, Quercus cornea, Q. glabra, Q. Mongolica, Q. serrata, Rhamnus chlorophorus, R. utilis, Rhapis flabelliformis, R. humilis, Rheum officinale, R. palmatum, R. Rhaponticum, R. Tataricum, R. undulatum, Rhus semialata, R. succedanea, R. vernicifera, Rosa Indica, R. lævigata, R. moschata, R. sempervirens, Rubia cordifolia, Rumex Acetosa, Saccharum officinarum, S. Sinense, Sagittaria sagittifolia, Salix Babylonica, Sciadopitys verticillata, Scorzonera albicaulis, Selinum Monnieri, Sophora Japonica, Spinacia oleracea, Tetragonia expansa, Tetranthera Japonica, Thea Chinensis, Tilia Europæa, T. Manchurica, Thuyopsis dolabrata, Torreya grandis, T. nucifera, Trapa bicornis, T. bispinosa, Trifolium pratense, Triphasia Aurantiola, Ulmus campestris, U. parvifolia, Vaccinium præstans, Veratrum album, Vigna Sinensis, Vitis Labrusca, V. vulpina, Zizania latifolia, Zizyphus Jujuba, Z. Sinensis.

SOUTHERN ASIA.

Acacia Arabica, A. Catechu, A. concinna, A. Farnesiana, A. latronum, A. Sundra, Acer lævigatum, Acer sterculiaceum, A. villosum, Aconitum ferox, Aegiceras majus, Aeschynomene aspera, Albizzia Lebbeck, Aloe Socotrina, Aloexylon Agallochum, Andropogon Calamus, A. cernuus, A citratus, A. Ivarancusa, A. Martini, A. muricatus, A. Nardus, A. pertusus, A. saccharatus, A. Schoenanthus, A. Sorghum, Anthistiria ciliata, Aponogeton crispus, Aquilaria Agallocha, Areca Nagensis, A. triandra (under Zalacca), Aristolochia Indica, Arundinaria falcata, A. callosa, A. debilis, A. Hookeriana, A. Khasiana, A. suberecta (under Schizostachyum), Averrhoa Bilimbi, A. Carambola, Avicennia officinalis, Azima tetracantha, Bambusa arundinacea, B. attenuata, B. elegantissima, B. monadelpha, B. spinosa, B. stricta, B. verticillata, B. vulgaris, Bambusa Balcooa, B. Blumeana, B. Brandisii, B. marginata, B. nutans, B. pallida, B. polymorpha, B. regia, B. Tulda (under Schizostachyum), Basella lucida, B. rubra, Beesha Rheedei, B. stridula, B. Travancorica, (under Schizostachyum), Benincasa cerifera, Bentinckia Coddapanna, (under Zalacca), Berberis aristata, B. Asiatica, B. lycium, Boehmeria nivea, Borassus flabelliformis, Brassica juncea, Butea frondosa, Buxus Wallichiana, Cæsalpinia Sappan, C. sepiaria, Cajanus Indicus, Calamus montanus, Calamus acanthospathus, C. erectus, C. extensus, C. Flagellum, C. floribundus, C. leptospadix, C. macrospathus, C. Mishmelensis, C. quinquenervius, C. Royleanus, C. schizospathus, C. tenuis (under Zalacca), Capparis aphylla, C. horrida, C. Roxburghi, C. sepiaria, Carex Moorcroftiana, Carissa Carandas, Carpinus viminea, Carthamus tinctorius, Carum Ajowan, C. gracile, C. nigrum, Caryota obtusa (under Zalacca), Caryota urens, Cassia fistula, Castaneopsis argentea, Cephalostachyum capitatum, C. pallidum, C. pergracile (under Schizostachyum),

Emodi, Pogostemon Heyneanus, P. parviflorus, P. Patchouli, Polygala crotalaroides, Polygaster Sampadarius, Prosopis spicifera, Pscudostachyum polymorphum (under Schizostachyum), Ptcrocarpus Indicus, P. Marsupium, P. santalinus, Ptychosperma gracilis (under Zalacca), Pyrularia edulis, Quercus annulata, Q. incana, Q. lancifolia, Q. semecarpifolia, Q. squamata, Q. Sundaica, Raphanus caudatus, R. sativus, Rheum Australe, R. officinale, Rhododendron Falconeri, Rhus vernicifera, Ribes glaciale, R. Griffithii, R. laciniatum, R. villosum, Ricinus communis, Rosa Indica, R. moschata, R. sempervirens, Rubia cordifolia, Rubus rugosus, Saccharum officinarum, S. spontaneum, S. violaceum, Santalum album, Schizostachyum Blumei, Scutia Indica, Sesamum Indicum, Sesbania aculeata, S. cannabina, Solanum album, S. ferox, S. insanum, S. longum, S. Melongena, S. pseudo-saponaceum, S. undulatum, S. xanthocarpum, Spinifex squarrosus, Stenotaphrum Americanum, Streblus asper, Tamarindus Indica, Tamarix articulata, T. Gallica, Tectonia grandis, Teinostachyum attenuatum, T. Griffithii (under Schizostachyum), Terminalia Catappa, T. parviflora, Tetranthera calophylla, T. laurifolia, Thamnocalamus Falconeri, T. spathiflorus (under Schizostachyum), Thea Chinensis, Thouarea sarmentosa, Trapa bispinosa, T. Cochinchinensis, T. incisa, T. quadrispinosa, Triphasia Aurantiola, Vaccinium Leschenaulti, Vigna Sinensis, Villebrunea frutescens, V. integrifolia, Vitis auriculata, V. Blumeana, V. elongata, V. imperialis, V. Indica, V. Labrusca, V. lævigata, V. mutabilis, V. quadrangularis, V. thyrsiflora, V. vulpina, Wallichia caryotoides, W. oblongifolia, W. obtusifolia, Ximenia Americana, Zalacca secunda, Zingiber officinale, Zizyphus Jujuba, Z. rugosa.

WESTERN SOUTH AMERICA.

Acacia Cavenia, Adenostemum nitidum, Adesmia balsamica, Alstroemeria pallida, Andropogon argenteus, Anona Cherimolia, Apium prostratum, Arachis hypogæa, Araucaria imbricata, Aristotelia Macqui, Arracacha xanthorrhiza, Berberis buxifolia, B. Darwinii, Cæsalpinia brevifolia, C. tinctoria, Canna edulis, Ceroxylon andicola, Cereus Quisco, Ceroxylon Australe, C. pithyrophyllum (under Wettinia), Cervantesia tomentosa, Chenopodium Quinoa, Chusquea Culcon, C. Dombeyana, C. montana, C. Quila, C. tenuiflora (under Schizostachyum), Cinchona Calisaya, C. micrantha, C. nitida, C. officinalis, C. succirubra, Dactylis cæspitosa, Dioscorea piperifolia, Diplothemium Porallys (under Wettinia), Diposis Bulbocastanum, Drimys Winteri, Elymus condensatus, Embothrium coccineum, E. emarginatum, E. lanceolatum, Erythroxylon Coca, Eucryphia cordifolia, Eugenia Hallii, Euterpe andicola, E. Hænkena, E. longivaginata (under Wettinia), Fagus Dombeyi, F. obliqua, F. procera, Festuca coiron, Fitzroya Patagonica, Fragaria Chiloensis, Geonoma densa (under Wettinia), Gossypium religiosum, Guadua augustifolia, G. latifolia, Guevina Avellana, Gun-

nera Chilensis, Helianthus annuus, H. tuberosus, Heliotropium Peruvianum, Hibiscus esculentus, Hypochoeris apargioides, H. Scorzoncræ, Ipomœa Batatas, Jubæa spectabilis, Lapageria rosea, Lardizabala biternata, Laurelia aromatica, L. serrata, Libocedrus Chilensis, L. tetragona, Lippia citriodora, Manihot Aipi, Maranta arundinacea, Maytenus Boaria, Melicocca bijuga, Morus celtidifolia, M. insignis, Myrtus Luma, M. Meli, M. nummularia, M. Ugni, Nageia andina, N. Chilina, N. nubigena, Opuntia vulgaris, Oreodoxa frigida (under Wettinia), Oryza latifolia, Oxalis crassicaulis, O. crenata, O. enneaphylla, O. succulenta, O. tuberosa, Pacchyrrhizus angulatus, Panicum pilosum, Passiflora alata, P. ligularis, Persea gratissima, Peumus Boldus, Physalis Peruviana, Phytelephas æquatorialis (under Wettinia), Prosopis horrida, P. juliflora, P. Siliquastrum, Priva lævis, Quillaja saponaria, Rhus caustica, Rubus geoides, Salix Humboldtiana, Saxono-Gothæa conspicua, Smilax officinalis, Solanum Gilo, S. Lycopersicum, S. muricatum, S. Quitoense, S. tuberosum, S. torvum, Sophora tetraptera, Spilanthes oleracea, Tagetes glanduligera, Tetragonia expansa, Tropæolum majus, T. minus, T. sessilifolium, T. tuberosum, Ullucus tuberosus, Vaccinium alatum, V. bicolor, V. grandiflorum, V. melliflorum, Wettinia augusta, W. Maynensis, Witheringia solanacea, Zea Mays, Zizyphus Ioazeiro.

WESTERN NORTH AMERICA.

Acer macrophyllum, Arbutus Menziesii, Baccharis consanguinea, B. pilularis, Castaneopsis chrysophylla, Ceanothus prostratus, C. rigidus, C. thyrsiflorus, Cercocarpus ledifolius, C. parvifolius, Chlorogalum pomeridianum, Cupressus Lawsoniana, C. macrocarpa, C. Nutkaensis, Cymopterus glomeratus, Fraxinus Oregana, Juglans rupestris, Juniperus occidentalis, Libocedrus decurrens, Myrrhis occidentalis, Nicotiana multivalvis, Parkinsonia aculeata, P. microphylla, Pinus amabilis, P. contorta, P. Coulteri, P. Douglasii, P. grandis, P. Jeffreyi, P. Lambertiana, P. Menziesii, P. Mertensiana, P. monophylla, P. monticola, P. muricata, P. nobilis, P. Pattoniana, P. ponderosa, P. radiata, P. Sabiniana, Platanus racemosa, Populus tremuloides, P. trichocarpa, Prosopis pubescens, Prunus ilicifolia, Quercus densiflora, Q. Douglasi, Q. lobata, Ribes aureum, R. divaricatum, R. niveum, R. tenuiflorum, R. villosum, Rubus macropetalus, Scilla esculenta, Sequoia sempervirens, S. Wellingtonia, Solanum Fendleri, S. tuberosum, Tetranthera Californica, Torreya Californica, Vaccinium humifusum, Valeriana edulis.

EASTERN NORTH AMERICA.

Acer dasycarpum, A. Negundo, A. rubrum, A. saccharinum, Achillea Millefolium, Achras Sapota, Acorus Calamus, Actæa alba, Agave Ameri-

nanthemum incanum, P. montanum, Pyrularia edulis, Pyrus coronaria, Quercus acutifolia, Q. alba, Q. aquatica, Q. chrysophylla, Q. coccinea, Q. falcata, Q. glaucescens, Q. lanceolata, Q. laurina, Q. lyrata, Q. macrocarpa, Q. obtusata, Q. obtusiloba, Q. palustris, Q. Phellos, Q. Prinus, Q. reticulata, Q. rubra, Q. Sideroxylon, Q. virens, Q. Xalapensis, Rhus copallina, R. glabra, R. typhina, Ribes aureum, R. Floridum, R. hirtellum, R. Hudsonianum, R. nigrum, R. rotundifolium, R. rubrum, Robina Pseudo-acacia, Rosa setigera, Rubus Arcticus, R. Canadensis, R. Chamæmorus, R. cuneifolius, R. deliciosus, R. occidentalis, R. odoratus, R. strigosus, R. trivialis, R. villosus, Rumex Acetosa, Sabal Adansoni, S. Palmetto, S. serrulata, Sagittaria lancifolia, S. obtusa, Salix cordata, S. longifolia, S. lucida, S. nigra, S. petiolaris, S. tristis, Sassafras officinale, Schoenocaulon officinale, Shepherdia argentea, Smilax medica, S. rotundifolia, Solanum calycinum, S. Fendleri, S. tuberosum, Spartina cynosuroides, S. juncea, S. polystachya, Spigelia Marylandica, Stenotaphrum Americanum, Tanacetum vulgare, Taraxacum officiniale, Taxodium distichum, T. macronatum, Taxus brevifolia, Thuya gigantea, T. occidentalis, Tilia Americana, Tilia heterophylla, Torreya taxifolia, Trifolium repens, Tripsacum dactyloides, Ulmus alata, U. Americana, U. crassifolia, U. fulva, U. Mexicana, U. racemosa, Uvularia sessilifolia, Vaccinium cæspitosum, V. corymbosum, V. erythrocarpum, V. leucanthum, V. macrocarpum, V. myrtilloides, V. Myrtillus, V. ovalifolium, V. Oxycoccus, V. parvifolium, V. Pensylvanicum, V. uliginosum, V. vacillans, V. Vitis-Idæa, Valeriana edulis, Veratrum viride, Vitis aestivalis, V. Labrusca, V. vulpina, Xanthorrhiza apiifolia, Ximenia Americana, Yucca æoifolia, Y. filamentosa, Y. gloriosa, Zizania aquatica, Z. miliacea.

CENTRAL AMERICA.

Achras Sapota, Agave Americana, Anona muricata, A. squamosa, Arracacha xanthorrhiza, Arthrostylidium excelsum, A. longiflorum, A. racemiferum (under Schizostachyum), Arundinaria acuminata, Aulonemia Quexo (under Schizostachyum), Bactris Gasipaes, Brahea dulcis, Buxus acuminata, B. citrifolia, B. Cubana, B. glomerata, B. gonoclada, B. laevigata, B. Purdieana, B. retusa, B. subcolumellaris, B. Vahlii, B. Wrightii, Canna coccinea, C glauca, Carludovica palmata (under Wettinia), Ceroxylon andicola, C. Klopstockia (under Wettinia), Chusquea abietifolia, C. Fendleri, C. Galeottiana, C. scandens, C. simpliciflora, C. uniflora (under Schizostachyum), Copernicia nana, C. Pumos, Cyperus giganteus, Dioscorea Cayennensis, D. esurientum, D. trifida, Eupatorium triplinerve, Fourcroya Cubensis, F. gigantea, F. longæva, Geonema undata, Gossypium Barbadense, G. hirsutum, G. religiosum, Hibiscus esculentus, Indigofera Anil, Ipomœa Batatilla, Juniperus Bermudiana, Kunthia montana, Maranta arundinacea, Melicocca bijuga,

Morus celtidifolia, Nageia Purdieana, Opuntia coccinellifera, O. Dillenii, O. elatior, O. Hernandezii, O. spinosissima, O. tuna, Pacchyrrhizus angulatus, Passiflora laurifolia, P. ligularis, P. maliformis, P. serrata, Pcireskia aculeata, Persea gratissima, Platenia Chiragua (under Wettinia), Pithecolobium dulce, Psidium acidum, P. Araca, P. cordatum, P. Guayava, P. polycarpum, Sechium edule, Smilax officinalis, S. papyracea, Solanum Plumieri, S. Topiro, S. torvum, Swietenia Mahagoni, Thrinax argentea, T. parviflora, Trophis Americana, Vaccinium meridionale, V. Mortinia, Zizania miliacea.

EASTERN SOUTH AMERICA.

Acrocomia Totai (under Wettinia), Amyris terebinthifolia, Apium prostratum, Araucaria Brasiliensis, Arundinaria verticillata (under Schizostachyum), Arundo saccharoides, A. Sellowiana, Bromus unioloides, Cæsalpinia coriaria, C. Gilliesii, Calyptranthes aromatica, Canna Achiras, Capsicum annuum, C. baccatum, C. frutescens, C. longum, Cephælis Ipecacuanha, Chenopodium ambrosioides, Chusquea capituliflora, C. Gaudichaudiana (under Schizostachyum), Cocos Australis, C. Romanzoffiana, C. Zatai (under Wettinia), Copernicia cerifera, Cyperus giganteus, Dactylis caespitosa, Desmodium triflorum, Dioscorea conferta, D. tuberosa, Diplothemium litorale (under Wettinia), Eugenia Nhanica, E. pyriformis, E. supra-axillaris, Guadua latifolia, Guadua augustifolia, G. capitata, G. macrostachya, G. paniculata, G. refracta, G. Tagoara, G. virgata, Hymenæa Courbaril, Ilex Paraguensis, Indigofera Anil, Ipomœa Batatas, I. Batatilla, I. operculata, I. paniculata, Iriartea deltoidea, I. exorrhiza, I. ventricosa (under Wettinia), Lippia citriodora, Lupinus arboreus, Manihot Aipi, M. utilissima, Marliera glomerata, M. tomentosa, Merostachys Claussenii, M. Kunthii, M. ternata (under Schizostachyum), Myrtus edulis, Nageia Lamberti, Nicotiana rustica, N. Tabacum, Ocimum gratissimum, Œnocarpus multicaulis (under Wettinia), Opuntia vulgaris, Oryza latifolia, Oxalis carnosa, O. conorrhiza, Pacchyrrhizus angulatus, Panicum barbinode, P. latissimum, P. pilosum, Parkinsonia aculeata, Passiflora alata, P. coccinea, P. cœrulea, P. edulis, P. filamentosa, P. laurifolia, P. maliformis, P. quadrangularis, P. serrata, P. suberosa, Peireskia aculeata, P. Bleo, P. portulacifolia, Periandra dulcis, Persea gratissima, Phaseolus adenanthus, P. lunatus, Phytelephas macrocarpa, P. microcarpa (under Wettinia), Prosopis dulcis, P. Siliquastrum, Psidium Araca, P. arboreum, P. Cattleyanum, P. chrysophyllum, P. cinereum, P. cuneatum, P. grandifolium, P. Guayava, P. incanescens, P. lineatifolium, P. malifolium, P. polycarpon, P. rufum, Salix Humboldtiana, Smilax papyracea, Solanum Gilo, S. indigoferum, S. Lycopersicum, S. torvum, S. tuberosum, Spilanthes oleracea, Syagrus Sancona, Tagetes glanduligera, Trithrynax Brasiliana (under Wettinia), Trophis Americana, Ullucus tuberosus, Zea Mays, Zizania microstachya.

MIDDLE AFRICA (AND MADAGASCAR).

Beesha capitata, Buddleya Madagascariensis, Buxus Madagascarica, Hyphæne Thebaica, Phœnix spinosa, Pterolobium lacerans, Rubus rosifolius, Solanum edule, S. Thonningi, Telfairia occidentalis, T. pedata, Vigna Sinensis, Vitis Sohimperiana.

SOUTHERN AFRICA.

Aberia Caffra, A. tristis, A. Zeyheri, Acacia Giraffæ, A. horrida, Aloe dichotoma, A. ferox, A. linguiformis, A. plicatilis, A. purpurascens, A. spicata, A. Zeyheri, Andropogon Caffrorum, Anthistiria ciliata, Aponogeton distachyon, Arundinaria tesselata, Asparagus laricinus, Azima tetracantha, Barosma serratifolia, Cannamois cephalotes, Carissa Arduina, C. ferox, C. grandiflora, Carum Capense, Combretum butyraceum, Elegia nuda, Euclea myrtina, E. undulata, Eugenia Zeyheri, Garuleum bipinnatum, Gladiolus edulis, Gonioma Kamassi, Grumilea cymosa, Hibiscus Ludwigii, Hyphæne ventricosa, Leucadendron argenteum, Leyssera gnaphalioides, Lyperia crocea, Matricaria glabrata, Melianthus major, Mesembryanthemum acinaciforme, M. edule, Monetia barlerioides, Myrica cordifolia, M. quercifolia, M. serrata, Nageia elongata, N. Thunbergia, Osmitopsis asteriscoides, Pappea Capensis, Parkinsonia Africana, Pentzia virgata, Phœnix reclinata, Plectronia ciliata, P. spinosa, P. ventosa, Rafnia amplexicaulis, R. perfoliata, Rhus lucida, Royenia Pseudebenus, R. pubescens, Rubus fruticosus, Salix Capensis, Selinum anesorrhizum, S. montanum, Tarchonanthus camphoratus, Voandzeia subterranea, Widdringtonia juniperoides.

WESTERN AUSTRALIA.

Acacia acuminata, A. lophantha, A. saligna, Boronia megastigma, Casuarina Decaisneana, C. Fraseriana, C. Huegeliana, C. trichodon, Dioscorea hastifolia, Encephalartos Preissii, Eucalyptus calophylla, E. cornuta, E. diversicolor, E. Doratoxylon, E. ficifolia, E. gomphocephala, E. marginata, Frenela Actinostrobus, Helichrysum lucidum, H. Manglesii, Lepidosperma gladiatum, Oryza sativa, Phaseolus vulgaris, Pimelea clavata, Santalum cygnorum, S. Preissianum, Spinifex hirsutus, S. longifolius, Strychnos Nux-Vomica, Tamarindus Indica.

EASTERN AUSTRALIA (INCLUDING TASMANIA).

Acacia decurrens, A. falcata, A. farnesiana, A. fascifulifera, A. glaucescens, A. harpophylla, A. homalophylla, A. Melanoxylon, A. pendula, A. pycnantha, A. salicina, Aegiceras majus, Aira cæspitosa, Alstonia constricta, Andropogon pertusus, Angophora intermedia, Anthistiria avenacea, A. ciliata, Apium prostratum, Aponogeton crispus, Araucaria Bidwilli, A. Cunninghami, Aristolochia Indica, Atalantia glauca, Atriplex halimoides, A. holocarpum, A. nummularium, Backhousia

citriodora, Bologhia lucida, Brachychiton acerifolium, Carissa Brownii, Casuarina glauca, C. quadrivalvis, C. suberosa, C. torulosa, Cedrela Taona, Chenopodium auricomum, Citrus Australasica, C. Planchoni, Colocasia Indica, Corchorus Cunninghami, C. olitorius, Crotolaria juncea, C. retusa, Cudrania Javanensis, Cycas angulata, C. Normanbyana, Cynodon Dactylon, Cyperus textilis, Dammara robusta, Danthonia nervosa, D. pectinata, D. triticoides, Dioscorea sativa, D. transversa, Ehrharta stipoides, Embothrium Wickhami, Encephalartos Denisonii, E. spiralis, Eucalyptus acmenoides, E. alpina, E. amygdalina, E. botryoides, E. brachypoda, E. citriodora, E. coccifera, E. coriacea, E. crebra, E. drepanophylla, E. eugenioides, E. globulus, E. goniocalyx, E. Gunnii, E. hemiphloia, E. leptophleba, E. leucoxylon, E. maculata, E. melanophloia, E. melliodora, E. miniata, E. obliqua, E. paniculata, E. phœnicea, E. pilularis, E. platyphylla, E. resinifera, E. robusta, E. rostrata, E. siderophloia, E. sideroxylon, E. tereticornis, E. tesselaris, E. trachyphloia, E. urnigera, E. vernicosa, E. viminalis, Eucryphia Billardieri, E. Moorei, Eugenia myrtifolia, Fagus Cunninghami, F. Moorei, Festuca distichophylla, F. dives, F. Hookeriana, Ficus colossea, F. columnaris, F. Cunninghami, F. macrophylla, F. rubiginosa, Flindersia Bennettiana, F. Oxleyana, Frenela Macleayana, F. verrucosa, Geitonoplesium cymosum, Grevillea robusta, Harpullia Hillii, Heleocharis spacelata, Helichrysum lucidum, Hibiscus cannabinus, Hierochloa redolens, Ipomœa paniculata, Jasminum calcareum, J. didymum, J. lineare, J. racemosum, J. simplicifolium, J. suavissimum, Kentia Belmoreana, K. Canterburyana, K. Mooreana, Lepidosperma gladiatum, Leptospermum laevigatum, Lycopodium clavatum, L. densum, L. laterale, L. varium, Maba fasciculosa, M. geminata, Macadamia ternifolia, Mallotus Philippinensis, Marlea Vitiensis, Melia Azedarach, Mentha Australis, M. gracilis, M. laxiflora, M. saturejoides, Mesembryanthemum æquilaterale, Microseris Forsteri, Mylitta Australis, Myoporum insulare, Myrtus acmenoides, Nageia elata, Niemeyera prunifera, Ocimum sanctum, Oryza sativa, Pandanus Forsteri, P. pedunculatus, Panicum decompositum, P. Italicum, P. miliaceum, P. prostratum, P. repens, P. sanguinale, P. virgatum, Pappophorum commune, Paspalum distichum, Phaseolus adenanthus, P. Mungo, Phyllocladus rhomboidalis, Pimelea stricta, Pipturus propinquus, Pisonia aculeata, Pittosporum undulatum, Poa Australis, P. Brownii, Ptychosperma Alexandræ, P. Cunninghami, P. elegans, Rubus Gunnianus, R. parvifolius, R. rosifolius, Santalum Preissianum, Sebæa albidiflora, S. ovata, Selaginella uliginosa, Sesbania aculeata, Smilax Australis, S. glycyphylla, Solanum vescum, Spinifex hirsutus, Spondias pleiogyna, Stenocarpus sinuosus, Synoon glandulosum, Tacca pinnatifida, Tetragonia expansa, T. implexicoma, Tetranthera laurifolia, Trigonella suavissima, Tristania conferta, Ulmus parvifolia, Vigna lanceolata, Vitis acetosa, V. Baudiniana, V. hypoglauca, Ximenia Americana, Zizyphus Jujuba.

NEW ZEALAND.

Apium prostratum, Cordyline Banksii, C. Forsteri, C. indivisa, Corynocarpus lævigata, Dacrydium cupressinum, Dammara Australis, Danthonia Cunninghami, Ehrharta Diplax, E. stipoides, Fuchsia excorticata, Fagus fusca, F. Menziesii, F. Solandri, Hierochloa redolens, Kentia sapida, Libocedrus Doniana, Metrosideros florida, M. lucida, M. robusta, M. tomentosa, Myoporum lætum, Nageia dacrydioides, N. ferruginea, N. spicata, N. Totara, Phormium tenax, Phyllocladus trichomanoides, Pittosporum eugenioides, P. tenuifolium, Ripogonum scandens, Sebæa ovata, Tetragonia expansa, T. implexicoma.

POLYNESIA.

Ægiceras majus, Araucaria Cookii, A. excelsa, Aristolochia Indica, Broussonetia papyrifera, Colocasia antiquorum, C. Indica, Cordyline Baueri, Cyrtosperma edulis, Dammara macrophylla, D. Moorei, D. obtusa, D. ovata, D. Vitiensis, Dioscorea aculeata, D. alata, D. nummularia, D. pentaphylla, D. sativa, Gossypium Taitense, G. tomentosum, Ipomœa paniculata, Kentia Baueri, Musa Troglodytarum, Ocimum gratissimum, Pipturus propinquus, Pringlea antiscorbutica, Saccharum officinarum, Santalum Freycinetianum, S. Yasi, Solanum Uporo, Spondias dulcis, Stilbocarpa polaris, Tacca pinnatifida, Tetragonia expansa.

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