PROCEEDINGS

OF THE

Royal Society of Queensland

With which is Incorporated

THE PHILOSOPHICAL SOCIETY OF QUEENSLAND.

FOUNDED 1859.

1889-90.

VOLUME VII, PARTS I and II.

EDITED AND PUBLISHED UNDER DIRECTION OF THE COUNCIL

BY

THE HONORARY SECRETARY.

The Authors of Papers are alone responsible for the opinions expressed therein.

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NOTES ON THE RESINS OF TWO QUEENSLAND SPECIES OF ARAUCARIA.

By J. H. MAIDEN, F.L.S., F.C.S., &c.

(Curator of the Technological Museum, Sydney).

[*Read before the Royal Society of Queensland, August 16th, 1889*].

ARAUCARIA CUNNINGHAMII (*Ait.*)

B. Fl. vi., 243.

N. O. Coniferæ. Found in Queensland and northern New South Wales. "Moreton Bay Pine," "Hoop Pine," "Colonial Pine."

Araucarias produce a resin when wounded which, in some physical characteristics, is similar to that produced by *Pinus* and allied genera.

"The resin which exudes from this tree is very remarkable, as it is transparent and nearly colourless, and that portion of it which adheres to the trees, hangs from them in pendants which are sometimes three feet long and six to twelve inches broad." (*Hill*). This species, in fact, appears to yield it most abundantly of all the genus, the resin flowing from every slight wound of the stem. The Norfolk Island pine (*A. excelsa*), also yields resin on wounding, but not so abundantly.

The sample before me is very like gum thus, or common frankincense, the produce of various species of *Pinus*, except that it is paler in colour. It is of the colour and lustre of pale amber. The pieces externally are quite hard and very brittle, but internally they are still in a viscid condition, and possess the pleasing odour of canada balsam, with perhaps a dash of creasote thrown in. In the mouth it has a slight aromatic flavour, readily softens, first feels sticky like dough, and then like paraffin. Cold water simply whitens the resin. Hot water seems scarcely to effect any change in it, although the liquid becomes slightly cloudy. In rectified spirit the greater part quickly dissolves, forming a pale yellow or almost colourless liquid. The residue is white and granular. Petroleum spirit extracts 52·7 per cent., consisting of a yellowish resin, a little volatile oil (turpentine), and a little wax. The residue was then treated with alcohol, which extracted 27·3 per cent. of a yellowish resin. The residue was then acted upon with water, which extracted 15·6 per cent. (arabin, 10·3 %, saline matters, 5·3 %). The remainder consisted of metarabic acid (1 %), and accidental impurity (3·2 %).

SUMMARY.

Soluble in petroleum spirit	.. ..	52·7
,, ,, alcohol	.. ..	27·3
,, ,, water	arabin..	10·3
	salts	5·3
Metarabic acid	.. ..	1·0
Accidental impurity..	.. .. ..	3·2
		99·8

As showing that this resin is somewhat variable in composition, a further sample was digested in alcohol direct, which dissolved 80·5 per cent. The residue consisted of white opaque particles, which were digested in water, which dissolved 9·7 per cent. (proved to be arabin, 8·3 per cent., and salts, 1·4 per cent.); while the remainder (9·8 per cent.) was soluble in petroleum spirit, with the exception of a little accidental impurity and metarabic acid, and proved to be a white waxy substance, which was not further examined.

SUMMARY.

Resin soluble in alcohol	.. .. ..	80·5
Waxy substance soluble in petroleum spirit		9·0
Metarabic acid	.. ..	0·8
Soluble in water	arabin	8·3
	salts	1·4
		100·0

The percentage of arabin is exceedingly high—sufficient, perhaps, to constitute this a gum-resin; but as I was not aware of a gum-resin being recorded for the coniferæ, I digested a fresh sample of the resin in cold water, with the result that I obtained 10·5 per cent. of arabin, a residue of a creamy white colour being left.

The only previous instance I can find of arabin being found in a coniferous resin, is by Dulk (Morel, *Pharm. Journ.* [3] ix., 714), who finds 0·1 per cent. in White Dammar (*Dammara orientalis*, Lamb.)

A. Cunninghamii resin melts at 97·2 degrees C. It contains sugar, but neither this substance nor the ash was determined.

ARAUCARIA BIDWILLI (*Hook.*)

B. Fl. vi., 243.

"Bunya-Bunya" of the aboriginals. Found in Queensland.

THIS specimen is as different from that produced by *A. Cunninghamii* as possible. It is not easily described. It is rather brighter in colour than low-grade resin of *Xanthorrhœa arborea**; otherwise, they are very similar in appearance. Except in redness of colour it is much like some samples of inferior gum benzoic I have seen. It has a creasote-like odour.

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* This particular resin and that of *X. arborea* are so much alike that the non-critical observer would scarcely fail to confound them. The following points serve to distinguish them:—

1. The comparatively high solubility of the *Araucaria* in petroleum spirit.
2. The large amount of accidental impurity in the *Araucaria*.
3. Examination of the residue left after treatment of the resins, first with petroleum spirit and then with alcohol. The *Araucaria* residue contains numbers of little scales, which are from the male amenta. The *Xanthorrhœa* residue contains fragments of the bases of its own leaves.
4. The absence of benzoic acid in *Araucaria*.

Its prevailing colour is purple-brown ; and lustre, dull resinous. When powdered it is of a bright red, something between Venetian and Indian red, forming a very pleasing colour. It is amygdaloidal, the amygdaloids being small, and consisting of the scales referred to in the foot-note. It is quite brittle, powdering readily. It stains the fingers, and is gritty to the teeth, like brick-dust, and colours the saliva red. It is similar to some poor sample of dragon's blood, except in the amygdaloid appearance.

This specimen is evidently an abnormal one, and therefore I have some doubts as to what value an analysis of it may be. According to the *Paris Exh. Cat.*, 1878, resin of this species is "clear and transparent," and probably it and the resin of *A. Cunninghamii*, collected under similar circumstances, are very much alike. My resin is very impure, and it may be that long exposure to rain and sun may have darkened the colour. I received this specimen from the Director of the Botanic Garden, Sydney, and there is no doubt as to its origin, apart from the evidence furnished by examination of its insoluble residue.

On digestion in pretroleum spirit for a few days there is removed 9·3 per cent. of a transparent substance, which would be taken for a resin but for the fact that scratching with a hard substance reduces it to a bright-looking flaky powder, and that alcohol, added to it, produces a white opaque powder which appears to possess more of the characteristics of a resin. It is insoluble both in aqueous and alcoholic potash. At present I am uncertain as to the precise nature of this substance.

Addition of alcohol to the residue from petroleum spirit dissolves 61·3 per cent. of a resin of superb ruby colour. This is a most handsome resin, and should be further enquired into, both from a scientific point of view, and also to investigate its usefulness for tinctorial or other economic purposes.

The residue was then acted upon by water, with the result that 3·8 per cent. of a yellow substance, consisting of colouring matter (?) and salts, was extracted. It contains no arabin.

The residue (26·0 per cent.) is of a chocolate colour, consists of woody fibre and other vegetable débris, such as cone-scales, &c., and does not contain any gummy matter.

SUMMARY.

Soluble in petroleum spirit (? resin acid)..	9·3
Resin soluble in alcohol (rect. spirit) ..	61·3
Soluble in water	3·8
Accidental impurity..	26·0
	100·4

A second sample was treated with alcohol direct, which extracted 72·9 per cent. of a bright coloured resin in no way differing (apparently) from that already described as having been extracted by alcohol.

The residue was then acted upon by petroleum spirit, which extracted 5·3 per cent. of the resinoid substance above referred to. It contained 22·6 per cent. of accidental impurity.

SUMMARY.

Soluble in alcohol direct	72·9
,, ,, petroleum spirit	5·3
Accidental impurity, &c.	22·6
	100·8

(The effect of water was not ascertained).

Cold water has apparently no effect on the resin. On boiling with water for some time it partly melts and clings to the sides of the beaker, the remainder breaks down and settles at the bottom. The liquor becomes turbid, of a yellowish-brown colour, and possesses a very slight odour.

For the chemistry of the resin of *Araucaria brasiliensis* (**A.** Rich.), and products therefrom, see Peckholt, *N. Br. Arch.*, cxxii., 225 ; Gmelin, xviii., 19 ; Watts' Dict., VI., 190.

DISTILLATION OF NATIVE ESSENTIAL OILS FROM A COMMERCIAL ASPECT.

By THOS. L. BANCROFT, M.B.

[*Read before the Royal Society of Queensland, August 16th, 1889*].

I THINK the following information is worth recording, as showing most certainly that the distillation of essential oils in Queensland could not be profitably undertaken.

I was led to investigate this subject by the encouraging accounts upon native essential oils given in the writings of Baron von Mueller, Messrs. Staiger, Schimmel & Co., and F. M. Bailey, all of whom would encourage the commercial distillation of these oils. It was, of course, apparent to anyone that some excellent oils could be prepared from a few native plants, and in quantity from several. This had been proved by Messrs. Gregory, Staiger, and others. The Hon. A. C. Gregory has been enabled, through the Government, to procure quantities of the leaves of many oil-bearing plants, regardless of expense, which in most cases was enormous. The leaves of five plants, the oils of which were highly spoken of—namely, *Eucalyptus Staigeriana*, *E. dealbata*, *E. Baileyana*, *E. citriodora*, and *Backhousia citriodora*—could not be procured in Brisbane for a sum less than the value of the oil contained.

For instance, *Eucalyptus Staigeriana* leaves from Maytown cost £30 a ton, and those of *Eucalyptus Baileyana* from Cooper's Plains, £10.

To pay the manufacturer he would have to make his oils to sell wholesale at 1s. 3d. to 1s. 6d. per lb. in Brisbane, or at the very outside 2s. 6d. in London.

Now, in a ton of leaves there is at the utmost but 20 lbs. of oil, which say is worth 30s. It would therefore be necessary to gather a ton of leaves, cart them to the still, distil and bottle the oil, pack and place f.o.b. for 30s., and this cannot be done at the present rate of wages.

I found that a man could gather from 3 to 5 cwt. of branches of leaves in a day. To save time the leaves are pressed into sacks, the mouths of which are then sewn up to facilitate carriage. A well filled sack weighs generally 45 lbs., but occasionally one will weigh as much as 56 lbs.—this depends upon the juiciness of the leaf. It is best to throw the filled sacks into the still instead of emptying out the leaves, as this is a most tedious thing to do; moreover, after being steamed, the sacks can be more readily handled than loose leaves.

The still I used was made of galvanised iron of the capacity of 1,000 gallons of water or half a ton of green leaves. Taking the maximum amount a man can gather daily at 5 cwt., yielding 5 lbs. of oil at 1s. 6d., equal to 7s. 6d.; against this you have 5s. wages, 5s. cartage, 2s. 6d. distilling, and 1s. other expenses, equal to 13s. 6d.

I found that only three plants growing about Brisbane—namely, *Eucalyptus hæmastoma*, *Malaleuca linariifolia*, and *M. leucadendron* gave anything like 20 lbs. of oil to the ton. I was unable to get the exact yield as the head of the still was not absolutely steam-tight.

The only commercial use that has been suggested for these oils is as perfume for soaps, and for this purpose they must compete in price with such oil as verbena grass.

The oil of *Eucalyptus globulus* is now obtained as a by product, and I am told can be sold in California to leave a profit, at less than 1s. per lb. I sent samples of these oils to Messrs. Cleaver and Co., large soap manufacturers in England. They tried them in the proportion of 1 lb. of oil to the cwt. of soap; the soap was perfectly scented after being made, but in two or three weeks it was impossible to say that any oil had been used. They say that for scenting soaps these oils are useless.

NOTES ON A REMARKABLE LICHEN GROWTH IN CONNECTION WITH A NEW SPECIES OF STICTA; WITH DESCRIPTIONS OF BOTH.

By Rev. F. R. M. WILSON, Kew, Victoria.

[*Read before the Royal Society of Queensland, August 16th, 1889*].

In April, 1886, I found in a fern-tree gully, on Mount Macedon, Victoria, a Sticta, which I sent to Dr. Charles Knight, of New Zealand, and which he pronounced a new species. He named it *Sticta stipitata.*

In the same gully, and at the same time, I found a few specimens of a remarkable plant, somewhat like a minute lead-coloured ostrich feather. Microscopical examination revealed, under the upper cortex, a stratum of gominic granules; which put it beyond doubt that the plant was a lichen. But to what tribe of lichen it belonged I could not decide.

Among the specimens collected were found one or two which were tipped by a minute broad green frond, having in its under surface white urceolate cyphellæ, and containing true yellowish-green gonidia. In fact, it seemed to be a minute Sticta, with some resemblance to the plant *Sticta stipitata.* But the presence of a Sticta or anything like a Sticta on the apex of so diverse a plant was a puzzle which I put aside till I should get more materials for examination.

In February, 1887, I found in another fern-tree gully on the same mountain a few more specimens of these lead-coloured plumules, and among them some which were tipped by larger fronds, bearing a still closer resemblance to a Sticta and to the species *stipitata.* The idea then grew stronger that this strange plume-like plant might be the juvenile form of *Sticta stipitata.*

It reminded me somewhat of the difference between the first and subsequent leaves (phyllodes) of certain acacias. I have been informed also that ferns in their infantile state simulate the liver-worts. But I knew of no parallel case among lichens. Still I could not account for the phenomena observed on any other hypothesis.

In November, 1887, being again on Mount Macedon, I explored the gullies for further specimens, and any doubts I had were set at rest by finding on a fallen and decaying tree numerous specimens of *Sticta stipitata* in all states of transformation :—Simple lead-coloured plumules, plumules tipped with small fronds, plumules with fronds as large as themselves, still larger fronds with remains of the plumules at their base, fronds without the plumules, but with their tomentose stipes more or less enlarged, and, lastly, fully developed and fruited plants with much thickened but well marked tomentose stipes.

In June, 1889, being on Mount Macedon, I resolved to examine the matter from a different point of view : I searched for juvenile forms of *Sticta stipitata*, and I found that in every case the very early stage of the plant was plumose.

I conclude that the plumule is a juvenile state of *Sticta stipitata*. I acknowledge that I have not found, either from my own observation or from reading or from correspondence, any case like this. The only analogies I can think of among lichens are the *cephalodia* which are found upon some lichens, and the *hypothallus* upon which many lichens grow.

Of the cephalodia which are found on some species of *Stictei*, Nylander says : "Cephalodia in thallo interdum observantur peculiaria (systemate gominico e granulis gominis formato), aut (1) sparsa glomerulos leptogiodeos referentia, aut (2) semel (in Sticta dichotomoide) *marginialia* simpliciora, aut demum (3) in pagina infera sit a faciei pyrenodeæ" (Syn., p. 333). The plumules in question have their gonimic system formed, like these cephalodia, of granula gonima, although the adult plants have true gonidia. But there is this important difference, that cephalodia are growths upon and out of the adult plant, while in the case of the plumules the more mature plant grows upon and out of them.

In this latter respect they seem to serve much the same purpose as the hypothallus of some plants. I refer again to Nylander: "La couche hypothalline est la plus inférieure du thalle. celle sur laquelle se stratifient les autres, mais ille n'est pas toujours visible et manque dans beaucoup d'espéces. Elle precède dans la genèse des lichens la formation des autres couches thallines, mais son développement s'arrête souvent de bonne heure, et elle est alors peu distincte ou disparaît entièrement. Son tissu est filamenteux ou cellulare, et sa couleur est le plus souvent foncèe ou noirâtre, d'autres fois pâle, mais rarement blanche," (Syn., p. 11). The plumule is probably a homologue of the hypothallus; but, while the tissue of the hypothallus is either filamentose or cellular, the plumule has also a gominic stratum and a cellular cortex besides.

In short, this is a new form of lichen growth, so far as my observation or reading serves me. If any lichenologist has observed any growth of the same or analogous nature, I should be glad to compare notes and exchange specimens, in order that the matter may be thoroughly investigated.

Descriptions of Sticta Stipitata and its Juvenile Form.

Sticta stipitata, C.K., spec. nov. Thallus glauceous pallid (when moist a bright green), here and there rufescent, moderate in size (2-3 inches high, and attaining sometimes 4 inches in breadth), thin, somewhat rigid, scarcely shining, obsoletely scrobiculate laciniato—lobate, lacineæ sub-pinnatifid, margins sinuate and undulate, sinuses largish and round, apices often broadly dilated and crenate, sometimes, deeply divided or even laciniatule; under surface pale fulvous, tomentose, tomentum short, sordid, denser towards the base, which often ends in a stout woody tomentose stipe, cyphellæ thelotremoid.

Apothecia fusco-rufous small (1-3·5 m. m. broad) scattered, margins thalline, entire, often at length obliterated. Spores colourless, fusiform, 5 septate, 035 x 007 m. m.

Habitat on trunks of trees and fern trees and on logs, in thickets on Mount Macedon, Victoria. It has not yet been discovered elsewhere. The plants generally grow closely crowded together and imbricated, often covering many feet of tree or log with subascending fronds.

Allied to *Sticta variabilis*, the juvenile state of this lichen is fruticulose ramose, the branches spreading out in one plane secundo-incurved, the stem and lower side of the branches terete fulvous, tomentose, the upper side plane, smooth, plumbeous, the higher branches slightly dilated, the last divisions extremely minute. Its height is about one inch, and the diameter of the stem about one millimeter. The plumbeous colour is owing to the presence of numerous bluish-green granula gomina disposed in a moniliform manner immediately under the upper cortex.

REMARKS ON THE TEMPERATURE OF THE EARTH AS EXHIBITED IN MINES.

WITH SPECIAL REFERENCE TO OBSERVATIONS IN SOME OF THE DEEPEST MINES ON THE GYMPIE GOLD FIELD.

By WILLIAM FRYAR, Inspector of Mines, Queensland.

[*Read before the Royal Society of Queensland, March 21st, 1889*].

The present and prospective importance of the mining industry of the colony is my excuse for troubling you with remarks which have an important bearing on its prosperity and permanency, and although the absolutely new data which can now be presented is only very meagre, the facts and deductions therefrom may be stated in order that attention may be drawn to the subject.

The question of subterranean temperature has been touched on by a few scientific gentlemen, but has scarcely had that attention at the hands of persons actually and daily engaged in underground operations which it deserves. It has, however, been attempted to be shewn on various occasions that the natural heat of the earth increases as descent is made into the strata or rocks constituting its crust; and that this increment of temperature is at the rate of 1 deg. Fahrenheit to from 40 to 60 feet of descent, and that therefore the limit at which men can work is quite within measurable distance, as indeed it would be in our tropical mining fields if this theory held good, for with a mean annual temperature of 67 degs. at Brisbane, and probably 10 degs. more on our Northern gold fields, a very short depth below that to which we have now attained would reach an atmosphere intolerable to be borne by human beings as at present constituted.

In the observations which have been made on this matter, the British mining engineer or manager takes a prominent place, although he is not alone in drawing attention to it. Information on such subjects is, however, generally made available to the English reader in whatever language it may have been originally written.

In the history of the coal trade by Matthias Dunn, published in 1844, it it stated that "the temperature of coal mines is now pretty well known to be in proportion to their depth. A single instance from my minutes of January, 1820, will shew the effect in different situations of Jarrow Colliery: Temperature at surface, 46 degs.; temperature at bottom of shaft, 146 fathoms deep, 61 degs." The other observations do not affect the present question; the mean ratio here is nearly 10 fathoms of depth to 1 deg. of temperature. The observation is made at the surface, however, in winter; whereas in summer the surface temperature would have been higher than that taken at the bottom of the shaft without the temperature at that point being materially altered, as the air would have become of the normal temperature of the strata through which it had passed. This observation therefore proves nothing, but it illustrates the principle which appears to affect all the observations which have been taken, which is, that whilst in nearly all cases there is an increment of heat in a lower over that of a higher level, that increment is almost, if not altogether, due to local and exceptional circumstances, and not to any general principle of internal heat, uniformly or otherwise affecting the crust of the earth in proportion to the depth from the surface or from any other point, whether a plane of invariable temperature, the surface of the ocean or the neighbouring plain of earth.

Mr. W. J. Hemwood, F.R.S., F.G.S., &c., &c., gives the result of forty-five observations in the principal mining districts of Cornwall and Devon. Mean depths, 112 fathoms; mean temperature, 66·88; ratios, 6·8 fathoms, or about 40 feet descent for each degree of temperature. Now the mean between this and the ratio of increment given by Dunn, which is also given by Wardle in his "Reference Book on Practical Coal Mining," will give 50 feet for each degree; and Hopton in his "Conversations on Mines," gives 50 feet to 1 degree in the first 100 fathoms, 70 feet in the second, and 85 feet in the third. This diminishing ratio of increment certainly not strengthening the internal heat theory.

But if a similar increase of temperature takes place in our mines, even with a decreasing ratio of increment, we will have at the depth of 3,000 feet a permanent addition of 40 degs. to the normal heat at the plane of invariable temperature, or the annual mean average temperature at the surface; which, taken at *68 degs., will give 108 degs. as the coolest possible state of the mine at that depth. But there are many additional sources of heat—adventitious or extraneous to the natural source—such as the pressure and friction brought about by the partial working away of the natural supports of the superincumbent rocks producing chemical decomposition, particularly in coal mines where the strata are much more pliable than those of other more crystalline formations, and these therefore subject the stratum of coal, where partial excavation has taken place, to severe pressure. There is also the heat produced by the men, the horses, the lamps or candles; and the heat generated by the decomposition of pyrites and other refuse of the mine. So that, according to this theory, it will be quite impossible to work our mines to anything approaching the depths mentioned.

There are, however, examples both of coal and metalliferous mines being worked on the continent of Europe to much greater depths than that mentioned, but they have the advantage of a lower average annual mean temperature than we have here.

I have taken the examples above as representing the two great divisions of the mining industry. But even in these there are circumstances other than the internal heat theory which account for the increase of temperature. In the coal mines it may be due to the various extraneous sources mentioned above, and which, although likely to be somewhat of a general

* Gympie is more than a degree north of Brisbane. Hence, 1 degree higher temperature is assumed for it; and all our other mining fields are in warmer latitudes.

character, so far as coal mining is concerned, do not to any great extent affect our more important division of that industry. In the other case it is extremely probable that effective ventilation would have had a very beneficial influence in modifying, if not entirely obviating, the great increase above the normal temperature, as the district in question had not acquired much reputation for progress in that direction at the time at which the "observations" were taken. The observations I have been privileged to take at Gympie, with my remarks thereon, will show that there is reason to believe that the above theory does not apply on that field at any rate. And they afford evidence that so far as our present depths are concerned—that is, at or under 1,500 feet—there need be no material increment of temperature above that of the normal temperature of the invariable plane, and which would at the worst be much lower than the temperature at the surface in summer.

The observations taken at Gympie have not been taken in holes drilled into the rock, nor in the water issuing from the rock, as has been customary when the information has been sought for philosophical reasoning rather than for practical purposes, but have been taken in the air of the mine where it has full play, and is such as men would ordinarily breathe at the depths mentioned. The temperature of the water issuing from the rocks must be a very uncertain means of estimating the temperature of the mine for practical purposes, as the source of supply may be far distant and the depth of some portion of its course far below the level at which its temperature is taken; and when water in a tepid state issues it cannot at once raise the temperature of a mine to its own heat, but must itself proportionally lose a portion of heat.

The first set of observations at Gympie was taken on 14th and 15th December, 1888, when our semi-tropical heat is nearing its maximum. But the four hottest hours (11 to 3) were avoided, and the surface temperature taken in the shadiest place at the surface of the mine. The temperature had been high during the preceding week, 102 degs. to 106 degs. on the verandahs of the houses near. The Inglewood mine is not connected with any other but is centred to the bottom—that is, a wooden partition divides the shaft into two equal compartments three feet square each, and a very slight imperceptible amount of ventilation was produced. The shaft is 1,200 feet in depth. The temperature at the surface at 10h. 30m. a.m. was 90 degs., whilst that at the bottom was 78 degs. Thus showing an average decrease of temperature of 1 degree to each 100 feet. This being so diverse from the commonly received theory caused other observations to be made, which appear to indicate that that theory is not universally applicable ; and, on looking up other records, it is evident that local causes in most cases sufficiently account for the increment of temperature which has been observed.

At the Golden Crown shaft on same day (14th December), at 3h. 15m. p.m., the temperature in the shadiest of places at the surface was 96 degs. ; at 240 feet down the shaft it was 78 degs. ; at 420 it was also 78 degs. ; at 1,090 it was 80 degs. ; and at 1,200 also 80 degs. The 290 feet level communicates with another shaft, but none of the other places have any such communication ; the shaft is centred, men were at work at the bottom—*i.e.*, at 1,200 feet, opening out, leaving a well-hole of 30 feet, no ventilating apparatus of any kind is in use, and therefore the bottom of the shaft would be hotter than its normal condition ; yet it was 16 degs. below the temperature of the coolest place to be found at the surface where abundant shade is found, and only 2 degs. hotter than the 240 feet level nearly 1,000 feet above, where the advantage of through communication with another shaft was obtained.

On 15th December, at the Great Monkland, the weather had materially altered from that of the previous day, a little rain had fallen, and a slight mist hung in a cloudy atmosphere ; again the shadiest place was taken, and the hour was 8 a.m., temperature 80 degs. ; went direct to the 1400 feet opening and found it 76 degs., the shaft was centered, but no artificial means of producing a current was used ; the centering was carried 5 feet below this opening. At 1450 feet, the depth to which the shaft had then reached, two men were at work ; the centering was 45 feet above, and the place kept continually warm by three shifts, of two men each, working, whose chief duty is boring and blasting, and the temperature was here found to be 79 degs., somewhat cooler than the coolest place on the surface at 8 o'clock in the morning of a dull day. At 650 feet in a recess in the shaft the temperature was 71 degs.; and at 240 feet, where communication is opened with another shaft, and to which a strong current of air was passing through, the temperature was 66 degs., that at the surface having risen by this time (10 a.m.) to 86 degs.; so that the effect of this 240 feet of rock on a good current of air passing was to cool it by at least 20 degs., but the difference between it and the exposed air at the surface would be from 40 degs. to 50 degs.

Observations were made on the same day at the No. 3 and 4 North Glanmire Company's mine, which is not a deep mine. The temperature at the surface was 86 degs. at 11 a.m., that at 160 feet down, 75 deg., in a recess in the shaft, and at the bottom (339 feet), where communication is made with an adjoining mine, it was also 75 degs. No perceptible current of air was travelling.

It will be observed that, notwithstanding the taking of the temperature at the coolest part of the day and in the shadiest place to be found on the surface, in all cases that of the shaft at whatever depth tried, was lower—generally much lower—than the temperature at the surface. But by far the coolest place was where a good current of air was passing through to another mine, shewing, I think, that at lower levels a similar cause would produce a like effect.

The next series of observations was taken on 27th and 28th March, and on 2nd April, 1889. The temperature on the surface was in all cases taken in the most shaded place obtainable near the mine. The weather was dull and cold for the time of the year. In some cases rain was falling, and had fallen during the previous night. At the Golden Crown the first observations were taken, date 27th March; time, 3h. 30m. p.m.; thermometer, 77 degs. At the 240 feet level, 76 degs., no current passing except that in the shaft, which was imperceptible. At the 830 feet level, 77 degs.; no men were at work at either of these levels. At the 930 feet level two men were working, 150 feet in from the shaft, three shifts are kept on, and no artificial ventilation provided; the temperature would therefore be much above the normal condition, it was 78 degs, ; and at 1200 feet two men were at work 150 feet in from the shaft (three shifts are kept at work); the thermometer here stood at 80 degs. It may reasonably be assumed that a current of air strong enough to carry off the heating effects of the workmen and their lights would cause a great decrease of heat at these greater depths.

At the Great Monkland, 9 h. 45 m. a.m., 28th March, rain had fallen, the air was moist, sun clouded, weather dull, thermometer 74 degs. in the shade. Two men were working in the bottom, the centering being 35 feet above them, three shifts are kept at work, consequently, with no artificial ventilation, the temperature would be abnormally high. At the 240 feet level a strong current was passing through to another outlet, and the thermometer indicated 64 degs.; this is 2 degs. less than on the previous occasion, as were those in the Golden Crown shaft, except that in the bottom, which was the same. At 650 and 900 feet, thermometer 72 degs.; at 1400 feet it indicated 75 degs.; and at 1490 feet, 78 degs. Here again the avoidable causes of heat more than accounting for the trifling increase in the bottom of the shaft over that at the surface, although that was 30 degs. less than the shade temperature in our hottest days of summer, and at least 50 degs. below the temperature of our summer's sun, under which many out-door workers pursue their avocations.

At the Inglewood Mine at noon of same day, the thermometer stood at 71 degs., the weather having become inordinately cold; 71 degs. in the shade at noon being most unusual in March. Showers were falling occasionally. At 350 feet and 620 feet down the shaft the thermometer showed 72 degs., and at 1,200 feet, 75 degs. Two men were working in a cross-cut from the shaft, 370 feet distant. The shaft was centered to the bottom but no division in the cross-cut; the temperature at the face was 92 degs., so that the bottom of the shaft would be affected by this heat, which with a fair current of air would be dissipated rapidly, leaving the normal temperature as low as in any portion of the shaft.

On 2nd April, when the weather had assumed a somewhat normal condition, the temperature, at 1 p.m., in the shade being 82 degs. at the surface of the Smithfield United Mine; that at 400 feet was found to be 74 degs.; at 600 feet, 76 degs.; at 800 feet, 79 degs.; at 1,150 feet, 81 degs.; and at 1,270, the bottom of the shaft, where the men were working, 82 degs. The 400 feet level is opened into another mine, but no perceptible current of air was passing. No communication is opened below this level. Three shifts of three men each are at work; the shaft bottom is somewhat wet; the rock drill is worked by compressed air, and the exhaust affords ventilation, but the compression produces heat; hence the high temperature at the bottom and its gradual diminution towards the surface.

It will be seen that at the surface of the Golden Crown shaft the temperature in March was 19 degs. less than in December, but that at the bottom (1,200 feet) it was the same. At the Inglewood the surface change was the same (19 degs.), while the temperature at the bottom was 3 degs. lower than on the former occasion. The temperature of the bottom of the Great Monkland shaft was 1 degree lower than in the December observation. No opportunity for observation presented itself at the United Smithfield in December, so that no comparison can be made.

The third series of observations was taken on the 18th June, when our coldest time is close at hand. At 8 a.m. at the surface of the Smithfield United, the thermometer indicated 49 degs.; at 400 feet, 74 degs.; at 600 feet, 80 degs.; at 800 feet, 81 degs.; at 1,150 feet, 82 degs.; and at 1,340 feet, 87 degs. At the 400 feet level which is holed into another mine, the temperature was exactly the same as on a previous occasion at which observations were taken, although that at the surface was 33 degs. lower; at the other levels or recesses in the shaft (for that is what they are) the temperature was slightly higher, and in the bottom it was 5 degrees higher, doubtless owing to the fact that the centering was 40 feet from the bottom, and that the rock drill was not being worked, nor was there any means of forcing ventilation in use. The weather on this occasion was dry, cold, seasonable weather; and at 12 noon on returning to the surface the thermometer indicated 66 degs.

At the Inglewood shaft at 1 p.m., thermometer 66 degs.; at 300 feet, 70 degs.; at 600 feet, 70 degs.; at 1,200 feet, 70 degs. A slight ventilation had been kept up during the dinner-hour, from 12 to 1, and no men had been working, hence the equality of temperature in the whole length of the shaft. Two men had been working in a cross-cut 400 feet in from the shaft in which the temperature was now 84 degs., which would soon affect the temperature of the shaft on the men resuming work. The temperature of the surface was 66 degs. on our return at 2 h. 30 m. p.m.

At 3h. p.m. at the Golden Crown shaft, therm. 68 degs.; at 240 feet, 68 degs.; at 420 feet, 74 degs.; at 830 feet, 76 degs.; at 930 feet, 73 degs; and at 1200 feet, 75 degs. The temperature was somewhat higher at the surface here than anticipated—probably tempered somewhat by a large quantity of steam being blown off from the crushing plant and winding engine boilers. At the 930 feet level, charges had been recently fired, and the smoke ascended by a winze to the 830 feet level, so causing the abnormal heat at that point in the shaft. The centering is carried to the bottom, but there are no winzes or other holings below that between 830 and 930 feet. The 240 feet level is holed into another shaft, and the temperature was there down to that at the surface, 68 degs.; on ascending to the surface at 5h. p.m., the thermometer stood at 66 degs. This is the winter series of observations, and the weather was excessively cold and clear. The observations were all taken on one day, and consequently at all the usual working hours; but this is probably not of so much consequence in the winter as it might be during the summer months.

The Great Monkland had ceased working and I was therefore unable to get any observations in that, the deepest mine on the field or in the colony, which has been stopped for the present at a depth of 1500 feet.

The above-mentioned mines were again visited on 30th September, but, it is to be regretted, access to the deeper levels could not be obtained. The Great Monkland had not resumed work, the Inglewood had ceased work, the Smithfield United had unfortunately been flooded, and the deep workings at the Golden Crown were suspended touching some rearrangement of work.

At the last named mine the tempt. at the surface was 70 degs. at 8 a.m. At the 240 feet level where the mine is holed into another mine, temperature 70 degs. at the 420 feet level, two men working 580 feet in the level, temperature at shaft 74 degs. The therm. at the face showing a temperature of 79 degs., but there is no division or artificial means of ventilation in this level.

At 830 feet, thermometer 78 degs. at the shaft, there were four men at work 150 feet in from the shaft; and at 930 feet, 79 degs. The trucking is done here from the men working between this and the 830 feet level, but no other work is being done. On returning to the surface at 10 a.m., temperature 76 degs.

This being near the Spring equinox, and therefore free from the influence of either extreme of summer or winter, the temperature at a few other places was taken. That at the top of the Ellen Harkins' shaft was 78 degs. in the shade; at the 720 feet level, 72 degs.; at the 600 feet, 72 degs.; and at 400 feet, 72 degs. In this case there is a separate communication to the surface, and winzes holed from one level to another in each case, so that the heated air can ascend to the surface withont vitiating the air at the shaft. On return to the surface at noon the temperature was 81 degs.

At the surface of the Crown and Phœnix mine, 1st October, 10 a.m., the temperature was 74 degs. in the shade. At the 540 feet level, 71 degs.; no work was being done here, except by one man trucking from the shoots; and the level is holed into other mines. The shaft is centered to the bottom. At the 733 feet there is no holing into any other mine or level, two men are working in a crosscut 190 feet in, temperature at shaft, 72 degs.; and at the 430 feet level, where holed into other mines, 68 degs. at the shaft.

At No. 4 North Phœnix, 2h. p.m., thermometer at surface, 78 degs. At the 347 feet level, 76 degs. There are five men in this level and it appears to act as a return for the whole mine, the stopes being open up to that point. The mine is also open to the adjoining mines, and probably answers as a return airway for two or three mines. At 440 feet level, thermometer 72 degs., several men are working betwixt this and the next level; at 530 feet, thermometer 70 degs.; and at 560 feet, 70 degs.; and in the face of cross cut, where a man was at work, 350 feet from the shaft, with no opening or division, thermometer 77 degs, and at 678 feet down the shaft, thermometer 71 degs., with no artificial ventilation, but holed into the 560 ft. level. Thence to top of shaft, at 3h. 30m. p.m., thermometer 80 degs. It may here be stated that the height of all the mines (at the surface) above sea level is from 300 to 150 feet, and that practically they are therefore on the same horizon. The rock, although varying somewhat from slates and grits, through a conglomerate of varying aspect and texture, to a highly crystalline form, the place of which is scarcely decided, may be taken as offering no strong points of divergence in its conductive properties; beds of limestone are in the series, but no granite or other plutonic or volcanic rocks.

There are many other mines at Gympie, none of which promise any variety or divergence of results. The metal mined for is gold exclusively, and it is not encumbered to any considerable extent by the presence of other metals.

The accompanying influences have in each case been noted in order that the means of forming a conclusion may be at hand. There does not appear to me, however, to be any reason to suppose that at any depth to which we have yet attained, there need necessarily be any increase of temperature beyond the normal heat of the invariable plane which may be a few fathoms below the surface.

The most noticeable feature of the statistics published on this subject is the great irregularity of the increase, which must go far to prove that the change is not due to any general internal heat of the earth but to local and special circumstances, which have more effect than the supposed internal heat of the earth, which, even if more intense, is further away, and may have a similar relative influence in this direction at any depth to which man has yet penetrated, to that of the sun to the moon in their influence on the tides of the ocean at the surface.

Mr. Hemwood, F.R.S., F.G.S., &c., above quoted, gives, in the transactions of the Royal Geological Society of Cornwall, certain observations taken in the Colorado mine, Chili. The surface of which is 3,650 feet above the Pacific and 1,750 above the plain, from which it appears that by an observation taken at 46 fathoms' depth the temperature of the air was 66 degs.; at 127 fathoms it was 66·75 degs. and at 150 fathoms it was 66 degs; thus showing that in this case at any rate there was practically no change in more than 100 fathoms. All the observations were made in the limestone formation, and a note is added to say that the last mentioned observation, made at the bottom of the shaft where the draft was very great, ought perhaps to be excluded from the general average. But only the same quantity of air could pass the bottom of the shaft that circulated through it, and of all places *that* would be the least likely to be smaller in section than the other portions. The fact that the temperature can be kept down by a heavy draft is however an important conclusion, and as the air rapidly assimilates to the temperature of the adjacent rocks, it may be assured that there was practically no difference of their temperature down to that point.

In July, 1863, in the mine at Morro Velho, the temperature of the water issuing from the hanging wall of the metalliferous deposit, that is, from the rock above the lode which is generally inclined somewhat from the vertical, at 28·5 fathoms was 64·5 degs., while the water collected at the bottom of the engine shaft, 160 fathoms down, was 65 degs., showing a difference of half a degree of temperature in 131·5 fathoms.

Similar irregularities occur in the observations made in Cornwall. Thus at Wheal Mary Ann, Menheniot district, a large stream of water from a lode at the bottom of the mine, 98 fathoms deep, on 9th September, 1851, showed a temperature of 67·5; but on 29th July, 1867, the water pumped to the surface from a depth of 280 fathoms, showed 64·5, or 3 degs. less temperature, although coming from 182 fathoms deeper. It may have lost some of its heat however in the course of its transit through the column of pumps.

At Wheal Trelawny a small stream flowing out of the lode 8th September, 1851, at 95 fathoms deep stood at 65 degs.; and in July, 1867, water pumped to the surface from 210 fathoms was 65·3—that is, ·3 of a deg. for 115 fathoms. It is noticeable that in estimating the increase of temperature in depth, the invariable plane is taken by Henwood at 16·6 fathoms (about 100 feet) down, and the annual mean temperature at the surface is taken as the mean temperature at that place. This, however, is likely to be very variable according to the latitude, the height above the sea, and other local peculiarities, in respect to which no general rule has yet been formulated, although that plane is probably much nearer the surface than the point mentioned.

Taking now a case from the coal pits it appears that even in the same shaft the irregularity is apparent.

A number of observations which were taken at Duckenfield colliery show that the mean rate of increase from observations, between the mean depths of 255·4 fathoms and 281·4, was 9·6 fathoms to a degree, but between 281·4 fathoms and 309·3, the mean ratio was 46·5 fathoms to a degree ; and in the two shafts the temperature, and more especially the ratio of increase, varied considerably from each other at corresponding depths. The increase, however, was at the rate of 14·8 fathoms and 16·8 fathoms to one degree of heat, or about 89 and 101 feet respectively. And at the Rosebridge colliery, near Wigan, similar observations show 1 degree to each 11 fathoms of descent. This mine was at the time probably the deepest mine in Britain, being 403 fathoms in depth, but here again the increase was very irregular, being 4 fathoms to a degree in one portion of the shaft, *i.e*,, from 331·5 to 339·5 fathoms the temperature rose from 85 degs. to 87 degs., but from 339·5 to 367 fathoms the temperature increased 1·5 degrees, that is, at the rate of 1 to 18·3 fathoms, again showing the probability of local influences. The crystalline rocks are not common in the coal measures, but a considerable stratum of sandstone or limestone might so modify the pressure on the weaker strata below, and so reduce the relative amount of chemical decomposition taking place as to account for the variations of the accession of temperature at these different depths.

At the Agoa Quenta mine in Brazil, situated 3,400 feet above the sea, where a large stream of water issued from a depth of 30 fathoms, the temperature of that water increased 1 degree for every 2·12 fathoms. But curiously enough the average ratio per degree of heat in Brazil is given as 106·6 fathoms in the first 100 fathoms. That is, omitting the temperature of water pumped out of the mine and the thermal springs which rise to the surface—a remarkable proof that the causes of increase are local and exceptional, and not general—as arising from any central body of fire.

It is also stated that " the different metals or metalliferous minerals indicate different ratios of increase of temperature. Gold and silver, which are generally worked in mountainous regions and between the tropics, showing 1 deg. to 30 fathoms, while the inferior metals, lead, copper, and tin, worked on lower levels, gave 1 deg. for each 8·9 fathoms." But Gympie is neither within the tropics nor in mountainous country, and yet shews a lower ratio of increase than is here given.

Again, taking the depth, irrespective of any other consideration, the heat increased from the surface to 150 fathoms at the rate of 1 deg. for 21·4 fathoms, but in the next 50, at the rate of 1 deg. for 5 fathoms, and in the next 72, at the rate of 1 deg. for each 60 fathoms.

A very striking fact is, that the increase of heat "the ratio in which the temperature augments in descending is greater in shallow than in deep mines." One set of 177 observations, not in the deepest mines of Cornwall and Devon, exhibit increments of temperature equal to 10 degs. each at intervals of about 47, 79, and 125 fathoms of descent, whilst 53 experiments in the deepest levels or accessible parts of mines show the rock, water, and air to preserve in round numbers a temperature of 60 degs. at 59 fathoms, 70 degs. at 132 fathoms, and 80 degs. at 239 fathoms, being an increase of 10 degs. above the mean temperature of the surface at 59 fathoms; this, however, would apparently accrue in 42·4 fathoms, as Henwood has invariably taken the plane of equal temperature as at 16·6 fathoms. An additional 10 degs. for the next 73 fathoms, and a third 10 degs. for the next 107 fathoms; thus showing, if not a cooling in descent, at any rate a very great failing off from the ratio of increase at the higher levels: a proof rather that the heat proceeds from the surface than from the centre of the earth.

D. C. Davies, F.G.S., &c,, &c., in his "Metalliferous Mines and Minerals," says:—"Still, there are the facts that the air in a mine is nearly stationary; that by being breathed by a number of men it loses its vital properties; that it is poisoned to some extent by noisome exhalations; that it becomes charged with the fumes of explosives; and that there are occasionally outbursts of hydrogen gas where saline water falls on blende ore. Added to these considerations, there is also the natural increase of the temperature of the earth downwards towards its centre." It must be borne in mind that the writer here speaks of metalliferous mines, and it is passing strange that, with a stationary atmosphere and all these sources of heat, it should never have occurred to him that these are really the chief, if not the only cause of the increase of temperature of the earth downwards towards its centre.

Davies continues, "concerning this last remark, I may here notice incidentally, that from observations made by Mr. Henwood in Cornwall, Professor Phillips in the North of England, Mr. Bryham in Lancashire, and Professor Reick in Saxony, as well as from the results obtained by other observers, the temperature of the earth increases downward at a rate varying from 1 degree Fahrenheit for every 45 feet in depth to I degree Fahrenheit for every 76 feet in depth. It may be taken as the average result that the rate of the increase of heat is 1 degree Fahrenheit for every 65 feet in depth."

I have already quoted largely from Henwood; the observations of Professor Phillips and Mr. Bryham were chiefly, if not entirely, taken in the coal measures where the adventitious sources of heat are exceptionally numerous and great, and do not much concern us in the present question, and those of Professor Reick are not at hand, but would probably be affected by the same adventitious causes.

In confirmation of the views put forward touching the cause of heat "The Useful Metals and their Alloys" may be quoted, which states that "the temperature of the air in Cornish mines, at great depths, has been generally found to exceed, by some degrees, the temperature of the lode. This can only be attributable to the heat given off by the men and the lights, and is a proof of the stagnant state of the air;" again, "the loss in amount of work performed at high temperatures offers a large premium for attention to underground ventilation ; and yet comparatively few of the managers of mines understand the principles which govern the motions of the atmosphere," and further, "In districts where ventilation is not understood it is commonly asserted by miners and others that the deeper the mine the more difficult the ventilation, when as will presently be shown the contrary should be the case, many parts of the deep metalliferous mines are altogether abandoned in consequence of the poor air and high temperature; this is neither due to the heat communicated by the rock, however deep the shaft, nor to the thousands of yards which it may be indispensible for the air to travel before it reaches the surface." An example is then given in which the air increased 5½ degs. in descending according to the usual rule of 1 degree increase of temperature for every 300 feet of descent, due to the increased pressure of the air ; which it again lost on returning to the surface where it exhibited a temperature of 46 degrees. No notice is here taken of the internal heat of the earth, but the air at the surface was below the average temperature, and therefore, the heat at the invariable plane of temperature might in part account for the 5½ degrees difference, the pressure owing to depth being lost by friction in the shaft, and the drawing effect of furnace or other artificial ventilation, as the example is taken from a coal mine.

Andre, in his "Mining Engineering," refers to it as a well-known fact that the temperature increases at the rate of about 1 deg. Fahrenheit for every 60 feet in depth, but gives no proof. Callon says,—"It is well known that at a little depth below the surface we arrive at a point where the temperature is invariable throughout the year; this is the case all over the globe, and the invariable temperature referred to is the mean temperature of the year at the surface at the place of observation. In sinking below this point again, we find an increase of temperature which varies according to circumstances, *still imperfectly understood*; but amongst them may be reckoned the peculiar conductivity of the rock, which is an important factor. This increase amounts to 1 deg. Fahrenheit for every 45 to 50 feet of vertical depth sunk through." In the "History of Fossil Fuel" the writer says.—"The long agitated question as to whether the temperature of our planet increases towards the centre or not has received little illustration from facts; the assertion therefore, that the increment of temperature corresponds on the average to about 1 deg. Fahrenheit for every 7 fathoms of descent rests rather on theory than experience." Atkinson on explosives in coal mines says.—" The temperature of the earths crust increases with its depth; at 50 feet from its surface the temperature is 50 degs. Fahrenheit, and below that depth the temperature rises 1 deg. for every 60 feet." No proof is given, and the statement is evidently of local reference and respecting coal mines. The Royal Commission on Coal in 1870 appeared to think that it would be possible so to cool a mine that operations might be carried on at a depth of 6000 feet. And if a coal mine, surely a metalliferous mine with much less difficulty.

The theory appears to have been formed at a comparatively early period in the history of mining, and as it is a subject in which few mining managers take much interest, it has been accepted rather than proved. Nearly all those who discuss the subject are scientific men who take the recorded observations of others, without any reference to the conditions under which they were taken, although it is evident that in many cases the avoidable causes of heat would go far to account for the recorded increase of temperature; but no one appears to have questioned or combatted the correctness of the theory by opposing evidence, although it would be difficult to find any other scientific theory based on facts so questionable and so utterly at variance with each other.

Hunt, Mungo Ponton, Ansted, Richardson, Geikie, Lyell, Chambers' Encyclopedia, the Globe, Encyclopædia Britannica, and a host of other writers and works have been consulted, but nothing further has been found than a repetition of the assumption already mentioned, with an occasional doubt or query, but the most noticeable fact is the great discrepancy between the conclusions arrived at even by the deepest thinkers on the subject. Phillips, says Mr. Hodgkinson, at the request of the British Association, made some experiments in the comparatively shallow salt mines of Cheshire which gave an augmentation of 1 deg. for every 70 feet from the surface. Observations by Buddle, Bald, Peace, Hodgkinson, and others in coal mines are also given, and show a ratio as high as 1 deg. for each 30 feet, while the majority show 1 deg. for 40 to 50 feet. He further says that the general result of a complete discussion of these observations on subterranean temperature made in mines and collieries appear to give a ratio of 1 deg. centigrade in 25 metres, or 1 deg. Fahr. for 45 English feet. Kupffer, after an extensive comparison of the results in different countries, makes the increase 1 deg. for about 37 English feet. Cordier is of opinion that the increase would not be overstated at 1 deg. for 45 feet, but he says the increase does not follow the same law being twice or thrice as much in one country as another. Anstead says:—"The increase of temperature in deep mines appears to vary according to some law which is not at present understood." Sir C. Lyall says in Saxony it was necessary to descend thrice as far in some mines as in others for each additional degree of temperature.

Some geologists calculate that the solid crust of the earth is only ten miles in thickness. Hopkins says it cannot be less than one-fifth or one-fourth of the earth's radius, *i.e.*, 800 or 1,000 miles as a minimum, but it may be anything higher.

Professor Hull, in a paper read before the Geological Society of Edinburgh during the present year, appears to think that notwithstanding a probable increase of output, the coal of Great Britain will last 1,000 years. He points out that coal is now being worked to a depth of 3,000 feet in Lancashire and Cheshire, and he believes that by the end of the century such depths will not be at all unusual, and he evidently implies that very much greater depths will be reached, as there is certainly not sufficient coal within that depth to yield the supply he anticipates.

A shaft 2,000 feet deep is less than one-ten-thousandth part of the earth's radius, but most of the observations on which the theory is based were taken at depths of only a few hundreds of feet, the average of which may have been one-fifty-thousandth part of the radius, a portion so exceedingly slight that it is quite impossible to found any theory upon it, even if the observations all pointed in one direction, but when we see that in nearly every case the results point to local peculiarities and are at variance with each other, we cannot avoid the conclusion that so far as practical mining is concerned, the theory has been too hastily formed and on data altogether insufficient for its establishment. As it is a matter of immediate importance in our northern mining fields, however, I have taken this opportunity of drawing attention to it, for investors will not care to invest if they have the fact or theory before their eyes that at the depth of 1,000 feet or so the mines must per force of nature come to an end; not on account of the cost of working, or the poor return from the mine, but because of the supposed impossibility of working in the intense heat of the surrounding atmosphere.

I indulge the hope, therefore, that one of its effects will be to stimulate other observers, particularly in mines where the ventilation is sufficient to carry off the abnormal or adventitious heat for which the normal state of the earth is not responsible; and will conclude by an extract from Sir. W. W. Smyth (with which I entirely agree) who says:—"In South Wales and Lancashire in the coal measures, and in certain districts where the surface is occupied by the red sandstone of the trias, we may have coal seams below at 5,000, 8,000, or 10,000 feet deep; some of the authors quoted think that the limit of accessible depth is 4,000 feet beyond which the increase of temperature would prevent the possibility of working, but a considerable experience of deep mines induces me to believe that the difficulties of temperature may by due appliances be overcome to a much greater depth.'"

ON ECHINOCOCCUS IN A WALLABY.

By THOS. L. BANCROFT, M.B.

On 11th April, 1890, on the shores of Deception Bay, I shot a forest wallaby *(Halmaturus dorsalis)* whose lungs were infested with what appeared to be hydatid cysts of Tænia echinococcus. Microscopic examination of the scolices or echinococcus heads confirmed that opinion. The cysts are of the exogenous variety and are 1 inch to 1½ inch in diameter. Any fact in the life history of echinococcus is of extreme importance and worthy of record, inasmuch as it may help in the extermination of this dreaded parasite. It would be a wise thing to burn carcasses of dead marsupials as well as of sheep and oxen to prevent as far as possible dogs and dingoes eating them. The livers and lungs are the especially dangerous parts, and dogs on no account should ever be fed with them.

NOTES ON THE EMBRYOLOGY OF THE AUSTRALIAN ROCK OYSTER

(Ostrea glomerata).

By W. SAVILLE-KENT, F.L.S., F.Z.S., &c.,

COMMISSIONER OF FISHERIES, QUEENSLAND.

[*Read before the Royal Society of Queensland, Feb. 14th, 1890.*]

A CONSIDERABLE amount of uncertainty having hitherto prevailed concerning the developmental phenomena of the Australian rock oyster of commerce (*Ostrea glomerata*), I have recently devoted some attention to this subject, and propose to submit to you on this occasion a brief summary of the results of my investigations.

It is desirable that I should point out, in the first place, that the researches that have been already conducted by European and American naturalists, with relation to the commercial oysters of the Northern hemisphere, have elicited the fact that the fertilisation and development of the oyster brood or spat is formulated on two essentially distinct plans. In the case of the most familiar European type, *Ostrea edulis*, represented by the far-famed British native and the variety so extensively cultivated on the coast of France, the propagation of the species is, as will be familiar to many present, accompanied by a condition in which the oyster is unfit for consumption, and is prohibited to be sold. This is occasioned through the circumstance that the parent oyster nurses or incubates its brood within the pallial or mantle cavity, throughout the early stages of its development, and does not liberate it until the shells of the young oysters are fully formed. An oyster eaten during the later phases of the breeding season, appears to be full of sand or grit, this being due to the presence of the many millions of minute embryonic shells. By oyster dealers at home, two distinct spawning conditions of the oyster are recognised: the one, when the embryos contained within the mantle chambers of the parent are white and colourless, being devoid of shells, is designated the "white sickness"; and the later stage when, the shells being formed, a grey or blackish tint is imparted to the entire mass, is known as the "black sickness." The close or spawning season of the ordinary European oyster, *Ostrea edulis*, extends throughout the summer, from May to September, and is popularly defined as being represented by those months in which the letter "r" is absent.

The fecundation of the ova of the European oyster necessarily takes place within the mantle cavity or brood-chambers of the female, the fertilising fluid or milt of the male being discharged into the water, and from thence it is absorbed and brought into contact with the mature ova by the ciliary currents that exercise the ordinary respiratory and food-purveying functions in the female mollusc. This plan of propagation was until within recent years supposed to apply to all descriptions of oysters. Investigations associated with the reproductive phenomena of the American commercial oyster, *Ostrea virgineana* failed, however, to discover any trace of the brood or spat within the mantle cavities of the breeding oyster, and it was ultimately demonstrated by Dr. Brooks (1880), that both the ova and milt were simultaneously discharged into the water in their mature condition, and fertilisation being there effected, the entire development of the embryo took place independently of the parent. Such being the case the artificial propagation of the species by the commingling in sea water of the matured sexual elements was considered feasible, and was successfully accomplished by the above-named authority. In the case of the typical European oyster, *Ostrea edulis*, such a method of artificial propagation is not possible, chiefly on account of the fact that the embryos are matured within the brood-chambers of the parent in a fluid medium, containing a large proportion of albuminous matter that cannot be artificially produced. Following upon the discovery of Dr. Brooks in connection with the American oyster, it was demonstrated by M. Bouchon-Brandeley, in the year 1882, that the small Portuguese oyster, *Ostrea angulata*, exhibited developmental phenomena which coincided essentially with those of the American species, the ova being similarly discharged into the water, where they are fertilised and developed independently of the parent. The artificial fertilisation of the ova of this species, and the investigation of the more important embryological phases of this Portuguese type, were also successfully carried out by the authority cited.

The oysters of Australia, like those of the Northern hemisphere, exhibit two distinct plans of propagation. The commercial form indigenous to Tasmania and Victoria, but now so reduced in numbers by exhaustive fishing as to be scarcely known in the market, cannot be distinguished from the *Ostrea edulis* of European waters, and is usually associated by naturalists with the same specific title, but is sometimes denominated the variety *Angasi* of the same type. The reproductive phenomena of this oyster have been personally investigated by me, and were found to coincide precisely with those of its European congener, the embryos, in like manner, being fertilised and developed within the mantle or pallial cavities of the parent. Similar phenomena have also been found by me to obtain, in association with the closely allied New Zealand mud oyster, and which is also apparently a local variety only of the same species.

The most important commercial oyster of Australia is undoubtedly the familiar rock oyster, *Ostrea glomerata*, of which Queensland enjoys the enviable position of producing the largest supplies, Moreton Bay and Wide Bay alone growing sufficient quantities not only for home consumption but also for exportation to the neighbouring colonies. The method of propagation of this oyster to which I have paid some attention within the past few weeks, is, I find, in all respects identical with that of the American commercial species, *Ostrea virgineana*. The fertilisation of the ova is brought about by their coming in contact with the milt or sperm cells in the open water, the young embryos being thus cast adrift and thrown upon their own resources from the earliest period of their existence. The artificial propagation of this species by the abstraction of the matured sexual elements, the ova and spermatozoa, and their admixture in a little sea water, may in consequence be easily effected and yields a most interesting and instructive embryological study. The method of procedure successfully adopted in accomplishing such artificial propagation, and the more conspicuous metamorphoses through which the embryo passes before assuming the parent form, may be described as follows:—

The aid of a microscope with a magnifying power of about 200 diameters is, in the first instance, indispensable for securing the most satisfactory results. On opening a number of oysters, the cream-coloured fat-like mass near the hinge or joint of the bivalve shell represents the seat of the reproductive elements. Inserting a fine spatula into the midst of this mass a small portion may be abstracted, and spread out in a drop of sea water or the natural juices of the mollusc on an ordinary glass slip. Placed under the microscope, the ova or germs of the female oyster will be at once recognised by their ovate or pyriform contour, the separate ova having an average diameter of the $\frac{1}{500}$th part of an inch. The male elements or spermatozoa when abstracted and similarly treated, present a widely different aspect. Its separate elements are so diminutive as to appear as minute granules only under the same magnification, and a considerably higher amplification is requisite to illustrate their individual structure. This is then shown to consist of a minute bulbous head and an exceedingly slender flexible hair-like tail, the proportions between the two being much the same as that of the head and shank of an ordinary pin. After a little experience it will be found easy to distinguish the comparatively coarse granular ova from the cloudy masses of spermatozoa, when placed on the glass slip, with the aid only of an ordinary pocket lens or even the unassisted vision. The assistance of the microscope is, however, desirable to insure the most favourable results, and is altogether indispensable for tracing the further development of the embryos. In many instances it will be found, what can be recognised only with the microscope, that the ova or spermatozoa, are not sufficiently matured, or in the case of oysters purchased in the market have become deteriorated by isolation from their native element for too long a period to permit of perfect fertilisation. The conditions being satisfactory, the ova under the microscope should present a clean and evenly rounded outline, while the vitality of the spermatozoa should be manifested by their active oscillating and vibratory movements. Should the sperm cells fail to exhibit this vitality, their admixture with the ova will prove of no avail.

In practice it will be found that the number of oysters containing the female elements or ova is greatly in excess of those producing the milt or sperm cells, the average proportion associated with many hundred examples recently examined being one male to six or seven females. The small quantity of milt that is required to fertilise a very large number of ova satisfactorily explains Nature's economy in this direction. No peculiarities of external structure exist, so far as I have been able to ascertain, that permit of distinguishing between the male and female oyster before it is opened. Healthily matured milt and ova having been successfully obtained, portions of each, the ova predominating, may be mixed in a watch-glass half full of sea water, and well stirred together. The ova, being heavier, will soon sink to the bottom, leaving the spermatozoa diffused as a cloud through the water. After an interval of ten minutes the top water may be poured off or withdrawn with a pipette and fresh supplied, and any fragments of lacerated tissue or tufts of immature milt be removed with a needle; these, if left, will decay and pollute the water. The pouring-off process should be repeated until the top water is quite clear and the bottom consists entirely of fertilised ova. If a small drop of water containing the mingled milt and ova is examined at short intervals some remarkable changes in the form and structure of the ova will soon be observed.

Almost immediately following upon the admixture of the two elements it will be found that the sperm cells are adhering in numbers by their dilated heads to the delicate capsular investments or vitelline membranes of the ova, and communicating to many of them, through the vigorous vibrations of their tail-like prolongations, a distinct oscillatory motion. It may also be observed that through the aperture of the narrower end of the capsule, known as the micropyle, several of the sperm cells have effected an entrance, and have been brought into direct contact with the body of the ovum. The fusion between the two elements that then takes place is not easy to trace, but the results arising from the union are speedily manifested. The ovum prior to fertilisation was distinguished by the presence of a central clear area with a contained nodular structure, the two representing what are distinguished technically by the titles of the 'germinal vesicle' and 'germinal spot' or the 'nucleus' and 'nucleolus.' Shortly after fertilisation the substance of the ovum becomes opaquely granular throughout, and the germinal vesicle is no longer visible. Within the second hour a small globular protruberance will have made its appearance at the broader end of the ovum, and opposite to the micropyle. This is the so-called directive or polar cell. Quickly following upon this, the entire body-mass of the ovum becomes furrowed or constricted across the centre, and each half is seen to contain a central nucleus. The upper half, associated with the polar cell, now divides itself into two equal parts. These again split into four and next into eight, the aspect of the ovum or embryo, as it may now be correctly termed, at about the end of the third hour being that of a number of small coherent cells, superimposed symmetrically on the top of a large basal cell.

This condition of development represents an important phase in the life-history of the embryo oyster. There are now present all the essential elements out of which the perfect animal will be built up. Out of the smaller superincumbent cells all the investing membranes, tactile organs, and essential animal structures will be fashioned, and they are consequently, distinguished as the formative cells. The larger basal cell, on the other hand, represents the nutritive or vegetable element, out of which will be constructed the stomach, alimentary track, and all the appended viscera. Within from four to six hours the smaller or formative cells have so increased and spread as to completely enclose the large nutritive cell, and which in its turn now divides up and lays the foundation of the alimentary track. Fine hair-like cilia are at this stage developed upon the external surface of the embryo, and by means of which it progresses through the water in an irregular rotatory manner. The polar cell, which up to this stage had occupied a conspicuous position, now breaks loose and disappears. The metamorphoses from this point progress more slowly. From the tenth to about the fifteenth hour the general shape of the embryo is somewhat kidney or turban shaped, it having a slight depression on one side. This represents what is known to biologists as the gastrula stage, a structural phase which has been found to be common to some period in the development history of almost every known form of animal life higher than the unicellular protozoa. In its most typical condition this gastrula embryo consists of a cup-shaped body composed of two single cell layers, the outer being built up of the animal or formative cells, and the inner one out of the nutritive or vegetable cells. The distinctive appellations of the 'epiblast' and 'hypoblast' are more commonly applied by biologists to these respective outer and inner cell layers.

After passing the 'gastrula' stage, development towards the typical organisation of the parent oyster proceeds apace. The central cavity representing the stomach opens out by an anterior and a posterior passage and apertures, which correspond respectively with the throat and mouth, and the intestine and vent. The shells make their appearance at a depression in the dorsal surface, and gradually increase in size until they enclose the entire body. Simultaneously with these metamorphoses a disc covered with powerful vibratile cilia has developed at the anterior extremity, and with the assistance of which the embryo oyster can propel itself vigorously through the water. As the shells grow larger and heavier the little oyster becomes less capable of sustaining itself in the water, and finally sinks to the bottom. This is a crucial epoch in the mollusc's existence. Should it settle upon a rock, shell, or other clean, hard substance, it attaches itself to it, and its life is assured; but should it, on the contrary, light upon soft mud, sand, or other material to which it cannot adhere, it inevitably perishes. The proportion of young oysters that find a secure anchorage in comparison with the vast numbers that are devoured, or become literally lost at sea, is necessarily infinitesimal.

The time taken by the embryo of the Australian oyster to pass through the series of metamorphoses enumerated, and to arrive at the attached or sedentary state, has been found by me, under favourable conditions, to average four days, two out these elapsing before the shells become conspicuously apparent. Permanent preparations of the ova and embryos in their various phases of development may be satisfactorily obtained by treatment, first with a 1 per cent. solution of osmic acid, and subsequent transfer to dilute glycerine, in the proportion of one-half glycerine and one-half-water. Several slides illustrating oyster embryology are submitted on this occasion for examination, as also living examples of the embryo at a period of about four hours after artificial fertilisation. The more prominent embryonic phases enumerated in this communication are likewise diagrammatically illustrated on the accompanying sheet.

In connection with the investigation of the embryology of the Australian rock oyster recently conducted, I have been and am still carrying out a series of experiments with the view of accurately determining the influence upon the embryonic brood that is exercised by the advent of fresh water floods or other sudden changes in the salinity of the water. Some of the results already obtained are of a highly interesting and instructive nature. From a series of oysters recently purchased in the market a fully matured male and female were selected for experiment. Portions of milt and ova from these two individuals were abstracted and commingled under precisely the same conditions and placed respectively in water of three different degrees of salinity. The first admitted was placed in sea water of the full ordinary strength. In the second there were equal proportions of salt and fresh water, and in the third one part of salt water to three of fresh. As a result, the ova placed in the equal admixture of salt and fresh water exhibited active vitality and were quickly speeding on their developmental career. Of the ova placed in pure sea water but few were fructified, and these developed very slowly. Those finally placed in the water containing only a one-fourth proportion of sea water were entirely deprived of life and soon commenced to disintegrate. This last-named circumstance suffices to indicate the pernicious effect upon breeding oysters that may be exercised by heavy floods, and opens out a wide field for further investigation.

It is worthy of note, in association with the embryological details here recorded, that matured ova and sperm-cells were found abundantly developed in individual oysters with shells measuring as little as half-an-inch in diameter, and whose age would not exceed three or four months. This precocity in the reproductive faculties of the species furnishes a clue to the extraordinary rapidity and abundance with and in which the Queensland Rock Oyster seizes upon and spreads itself over every surface presented that possesses favourable conditions for its attachment.

PLATE ILLUSTRATING THE EMBRYOLOGY OF
OSTREA GLOMERATA.

EXPLANATION OF PLATE ILLUSTRATING THE EMBRYOLOGY OF *OSTREA GLOMERATA*.

Figs. 1 and 2. Unfertilized ova with investing vitelline membrane and micropyle, *a*: magnified about 500 diameters.

,, 3. Milt or sperm cells.

,, 4. Ovum with attached sperm cells, immediately preceding amalgamation and fertilization.

,, 5. Ovum from 1st to 2nd hour after fertilization.

,, 6 and 10. Consecutive metamorphoses observable within the 2nd and 3rd hours after fertilization.

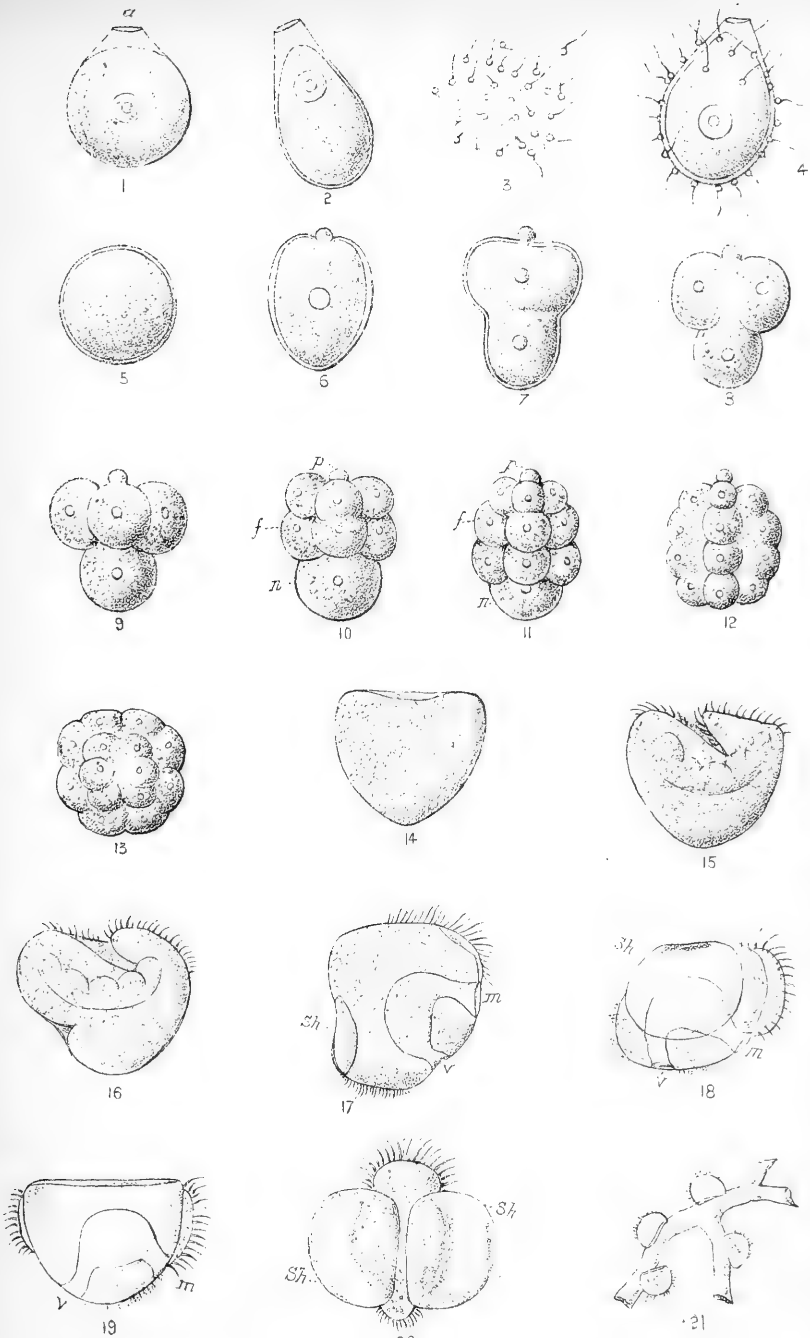
,, 11 and 13. Changes progressing within the 4th to 8th hours after fertilization, terminating in the ejection of the polar cell, *p*, and the complete investment of the larger nutritive cells, hypoblast, by the smaller formative cells or epiblast.

,, 14 and 16. Phases of the embryo, known as the "Gastrula" stage, observed between the 10th and 15th hours of development.

,, 17 and 18. Phases arrived at from within 24 to 48 hours, and in which the shells, *sh*, mouth, *m*, and vent *v*, of the perfect oyster have made their appearance.

,, 19 and 20. Lateral and dorsal aspects of an embryo, three to four days old, and in which the shells have grown to such dimensions that they entirely enclose the body when contracted; magnified about 200 diameters.

,, 21. Earliest observed attached condition of the oyster embryos or "spat," attained to within the fourth or fifth days succeeding the primary fertilization of the ovum; magnified about 50 diameters.



OSTREA GLOMERATA.

SECHIUM EDULE.

(Chayote).

ITS INTRODUCTION INTO QUEENSLAND—CULTIVATION AND USES.

By LEWIS A. BERNAYS.

(Past President).

[Read before the Royal Society of Queensland, on 9th May, 1890.]

The Royal Society of Queensland has signalised its career in a manner remarkable for so young and indifferently endowed an organisation, by the number and importance of its contributions to pure science. While numerically and pecuniarily weak, this Society includes among its members scientific investigators whose researches have added materially to the knowledge of various branches of science, and whose names have made for themselves a place in its ranks in older and more important centres of scientific enquiry. I should not presume to ask for a place among the contributions of such of my colleagues (as I lay no claim whatever to scientific knowledge), were it not for a belief which I strongly entertain that, in so very young a country as this, there is still much to be taught in the way of developing the resources of the soil, and by providing new objects of cultivation to add thereby permanently to the productions of the country. This is a subject in which I have taken much interest, and to which I have devoted not a little time for years past ; and on such matters, therefore, I venture—with some diffidence—occasionally to speak among you.

A former Governor of Queensland remarked, on a public occasion, "that in a territory of the vast extent of Queensland we find a variety of climates, each of which is capable of bringing to perfection some particular growth or growths of animal or vegetable life. There is thus opened out an immense opportunity of usefulness before persons who are willing to address themselves to the inviting labor of adding to the productive wealth of each separate district of the colony, by means of the introduction of such novelties of ascertained value as may have only awaited the encouragement of a helping hand in order to settle down and flourish—to become acclimatised—in a thoroughly congenial latitude and soil." It is to such a novelty that I desire to ask your attention for a short time this evening.

In June, 1888, the late Sir Anthony Musgrave, whose intelligent and active interest in the development of the material resources of Queensland will be long and gratefully remembered, suggested to me the advisableness of testing the adaptability, to some part of the colony, of a food-plant well-known to him during his sojourn in Jamaica—namely, the Chocho, as it was there known in the vernacular. The plant having been described in the *Kew Bulletin*, edited by Mr. D. Morris, so long and favourably known as Director of Plantations in Jamaica prior to his appointment as Assistant Director to Royal Gardens, Kew, I wrote to that gentleman for information as to the best mode of procedure in order to procure the plant in question. This resulted, after some correspondence, in the receipt from Mr. Fawcett, Mr. Morris's successor in Jamaica, of a box of fruits of the "Chocho." There were only two alive, these by great good fortune being of distinct varieties; and having been placed in the care of Mr. William Soutter, the manager of the Acclimatisation's Society's Gardens, it goes without saying that they were nursed into vigorous growth. The plant having proved to be admirably adapted to the climate of Brisbane, and to be a useful addition to our food-plants, is, I think, worth the place in our transactions which I propose to give it.

The genus "Sechium," which seems to be peculiar to two species, derives its name from the the Greek *sekazo*, "to coop up," and that again from *sekos*, "a pen for rearing young animals," the fruit apparently having been used for fattening hogs, although there is a host of concurrent testimony that it is largely used as a culinary vegetable by man in all places where its grows.

The "Chocho" of Jamaica (*Sechium edule*, Swartz) is known by other vernacular names in other countries. In Brazil it is "chuchu," in the French W. Indies "christophine," in Madeira "pipinella" and "chayota." From this latter locality it reaches Covent Garden Market, where it is known as "chayote"—sometimes called "chay," but this latter name is probably a mere trade abbreviation. I think the balance is in favour of "chayote," both because it is euphonious, and is the chief designation by which it is known in Europe. The chayote is a perennial cucurbitaceous plant, and a strong climber, with three to five-cleft tendrils, and a smooth somewhat stout stem, rising from a very large fleshy perennial root having the appearance of a yam. The leaves are heart-shaped, rough to the touch, and five-angled. The flowers are green or yellow, with separate male and female flowers on the same plant. The fruit in shape is like an elongated pear, about three to five inches long, covered with soft prickles, and either green or cream-coloured. There are two varieties, one having flower and fruit of a pale green, and the other with flower and fruit rather larger, cream-coloured or white. The fruit contains a single seed, like a large thin almond, situated at the very top and when ripe projecting a little and emitting roots while still on the vine.

The Chayote is now widely distributed in all parts of tropical America, in the East Indies, and in Madeira and the Atlantic Islands. De Candolle attributes its native habitat to the south of Mexico and Central America, whence it was probably transported into the West India Islands and to Brazil, in the eighteenth century.

Mr. Morris stated that in the West Indies the plant flourishes at temperatures ranging from 63 degs. to 75 degs. Fahrenheit. Experience in Brisbane proves that it fruits abundantly with a much wider range of temperature, remaining unscathed under 4 degs. of frost, while other cucurbitaceous plants blacken and succumb.

The cultivation of the Chayote presents no difficulties. A ripe fruit placed on its side, so that the incipient roots may be in contact with the prepared soil, will start into active growth in a few days. It does not do equally well, and may fail, if placed in any other position, and the seed does not bear extraction for the purpose of cultivation. The plant will also grow from cuttings, but the plan is not recommended.

The plant revels in being allowed to run over a tall bush structure of some kind, as it is a strong climber and bears most freely if unrestrained; but if circumstances do not permit this, it can be allowed to run on the surface of the ground like the annual edible cucurbits.

Under suitable conditions of climate, the Chayote fruits all the year round, increasing in productiveness after the first year from the seed. These high qualities will no doubt be modified by the character of the treatment it is called upon to encounter, and by other conditions; but a perennial plant which, under favourable circumstances, will constantly, or nearly so, give a useful and palatable food product is an important addition to the available resources of our gardens.

The average weight of the fruit at the Hakgala Gardens, Ceylon, has been found to be 3½ lbs., and this is fairly borne out by our short local experience. The number of fruits obtainable in a year from one vine will naturally depend upon the conditions and degree of care under which it is grown; but the age of the plant is an element in its productiveness, and one estimate gives from 200 to 500 fruits. Taking, however, the former number as the maximum, and the average weight as given above, a very handsome return indeed is afforded by a single plant.

The edible parts of the plant are (*a*) the fruit, (*b*) the root. The fruit is used in various ways, primarily as a vegetable. For this purpose it is best boiled for about twenty minutes, and, when soft, drained, sliced, seasoned and fried. Prepared in that way it is much like the egg-fruit with a dash of the flavour of the Jerusalem artichoke, and makes a very palatable vegetable indeed. Lunan recommends it dressed with lime-juice and spices, or made into a succedaneum for apple sauce by treatment with lime-juice and sugar. All this, however, may be left to the

Queensland housekeeper; who, having before her a substantial addition to the *materiel* for the table, will soon discover methods of cooking it in palatable form.

The root of an old plant will sometimes attain the weight of 20lbs. It resembles a yam in appearance and is very nutritious, containing a large proportion of starch, as is shown by the following analysis by Professor Herrera, given by P. L. Simmonds in his "Tropical Agriculture":—

Water	71·00
Starch	20·00
Resin soluble in water	0·20
Sugar	0·32
Albumen	0.43
Cellulose	5·60
Extractive matter Tartrate of Potash Chloride of Sodium Sulphate of lime and silica	2·25
Loss	0·20
	100·00

It is stated that during its second year the root throws off small tubers which can be removed for use, and that this operation may be repeated for six or eight years; but longer experience will be required to verify this here. The *Sechium* is also credited with being free from diseases which affect other tuberous plants.

The foregoing notes are taken from various authorities; tested by the local experience, in and about Brisbane, of one year only. When the plant has been better distributed we shall know more of its capabilities, grown at various elevations, and in climates differing in temperature and moisture; but I am strongly of opinion that in the "chayote" we have an introduction good in quality as an addition to the food productions of the country, and important from the simplicity of its cultivation and its heavy cropping capabilities. I shall watch its progress with interest, having been instrumental in its introduction, and believing that as a work of acclimatisation it will prove a signal success.

THE

Royal Society of Queensland,

With which is Incorporated

THE PHILOSOPHICAL SOCIETY OF QUEENSLAND.

FOUNDED 1859.

PROCEEDINGS

OF THE

ANNUAL MEETING,

WITH

REGISTER OF MEMBERS

FOR 1890.

Brisbane:
PRINTED BY WATSON, FERGUSON & CO.

1891.

THE

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Royal Society of Queensland.

ADJOURNED ANNUAL MEETING,

22nd NOVEMBER, 1890.

The adjourned ANNUAL MEETING for the year 1889-90 was held in the Lecture Hall of the College of Pharmacy, on Saturday, 22nd November, 1890. There were present 73 officers, members, and visitors. Amongst the members present were Messrs. F. M. Bailey, F.L.S. (President), Hon. A. Norton, M.L.A., W. Saville-Kent, F.Z.S., F.L.S., L. A. Bernays (Past Presidents), Drs. T. L. Bancroft, Rendle, R. Thompson, Lauterer, E. Hirschfield, Professor Shelton, Capt. Townley, Messrs. O'Connor, J. Thorpe, D. R. Elen, J. S. Michael, G. Watkins, P. R. Gordon, A. B. Chater, D. R. McConnell, H. J. Oxley, H. Stokes, A. Jardine, F. McFadyen, Mrs. Coxen, W. J. Ryott-Maughan, C. Woodcock, A. Armstrong, P. Fewings. Amongst the visitors present were Mesdames Saville-Kent, Hudson, Woodcock, Oxley, O'Connor, Kelynack, Jordan, the Rev. Manley Power, Dr. Wheeler, and Messrs W. H. Kelynack, Lereselie, J. G. Anderson, Hudson, O'Connor, Townley and Bernays.

The President for the year 1890-91, Mr. F. M. Bailey, F.L.S., took the chair, and called upon the Honorary Secretary, Mr. W. J. Ryott-Maughan, to read the following Report:—

To the Members of the Royal Society of Queensland.

Your Council have pleasure in submitting the report of the work done during the past year

Publication of Proceedings.

Your Council regret that they have been unable to print the many valuable papers which have been contributed by members of the Society, and other kind friends in the Southern Colonies. The heavy expense in connection with the printing of Vol. VI. for the year 1888-9, would not allow your Council to incur fresh liabilities, until the financial position of the Society would warrant it. It is hoped, however, that at an early date, the proceedings will be published regularly as heretofore. Some reference may be appropriately made at this point, to the hope entertained by the Council, that in recognition of the practical and scientific aims and achievements of the Queensland Royal Society, the Government will feel justified in according to it, some measure of that material assistance towards the publication of its transactions, that is, or has been accorded to almost every scientific society, occupying a like status, in the adjoining colonies. In this direction it may be mentioned, that the Royal Society of Victoria received up to last year an annual Government grant of £500, and this year receives £250; the Royal Society of New South Wales receives £1 for every £1 collected, and at its commencement was subsidised to the extent of £1000; the Proceedings of the Royal Society of Tasmania are printed by the Government; the Royal Society of South Australia receives £1 for every £1 collected.

It is furthermore worthy of record, that the Queensland Royal Society, in the earlier years of its existence, was likewise subsidised to the amount of £100 per annum, and which subsidy was permitted to lapse, apparently, through the negligence of the Society to energetically support their claims for its continuance.

It is a matter of much regret to the Council, that under present conditions, many valuable papers relating to Queensland science, offered to the Society by members and others, have to be refused, and are remitted for publication in the Proceedings of Societies outside Queensland.

Accommodation.

On the removal of the Department of Public Instruction to their new offices, the Honourable J. Donaldson, (Minister for Education), was kind enough to again place a room at the disposal of the Society, but it being found totally unsuitable for the objects of the Society, the Council accepted the kind offer of the Pharmacy Board, to have the use of their rooms for meetings. It is, however hoped that, the Government will, at some future date, render to the Society similar concessions, as regards suitable accommodation, as that granted to kindred societies, both at home and in the neighbouring colonies.

Sections.

On a requisition signed by Messrs. Shirley, Hedley, and Corrie, the Council's approval was granted for the establishment of a microscopical section; and it is the fervent wish of the Council to see this, as well as other sections, become important factors in furthering the Society's objects.

Ordinary Meeting of Members.

The Council are much gratified at being able to report that the attendance of members, at the ordinary monthly meetings, has been considerably increased. Doubtless, a variety in the evening's programme is in some way accountable for this fact. Eight monthly meetings have taken place, the attendances being as follows:—

1889.—August 16th	...	Members present	...	17
September 13th	...	,, ,,	...	19
October 18th	...	,, ,,	...	7
1890.—February 14th	...	,, ,,	...	13
March 21st	...	,, ,,	...	22
April 12th	...	,, ,,	...	16
May 9th	...	,, ,,	...	22
June 13th	...	,, ,,	...	17

Following the practice carried out by other societies, your Council decided to go into recess for the three hotter months, viz., November, December, and January.

Deceased Members.

Your Council deeply regret to record the death of three members, in the persons of His Honor Mr. Justice Mein, who died in Sydney; also, Messrs. Alexander Archer and J. C. Garner, who lost their lives in the ill-fated "Quetta." The two first-named gentlemen had been connected with the Society for many years, and always most heartily supported the good work the Society was carrying on.

Change of Officers.

Mr. W. Roth, B.A., who, at the last Annual Meeting was appointed Hon. Librarian, found it necessary to resign on October 14th, 1889, having been called to take up work in South Australia. Mr. Chas. Hedley, F.L.S., who was appointed Hon. Secretary at the last Annual Meeting, had to relinquish his duties in order to proceed to British New Guinea. The duties of these two offices are now fulfilled by Mr. W. J. Ryott-Maughan. Your Council has great pleasure in placing on record, their appreciation of the valuable services, collectively and severally, rendered by these past and present honorary officers.

Explanatory.

A few words are desirable in explanation of the circumstance of the annual accounts and presidential address being submitted to the members of the Society at so late a date. In consequence of the absence of the president, Mr. W. Saville-Kent, F.L.S., F.Z.S., on official duties in Northern Queensland, and which absence extended over several months, and the honorary secretary, Mr. J. Ryott-Maughan, in the southern colonies, it was considered advisable by your Council to postpone the submission of these accounts together with the communication of the customary address until the president's return. Steps were at the same time taken to elect the new officers and council for the succeeding year 1890-91, the list of which is herewith appended:—

ATTENDANCE OF OFFICERS AND MEMBERS OF COUNCIL, 1889-90.

Office.	Name.	Meetings.	Attended.
President ...	W. Saville-Kent, F.Z.S., F.L.S. ...	11	4
Vice-President	J. F. Shirley, B.Sc., F.L.S.	11	8
Hon. Treasurer	L. A. Bernays	11	2
Hon. Secretary	C. Hedley, F.L.S. (resigned April 8)...	8	7
Hon. Secretary	W. J. Ryott-Maughan (elected April 8)	3	3
Hon. Librarian	W. Roth, B.A. (resigned October 14)	3	1
Hon. Librarian	W. J. Ryott-Maughan (elected October 14, resigned April 8)	4	4
Members of Council ...	A. Corrie	11	4
	C. W. De Vis, M.A.	11	3
	W. Fryar	11	6
	W. H. Miskin, F.E.S.	11	6
	R. Mar, F.C.S.	11	1

NEW MEMBERS, 1889-90.

Ordinary Members.

Name.	Date of Election.
Mr. W. D. Percival	August 16, 1889.
Dr. Vereker Bindon	September 13, 1889.
Mr. A. E. Holland	September 13, 1889.
Mr. Buckland	September 13, 1889.
Mr. Tregaskis	September 13, 1889.
Mr. Ogg	September 13, 1889.
Mr. Coane	September 13, 1889.
Mr. Garner...	September 13, 1889.
Mr. W. Thompson	February 14, 1890.
Miss Pells	March 21, 1890.
Dr. Griffin	March 21, 1890.
Dr. Southam	March 21, 1890.
Mr. P. McMahon	March 21, 1890.
Mr. P. McLean	March 21, 1890.
Professor E. M. Shelton	May 9, 1890.
Mr. G. Pocock	May 9, 1890.
Mr. Charles F. Yeo	May 9, 1890.
Mr. A. Johnston	June 13, 1890.
Mr. H. Oxley	June 13, 1890.
Mr. H. G. Stokes	June 13, 1890.
Mr. A. E. Harte	June 13, 1890.
Dr. Ellison...	June 13, 1890.

Corresponding Members.

Name.	Date of Election.
Rev. R. Harley, M.A., F.R.S., F.R.A.S. ...	March 21, 1890.
Dr. Cockle, London	March 21, 1890.

MEMBERS RESIGNED.

Name.	Date of Resignation.
Mr. Birch	February 10, 1890.
Mr. Percival	February 10, 1890.
Mr. A. Bennett	July 22, 1890.
Mr. T. Connah	July 22, 1890.
Mr. Jas. Cowan	July 22, 1890.
Mr. Campbell	January 20, 1890.

SCIENTIFIC WORK OF THE YEAR.

No.	Title of Paper.	Author.	Date.
1	*Macro lepidoptera* of Queensland	T. P. Lucas, M.R.C.S....	Aug. 16, 1889.
2	The resins of the two Queensland species of *Araucaria*...	J. H. Maiden, F.L.S. ..	
3	On the distillation of native essential oils viewed from a commercial point ...	T. L. Bancroft, M.B. ...	,,
4	Notes on a remarkable lichen grown in connection with a new species of Sticta, with descriptions of both ...	Rev. F. R. M. Wilson...	,,
5	On genera of plants collected by Sir W. MacGregor ...	Baron Sir F. von Mueller	Sept. 13, 1889.
6	A popular description of Filaria and Hæmatomonas ...	T. L. Bancroft, M.B. ...	,,

SCIENTIFIC WORK OF THE YEAR—*(continued)*.

No.	Title of Paper.	Author.	Date.
7	Notes on the Embryology of the Australian rock oyster, *Ostrea glomerata*... ...	W. Saville-Kent, F.L.S., F.Z.S....	Feb. 14, 1890.
8	Meteorological notes... ...	Mrs. Chas. Coxen ...	,,
9	Temperature of the earth as exhibited in mines, with special reference to observations in some of the deepest mines on the Gympie goldfield	W. Fryar	Mar. 21, 1890.
10	Tea, its cultivation, manufacture, and adaptability to the climate of Queensland	J. S. Michael	Apr. 12, 1890.
11	Hydatids in Marsupials, *Echinococcus hominis* in a Marsupial	T. L. Bancroft, M.B. ...	May 9, 1890.
12	New Queensland plants ...	F. M. Bailey, F.L.S. ...	,,
13	Introduction of the "Cho-cho" into Queensland ...	L. A. Bernays	,,
14	1. Notes on Ringworm as affecting stock	T. L. Bancroft, M.B. ...	June 13, 1890.
	2. *Actinomyces*, fungus of the disease *Actinomycosis* ..	,,	,,
	3. The mite *Demodex* probable cause of mange in dogs	,,	,,
	4. The *Echinococcus hominis* from a Marsupial ...	,,	,,
15	Botanical notes on new species	J. F. Shirley, F.L.S., B. Sc.	
16	Notes on new economic entomological specimens ...	H. Tyron	
17	Notes on remarkable Queensland spiders	W. Saville-Kent, F.L.S. F.Z.S.	,

EXHIBITS AND DESCRIPTIONS.

No.	Title.	Exhibitor.	Date.
1	Various pests, animal and vegetable, which injure rose trees in the vicinity of Brisbane	H. Tryon	Aug. 16, 1889.
2	New fish, *Regalecus masteri*	C. W. DeVis, M.A. ...	Oct. 18, 1889.
3	Undescribed bird, *Amblyoris macgregoriæ*	C. W. DeVis, M.A. ...	,,
4	Luminous fungus *Agaricin*...	W. Saville-Kent, F.L.S. F.Z.S.	Feb. 14, 1890.
5	New and rare plants, Bellenden Ker	F. M. Bailey, F.L.S. ...	Mar. 21, 1890.
6	Australian *Cypræidæ*, Cowrie shells	Mrs. Chas. Coxen ...	,,
7	New plants from Bellenden Ker...	F. M. Bailey, F.L.S. ...	Apr. 12, 1890.
8	Photographs and notes on the Australian morepork, *Podargus strigoides*	W. Saville-Kent, F.L.S., F.Z.S.	,,
9	*Mimetic larvæ*, simulating Lichens on gum tree ...	W. Saville-Kent, F.L.S., F.Z.S.	,,
10	Botanical specimens, with notes	J. H. Simmonds ..	May 9, 1890.
11	New *Lepidoptera*, with notes	T. P. Lucas, M.R.C.S.	,,
12	New standard weights and measures, with notes ...	Trustees Museum, per C. W. DeVis, M.A....	,
13	Photos with notes on giant herrings, *Chanos salmoneus* and *Megalops cyprinoides*	W. Saville-Kent, F.L.S., F.Z.S.	,,

The following is a list of Societies and Public Institutions with which an exchange of publications has been arranged, or to which our proceedings are forwarded :—

ADELAIDE	Public Library, Museum and Art Gallery.
,, ...	Royal Society of South Australia.
AUCKLAND	The Auckland Institute.
BATAVIA	Natuurkundig Tijdschrift voor Nederlandsch-Indie.
BOLOGNA	Reale Accademia delle Scienza dell' Instituto.
BONN	Naturhistorischen Nerein.
BOSTON	The American Academy of Arts and Sciences.
BRISBANE	Acclimatisation Society of Queensland.
,, ...	The Museum.
,, ...	The Parliamentary Library.
,, ...	School of Arts, North Brisbane.
,, ...	,, ,, West End.
BRUSSELS	L'Academie Royale des Sciences des Lettres et des Beaux Arts.
,, ...	Société Royale Malacologique de Belgique.
CALCUTTA	Asiatic Society of Bengal.
,, ...	Geographical Survey of India.
EDINBURGH	Botanical Society of Edinburgh.
,, ...	Royal Society.
FRANKFURT AM MAIN	Senkenbergische Naturforschende Gesellschaft.
GENEVA	Société de Physique et d'Historie Naturelle.
GENOA	Musea Civica di Storia Naturale di Genova.
HAMBURG	Verein für Naturwissenschaft.
HOBART	Royal Society of Tasmania.
KAZAN	Society of Naturalists of the University.
LEEDS	Leeds Philosophical and Literary Society.
,, ...	Conchological Society of Great Britain.
LONDON	Royal Geographical Society.
,, ...	Royal Society.
MADRID	Real Academia de Ciencias Extras Fisicas y Naturales.
MANCHESTER	Literary and Philosophical Society.
MELBOURNE	Field Naturalists' Club of Victoria.
,, ..	Geological Society of Australasia.
,, ..	Public Library Museum, and Art Gallery.
,, ..	Royal Society of Victoria.
,, ..	"Victorian Engineer," Editor of,
MONTREAL	Royal Society of Canada.
NEW YORK	American Geographical Society.
,, ...	New York Academy of Sciences.
,, ...	Zoological Gardens.
OTTAWA	Geological and Natural History Survey of Canada

PARIS	...	La Feuille des Jeunes Naturalistes. La Société d' Etudes Scientifiques.
PHILADELPHIA	...	Academy of Natural Sciences.
"	...	Zoological Society.
PISÁ	...	Societa Toscana di Scienze Naturali.
ROCKHAMPTON	...	Natural History Society.
SANTIAGO DE CHILI	...	Deutschen Wissenchaftlichen Verein.
ST. PETERSBURG	...	La Société Imperiale Russe de Geographie.
SAN FRANCISCO	...	California Academy of Sciences.
SINGAPORE ...	...	Straits Branch of the Asiatic Society.
SYDNEY... ...	...	Australasian Museum.
"	...	Department of Mines.
"	...	Linnean Society of N. S. Wales.
"	...	Natural History Association.
"	...	Royal Society of N. S. Wales.
TASMANIA ...	...	The Royal Society.
TOKIO	...	Seismological Society of Japan.
TORONTO ..	...	Canadian Institute.
VIENNA	...	Anthropologische Gesellschaft.
WASHINGTON ...	...	Smithsonian Institution.
WELLINGTON ...	...	Geological Survey of New Zealand.
YOKOHAMA ...	...	Asiatic Society of Japan.

Also donation of books, papers. &c., from F. M. Bailey, F.L.S.; L. A. Bernays, Brisbane; W. Saville-Kent, F.L.S., F.Z.S., Brisbane; J. Maiden, F.L.S., Sydney; Prof. Liversidge, F.R.S., F.L.S.; The University, Sydney; Baron Sir F von Mueller, K.C.M.G., F.R.S.; W. H. Rands, Maryborough; H. C. Russell, Esq., F.R.S., Sydney; J. F. Shirley, B.Sc., F.L.S.; Dr. Thorpe, R.N., Kingston, Ireland.

W. SAVILLE-KENT, F.Z.S., F.L.S., F.R.M.S.,

President.

WM. J. RYOTT-MAUGHAN,

Honorary Secretary

ROYAL SOCIETY OF QUEENSLAND.

Dr. *Statement of Receipts and Disbursements for the Year ending July 11th, 1890.* **Cr.**

	£	s.	d.	£	s.	d.
To Balance brought forward from last Statement				19	1	9
,, Members' Subscriptions—						
1887	2	2	0			
1888	6	6	0			
1889	26	5	0			
1890	56	14	0			
				91	7	0
,, Life Membership (Hon. A. Norton)				10	10	0
,, Entrance Fees—						
1889	6	6	0			
1890	10	10	0			
				16	16	0
,, Associates' Subscriptions, 1890				2	2	0
,, Exchange added to Cheques				0	2	6
				£139	19	3

	£	s.	d.	£	s.	d.
By Muir and Morcom, account of Printing, 1888-9				85	0	0
,, J. Brown, Printing, 1888-9				1	2	1
,, C. Edmunds, Litho.				6	0	0
,, Office Cleaner, 1889-90				4	0	0
,, Advertising				1	1	6
,, Alterations and making new Book Shelves ...				11	8	9
,, Removal Expenses				2	5	9
,, Gordon and Gotch				2	15	6
,, Petty Cash, per—						
C. Hedley, Postage of Proceedings, &c.	11	5	9			
W. J. Ryott-Maughan, ditto ..	2	0	0			
				13	5	9
,, Exchange				0	5	6
,, Cheque Book				0	5	0
				£127	9	10
Cr. Balance—						
Queensland National Bank ...	2	19	11			
Cheques and Cash in hand ...	9	9	6			
				12	9	5
				£139	19	3

LEWIS A. BERNAYS, *Hon. Treasurer.* WM. J. RYOTT-MAUGHAN, *Hon. Secretary.*

Examined and found correct, Brisbane, 21st October, 1890.—ALEX. J. TURNER, *Auditor.*

As against the Credit Balance of £12 9s. 5d. there is an overdue obligation for Printing of £60 3s. 2d.—A.J.T.

The adoption of the Report of the Council and the financial statement was moved by the Hon. A. Norton. M.L.A., seconded by Mr. D. O'Connor, and carried.

The Chairman then called upon Mr. W. Saville-Kent to deliver the presidential address for the year 1889-90.

PRESIDENTIAL ADDRESS.

By W. Saville-Kent, F.L.S., F.Z.S., &c.,
Commissioner of Fisheries, Queensland.

Following habitual custom, it has been incumbent that your retiring president should prepare and submit for your consideration, an essay upon some subject in harmony with the general scope of the scientific Society which conferred upon him the high honour of election to its presidential chair.

The theme selected for this address, should preferably be one with which the author finds himself in a position to speak with some amount of confidence, and in this direction I trust that I have chosen one containing, or that may stimulate into life, some few germs of thought, that in the no very distant future, may bring forth a profitable harvest. The excellent address delivered by your last year's retiring president, eloquently championed the just claims of Queensland to possess a university, whereat her rising youth should be afforded the means of obtaining that systematic training for the liberal professions, which under present auspices, they are accustomed to seek in either Europe or the neighbouring colonies. Another year's circuit has served but to emphasise the necessity for the provision of these advantages, within the boundaries of the colony. The gain that will accrue from the highest and widest system of education, being readily accessible to all classes of the community, has already commanded such an extent of public recognition, that a committee has been appointed to discuss and decide upon the most efficient scheme for the establishment of such a university for Queensland. Another year will not elapse, I trust, before the consultations and recommendations of that committee will have taken a tangible shape.

Not the least prominent among the many subjects that will find a place in the curriculum of the newly established Queensland university, will be the science of biology. In association not only with the higher walks of the learned professions, but also, along the crowded highway of every day life, the importance of a fundamental knowledge of the laws that regulate and govern the well-being and profitable production of all animal and vegetable organisms of direct utility to man, is becoming increasingly apparent. The briefest consideration will suffice to indicate to what a considerable extent the wealth of Queensland is dependent upon its organic products, and to demonstrate the importance that attaches to their scientific comprehension and treatment. Making a rough extract from the official statistics of this colony, it is found that the animal and vegetable exports within the last few years, have been represented by an average annual value of close upon £4,000,000, or almost precisely double that of its mineral products, which is represented by something less than £2,000,000. In face of these figures, it can scarcely be questioned that the organic produce represents the backbone or mainstay of the colony's existence, and it is consequently, of the first importance that every effort should be made to foster and further develop every industry connected with it. Now in order to keep abreast of the times, in association with the profitable utilisation of nature's productions, it is incumbent at the present day, to abandon the unskilled and haphazard methods of former years, and to conduct every operation on a thoroughly scientific basis. This scientific treatment necessarily involves the possession of technical knowledge and a previous scientific training; and it is here that the rôle of the university becomes apparent. At the present time, in almost every matter threatening to seriously affect the welfare of the higher branches of agricultural, pastoral, and allied industries, the engagement of an expert from beyond the borders of the colony, is an almost unavoidable necessity.

With the inauguration of a university, all this should be changed. At the biological laboratories associated therewith, those fell diseases which periodically work so much havoc among our sheep, cattle, and other live stock, will receive special attention; and the more widely diffused knowledge that will thus accrue concerning their primary nature, causes and effects, will no doubt enable the rising generation of pastoralists to cope with, or minimise the effects of these diseases, to an extent that will represent the saving of untold wealth to the colony. With respect to the departments of agriculture, arboriculture, and forestry again, the college courses devoted to plant anatomy and physiology, with their associated laboratory work and probable experimental agricultural farms, should similarly impart or evoke information that will ensure the successful treatment of the many destructive plant diseases. And on the other hand, give an enormous impetus towards the fuller utilisation of the vast areas which at present lie waste, or which through the absence of technical knowledge, are cultivated with such crops, or in such manner, as to yield but a fractional proportion only of the profits they might be brought to realize, under scientific treatment.

The information and experience gained in the university lecture-rooms and laboratories, and which will arm the agricultural and pastoral student with the technical knowledge and acumen enabling him to successfully handle the many problems of animal and vegetable physiology and pathology he will encounter in his work-a-day life, have necessarily to be of a thorough-going and comprehensive order. Types representative of every important section of the animal and vegetable kingdoms have to be intelligently comprehended, and, if possible, practically investigated with the aid of the scalpel and microscope. The mutual relationship and interdependence of one group to or upon another, it may be as a direct means of support or it may be as a check serving to preserve the balance of power, is so subtly adjusted that unless they are studied collectively they cannot be intellegently understood. In this manner, certain of the diseases rife among cattle and other live stock are now known to be occasioned through the presence, in their vital fluids, as parasites, of incalculable numbers of the lowest and most minute forms of vegetable life, which are distinguished by the name of Bacteria, or Bacilli. Many of these disease organisms have been successfully cultivated in biological laboratories, and, as has been demonstrated by those schools of research, of which M. Pasteur and Dr. Koch are the respective founders, these parasitic organisms are capable, under such conditions, of complete extirpation, or of such modification or attenuation, that they can be utilized for the purposes of inoculation, as in the case of vaccination for small-pox, the cattle thus inoculated being effectively protected from further fatal attacks of the disease. To rightly comprehend the true nature or physiological phenomena of this class of diseases and their effective treatment, the student has to make himself familiar with the external aspects and vital phenomena, not only of the specific form producing the disease, but of an extensive series of the minute vegetable organisms belonging, or allied to, the same order. Other diseases affecting live stock, such as those producing what is known as "staggers," and liver-fluke in sheep, are due to the presence of endo-parasitic worms, traceable in most instances to causes that can be effectually controlled, but involving the knowledge of an altogether distinct biological group. Various other diseases, such as the form of mange with which the horses of this colony have been seriously affected within recent years, require to be more extensively investigated and understood before an effective antidote can be prescribed. The disease just mentioned, represents but one out of a number, that at the present day specially invite the patient research of the biological expert.

Among the numerous organic types that engage the attention of the university student, in his laboratory course, are those which pertain to marine aquatic life. So important is a knowledge of this biological section, that in connection with many of the European and American universities special seaside laboratories, of either a stationary or transportable construction, have been established for the express purpose of providing advanced students with opportunities for extending their area of experience, throughout the domain of marine biology. As an advance upon these less pretentious marine laboratories, have been evolved those more perfectly appointed institutions, such as the Zoological Station at Naples, or the more recently erected Marine Biological Station at Plymouth. The Naples station, founded by Dr. Dohrn, has been established for the more exclusive object of purely scientific research, and is resorted to for this purpose by scientists from every country in Europe. Oxford University, among others, pays, or until recently paid, a subsidy to Dr. Dohrn, for the privileges of having a "table" at his station reserved for the use of her students and graduates, while the same institution has been in receipt of a yearly grant of £100 from the British Association for the Advancement of Science, to assist towards the furtherance of its exclusively scientific aims. The University of Pennsylvania, in the United States, also holds a table at this Marine Zoological Station, on the same terms as that of Oxford.

At the more recently established British Zoological Stations and Marine Laboratories, and likewise at those in America, a more practical element has been introduced. In addition to the researches connected with organisms of purely scientific import much attention has been given to acquiring a knowledge of the embryology, life habits, and general economy of all fish, and other marine products having a direct economic value. At the Scottish Marine Biological Laboratory, associated with the Edinburgh University, by way of example, most valuable investigations have been conducted by Professor Cossar Ewart and others, with relation to the spawning habits of the common herring, and both here and at the Plymouth station, the turbot, sole, lobster, oysters, and other commercial products of the sea, have been subjected to scientific investigation with the object of solving the many problems associated with their reproduction, and with the object of increasing their rates and areas of distribution by artificial means. The progress made in the science of fish propagation, through the instrumentality of seaside and riverine laboratories, in the United States and Canada, surpasses, as is well known, in practical results all that has so far been accomplished in the Old World.

The rôle that Australia in general, and Queensland in particular, is destined to play in the advancement of marine biological science, and in the scientific development of her fisheries, through the medium of kindred marine laboratories or zoological stations, has yet to be discovered. That Queensland, in connection with the university she is shortly promised, will sooner or later supplement her class-room and laboratory instruction with practical operations at the seaside, may be taken for granted

In recognition of the extraordinary potentialities that are possessed by this colony, for the occupation of a prominent position in the development of Australian biological investigation, I have selected this topic, on the present occasion, as one upon which I might appropriately offer a few remarks and suggestions.

The peculiar advantages possessed by Queensland are associated with the circumstance that she possesses a line of sea-board stretching far up into the tropics, and embracing the world-famous Great Barrier coral reef, and the many islands entering into the composition of the Torres Straits Archipelago. This extensive area is rich beyond imagination, in the production of a marine fauna redundant with forms possessing both an economic and a scientific value. My professional vocations having, within the past two years, occasioned the devoting of a considerable interval of time to the investigation of the fishery products of this tropical region of Queensland, the fact just alluded to has made a strong impression, and likewise forced upon me a recognition of the grand results that might be accomplished through the medium of a well appointed zoological station and marine biological laboratory, established at a suitable location in this district. The indication of a suitable site for such an institution is a comparatively easy task. Nowhere probably, throughout the Australian littoral, does there exist a spot so naturally adapted, in every way, for the establishment and maintenance of a marine biological observatory as that of Thursday Island. Situated in Torres Straits, at a distance of twenty miles only from Cape York Peninsula, with a climate far more temperate than that of the mainland, and constituting a weekly or bi-weekly port of call to various lines of mail steamers, it represents a perfect paradise for the naturalist. As the central depôt of the Torres Straits pearl and pearlshell and the bêche-de-mer fisheries, it takes the leading position in the colony with regard to the value of its fisheries exports, and which, with reference to the two items last named alone, represent a collective annual value of close upon £100,000.

Through the acquirement of accurate knowledge concerning the life histories and conditions of growth of these valuable commercial products, coupled with the application of approved methods of scientific culture, there is but little doubt that their existing export value might be immensely enhanced, and probably more than doubled. Experiments personally made, during the limited durations of my visits to this district, have established with absolute certainty that the mother-of-pearl shell, *Meleagrina margaritifera*, can, notwithstanding previous local assertions to the contrary, be successfully transported from the outer fishing grounds, and laid down and cultivated in inshore waters. A number of shells thus experimented upon by me on the occasion of a former visit, and deposited in a selected area on the Thursday Island foreshore, had on my return, eight months later, thriven beyond expectation, increasing in diameter to the average extent of one inch. There were, moreover, no losses to record, except in the case of a few specimens that had been ignorantly appropriated and eaten by some of the Javenese survivors from the "Quetta" wreck, who were temporarily lodged at Thursday Island.

The results obtained by these experiments, though conducted on a relatively small scale, are pregnant with practical suggestions, and are capable of exerting a far-reaching influence. They demonstrate the possibility of establishing extensive artificial beds or reserves, and through their medium of re-stocking the large areas in Torres Straits which, in consequence of their nearness and convenience of access from Thursday Island, have been depleted and laid waste through overfishing. They have demonstrated the feasibility of bringing in all the shell alive from the outer grounds to the home stations, so that they can be opened and the pearls which they contain can be secured to the rightful proprietors, instead of, as under present conditions, constituting for all practical purposes the perquisites of the divers and boats' crews, and by whom they are surreptitiously traded away. The possible formation of artificial beds in conjunction with the existing shelling stations, or as independent undertakings, on which young shell can be laid down to grow and multiply after the manner of ordinary oysters, has been clearly established by these experiments, and the way is thus opened up to an entirely new development of the pearl-shell industry. Doubtless with that true conservative instinct that distinguishes fishermen all the world over, the great majority of those engaged in this important industry will be content to continue working along the same groove with which they are alone familiar, reaping all they can of this grand harvest of the sea from where they have not sown, and without the slightest care or compunction for the reapers that follow after. This short-sighted policy especially commends itself to those who, as in many instances, have only a passing interest to serve, and who act merely as representative managers for some absentee firm or employers. Better results may, however, be looked forward to when the boat and station owners have a direct stake in the future prosperity of the industry, and when they are empowered, as I have recommended, to obtain leases of foreshore and water areas, with secure tenure for themselves and their posterity, for the culture of pearl-shell on a basis identical with that on which the oyster fisheries are regulated. In the not very distant future it may be confidently anticipated that all of the most favourable water areas in the vicinity of Thursday Island will be utilised for this purpose, the pearl-shell industry not then being in the hands of those who have to proceed, or to send their agents, as now, to distant grounds in search of shell, but every proprietor of a holding with a favourable foreshore having a pearl-shell bed under personal supervision.

There is yet another direction in which substantial profits may arise through the recently-demonstrated possibility of artificially cultivating pearl-shell. As already indicated the pearls, as well as the pearl-shell, will be under the control of the cultivators, in place of being smuggled away as so usually occurs under the existing conditions of the fishery. Going beyond this, I am prepared to maintain that the artificial production of pearls is by no means beyond the pale of human possibility. This suggestion as an idea is by no means a novel one; it has occurred to many minds, the chief obstacle hitherto to its practical development being the inability to obtain the living material to work upon. Knowing what the Chinese have accomplished towards the production of artificial pearls and pearl-coated images of Buddha in the fresh water mussel, *Dipsas plicatus*, it is reasonable to infer that as much or more might be achieved by the scientific treatment of the true pearl-shell, *Meleagrina margaritifera*. A little later on, I shall possibly be in a position to record something more definite upon this interesting subject, and will refer to it on the present occasion only as one that might be scientifically approached, and successfully followed up, at a marine laboratory established at Thursday Island. In addition to the large mother-of-pearl shell, many other allied species of the genus *Meleagrina* and *Avicula* occur in Torres Straits, and are well worthy of attention with relation to their pearl-producing capabilities. Many of these abound indeed throughout the Queensland coast.

The bêche-de-mer fisheries represent another important industry that might be substantially benefitted by the establishment of a marine observatory, with a trained staff of scientific investigators, at Thursday Island. Little or nothing is known as yet concerning the reproductive phenomena and life habits of the numerous commercial species of trepang or bêche-de-mer. It is quite possible that their propagation might be greatly accelerated by the application of methods of culture, discoverable only in connection with prolonged scientific investigations, at such an institute as is now under consideration. There are many other crops to be cultivated in these northern waters, that only await the advent of the scientific labourer. Sponges of fine texture and of commercial value, are now and again brought in by the pearl-shell and bêche-de-mer fishermen from the grounds they frequent in pursuit of the special objects of their industry. Beds of this organic product, of sufficient extent to constitute a prolific fishery, would doubtless reward the investigation of experienced hands. Here again, however, science would be in a position to play an important rôle. By experiments independently conducted in the Adriatic Sea and in the neighbourhood of the Florida reefs, the possibility of scientific sponge culture has been amply demonstrated. Unshapely sponges even, may be divided up into small fragments, and planted over suitable areas, like cuttings in a garden, each fragment in the course of a year or two growing into a symmetrical sponge. This fact is of itself redundant with suggestions of what might, under scientific auspices, be accomplished on the Queensland coast line.

In close alliance with the sponges, some attention may be directed to the group of the corals. Although the red or precious coral of commerce, *Corallium rubrum*, has not yet been discovered in Australian waters, it does not necessarily follow that it is non-existent. A closely allied, if not identical species, has been obtained from the neighbourhood of Japan, and is also imported into China from Singapore, Sumatra, and the Philippine Islands. It is therefore reasonable to anticipate that this species possesses a considerable range of distribution in the Pacific Ocean. Even if not naturally existing, its artificial introduction and establishment, on the Australian coast line, would by no means be an impossible or even a very difficult task to accomplish. This coral may be seen growing luxuriantly under artificial conditions in the tanks of the Aquarium at the Naples Zoological Station, and it would only be a matter of mechanical detail to construct portable tanks, with a circulating or oxyginating arrangement for the water, combined with appliances for the regulation of the temperature, to transport the living organism from the Mediterranean to Australia. The conditions favourable to the growth of *Corallium rubrum* are not limited to tropical waters and would be more nearly approximated in the neighbourhood of Moreton Bay or Port Jackson. Some idea of the importance of this article and its consequent worthiness of attention, may be derived from the circumstance that the annual value of this material, as obtained from the Sardinian coast is estimated at £60,000, while that obtained from the coast lines of Algeria and Tunis are estimated to represent an annual value of £100,000. Coral to the value of 20,000 per annum is also obtained from the Cape de Verde Islands. The industry, as prosecuted in the Mediterranean alone, is estimated to give employment to over 10,000 fishermen. Especial success in the fishery for coral attended some recent experiments made with the aid of diving apparatus, such as is used by the pearl-shell divers in Torres Straits, in place of the primitive engine formed of wood, in the shape of a cross, and garnished with swabs and tangles, and which is simply lowered and dragged over the surface of the coral ground. A coral of commercial value, which is occasionally collected by the pearl-shell divers in Torres Straits, is the black coral, *Antipathes arborea.* This species constitutes a special fishery at Jeddah, in the Red Sea, and commands a ready sale for the manufacture of mouth-pieces for cigars, beads, amulets and other ornaments. I am informed that the produce of the Jeddah Fishery has greatly diminished within the last few years, and that the discovery of any new sources of supply would be gladly welcomed. There is, I consider, every element in favour of the development of a profitable black-coral fishery in North Queensland waters. Like *Corallium rubrum*, this black variety is probably susceptible of artificial cultivation.

Leaving for awhile the consideration of those forms of corals that possess an universally recognised commercial value, some attention may be directed to that wealth of varieties that enter into the composition, or are intimately associated with the growth, of coral reefs, and are technically known by the title of madrepores or stony corals. It is in this direction more particularly that Thursday Island may be referred to as a paradise for the naturalist, its immediate vicinity abounding with easily accessible forms of infinite variety of shape and colour. Concerning the aspect and structure of the living polyps, of which these corals in their more familiar bleached condition constitute but the inorganic skeletons, much yet remains to be discovered. In no locality probably, could they be so effectively studied as at a zoological station or biological laboratory established at Thursday Island. The record of a few observations of interest, relating to the structure and appearances of certain coral animals and allied organisms, personally made during my recent visits to this island and the Torres Straits district, may help towards indicating a few landmarks in the extensive field that exists here for original work by the biologist. To assist in the faithful representation of the natural aspect of the living organisms, I, on the last occasion of my visit, enlisted the aid of the camera, and thus availed myself of such opportunities as occurred of photographing the animals, as naturally expanded in the rock pools, or when transferred to suitable receptacles. The results obtained have, on the whole, been so successful that they will, I think, recommend themselves to the attention of all interested in marine biology, and lead to the extensive adoption of the method employed.

Among the examples that are more especially noteworthy, I may refer to the several photographs illustrative of what are known as mushroom corals, *Fungiæ*, in various stages of contraction and expansion.

In most standard works on corals, including Milne Edwards' "Histoire des Corallaires," J. D. Dana's "Report on Zoophytes," "U.S. Exploring Expedition," and "Corals and Coral Islands," the tentacles of the living animals of the mushroom corals are represented as being comparatively small and inconspicuous; Dana, more particularly, maintains this feature to have been true of all the living *Fungiæ* he examined, and adds, that the power in their tentacles must reside wholly in their urticating or lasso cells. From the observations made by myself and recorded by the camera, of certain of the Torres

Straits species, one is driven to the inference that Dana did not succeed in observing these corals in their fully expanded state. One species more particularly, and which seems to be identical with the *Fungia crassitentaculata* described by Quoy and Gaimard, presents, as shown by the photographs taken, a most luxurant development of the tentacular elements, and is not unlike, in general aspect, though not in colour, the large so-called Dahlia anemone, *Bunodes crassicornis*, of the British seas. The tentacles, however, of this mushroom coral, in their fully extended condition, are relatively larger than in the foregoing species, and vary in colour from a brilliant grass green to a bronze green, or dark brown hue, with distinctly inflated whitish or pale yellow tips. Other species of *Fungiæ* observed, exhibited similar structural phenomena, though the tentacles, while conspicuously developed, were of somewhat less relative dimensions than observed of *F. crassitentaculata*. Several interesting illustrations of the characteristic stalked condition of the young *Fungiæ*, are included among the photographs taken. In some instances these are attached to coral branches of various species, while in one instance, as many as ten individuals are crowded together on the disk of their defunct parent, and from which they apparently arose by a process of gemmation. At an early date, the stalks by which the young individuals are attached become ruptured and they henceforward lie freely on the sea bottom, after the manner of their parents.

Another group of corals, which is abundantly represented at Thursday Island, is the genus *Euphyllia*. The expanded polyps in this genus are exceedingly beautiful objects, being surmounted by large tufts of cylindrical tentacles, the extremities of which are knobbed or inflated, and of a distinct colour. Much variation in tint exists among separate clusters of these corals. In one species, *Euphyllia glabrescens*, the tentacles vary from a rich seal-brown to dark myrtle-green, the rounded tips being white, blue-grey, or golden yellow. In a smaller form, apparently *Euphyllia rugosa*, the tentacles are more commonly slate-grey or lilac, and the rounded tips a brilliant emerald green. An interesting observation was made, with reference to the variation of colour that may exist among the polyps belonging to the same corallum of *Euphyllia glabrescens*, and with relation to the amount of light to which they are exposed. An example noticed was so growing that certain of the polyps projected underneath, and were completely concealed from the light by surrounding coral growths; here the tentacles were transparently white, with pale primrose-coloured tips. Where the light only partially fell on them, the tentacles were sage-green, with brighter yellow tips; while, in the fully exposed area, all the tentacles were dark brown, with deep golden terminations. Analagous illustrations of the effect on the colours of the coral animals, produced by the absence of light, were also observed by me among representatives of the genera *Mussa* and *Galaxea*, and in which the polyps were similarly bleached, after the manner of cultivated celery and sea-kale when screened from the light. Examples of *Euphyllia* in a condition of semi-extension, illustrating the characteristic structure of the polyps, were also successfully photographed.

A remarkably beautiful coral, that occurs in tolerable abundance in the vicinity of Thursday Island, is a representative of the same family of the *Euphylliidæ*, and is known to science by the name of *Pleroqyra laxa*. It consists of clusters of polyps, united in undulating linear series. As seen in their expanded state, the centres of the polyps are emerald green, variegated with brownish striæ, while the tentacles are primrose or lemon yellow, with brilliant lilac or magenta tips. In their fully extended state, the tentacles are over an inch in length, and the lilac tips are spherically inflated. When, however. only partially extended, as represented in the photographs secured, the tentacles do not exceed half-an-inch in length, and are simply terete.

One of the most interesting corals, that grows abundantly in the same district, is the form popularly known as the organ pipe or music coral, *Tubipora musica*. The species takes its name from the fancied resemblance of its corallites to the pipes of an organ. The corallum of *Tubipora* is remarkable for its deep crimson hue, while the polyps, by which it is secreted, are pale emerald green. A very satisfactory photographic picture of this coral, in its living and fully extended state, was obtained, and is herewith submitted. It is worthy of note that the organ pipe coral belongs to a separate order, as compared with the ordinary reef-forming corals. In the corals last named, the tentacles are invariably a multiple of six, and are simple in structure, while in the organ pipe coral, and all allies of it, there are always eight tentacles only, which are feathered or pinnately branched. This peculiarity of structure is well shown in the photograph exhibited.

One other coral, that is not unfrequently obtained in the neighbourhood of Thursday Island, invites brief notice. This is the blue coral, *Heliopora cerulea*, remarkable for the circumstance that its interior substance, when broken through, is coloured a deep indigo blue. The true affinity of the coral was, to within a recent date, a matter of conjecture, and even up to the present time I have not been able to discover that the polyps have been observed in their expanded state. Professor H. N. Moseley obtained the species in connection with the Challenger expedition, and determined, from an investigation of preserved and retracted examples, that the organism was referable to the same order as the organ pipe coral, *Tubipora*, it possessing in a similar manner eight tentacles, upon which there were evidences of short, stout, lateral tubercles. This species was obtained by myself last year, in the neighbourhood of Warrior Island, in Torres Straits; but, though preserved in constantly-changed sea-water, and carefully watched for many days, the polyps refused to expand. During my recent visit to Torres Straits, I was accorded a passage to Thursday Island in H.M.S. "Rambler," and stopped for some days on the way in the vicinity of Adolphus Island, near the scene of the terrible catastrophe that befel the "Quetta." This ground the "Rambler" had been deputed to survey, and the opportunity was consequently afforded me of exploring the neighbouring coral reefs. On one of these, near the Mid-brother Rock, I again obtained specimens of the blue coral, *Heliopora*, and its investigation on this occasion produced some totally unexpected results. The surface of the corallum in this species is perforated with cylindrical pores of two descriptions, larger and fewer ones, which, however, have a diameter of less than a millimetre, and interspersed among these, innumerable smaller perforations, that are about one-fourth of the diameter of the larger pores. Relatively considerable areas may, moreover, occur, in which the corallum, while riddled with the smaller, are entirely deficient in the larger pores. Within a few hours after bringing specimens from the reef, and placing suitable fragments in sea-water, living organisms, in the form of two slender transparent tentacles, were seen protruding from each of the smaller pores, followed by a short portion of a cylindrical semi-transparent body. The aid of a pocket lens was necessary to make out these details distinctly. At first sight it was suspected that the organisms were allied to the bitentaculate hydroid zoophyte, described many years since, by Mr. P. H. Gosse, under the title of *Lar sabellarun*, and which inference, had it proved correct, would have approximated *Heliopora* to *Millepora* and other *Hydroidea*. Following, however, the superficial examination by sections through the corallum, laying open the pores from which the tentacles protruded, the true character of their owners was revealed. It was then shown that these tentacles were the terminal appendages of a long, slender, setiferous worm, since ascertained to belong to the same family, and to be very closely allied to, *Leucodore ciliata*, a species that has been recently accredited with compassing the destruction of the New South Wales oyster beds. Hundreds of these worms were exposed to view in a section of the coral less than one inch square, and either remained ensconced in their respective tubules, or, wriggling out, fell through the water to the bottom of the glass dish, in which they were under examination. The investigation was continued, with the object of ascertaining whether any separate organisms were associated with the larger pores. These pores, however, appeared to be hermetically closed, with one or two exceptions, and in which worms, similar in aspect to, but of larger size than those inhabiting the smaller pores, were seen protruding from their orifices. It appeared reasonable, under these circumstances, to anticipate that these larger pores probably represented the brood chambers of the adult worms, and that the entire corallum was built up by the worms that had been placed so conspicuously in evidence. It is desirable that I should remark at this point that I was at the time unaware of the Alcyonarian interpretation, that had been associated with *Heliopora* by Professor Mosely. The subject was one to which I had not given systematic attention for some years, and I retained merely a dim recollection that the living zooids of the organism had not yet been exhaustively examined. A brief summary of the results of my examination of this coral was accordingly almost immediately forwarded to the scientific journal, "*Nature*," to be followed later by fuller systematic details.

Meanwhile, a specimen of the *Heliopora* was placed in a small coral pool at Thursday Island, and was examined from time to time, as the tide and other engagaments permitted, during my visit, for the detection of any new developments. Up to the close of five weeks from the day that the specimen was first collected, no alteration was noticed in the external aspect of the coral. The worms, as previously observed, continued to manifest the same state of activity, protruding and extending their tentacles on all sides from the smaller pores, in search of food.

The afternoon before leaving Thursday Island, a last visit was paid to the coral pool, when to my no small astonishment, zooids, each with eight pinnate tentacles, were seen protruding from the larger pores. The fact was not at the time actually realised, that these were alcyonoid polyps; there are also pinnately tentacled annelids or worms, and this circumstance justified the conjecture that they probably represented the matured growth of the undoubted worms which inhabited the more numerous smaller pores. On raising the specimen nearer to the surface of the water, for more careful examination, the animals retreated again into their respective cells, and were seen no more in the living state. Other engagements prohibited the further investigation of the organism on this occasion, and it was placed in spirit for future examination. I have recently satisfied myself that Professor Moseley's interpretation of the Alcyonarian nature of the zooids, associated with the larger pores, is correct. The fact still remains established however, that the exceedingly more numerous smaller pores, are inhabited by a worm allied to *Leucodore*. To what, if any extent, these annelids contribute to the formation of the corallum of *Heliopora*, or to the moulding of its characteristic porous structure, remains to be discovered. As so far investigated, the coral is shown to represent a most interesting example of what is known as "commensalism," or the sharing of a common residence, by two entirely distinct organisms. Much remains yet to fully elucidate the precise relationship that subsists between the two organisms, associated together in *Heliopora cerulea*, as also to make known their developmental histories, and respective histiological details. I propose now, to leave this coral as one among the many attractive lures, calculated to attract the biological student to the marine laboratory, I hope to see established in the near future, at Thursday Island.

While on the subject of commensalism, a passing reference may be made to one or two additional instances of this strange natural phenomenon that attracted my attention in the same district. Among the reefs in the neighbourhood of Thursday Island, are some enormous sea anemones, having not unfrequently an extended diameter of at least two feet, and apparently referable to the genus *Discosoma*. One of these has frequently associated with it a fish, about three inches in length, of a brilliant vermillion hue, with three broad white crossbands, and which I have identified with the *Amphiprion percula* of Lacepede. This fish takes up its abode within the gastric cavity of the anemone, and into which it swims back for refuge after having been dislodged with a stick. In Day's "Fishes of India," an example of the species is described as having been obtained from the stomach of a sea-anemone, the inference being, however, that it found its way there accidentally, and simply as an article of food. No indication concerning its interesting commensal habits is given, either here, or in Macleay's "Fishes of Australia," where it is also recorded.

In a second species of sea-anemone, allied to the one providing board and lodging for the *Amphiprion*, but of rather smaller size, and having the tentacles represented by globular bead-like prominences, I found a singular form of prawn associated in a similar manner. This species was, however, more common in the neighbourhood of Tud, or Warrior, Island. This prawn, which I have not yet had an opportunity of identifying, was further remarkable for being coloured red and white, after the manner of the fish just described. These hues in the two organisms, no doubt, fulfil some important function in the economy of the host or guest, or probably of both. Possibly, it may be that their brilliant colours attract the notice of other predatory fish, and which, on rushing to seize an apparently easy prey, fall victims themselves to the passively expectant sea-anemones. The anemones' guests would thus, in return for secure and comfortable lodgings, enact for their hosts the parts of very effective baits. Among the sea-anemones of the Torres Straits district, noteworthy for their intrinsic beauty, reference may be made to a form frequently found rooted in the sand among the coral pools, and in which the tentacles, which are twenty-four in number, are delicately subdivided, like the fronds of certain ferns. A highly characteristic photograph of an example of this species, of the natural size and in its fully extended condition, was secured. It it apparently referable to the genus *Thalassianthus* of Leuckart.

A subject that could be studied very effectively in connection with a Zoological Station established at Thursday Island, and one that is intimately connected with both practical and scientific interests, is that of the formation and growth of coral reefs. Next to nothing is as yet known concerning the individual rate of growth of the numerous and extensively diverse species of madrepores, that contribute extensively towards the composition of this submarine architecture, and it is only through investigations prosecuted in a persistent and systematic manner, and as they would be under the auspices of such an institution as is here advocated, that anything approaching a comprehensive knowledge of this very complex subject can be acquired. Some of the reef-forming corals undoubtedly increase—as compared with others—at a greatly augmented ratio, in consonance with their structure and their individual conditions of environment. To arrive at an exact knowledge of their specific peculiarities in this respect, living coral masses must be selected and carefully measured from time to time, and their bearings recorded with reference to other corals growing on the same reef. As an experimental step towards the accomplishment of the investigations suggested, I availed myself of the opportunity afforded at Thursday Island, of making a few observations regarding the dimensions and relative proximity of the coral on certain of the most easily accessible reefs, and which observations may subserve as a basis for more systematic investigations in the same direction. In this manner an isolated portion of the reef, on the extreme edge of Vivian Point, Thursday Island, as exposed by the low spring tide early in the month of June, was measured off, and the dimensions and relative positions of the various descriptions of corals growing on it carefully recorded. The substratum of this isolated point of the reef consists of a dense mass of *Porites*, which measures 19 feet in its largest diameter. The several descriptions growing upon it, and whose dimensions have been taken, are referable to the several genera—*Madrepora*, *Pocillopora*, *Meandrina*, *Mussa*, and *Symphyllia*. An adjoining coral block is a grey-green *Astrea*, measuring 8 feet 2 inches across its longest axis. A channel, exactly 2 feet wide in its narrowest point, separated these two coral blocks at the date of measurement. A rough outline plan of the positions and measurements recorded is herewith submitted. It will be an easy task, with the aid of this plan, to ascertain from time to time the extent to which the several coral masses have enlarged their dimensions. The same system of registration is capable of application on an extended scale, throughout considerable areas in the vicinity of Thursday Island, and would be productive of valuable results. The most unerring and efficient assistant in mapping out the salient characters, dimensions, and relative positions of coral growths is, no doubt, the camera. This instrument was somewhat extensively utilised by me for this purpose, both at Thursday Island and various stations connected with the Great Barrier System as far south as Bowen. A reference to these photographs obtained (exhibited) will convey a very tolerable idea of the aspect of various descriptions of coral reefs and coral growth, as exposed to view at extreme low spring tides. The element of colour, however, is the one thing wanting to render the imagery complete. As will be observed, separate varieties of corals predominate in the different views. One of these represents an almost unbroken field or forest, many acres in extent, of a branching *Madrepora*, coloured brown with white or pale yellow tips. In another, a corymbese form of the same genus—*Madrepora*—tinted a dull green with yellow terminations, forms encrusting masses throughout the landscape. Large massive *Astreas*, *Symphyllias*, and *Meandrinas* enter most extensively into the composition of a third series, while a fourth will be found to contain a commingling of species too extensive for enumeration, and presenting, as seen in a state of nature, a variety of form and colour challenging comparison with that of the gayest flower bed.

From a practical point of view, the acquisition of reliable data concerning the rate of growth of coral reefs and of their component corals is of considerable import. There is strong reason for suspecting that a large portion of the reef-forming species increase in dimensions at so appreciable a rate, that waters in the coral seas surveyed and declared safe for navigation, twenty years ago or more, may now contain many hidden dangers arising from the upward growth of isolated or accumulated coral masses. The true nature of the submarine obstacle upon which the ill-fated "Quetta" came to an untimely end, has not yet been determined, though the probabilities are that it is a pinnacle of rock capped with a continually upward growing coral mass, that has within recent times been brought to within striking distance of the keels of deeply laden vessels. That such phenomena are in course of progress was moreover substantially proved by H.M.S. "Rambler," during her recent survey in search of the Thales rock in the direction of the Booby Lightship, to the north west of Thursday

Island. Several uncharted shallow patches were then discovered, and a professional pearl-shell diver being employed to investigate their nature, ascertained that they consisted of recently formed and growing coral. These patches are somewhat out of the accustomed track of the ordinary mail steamers, and are at present of insufficient altitude to constitute a danger to passing shipping. It is anticipated, however, that within a few years' time, they may so increase in proportion as to fall within this category, and I have reccommended that their position should be marked, and a periodical investigation made, in order to determine the rate of growth and altitude of the corals of which they are composed.

Apart from the vital processes by which reefs and their component corals are continually adding to their bulk, there can be but little doubt that a slow motion of upheaval is progressing throughout the region of Torres Straits and the great Barrier system, and this too must tend towards rendering the older charts untrustworthy. The coral reefs volunteer their own evidence upon this point. At many stations throughout this region, the circumstance may be noted that large expanses of dead coral intervene between high water mark and the living banks. This dead coral here referred to, is not the broken *débris* that has been cast up by storms, such as commonly exists all along extreme high water mark, but occurs at a lower level *in situ* as it originally grew, and is only lacking in vitality to distinguish it from the living reefs. The Albany pass, between Cape York and Albany Island, yields a prominent illustration of this phenomenon. On either side of the passage there is a fringing coral reef, the living inner margin of which, composed chiefly of a branching Madrepora, is only exposed at the lowest spring tides. Immediately adjoining this living bank, between it and the foreshore, there is a belt of the same species of coral, but entirely dead and brittle, like rotten ice, to walk upon. Within a few more years this dead belt will no doubt be broken up, by the action of the waves and chemical disintegration, and be added to the existing inshore area of coral mud and *débris*. An examination of the circumstances that have brought about the present condition of the reef, show that this dead belt of coral is now exposed to atmospheric influences, which are antagonistic to its growth, with every ordinary spring tide; while the living coral, as before observed, is only visible above the water at the exceptional or lowest springs At the period that the inner belt of dead madrepora was alive, and which from its state of preservation cannot be long ago, it must have grown at a similar lower level as that now living, and nothing but the general upheaval of the area on which it throve can logically explain the fact of its decadence. The fringing reef off Magnetic Island, near Townsville, presents closely analogous phenomena. Dead bivalve shells of large size, such as *Tridacnas* and *Pinnas*, also occupy their original positions here, in close contiguity to the dead corals. Yet more substantial evidence of the upheaval in this district was afforded me, by a station holder on Magnetic Island, and by whom I was informed that, within the time he had been located there, a very perceptable change had taken place in the small bay facing his property. In former years boats could approach the landing place at all tides, excepting very low springs, whereas now it was not possible to bring a boat in at even ordinary low tide. The shallowing of the water could not be accounted for by the silting-up of the bay, there being no fresh water flow into it, while the rocky bed of the bay itself had apparently been raised to a higher level. The instances now recorded might easily be multiplied. Sufficient have. however, I think, been adduced to indicate how extensive a field for exploration exists in North Queensland, with relation to the growth and composition of coral reefs, and with regard to the geodic phenomena now in course of progress and influencing their development. Thursday Island, as previously suggested, would constitute a most suitable basis for the inauguration of a thoroughly scientific investigation of this very important subject.

To enumerate one tithe of the forms of animal life of economic or scientific import, as yet unnoticed, that would invite attention in connection with a zoological station established at Thursday Island, would be exceeding the object of this address, and the limits of your patient hearing. It will suffice to observe, that every animal group, from the lowest *Protozoa* to the highest, is represented in the Torres Straits district, by forms of special interest to the biologist. It is not even necessary to except from this category the crowning work of creation—the genus *Homo*. As has been proved by the excellent work recently accomplished by Professor Haddon, with reference to the customs and folk lore of the various tribes inhabiting the Torres Straits Islands, in the neighbourhood of Thursday Island, the anthropologist will also find here a mass of the rarest material for investigation.

One small *bonne bouche* I have reserved for the termination of this discourse. The delicacy known as *Palolo* is probably not unknown to many Queenslanders. It is a small marine worm, allied to the genus *Nereis*, that at a certain season of the year appears in vast shoals on the surface of the sea, in the vicinity of Samoa, Tonga, Fiji, and other of the Pacific Islands, and is regarded by the natives as one of the daintiest luxuries that their territories produce. The epoch of its appearance is reported to be confined to two days only, in the months of October and November, and these being the day before and the day upon which the moon enters her last quarter. In anticipation of the forthcoming feast, the natives assemble in numbers, the night previously, at the localities among the reefs where the *Palolo* is to be obtained most abundantly. At dawn of day on the following morning the worms make their appearance in countless myriads, sport on the surface of the water for two or three hours and then mysteriously disappear. On the second day, they appear at the same time in even greater quantities than on the first one, and are ladled into the canoes with the hands, nets, baskets, bowls, or any other available utensils. They are eaten both raw, and tied up in bread-fruit leaves and baked, while large quantities are sent inland by way of barter, or as presents to those who are unable to take part in the fishery.

I am by no means beyond hope that *Palolo* may become a Queensland standard dish Soon after daybreak, on one of the reefs at Thursday Island,—I might intimate, that it is the early bird only that gets the worms, both literally and metaphorically in this case,—I witnessed, in October last year, an assemblage of *Nereids* on the surface of the water, which, though of somewhat smaller size, resembled in form, and manifested all the peculiar movements, described of the *Palolo.* In like manner, they also, within a few hours, entirely disappeared from view. By a close examination of these worms disporting upon the surface of the water, and also isolated in suitable receptacles, and with the aid of the microscope, I was fortunate in discovering the *raison d'être* of their early revels. It was in fact, their general wedding morn, and these their wedding junkettings. Each worm was laden with ova or milt, and which was discharged in little thin milky streams, one from each side of the body, as they swam through the water. The reproductive elements commingling under these conditions were fertilized after the manner of the spawn of certain fishes, such as the *Gadidæ* or cod tribe. It may be taken for granted, that the periodical appearance of the Polynesian *Palolo* at the surface of the water is similarly associated with the animal's propagation. Concerning the Thursday Island variety, it is well worthy of further investigation from both a scientific and gastronomic point of view. Premising a happy combination of the two, we may look forward, in the not very distant future, to a nineteenth century revival of the "Diet of Worms" at the Thursday Island Zoological Station, and which shall be annually discussed by the ministry of North Queensland, with all the dignity and decorum of a Greenwich whitebait dinner.

In conclusion: the keynote of this brief address, viz., the establishment of a zoological station or biological laboratory at Thursday Island, will not, I trust, die away without wakening up some sympathetic chord or chords, that will be in such full harmony with the aspirations and exigencies of the times, that the institution shall become an accomplished fact. The mainstay of such an institution should, no doubt, be the Queensland University. It would be one, however, that should command the support of every Australasian scientific society, and more especially that of the Australian Association for the Advancement of Science, and from whom, when the time is ripe, material assistance may, no doubt, be depended on. The Queensland Royal Society will also, I trust, when that day arrives, be in the position to take a leading part in the establishment and maintenance of an institution capable of yielding the highest practical and scientific results, and of which, moreover, it will possess some claim for recognition as having given birth to the germ of its initiation.

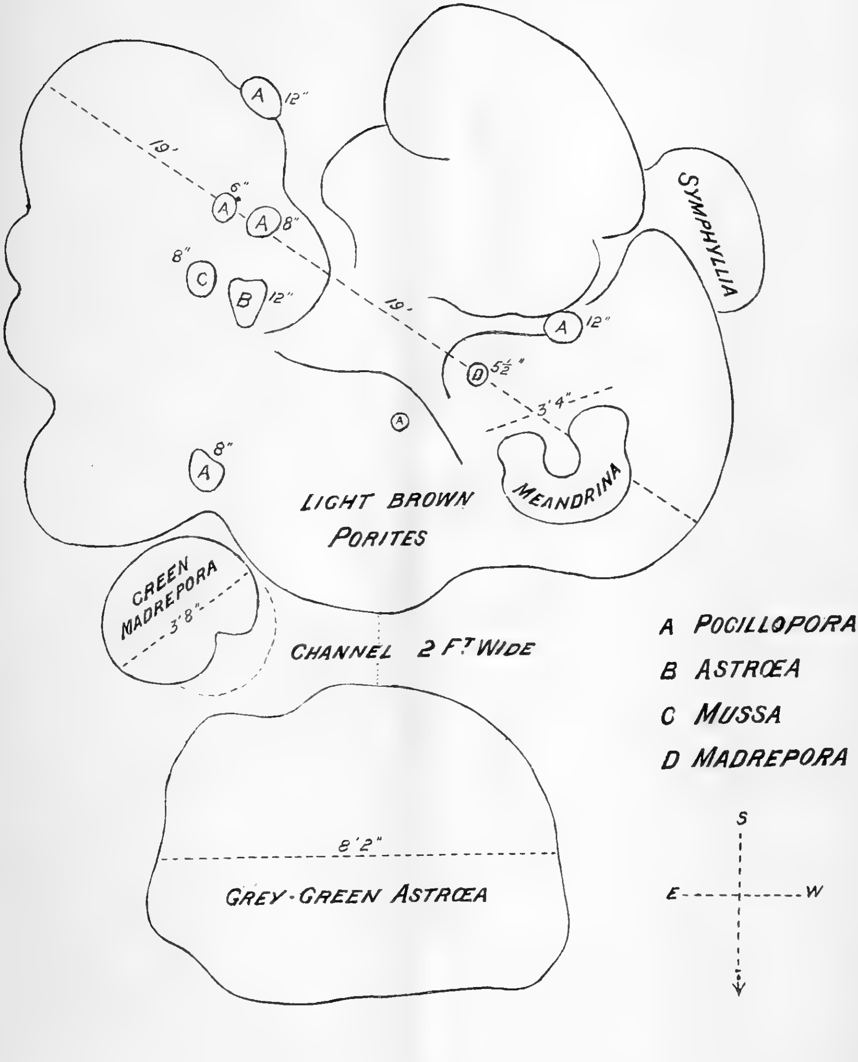
The President (Mr. F. M. Bailey, F.L.S.) remarked that the address that had just been delivered was one of the most interesting he had ever been privileged to listen to, and expressed the hope that Mr. Saville-Kent would favour the Society with many more papers of a similar character.

Mr. L. A. Bernays, in moving a vote of thanks to the retiring President for his address, said that if the ladies and gentlemen present had listened to it with the keen interest that he (Mr. Bernays) had, they must have been largely impressed with the advantage of having in the colony a gentleman of Mr. Saville-Kent's scientific attainments. His paper had shown that not only was he a scientist in the technical sense of the term, but one who could explain his investigations in such a manner that they were interesting and readily understood by the common and non-technical mind.

Mr. Palmer, M.L.A., seconded the motion, and stated his concurrence with the views of the mover in respect to the address. The more scientific portions of it were highly interesting, but it was the practical way in which the subject was dealt with that impressed his mind. Unless science was addressed to the practical part of life in the colony, it would not be greatly taken notice of, for this was a utilitarian age. One difficulty in connection with the establishment of a university in Queensland was the fear that it would not beneficially affect matters practical. But there was no doubt that Mr. Saville-Kent's suggestion as to the advisableness of establishing a

Plate No. I.

Plate No. II.



GROUND-PLAN OF LIVING CORAL BLOCKS AT THE EXTREME END OF VIVIEN POINT, THURSDAY ISLAND. AS EXPOSED AT LOWEST EBB OF SPRING TIDE. JUNE 9TH 1890.

laboratory in connection with the university, for the purpose of obtaining knowledge of the diseases which militated against the growth and propagation of animals and vegetables in the colony, was a very valuable one. An instance had already been given of the value which the operations of such a laboratory might attain to—namely, in the discovery of the germs of pleuro-pneumonia; and he thought nothing more conducive to the establishment of such a laboratory could happen than the founding of a Queensland University. He hoped that, when the time came, everyone taking the slightest interest in the advancement of human knowledge would do their utmost to help on the movement.

The motion was carried with acclamation, and Mr. Saville-Kent expressed his high sense of the compliment paid him.

The Hon. A. Norton proposed a vote of thanks to the retiring officers, which Mr. D. O'Connor seconded.

Mr. W. J. Ryott-Maughan, in responding, said that it should not be imagined that, because the finances were not always in a good condition, the Society was not doing good work. All things considered, the members might congratulate themselves that the scientific work done, and also the attendance of members at the meetings of the Society, compared very favourably with kindred institutions in Melbourne, Sydney, and Adelaide.

The Hon. Secretary was instructed to convey to the Honorary Auditor, Mr. A. J. Turner, the thanks of the Society, in writing, for his past services.

This concluded the business of the adjourned annual meeting.

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CONTENTS.

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1. Members whose Subscriptions are in arrears are requested to forward same to the Honorary Secretary.

2. The Annual Subscriptions are payable in advance and should be forwarded to the Honorary Secretary on the first day of January in each year.

A REVISION OF THE AUSTRALIAN SPHINGIDÆ.

By W. H. Miskin, F.L.S., F.E.S.

[*Read before the Royal Society of Queensland, 13th March, 1891*]

No attempt has hitherto beem made to present in one article the various Australian Species of this Family, and the material that has been published to date thereon. In the present paper it is proposed to supply this desiderata, and an experience of twenty years' study of the subject in Queensland, during which many of the species have been observed in their several stages, and most of them captured on the wing, the whole with five exceptions being contained in his collection, affords the writer exceptional facilities, and some authority for undertaking the subject. It is only of late that the numerous scientific works bearing on the matter have sufficiently accumulated in colonial libraries, however, to permit of the completion of the work.

My synonymic catalogue of the Australian Rhopalocera, bringing that division up to date, now in the press, and Mr. Meyrick's work on the Micro-Lepidoptera, and several groups of Bombycites and Geometrites will, with the present paper, constitute a considerable advance towards a complete publication of the known Australian Lepidopterous fauna to date.

SYNOPSIS OF THE SPECIES.

Order—LEPIDOPTERA.

Section—HETEROCERA.

Family—SPHINGIDÆ, *Horsf.*

Sub-Family I.—MACROGLOSSINÆ, *Bois.*

Genus 1: *HEMARIS*, *Dalm.*

1. H. Kingii, *Macl.*
2. H. Hylas, *Lin.*
3. H. Janus, *Misk.*

Genus 2: *MACROGLOSSA*, *Ochs.*

4. M. Errans, *Walk.*
5. M. Approximata, *Walk.*
6. M. Micacea, *Walk.*
7. M. Nox, *Butl.*

Sub-Family II.—CHÆROCAMPINÆ, *Butl.*

Genus 3: *ACOSMERYX*, *Bois.*

8. A. Miskini, *Murray.*
9. A. Sericeus, *Walk.*
*10. A. Cinnamomea, *Herr. Schf.*

Genus 4: *PANACRA*, *Walk.*

11. P. Lignaria, *Walk.*
12. P. Joanna, *Kirb.*
13. P. Testacea, *Walk.*

Genus 5: *CIZARA*, *Walk.*

14. C. Ardenia, *Lewin.*

Genus 6: *CHÆROCAMPA*, *Dup.*

15. C. Thyelia, *Lin.*
16. C. Pinastrina, *Martyn.*
17. C. Phœnix, *Koch.*
18. C. Oldenlandiæ, *Fab.*
19. C. Celerio, *Lin.*
*20. C. Yorkii, *Bois.*
21. C. Scrofa, *Bois.*
22. C. Erotus, *Cram.*
23. C. Nessus, *Dru.*
24. C. Clotho, *Dru.*
25. C. Cleopatra, *Misk.*
26. C. Cloacina, *Misk.*
27. C. Latreillii, *Macl.*
28. C. Tryoni, *Misk.*
29. C. Pallida, *Misk.*
*30. C. Walduckii, *Butl.*
*31. C. Inornata, *Walk.*

Genus 7: *DEILEPHILA*, *Ochs.*

32. D. Livornica, *Esp.*

Genus 8: *DAPHNIS*, *Hub.*

33. D. Hypothous, *Cram.*
34. D. Protrudens, *Feld.*

Sub-Family III.—AMBULICINÆ, *Butl.*

Genus 9: *AMBULYX*, *Westw.*

35. A. Wildei, *Misk.*

Sub-Family IV.—SMERINTHINÆ, *Bois.*

Genus 10: *CŒQUOSA*, *Walk.*

36. C. Australasiæ, *Don.*
37. C. Triangularis, *Don.*

Sub-Family V.—SPHINGINÆ, *Butl.*

Genus 11: *PROTOPARCE*, *Burm.*

38. P. Convolvuli, *Lin.*
39. P. Abadonna, *Fab.*
40. P. Minimus, *Misk.*

Genus 12: *MACROSILA*, *Walk.*

41. M. Casuarinæ, *Walk.*
42. M. Severina, *Misk.*
43. M. Edwardsi, *Olliff.*
44. M. Bethia, *Kirb.*

Genus 13: *NEPHELE*, *Hub.*

45. N. Subvaria, *Walk.*

Those species with which I am unacquainted, except by name and description, are indicated by an asterisk prefixed to the name.

Order—LEPIDOPTERA, *Lin.*

Section—HETEROCERA, *Bois.*

Family—SPHINGIDÆ, *Westw.*

Int. Mod. Class. Ins. II. p. 364 (1840); *Walk.* B. M. Cat. Lep. Het. VIII. p. 76 (1856); *Horsf.* Cat. Lep. E. I. C. I. p. 257 (1857).

Sphingides, Bois. Sp. Gen. Het. I. p. 2 (1874).

Sub-Family I.—MACROGLOSSINÆ, *Butl.*

Trans. Z. Soc. IX. p. 516 (1875); *Moore* Lep. Cey. II. p. 26 (1882-3).

Macroglossides, Bois. Sp. Gen. Het. I. p. 289 (1874).

Genus 1: *HEMARIS, Dalm.*

Vet. Akad. Handl. p. 207 (1816).

Sesia. part. Fab. Ent. Syst. III. 1. p. 379 (1793); *Walk.* B. M. Cat. Lep. Het. VIII. p. 84 (1856).

Cephonodes, part. Hub. Verz. bek. Schmett, p. 131 (1818-25); *Wallen*, Ofvers. Kongl. vet. Akad. Forh. p. 139 (1858); *Moore*, Lep. Cey. II. p. 31 (1882-3).

Potidæa, Wallen. Kong. Sven. Vet. Akad. Handl. (1865).

Macroglossa, part. Ochs. Schmett. Eur. IV. p. 41 (1816).

1. H. Kingii, *Macl.*

(*Macroglossum, K.*) Kings. Surv. Aust. II. p. 465, n. 167 (1827); *Kirb.* Trans. E. Soc. p. 233 (1877); *De Cerisy* M. S.

Sesia. Cunninghami, Walk. B. M. Cat. Lep. VIII. p. 85 (1856); *Schaufuss.* (*Mac. C*). Nunquam Otiosus. I. p. 22 (1870); *Bois.* (*Mac. C*). Sp. Gen. Het. I. p. 375, n. 69, t. 33, f. 5 (1874).

Hem. Hylas, Butl. Trans. Z. Soc. IX. p. 522, n. 24 (1875).

Hab.: Brisbane and Rockhampton.

This species is well distinguished from *Hylas.* by the wide apical brown band of primaries, and the yellowish-green basal areas of both wings, well delineated in Boisduval's figure, which exactly represents our insect. I have bred it abundantly and found no variation. It feeds on Gardenia. Butler's figure (T. Z. Soc., 1875, t. 90, f. 6) of *Mac. Belis.* so precisely agrees with our larva that a description of it here is rendered unnecessary. Our pupa is rather darker in colour than in his figure.

2. H. Hylas. *Lin.*

(*Sphinx H.*) Mant. I. p. 539 (1771); *Fab.* (*Sp. H.*) Sp. Ins. II. p. 154 (1781); Mant. Ins. II. p. 99, n. 4 (1787); Ent. Syst. III. 1, p. 379, n. 3 (1793); *Gmelin.* (*Sph. H.*); Syst. Nat. I. 5, n. 2387 (1795); *Turton.* (*Sp. H.*); Syst. Nat. *Lin.* III. p. 179 (1806); *Hub.* (*Ceph. H.*), Verz. bek. Schmett, p. 131 (1816); *Walk.* (*Ses. H.*) B. M. Cat. Lep. Het. VIII. p. 84 (1856); *Horsf. & Moore* (*Ses. H.*) Cat. Lep. E. I. C. I., t. 8, f. 1, 1A larva (1857); *Bois.* (*Mac. H.*), Sp. Gen. Het. I. p. 376, n. 72 (1874); *Butl.* Trans. Z. Soc. IX. p. 522, n. 24, t. 90, f. 4, 5 (larva and pupa) (1875); *Moore* (*Ceph. H.*) Lep. Cey. II. p. 31, t. 93, f. 4, 4A, 4B (1882-3); *Swin.* (*Ceph. H.*) Proc. Z, Soc. p. 287 (1885); *Saalmuller.* Lep. Madag. I. p. 117, t. 3, f. 40 (—).

Sp. Picus. Cr. Pap. Ex. II. p. 83, t. 148, f. B. (1779); *Koll.* (*Mac. P.*) Hug. Kasch. IV. 11. p. 458 (1848).

Mac. Apus. Bois. Faun. Madag. p. 79, n. 2, t. 10, f. 4 (1833).

Hab.: Brisbane, Rockhampton, and Mackay; Japan, China, Philippines, Molucca, Penang, Nepal, India, Ceylon, S. and W. Africa.

Butler's figure of the larva of this species presents such an extraordinary diversity of appearance from that of the preceding species as to raise doubts in my mind of its correct application to Hylas, considering how nearly allied the two insects are. Horsfield and Moore's figure is not from life, which will account for its shortcomings. The copy of Moore's Lep. of Ceylon to which I have referred, is, unfortunately for me, deficient of the part containing this genus.

3. H. Janus. *n. sp.*

Wings transparent, hyaline; veins black. *Primaries:* costal margin narrowly black; apex rather wider black; outer margin very narrowly black. *Secondaries:* costal margin, for about half way, narrowly yellowish-brown; abdominal margin wholly the same. Antennæ, black. Head and thorax, greenish-yellow. Abdomen, sordid ochreous-yellow. Anal brush, black; reddish-yellow at side extremities. Underside: darker parts of both wings near base, ochreous-yellow. Head and body, light yellow.

Exp.: ♂ 56 mm.; ♀ 60 mm.

Hab.: Brisbane and Rockhampton. (Coll.: Miskin).

This species in marginal development of wings pretty closely resembles *Hylas*; it is well distinguished, however, by its smaller size, and difference in colour of body and brush, but most conclusively by the entire absence of dorso-abdominal band.

Genus 2: *MACROGLOSSA*, *Ochs.*

Schmett. Eur. IV. p. 41 (1816); *Walk.* B.M. Cat. Lep. Het. VIII. p. 85 (1856); *Horsf. & Moore* Cat. Lep. E.I.C. p. 261 (1857); *Bois.* Sp. Gen. Het. I. p. 332 (1874); *Moore*, Lep. Cey. II. p. 28 (1882-3).

Macroglossum, *Scop.* Ent. Carn. p. 414 (1763); *Swain*, Zool. Ill. Ser. I. t. 64 ( )

Rhamphoschisma, *Feld.* Reise. Nov. Lep. IV. t. 75, f. 7 (1874); *Moore*, Lep. Cey. II. p. 26 (1882-3).

4. M. Errans, *Walk.*

B.M. Cat. Lep. Het. VIII. p. 96, n. 20 (1856); *Bois.* Sp. Gen. Het. I, p. 352, n. 32 (1874); *Butl.* Trans. Z. Soc. IX. p. 529, n. 38 (1875).

Rham. Scottiarum, *Feld.* Reise. Nov. Lep. II. t. 75, f. 8 (1868); *Bois.* Sp. Gen. Het. I. p. 354, n. 35 (1874); *Butl.* Trans. Z. Soc. IX. p. 529, n. 35 (1875).

Hab.: Brisbane, Rockhampton, and Bowen.

This species is variable in the development of the white transverse band of primaries; in some specimens it is barely discernible. Felder's insect is undoubtedly not distinct.

5. M. Approximata, *Walk.*

B. M. Cat. Lep. Het. Supp. XXXI. p. 27 (1861); *Butl.* Trans. Z. Soc. IX. p. 524, n. 6 (1875).

Hab.: Cardwell.

This species is very close to *Errans*, but from its restricted range may be safely considered distinct.

6. M. Micacea, *Walk.*

B. M. Cat. Het. VIII. p. 96, n. 21 (1856); *Bois.* Sp. Gen. Her. I. p. 356 (1874); *Butl.* Trans. Z. Soc. IX. p. 529, n. 39 (1875).

M. Nox. Newm. (*nec. Butl.*) Trans. E. Soc., ser. 2, IV. p. 54 (1857).

M. Ethus, Bois. M. S.

Hab.: Brisbane and Rockhampton.

There can be no doubt from Newman's description that his insect is referable to this species.

7. M. Nox. *Butl.*

(*nec. Newm.*) Proc. Z. Soc. p. 5, t. 1, f. 6 (1875); Trans. Z. Soc. IX. p. 529, n. 40 (1875).

Hab.: Mackay and Cardwell.

This is a North Queensland form, never taken in Brisbane. Butler's figure does not do justice to the steely splendour of this insect.

Sub-Family II.—CHÆROCAMPINÆ, *Butl.*

Trans. Z. Soc. IX. p. 516 (1875); *Moore* Lep. Cey. II. p. 13 (1882-3).

Deilephiliæ. Bois. Sp. Gen. Het. I. p. 158 (1874).

Genus 3: *ACOSMERYX, Bois.*

Sp. Gen. Het. I. p. 214 (1874); *Butl.* Proc. Z. Soc. p. 245 (1875); *Moore,* Lep. Cey. II. p. 23 (1882-3).

Philampelus, part. Harr. Amer. Jour. Sc. XXXVI. p. 299 (1839); *Walk.* B. M. Cat. Het. VIII. p. 173 (1856).

Daphnusa, Walk. l. c. p. 237 (1856); *Bois.* Sp. Gen. Het. I. p. 51 (1874).

8. A. Miskini, *Murray.*

(*Daph. M.*). Cist. Ent. I. p. 178 (1873); *Kirb.* (*Ac. M.*) Trans. E. Soc. p. 234 (1877); *Butl.* (*Ac. m.*) l. c. p. 396 (1877); Trans. Z. Soc. IX. p. 544, n. 4 (1875).

Ac. Daulis. Bois. Sp. Gen. Het. I. p. 218, n. 5 (1874).

Ac. Cinerea. Butl. P. Z. Soc. p. 245, n. 18 (1875); *Moore,* Lep. Cey. II. p. 24, t. 89, f. 2, 2a. (larva and pupa) (1882-3).

Hab.: Newcastle, Brisbane, Rockhampton; India and Ceylon.

This may be identical with *Anceus* (*Ancetus* in index) of Cramer (Pap. Ex. IV. t. 355, f. A.) but is not easily reconcileable.

9. A. Sericeus, *Walk.*

(*Phil. S*). B. M. Cat. Het. VIII. p. 181 (1856); *Horsf. and Moore* (*Phil. S*). Cat. Lep. E.I.C.I. p. 271 (1857); *Butl.* (*Ac. S*). Trans. Z. Soc. IX. p. 544, n. 2 (1875); Ill. Typ. Lep. Het. B.M. V. p. 1. t. 78, f. 2 (1881).

Ac. Anceoides, Bois. Sp. Gen. Het. I. p. 216, n. 2 (1874).

Hab.: Brisbane and Cardwell; India.

*10. A. Cinnamomea, *Herr. Schff.*

(*Enyo. C.*) Ex. Schmett. II. p. 3, f. 558 (1869); *Butl.* (E. ? C.) Trans. Z. Soc. IX. p. 542 (1875); *Kirb.* (*Ac. C.*) Trans. E. Soc. p. 234 (1877); *Butl.* (*Ac. C.*) l. c. 396 (1877).

Hab.: N. Australia.

It is difficult to say what Herrich Schff's figure is intended for. I have never seen anything like it. It is, doubtless, like many other of his figures, excessively over-coloured, and I should not be much surprised if Mr. Kirby's surmise was correct.

Genus 4: *PANACRA*, *Walk.*

B. M. Cat. Het. VIII. p. 154 (1856); *Bois.* Sp. Gen. Het. I. p. 285 (1874); *Moore* Lep. Cey. II. p. 24 (1882-3).

Perigonia, *Walk.*, B. M. Cat. Het. VIII. p. 100 (1856); *Bois.* Sp. Gen. Het. I. p. 320 (1874).

Angonyx. Bois. l. c. 317 (1874).

11. P. Lignaria, *Walk.*

B. M. Cat. Het. VIII. p. 156 (1856); *Bois.* Sp. Gen. Het. I. p. 288, n. 6 (1874); *Butl.* Trans. Z. Soc. IX. p. 551, n. 16 (1875).

Hab.: Brisbane, Mackay, and Cape York.

Vigil of *Guer*, *Bois.*, and *Moore*, which is apparently synonymous with *Phenyx* of *Herr. Schff* and *Bois.*, is certainly very close to our species, but from Herr. Schff and Moore's figures is altogether lighter coloured and a smaller insect.

Phenix of *Koch* is quite another species—a Chœrocampa. There can be no doubt of this, as I had the name from that author to specimens sent him by me.

12. P. Joanna, *Kirb.*

(*Chœ. J.*) Trans. E. Soc. p. 236, 241 (1877).

P. Maculiventris, *Walk.*, M.S.

Hab.: Brisbane.

13. P. Testacea, *Walk.*

(*Peri. T.*) B. M. Cat. Lep. Het. VIII., p. 102, n. 3 ♂ (1856); l. c. XXXI. p. 29 (1864); *Bois.* (*Peri.? T.*) Sp. Gen. Het. I. p. 329, n. 15 (1874); *Butl.* Trans. Z. Soc. IX. p. 550, n. 2 (1875); *Moore*, Lep. Cey. II. p. 26, t. 89, f. 1 (1882-3).

Angonyx. Emilia. Bois. Sp. Gen. Het. I., p. 318, t, 8, f, 1 ♂ (1874).

Pan. Ella. Butl. P. Z. Soc. p. 246 (1875); Trans. Z. Soc, p. 550, t, 92, f. 7 ♀ (1875).

Hab.: Cairns; Ceylon and India.

Butler's figure of *Ella* is doubtless from a faded specimen; the green is apt to turn yellowish.

Genus 5: *CIZARA*, *Walk.*

B. M. Cat. Lep. Het. VIII., p. 119 (1856).

14. C. ARDENIA, *Lewin.*

(*Sp. A.*) Lep. Ins. N.S.W., p. 3, t. 2, (larva) (1822); *Bois.* (*Dail. A.*) Voy. Astr. Lep. p. 183 (1832); *Walk.* B. M. Cat. Lep. Het. VIII., p. 120 (1856); *Bois.* (*Zon. A.*) Sp. Gen. Het. I., p. 148 (1874); *Butl.* Trans. Z. Soc. IX., p. 552 (1875).

Hab.: Sydney and Brisbane.

Genus 6: *CHÆROCAMPA*, *Dup.*

Hist. Nat. Lep. Fr. Supp. II. p. 159 (1835); *Walk.* B. M. Cat. Lep. Het. VIII. p. 125 (1856); *Bois.* Sp. Gen. Het. I. p. 223 (1874).

Deilephila, part. Ochs. Schmett. Eur. IV. p. 42 (1816).

Theretra, part. Hub. Verz. bek. Schmett. p. 135 (1818-25); *Moore* Lep. Cey. II. p. 21 (1882-3).

Hippotion, part. Hub. Verz. bek. Schmett. p. 135 (1812-25); *Moore* Lep. Cey. II. p. 16 (1882-3).

Xylophanes, part. Hub. Verz. bek. Schmett. p. 136 (1818-25); *Moore* Lep. Cey. II. p. 17 (1882-3).

Oreus, Isoples, Amphion, et *Thaumas, part. Hub.*

Metopsilus, part. Duncan. Nat. Lib. Brit. Moths. p. 154 (1836).

Hathia, part. Moore. Lep. Cey. II. p. 19 (1882-3).

15. C. THYELIA, *Lin.*

(*Sp. T*). Mus. Ulr. p. 360 (1764); Syst. Nat. I. 2. p. 803 (1767); *Clerck* (*Sp. T.*), Icones, t. 46, f. 4, [? f. 7 8] (1759-64); *Fab.* (*Sp. T.*) Sp. Ins. II. p. 153 (1781); Mant. Ins. II. p. 98 (1787); Ent. Syst. III. 1. p. 378 (1793); *Turt.* (*Sp. T.*) Syst. Nat. III. p. 178 (1806); *Horsf. and Moore.* Cat. Lep. E.I.C. I. p. 276 (1857); *Bois.* Sp. Gen. Het. I. p. 231 (1874).

Sp. Theylia. Cram. Pap. Exot. III. p. 58, t. 226, f. E. F. (1782); *Hub. (Isop. T).* Verz. bek. Schmett. p. 135 (1816); *Butl.* Trans. Z. Soc. IX. p. 556, n. 13 (1875); *Moore (Isop. T.)* Lep. Cey. II. p. 19, t. 84, f. 5 (1882-3); *Forsayeth* Trans. E. Soc. p. 388, t. 15 (larva) (1884); *Swin.* Proc. Z. Soc. p. 288, n. 13 (1885).

Sp. Octopunctata. Gmelin. Syst. Nat. I. 5, p. 2386 (1790).

Sp. Boerhaviæ, Fab. Syst. Ent. p. 542, n. 22 [1775]; *Sulz.* [*Sp. B.*] Gesch. Ins. p. 40, t. 20, f. 3 [1776]; *Fab.* [*Sp. B*]. Sp. Ins. II. p. 148 [1781]; Mant. Ins. II. p. 96 [1787]; Ent. Syst. III. 1. p. 371 [1793]; *Turton* [*Sp. B*]. Syst. Nat. *Lin.* III. p. 175 [1806].

Sp. Pluto. Fab. Sp. Ins. II. p. 148 [1781].

Sp. Eson. Cram. Pap. Ex. III. p. 57, t, 226, f. C [1782]; *Hub.* [*Isop. E*]. Verz. bek. Schmett. p. 135 [1816]; *Walk.* [*Ch. E*]. B. M. Cat. Lep. Het. VIII. p. 137 [1856].

Deil. Rafflesii, Horsf. M. S. [1826].

C. Charis. Bois. Sp. Gen. I, p. 236, t. 30, f. 4 (1874).

Hab: Brisbane, Cardwell; China, India, Sarawak, Ceylon, and Canara

16. C. Pinastrina, *Martyn.*

(*Sp. P.*) Psyche, t. 30, f. 85. (1797); *Moore* (*Xyloph. P.*) Lep. Cey. II. p. 18. t. 87, f. 2 (1882-3).

C. Silhetensis, Walk. B.M. Cat. Lep. Het. VIII. p. 143 (1856); *Schaufuss.* Nunquam. Otiosus. p. 17 (1870); *Butl.* Trans. Z. Soc. IX. 560, n. 32, t. 92, f. 8—larva—(1875), Ill. Typ. Lep. Het. B.M. V. p. 8, t. 79, f. 6 (1881); *Bois.* (*Deil. S.*) M.S.

C. Bisecta. Horsf. and Moore. Cat. Lep. E.I.C. I. p. 298, t. 11, f. 5A—larva—(1857); *Horsf.* M.S. (1826).

C. Intersecta., Butl. P. Z. Soc. p. 623 (1875); Trans. Z. Soc. IX. p. 638 (1875).

Hab.: Brisbane and Rockhampton; Java, India, and Ceylon.

17. C. Phœnix, *Koch.*

Ind. Aust. Lep. Faun. II. p. 53 (1873).

C. Margarita, Kirb. Trans. E. Soc. p. 240 (1877).

Hab.: Brisbane and Rockhampton.

The *Phœnyx* of Herr. Schff is a *Panacra.* near to *P. Lignaria*, which see (No. 11.)

18. C. Oldenlandiæ. *Fab.*

(*Sp. O.*) Sp. Ins. II. p. 148, n. 37 (1781); Mant. Ins. II. p. 96, n. 41 (1787); Ent. Syst. III. 1, p. 370, n. 44, (1793); *Turton* (Sp. O); Syst. Nat. Lin. III. p. 174 (1806); *Lewin.* (*Sp. O*). Lep. Ins. N.S.W. p. 4, t. 3—larva—(1822); *Thon.* (*Sp. O*). Ent. Archiv. Pt. I, t. 1, f. 3, p. 6 (1828); *Bois.* (*Deil. O*). Voy. Astr. Lep. p. 184, n. 2 (1832); *Walk*, B. M. Cat. Lep. Het. VIII. p.142 (1856); *Horsf. and Moore* Cat. Lep. E.I.C. I. p. 278, t. 11, f. 4, 4A,—larva—(1857); *Koch.* Ind. Aust. Lep. Faun. II. p. 53 (1873); *Bois.* Sp. Gen. Het. I. p. 242, n. 22 (1874); *Butl.* Trans. Z. Soc. IX. p. 559, n. 29, t. 91, f. 1,—larva—(1875); *Kirb.* Trans. E. Soc. p. 235 (1877); *Moore* (*Xyl. O*). Lep. Cey. II. p. 17, t. 85, f, 1, 1A.—larva—(1882-3); *Forsay.* Trans. E. Soc. p. 390 (1884); *Swin.* Proc. Z. Soc. p. 514 (1884).

? *Sp. Lycetus. Cram.* Pap. Ex. I. p. 96, t. 61, f. D. (1779); *Fab.* (*Sp. L*). Mant. Ins. II. p. 96, n. 42. (1787); Ent. Syst. III. 1. p. 371, n. 45 (1793); *Turton* (*Sp. L*). Syst. Nat. Lin. III. p. 174 (1806); *Hub.* (*Xyl. L*). Verz. bek. Schmett. p. 136, n. 1457 (1816); *Walk.* (*Ch. L*). B. M. Cat. Lep. Het. VIII. p. 143, n. 126 (1856); *Herr. Schff* (*Ch. L*). Ex. Schmett, II. p. 3, f. 557 (1869); *Butl.* (*Ch. L*). Trans. Z. Soc. IX. p. 560 (1875).

Xyl. Gortys, Hub. Samml. Ex. Schmett. p. 58, f. 513-14 (1806).

Sp. Argentata, Haw. Ent. Trans. I. p. 334. (1812); *Steph.* (*Deil. A*). Ill. I. p. 130 (1828); *Wood.* Ind. Ent. Supp. f. 28 (1839); *Butl.* (*Ch. A*). P. Z. Soc. p. 8, t. 2, f. 3 (1875); Trans. Z. Soc. IX. p. 559, n. 30 (1875).

Ch. Firmata, Walk. B. M. Cat. Lep. Het. VIII. p. 148 (1856).

Hab.: Newcastle, Brisbane, Cardwell; Java, Sumatra, Celebes, Manilla, China, India.

Cramer's figure and description is, I think, intended for this species, but his figure leaves some room for doubt. I have not thought it advisable, therefore, to give his name the precedence, to which the priority of date would otherwise entitle it.

About *Argentata* and *Firmata* there is no doubt. Larva tolerably common on Balsamia.

19. C. Celerio, *Lin.*

(*Sp. C.*) Syst. Nat, I. 2, p. 800, n. 12 (1767) ; *Cram.* (*Sp. C.*) Pap. Ex, II. p. 42, t. 125, f. E. (1779) ; *Fab.* (*Sp. C*). Sp. Ins. II, p. 151 (1781) ; Mant. Ins. II. p. 97, n. 54 (1787) ; Ent. Syst. III. 1 p. 370, n. 43 (1793) ; *Turton.* Syst. Nat. Lin. III. p. 174 (1806) ; *Hub.* (*Hipp. C*). Verz. bek. Schmett. p. 135, n. 1450 (1816) ; *Steph.* (*Deil. C*). Ill. Brit. Ent. Haust. I. p. 128 (1828) ; *Dup.* Lep. France Supp. II. p. 159 (1835) ; *Bois.* (*Deil. C*). Ind. Meth. Eur. Lep. p. 47 (—) ; *Steph.* Cat. Brit. Lep. p. 28 (1850) ; *Walk.* B. M. Cat. Lep. Het. VIII. p. 128. (1856) ; *Staint.* Brit. Butl. I. p. 96. (1857); *Horsf. and Moore* Cat. Lep. E.I.C. I. p. 274, t. 2, f. 1, 1a,—larva—(1857) ; *Chenu.* (*Deil. C*). Enc. Hist. Nat. Pap. p. 264, f. 468 (1869) ; *Bois.* Sp. Gen. Het. I. p. 238, n. 18 (1874) ; *Butl.* Trans. Z. Soc. IX. p. 557, n. 23. (1875) ; *Kirb.* Ent. M. Mag. XIV. p. 185 (1877) ; *Green* Entom. XIV. p. 255 (1881) ; *Auriv.* Vet. Akad. Handl. XIX. p. 139, n. 5 (1882) ; *Moore* (*Hipp. C*). Lep. Cey. II. p. 16, t. 84, f. 4 (1882-3) ; *Forsay.* Trans. E. Soc. p. 388 (1884) ; *Swin.* P. Z. Soc. p. 513 (1884) ; l. c. 288 [1885].

Sp. Tisiphone, Lin, Mus. Ulr. p. 359 [1704]; Syst. Nat. XII. Ed. p. 803 n. 23 [1767].

Phalæna Inquilina, Harris, Ex. p. 93, t 28, f. 1. [1781].

Hipp. Ocys. Hub. Verz. bek. Schmett. p. 135 [1816].

Hab. : South Australia, Victoria, New South Wales, Brisbane, Rockhampton, Europe, E. W. and S. Africa, Madagascar, Mauritius, Ceylon, India, Java, Malay Archipelago.

I have had the larva feeding on grape vines.

*20 C. Yorkii, *Bois.*

Sp. Gen. Het. I. p. 248 [1874]; *Butl.* Trans. Z, Soc. IX. p. 631 [1875]; *Kirb.* Trans, E. Soc. p. 236. [1877].

Hab.: Cape York.

I cannot identify this description with anything with which I am acquainted.

21. C. Scrofa, *Bois.*

[*Deil. S*]. Voy. Astr. Lep. p. 185, n. 3 [1832]; *Walk.* B. M. Cat. Lep. Het. VIII. p. 147 [1856]; *Bois.* Sp. Gen. Het. I. p. 235 [1874]; *Butl.* Trans. Z. Soc. IX. p. 566, n. 72 [1875]; *Kirb.* Trans. E. Soc. p. 236 [1877].

Deil. Porcia, Wallen. Wien. Ent. Mon. IV. p. 42 [1860].

C. Ignea. Butl. P. Z. Soc. p. 10. t. 1, f. 4 (1875); Trans. Z. Soc. IX. p. 566, n. 73 (1875); *Kirb.* Trans. E. Soc. p. 236 (1877).

Hab.: Tasmania, South Australia, Victoria, Newcastle, Brisbane, Rockhampton.

Butler's figure represents the ordinary form of the ♀; Koch's name *Bernardus* (undescribed) was applied to a fresh example of the other sex, which presents a bluish-grey tinge on primaries.

22. C. Erotus, *Cram.*

[*Sp. E*]. Pap. Ex. III. t. 104, f. B. [1779]; *Fab.* [*Sp. E*]. Mant. Ins. II. p. 95 [1787]; Ent. Syst. III. 1. p. 365, n. 28 [1793]; *Turton* [*Sp. E*]. Syst. Nat. Lin. III. p. 172. [1806]; *Hub.* [*Chromis. E*]. Verz. bek. Schmett, p. 138. n, 1479 [1816]; *Walk.* B. M. Cat. Lep. Het. VIII. p. 146 [1856]; *Koch.* Stett. Ent. Zeit. p. 239 [1871]—note; *Bois.* Sp. Gen. Het. I. p. 250, n. 31 [1874]; *Butl.* Trans. Z. Soc. IX. p. 566, n. 76 [1875].

Deil. Eras, Bois. Voy. Astr. Lep. p. 185, n. 4 [1832]; *Feisth.* Voy. Fav. t. 5, f. 2 [1829]; Mag. Zool. Ins. t. 21, f. 2. [1839]; *Walk.* [*Darap. Eras*]. B. M. Cat. Lep. Het. VIII. p. 186, n. 3. [1856]; *Butl.* [*Ch. Eras*]. Trans. Z. Soc. IX. p. 567, n. 78 [1875].

Gnathothlibus. Erotoides, Wallen. Wien. Ent. Mon. IV. p. 43, n. 44 [1860]; *Walk.* [*Ch. E*]. B. M. Cat. Lep. Het. VIII. p. 146, n. 34 [1856]; *Butl.* [*Ch. E*]. Trans. Z. Soc. IX. p. 566, n. 77 [1875].

Deil. Sapor, ♂ *Bois.* M. S.

Hab.: Newcastle, Brisbane to Cape York, Solomon Islands, New Caledonia, Tahiti, Navigator's Islands.

The larva is exceedingly common on grape vine. The reference by Mr. Tepper [Native Insects of South Australia II, p 15] to *C. Pallicosta, Walk.* is evidently applicable to *C. Scrofa, Bois.* *Pallicosta* is a near ally of *Erotus. Cram.* but is certainly a distinct species.

23. C. Nessus, *Drury.*

[*Sp. N*]. Ill. Ex. Ins. II. p. 46, t. 27, f. 1. [1773]; *Cr.* [*Sp. N*]. Pap, Ex. III. t. 226, f. D. [1782]; *Walk.* B. M. Cat. Lep. Het. VIII. p. 140 [1856]; *Horsf. and Moore,* Cat. Lep. E.I.C. I. p. 276, t. 11, f. 2, 2A, larva [1857]; *Butl,* Trans. Z. Soc. IX. p. 565, n. 71 [1875]; *Moore. (Ther. N).* Lep. Cey. II, p. 22, t. 86, f. 1 (1882-3); *Swin.* P. Z. Soc. p. 514 (1884): l. c, 288 (1885)

Sp. Equestris. Fab. Ent. Syst. III. p. 365, n. 29. (1793); *Hub. (Ther. E).* Verz, bek. Schmett. p. 135, n. 1446 (1816).

Ch. rubicundus. Schaufuss. Nunquam. Otiosus. I. p. 18 (1870).

Hab.: Brisbane, Hongkong, Canara, Java, India, Ceylon.

24. C. Clotho, *Drury.*

(Sp. C). Ill. Ex. Ins. II. p. 48, t. 28, f. 1. (1773); *Fab. (Sp. C).* Syst. Ent. p. 540 (1775); Mant. Ins. II. p. 97 (1787); Ent. Syst. III. 1. p. 376 (1793); *Walk,* B. M. Cat. Lep. Het. VIII. p. 141 (1856); *Horsf. and Moore,* Cat. Lep. E.I.C. I. p. 277 (1857); *Semp,* Verh. Zool. Bot. Ges. Wien, t. 23, f. 3a, 3b, 3c (1867); *Bois,* Sp. Gen. Het I. p. 253, n. 135 (1874); *Butl.* Trans. Z. Soc. IX. p. 561, n. 43. (1875); *Moore. (Hathia. C).* Lep. Cey. II. p. 20, t. 87, f. 1 (1882-3); *Swin,* P. Z. Soc. p. 289 (1885).

Sp. Batus, Fab. Ent. Syst. III. p. 377, n. 64. (1793).

Deil. Cyrene, Westw. Cab. Or. Ent. p. 13, t. 6, f. 1 (1847)

Cretica. ♂ *Bois.* Icones, t. 49, f. 2 (—).

25. C. Cleopatra, *n. sp.*

Primaries: Exceedingly angulated apically. Mouse-coloured, with greenish tinge; outer margin broadly suffused with rosy hue; broad clouding of darker greenish-brown transversely, from costa about midway, widely, to near hinder angle, which it does not quite reach; a very fine almost indistinct diagonal line from near, but not touching, costa near to apex, to hinder margin at about two-thirds; a faint short curved streak from apex downwards, but not coalescing with diagonal line; faint indication of discoidal speck; light posterior basal spot; costa edged with red. *Secondaries*: Blackish-brown, anal area pale buff. Antennæ, rosy. Head and thorax, dark greenish mouse-colour; thoracic lateral band white. Abdomen, mouse-coloured, fainter at sides. UNDERSIDE: Light dirty buff, covered with fine black specks on almost invisible green grounds; a clouding of dark brown from base to middle, not touching costa. Body and legs, light greyish. Antennæ, red.

Ex.: ♂ 94 mm; ♀ 98 mm.

Hab.: Brisbane. (Coll.: Miskin).

This species is certainly very close to *Clotho*, but the indistinctness and different direction of the oblique band, and the discal dark cloud of primaries, and the entire light anal area in secondaries, as also the uniformity of tint of the thorax, sufficiently distinguish it.

26. C. CLOACINA, *n sp*

Primaries: Soft ochreous-yellow, faintly tinged with green; a discal shadow of darker hue; an oblique rather fine, but distinct line of brown from apex to about two-thirds of hinder margin; front of costa reddish; a round black spot at base posteriorly in ♀; pale buff in ♂. *Secondaries:* Soft ochreous-yellow; baso-costal area only, except a narrow streak along and to end of sub-median, blackish-brown. Antennæ, rosy; Head, thorax, and abdomen same colour as primaries, but abdomen paler at sides; thoracic lateral band, creamy, surmounted by greenish fringe. UNDERSIDE: Shining buff, with two or three imperfect oblique lines crossing the wings, consisting of pale grenish blue spots, most developed in secondaries; uniformly covered with specks of same colour; a brown clouding from base towards disc more or less pronounced in specimens. Body and legs, light fawn

Ex. ♂ 90 mm.; ♀ 100 mm. Hab.: Brisbane, Cardwell. Coll.: Miskin.

This species is nearest to *Clotho*, but is of an entirely different colour, showing but very faint indications of green, and an absence of discal speck, while in the secondaries the dark colour restricted to the base only, well distinguishes it.

27. C. Latreillii, *Macl.*

(Sp. L). King's Surv. Aust. II. p. 464, n. 165 *(1827)*; *Butl. (Diludia ? L).* Trans. Z. Soc. IX. p. 614, n. 12 *(1875)*; *De Cerisy (Deil. L).* MS.; *Kirb.* Trans. E. Soc. p. 235 *(1877)*.

C. Lucasii, Walk. B.M. Cat. Lep. Het. VIII. p. 141, n. 24 *(1856)*; *Horsf. & Moore.* Cat. Lep. E.I.C. I. p. 277, t. 11, f. 3, 3a, larva *(1857)*; *Bois.* Sp. Gen. Het. I. p. 254 *(1874)*; *Butl.* Trans. Z. Soc. IX. p. 560, n. 36. *(1875)*; Ill. Typ. Lep. Het. B.M. V. p. 8, t. 79, f. 5 *(1881)*; *Moore (Hath. L).* Lep. Cey. II. p. 20, t. 86, f. 3 (1882-3); *Swin.* Proc. Z. Soc. p. 289 (1885); *Bois. (Deil. L).* MS.

C. Comminuens, Walk. B.M. Cat. Lep. Het. XXXI. Supp. p. 31 (1864); *Butl.* Trans. Z. Soc. IX. p. 561, n. 37 (1875).

C. Deserta, Butl. Trans. Z. Soc. IX. p. 638 (1875).

C. Tenebrosa, Moore. P. Z. Soc. p. 595 (1877); (*Hath. T*). Lep. Cey. II. p. 20, t. 86, f. 2. 2a (1882-3).

Deil. Spilota. Horsf. MS.

Hab.: Hunter River, Brisbane, Rockhampton, Mackay; Java, India, Ceylon.

I have bred this frequently; feeds on fuchsia and grape-vine.

28. C Tryoni, *n. sp.*

Primaries: mouse-coloured with decided green tinge, paler on outer margin; front edge of costa reddish; a diagonal brownish line from apex to hinder margin at about one-third from hinder angle, represented at the intersection of each of the nervules by a black speck; very faint indication of an inner parallel line; rather indistinct black discoidal speck. *Secondaries*: black; a very slight appearance of lighter colour at anal angle and base of abdominal border; fringe white. Head and thorax and abdomen, dorsally, same colour as primaries; abdomen, laterally, paler, with patch of black at base. Antennæ white. Underside: very light fawn with greenish hue faintly sprinkled with fine black specks. Primaries with a large black suffusion over basal and discal areas. Head and thorax buff; abdomen whitish; legs white. Antennæ brown.

Exp.: 80 mm. Hab.: Brisbane. Coll.: Queensland Museum.

Mr. Tryon, the Assistant Curator of the Queensland Museum, drew my attention to the absence of the usual thoracic lateral white band in some specimens associated in the collection with the series of *Latreilii*, and which had been looked upon simply as a varying form of that species; upon careful scrutiny I conclude that this must be treated as a distinct species; the difference in the general colour, the absolutely black secondaries, but, above all, the entire absence of even the faintest indication of the thoracic lateral band amply distinguishes it from its nearest ally.

29. C. Pallida, *n. sp.*

Primaries: uniform pale yellowish-fawn; simple fine brown oblique line from apex, where it is rather indistinct, to about two-thirds of hind margin; costal edge reddish. *Secondaries*: uniform dark brown with a scarcely perceptible light shade at anal angle. Antennæ white. Head, thorax, and abdomen, same colour as primaries, latter rather fainter at sides; thoracic lateral band dingy white. Underside: wings uniform light fawn colour; discal area of primaries brown; body very pale buff; legs fawn, lighter above.

Ex.: 80 mm. Hab.: Brisbane. Coll.: Miskin.

This species is absolutely devoid of markings except the oblique line on upper side of primaries; it belongs to the group of which *Latreillii* is the type, but is well distinguished by the absence of discal spot and the single oblique line, and absence of spots on underside.

30. C. Walduckii, *Butl.*

Trans. E. Soc. p. 398, t. 9, f. 2 (1877).

Hab.: Western Australia (?).

This is near to *Latreillii*, but I cannot identify it with any species with which I am acquainted.

31. C. Inornata, *Walk.*

B.M. Cat. Lep. Het. XXXI. Supp. p. 31 (1864; *Butl.* Trans. Z. Soc. IX. p. 561, n. 38 (1875).

Hab.: North Australia.

I cannot identify this species; the description would almost do for my *Pallida* but for "secondaries wholly pale."

Genus 7: *DEILEPHILA, Ochs.*

Eur. Schmett. IV. p. 42 (1816); *Walk.* B.M. Cat. Lep. Het. VIII. p. 163 (1856); *Bois*, Sp. Gen. Het. I. p. 158 (1874)

32. D. LIVORNICA, *Esp.*

(*Sp, L*). Aus. Schmett. II. pp. 87, 196, t. 8, f. 4. (1785); *Hub.* (*Phryæus L*). Verz. bek. Schmett. p. 137, n. 1468 (1816); *Steph.* Cat. Brit, Lep. B.M. Pt. I. p. 28 (1850); *Walk.* B.M. Cat. Lep. Het. VIII. p. 164 (1856); *Bignell.* Ent. V. pp. 169, 180, 214 (1870), larva; *Hellins*, Ent. M. Mag. VII. p. 99. (1876), larva; *Butl.* Trans. Z. Soc. IX. p. 568 (1875); *Swin.* P. Z. Soc. p. 513 (1884); l. c. 287 (1885); Trans. E. Soc. p. 346 (1885)

Sp. Lineata, Fab. (*part*) Syst. Ent. p. 541 (1775); Sp. Ins. II. p. 147, n. 34 (1781); Mant. Ins. II. p. 96, n. 37 (1787); Ent. Syst. III. p. 368, n. 39 (1793); *Bois.* (Deil. L). Sp. Gen. Het. I. p. 172, n. 15 (1874).

? *Sp. Koechlinii, Fues.* Arch. Insect. Sugesch. t. 33, f. 1. 6 (1781)

Hab.: Brisbane; South Europe and India.

I have in my collection an example of this species, which is said to have been taken in Brisbane. It came from the cabinet of a gentleman, now deceased, who had no foreign specimens.

Genus 8: *DAPHNIS, Hub.*

Verz. bek. Schmett. p. 134 (1816); *Walk.* B.M. Cat. Lep. Het. VIII. p. 182 (1856); *Moore*, Lep. Cey. II. p. 14. (1882-3).

Darapsa (*part*), *Walk.* B.M. Cat. Lep. Het. VIII. p. 182 (1856).

33. D. HYPOTHOUS, *Cram.*

(*Sp. H*). Pap. Ex. III. p. 165, t. 285, f. D. (1782); *Hub.* Verz. bek. Schmett. p. 134, n. 1440 (1816); *Walk.*

(*Darap. H*). B.M. Cat. Lep. Het. VIII. p. 185 (1856); *Horsf. and Moore*, Cat. Lep. E.I.C. I. p. 271, t 10, f. 2, 2a—larva—(1857); *Bois.* (*Ch. H*). Sp. Gen. Het. I. p. 226 (1874); *Butl.* Trans. Z. Soc. IX. p. 572. n. 2 (1875); *Moore*, Lep. Cey. II. p. 15, t. 83, f. 1, 1A—larva—(1882-3).

D. Angustans, Feld. Reise. Nov. Lep. Het, t. 76, f. 6 (1868); *Butl.* Trans. Z. Soc. IX, p. 572, n. 5 (1875); *Kirb.* Trans. E. Soc. p. 236 (1877).

D. Pallescens, Butl. Proc, Z. Soc. p. 6. (1875); Trans. Z. Soc. IX. p. 572 (1875).

D. Horsfieldii, Butl. l. c. n. 6 (1875).

Hab.: Brisbane, Rockhampton, Cardwell; Molluccæ, Philippines, Amboina, Celebes, Java, India, and Ceylon.

34. D. Protrudens, *Feld.*

Reise. Nov. Lep. II. t. 76, f. 7 (1868); *Bois.* (*Ch. P*). Sp. Gen. Het. I, p. 226 (1874); *Butl.* Trans. Z. Soc. IX. p. 572, n. 4 (1875).

Ch. Neriastri, Bois. MS.

Hab.: Brisbane, Rockhampton, Cardwell; Halmeira and Cape Good Hope (?).

Sub-Family III—AMBULICINÆ, *Butl.*

Trans. Z. Soc. IX. p. 516 (1875); *Moore*, Lep. Cey. II. p. 10 (1882-3).

Genus 9: *AMBULYX, Westw.*

Cab. Or. Ent. p. 61, t. 30, f. 2 (1847); *Walk.* B.M. Cat. Lep. Het. VIII. p. 120 (1856); *Bois.* Sp. Gen. Het. I. p. 181 (1874); *Moore*, Lep. Cey. II. p. 11 (1882-3).

35. A. Wildei, *n. sp.*

♀ *Primaries*: Light reddish brown, with numerous transversed waved and bent, darker brown lines; the first of these is from the costa, bordering end of cell, thence sharply elbowed towards base, and continued to hinder margin; another beyond, nearly parallel about 8 mm. apart; beyond this last line (from whence the wing is a much darker brown) a short distance from it, is another, faintly discernible except at costal and hinder margins, parallel line, and yet another from costa only reaching a short distance; a short dark band from costa near apex, curved and touching outer margin a little below apex; from the point where the last mentioned touches outer margin, commences a marginal band of very dark reddish-brown, which is continued along outer margin to hinder angle where it runs out to nothing, somewhat curved internally; towards base and near to hinder margin, is a large perfectly round very dark reddish-brown spot, with faint indication of ring of lighter colour around it. *Secondaries:* Yellowish-brown, lighter towards base of costa and pale brown along abdominal margin, the yellow part speckled with fine brown marks; a widish straight transverse black band about midway; a black crenated line midway between last and outer margin, with which latter it is nearly parallel, terminating just above anal angle; a round black spot near apical angle; a small round spot near anal angle, Head, thorax, and abdomen light reddish-brown; thorax with dark brown at sides. Antennæ exceedingly fine; light reddish-brown. UNDERSIDE: Golden yellowish-brown, clouded with brown specks, the basal area paler brown, the lines and bands of upper side faintly developed, the outer marginal band of primaries being here greyish white surmounted by dark brown line. Body yellowish-brown.

Exp.: 105 mm. Hab.: Cairns. Coll.: Queensland Museum.

This species approaches somewhat to *A. Lahora, Butl.*, and was captured by the Museum Collector, Mr. Wilde, recently at Cairns. It is noteworthy as representing an hitherto unrecorded Australian genus and family in this group, and is another instance of the wonderfully close similarity of the Heterocerous-Lepidopterous fauna of this particular locality (embracing Cardwell, Johnstone River, and Cairns) with the Indian fauna.

SUB-FAMILY IV.—SMERINTHINÆ, *Bois.*

Sp. Gen. Het. I. p. 8 (1874); *Butl.* Trans. Z. Soc. IX. p. 516 (1875); *Moore*, Lep. Cey. II. p. 7 (1882-3)

Genus 10.—*COEQUOSA*, *Walk.*

B.M. Cat. Het. Lep. VIII. p. 256 (1856).

Acherontia (*part*), *Ochs.* Schmett. Eur. IV. p. 44 (1816).

Brachyglossa, *Bois.* Sp. Gen. Het. I. p. 9 (1874).

Metamimas, *Butl.* Trans. Z. Soc. IX. p. 582 (1875), uncharacterised.

36. C. Australasiæ, *Don.*

(*Sp. A*). Ins. N. H. t. 33. f. 1 (1805) ; *Bois.* (*Ach. A*). Voy. Astr. Lep. p. 181, n. 2 (1832) ; *Walk.* B.M. Cat. Lep. Het. VIII. p. 257, n. 2 (1856) ; *Bois.* (*Brach. A*). Sp. Gen. Het. I. p. 10 (1874) ; *Butl.* (*Met. A*). Trans. Z. Soc. IX. p. 582. n. 1 (1875).

B. Banksiæ, *Bois.* Sp. Gen. Het. I. p. 11, t. 27, f. 1 (1874) ; *Kirb.* (*Met. B*). Trans. E. Soc. p. 237 (1877)

Hab. : Newcastle, Brisbane.

37. C. Triangularis, *Don.*

(*Sp. T*). Ins. N. H. t. 33, f. 2 (1805) ; *Bois.* (*Ach. T*). Voy. Astr. Lep. p. 181, n. 1 (1832) ; *Walk.* B.M. Cat. Lep. Het. VIII. p. 257 (1856) ; *Chenu.* Enc. Hist. Nat. Pap. p. 275, f. 481 (1869) ; *Bois.* (*Brach. T*). Sp. Gen. Het. I. p. 9, t. 16, f. 2 (1874) ; *Butl.* Trans. Z. Soc. IX, p. 597 (1875) ; *Oll. and Forde*, Scott's Aus. Lep. II. p. 5, t 10. larva—(1890).

Sp. Castaneus, *Perry.* Arcana or Mus. Nat. Hist. 1 (1811).

Hab. : Throughout East coast of Australia.

Sub-Family V.—SPHINGINÆ, *Butl.*

Trans. Z. Soc. IX. p. 517 (1875) ; *Moore*, Lep ; Cey. II. p. 1. (1882-3).

Genus 11 : *PROTOPARCE*, *Burm.*

Abhandl. naturf. Gesellsch. Halle, p. 63 (1855) ; *Butl.* Trans. Z. Soc. IX. p. 606 (1875) ; *Moore*, Lep. Cey. II. p. 4. (1882-3).

Sphinx. (*part*), *Walk.*—B.M, Cat, Lep. Het, VIII. p. 211 (1856).

38. P. Convolvuli, *Lin.*

(*Sp. C*). Syst. Nat. I. 2. p. 798 (1767); *Roesel.* (*Sp. C*). Ins. Belust. I. t. 7, f. 1, 5. (1746); *Dru.* (*Sp. C*). Ill. Ex. Ins. I. t. 25, f. 1. (1770); *Fab.* (*Sp. C*). Sp. Ins. II. p. 150 (1781); *Cram.* (*Sp. C*). Pap. Ex. III. p. 55, t. 225, f, D. (1782); *Fab.* (*Sp. C*). Mant. Ins. II. p. 97. (1787); Ent. Syst. III. 1. p. 374. (1793); *Hub.* (*Agrius. C*). Verz. bek. Schmett, p. 140 (1816); *Steph.* (*Sp, C*). Ill. B. Ent. Haust. I. p. 119 (1828); *Bois.* (*Sp. C*). Voy. Astr. Lep. p. 187, n. 1 (1832); *Westw.* (*Sp. C*). Brit. Moths I. p. 12, t. 3, f. 1—3 (1843); *Steph.* (*Sp. C*). B.M. Cat. Lep. I. p. 27 (1850); *Walk.* (*Sp. C*). B.M. Cat. Lep. Het. VIII. p, 212 (1856); *Staint.* (*Sp. C*). Brit. Butt. and Moths, I. p. 89 (1857); *Horsf. & Moore*, (*Sp. C*). Cat. Lep. E.I.C. I. p. 267, t. 9, f, 3, 3a,—larva—(1857); *Chenu.* (*Sp. C*). Enc. Hist. Nat. Pap. p. 270, f. 477 (1869); *Bois.* (*Sp. C*). Sp. Gen. Het. I. p. 94, (1874); *Butl.* Trans. Z. Soc. IX. p. 609, n. 19 (1875); *Snell.* (*Sp. C*). Tijd. Ent. XX. p. 3 (1877); *Auriv.* (*Sp. C*). Kongl. Sv. Akad. Handl. XIX. p. 129, n. 5 (1882): *Newm.* (*Sp. C*). Ent. VIII. p. 72 (larva) (—).

Sp. Roseafasciata, *Koch*, Ind. Aust. Lep. Faun. p. 54 (1873); *Scott*, MS.

Sp. Distans, *Butl.* Cat. Lep. N. Z. p. 4, n. 10, t. 2, f. 11 (1874); (*Prot. D*). Trans. Z. Soc. IX. p. 609, n. 20 (1875).

Hab.: Victoria, New South Wales, Brisbane to Cardwell; New Zealand; Europe, Asia, South Africa, Java.

Orientalis of *Butl.* (Trans. Z. Soc. IX. p, 609, t. 91, f. 16-17, 1875) is doubtless the same insect; Moore's figures (Lep. Cey. II. t. 75, f. 1a-e) exactly represent the various larval changes in our species, which feeds on Ipomæa and sweet potato.

39. P. Abadonna, *Fab.*

(*Sp. A*). Ent. Syst. Supp. p. 435, n. 56-7 (1798); *Kirb.* Trans. E. Soc. p. 238. (1877).

Sp. Godarti. (*Macl*). King's Surv. Aust. II. p. 464, n. 166 (1827); *Butl.* (*Diludia. G*). Trans. Z. Soc. IX. p. 615, n. 13 (1875); *de Cerisy*, MS.

Hab.: Brisbane, Rockhampton; India.

40. P. Minimus, *n. sp.*

Primaries: Light grey with markings of black, arranged principally in short longitudinal lines close together, forming irregular transverse bands; a small discoidal white spot surrounded with black; the principal transverse band is beyond but touching the discoidal spot, whereat it is widest, somewhat narrower at costa, and much narrower on reaching hinder margin, a branch less wide from just below and on basal side of discoidal spot to costa; some black lines in basal area; a few black marks towards apex, and some patches at hinder angle. *Secondaries:* light brown, with an oblique sub-basal dark line; outer margin irregularly bordered with blackish; fringe white, interrupted with dark spots, at termination of nervules. Antennæ: light grey. Head and thorax dark grey, latter with two dorsal black lines. Abdomen shining grey buff; dorsal very fine black line; lateral thicker black line; fringe of each segment and an irregular patch on apical edge of same towards the side, black. Underside: dusky brown, lighter toward outer margins, with two indistinct transverse slightly waved fine lines; abdominal border of secondaries much lighter. Body and legs dark grey. Antennæ, reddish-brown.

Exp.: 63 mm. Hab.: Dawson River (Barnard). Coll.: Miskin.

Genus 12: *MACROSILA, Walk.*

B. M. Cat. Lep. Het. VIII. p. 198 (1856); *Bois. (part).* Sp. Gen. Het. I. p. 60 (1874); *Butl.* Trans. Z. Soc. IX. p. 605 (1875).

Diludia, Grote. and Robinson. Proc. Ent. Soc. Phil. V. p. 188 (1865); *Moore,* Lep. Cey. II. p. 3 (1882-3).

Meganoton, (part). Bois. Sp. Gen. Het. I. p. 58. (1874).

41. M. Casuarinæ, *Walk.*

B. M. Cat. Lep. Het. VIII. p. 210 (1856); *Bois. (Sp. C).* Sp. Gen. Het. I. p. 109 (1874); *Butl. (Dil. C).* Trans. Z. Soc. IX. p. 615, n. 14 (1875).

Dil. Nebulosa, Butl. l. c. 15 (1875).

Hab.: Newcastle, Brisbane, Rockhampton, Cardwell, Cape York.

Larva feeds on Tecoma Velutina and grandiflora, and Jasminum hirsuta.

42. M. Severina, *n. sp.*

Primaries: Yellowish-brown with greyish tinge, with numerous black or brown generally transverse crenelated bands or lines; a large discoidal white lunule surrounded with black; a waved black line from apex into the wing and returning to costa at about one-fourth from apex; a widish oblique band from costa to discoidal spot; a black streak from discoidal spot to middle of outer margin; another less distinct below and parallel with last; a short costal oblique somewhat obscure band, between base and discoidal band; another short costal double line or band, mid-way between discoidal band and inner face of apical streak; other less defined transverse waved lines across wings beyond discal spot. *Secondaries:* Dark brown, lighter in hue towards base, with an almost obsolete faint band from anal angle—where it presents a greyish lunular shaped mark—towards costal margin; fringe of both wings whitish. Antennæ, reddish-brown. Head, yellowish-brown; thorax dorsally the same, laterally with a cream coloured band surmounted by a wide intense black band nearly reaching to the head. Abdomen dorsally same as head and thorax with a dorsal black line interrupted at the joints by the fringe of the two first segments, black; laterally the first six segments black, with a square patch of dirty white occupying nearly the whole width of each; the remaining segments show a continuing black line to near the extremity. Underside: Uniform shining purplish-brown, paler on hinder and abdominal margins; outer margins of both wings waved white and brown alternately. Body, shining grey; legs, grey; antennæ, brown.

Exp.: ♂ 133 mm.; ♀ 140 mm. Hab.: Cape York. Coll.: Miskin. Queensland Museum.

This fine species has probably escaped notice by reason of its extreme rarity. I know of only four specimens. It is pretty closely allied to *Casuarinæ*, to some examples of which excessively varying and common species, the arrangement of the markings of the wings bear some resemblance.

43. M. Edwardsi, *Olliff.*

Proc. L. Soc. N.S.W. 2nd Ser. V. p. 515 (1890).

Hab. : Hunter River ; Brisbane.

44. M. Bethia, *Kirb.*

(*Dil. B*). Trans. E. Soc. p 238, 243 (1877).

Hab. : Rockhampton.

Genus 13: *NEPHELE*, *Hub.*

Verz. bek. Schmett. p. 133 (1816) ; *Moore.* Lep. Cey. II. p. 1 (1882-3).

Zonilia, *Walk.* B.M. Cat. Lep. Het. VIII. p. 192 (1856) ; Bois. Sp. Gen. Het. I. p. 139 (1874).

45. N. Subvaria, *Walk.*

(*Zon. S*). B.M. Cat. Lep. Het. VIII. p. 196 (1856) ; *Bois.* (*Zon. S*). Sp. Gen. Het. I. p. 143 (1874) ; *Butl.* Trans. Z. Soc. IX. p. 624, n. 15 (1875).

Zon. Metapyrrha, *Walk.* B.M. Cat. Lep. Het. VIII. p. 196 (1856); *Bois.* (*Z. M*). Sp. Gen. Het. I. p. 143 (1874) ; *Butl.* (*Nep. M*). Trans. Z. Soc. IX. p. 625, n. 16 (1875).

Deil. Dalii, *Newm.* Trans. E. Soc. Ser. 2, IV. p. 54 (1857).

Z. Antipoda, *Walk.* B.M. Cat. Lep. Het. XXXI, p. 34. (1864) ; *Bois.* MS.

Hab. : Swan River, Brisbane, Rockhampton.

Probably our species is the same as *Hespera* (*Fab.*) = *Morpheus* (*Cram.*) which latter species seems variable in one character in which ours is always constant, *i.e.*, the reddish or ferruginous colour of the secondaries ; for, although in all the examples I have seen from India and Ceylon this character agrees with Moore's fig. in Lep. Cey., the secondaries being of the same brown hue as in the primaries, we find that Walker makes it "ferruginosæ" and Bois. "brun roussâtre," Fab. describing it as "fuscis." There appears to be no published description of *Antipoda*.

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THE

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PART II.

STRYCHNINE, A USELESS REMEDY IN SNAKE-BITE.

By T. L. BANCROFT, M.B., Edin.

[*Read before the Royal Society of Queensland, Sept. 19th, 1890.*]

Dr. Augustus Mueller, of Victoria, has asserted that strychnine is an antidote in snake-bite, and that no medical man in Australia now can treat a case of snake-bite other than by his method without incurring the charge of culpable ignorance.* I am not aware that either Dr. Mueller or anyone else has tested the value of strychnine in snake poisoning upon the lower animals. It is further quite probable that the cases of snake-bite in human subjects treated by him would have recovered had no drug been administered at all. It is so extremely improbable that any substance is capable of counteracting the effects of snake venom that I deemed it prudent to make the following investigation. The venom of snakes when smeared upon glass and dried in the sun will keep good indefinitely. The poison glands of the black snake (*Pseudechis porphyriacus*) were removed immediately after the snakes were killed, put upon a watch-glass in an exsiccator containing anhydrous chloride of calcium, where they were allowed to remain until required for use. The dried poison gland when pounded in a mortar is found to give up all its venom in the form of a fine white powder; the fibrous wall of the gland remains intact. The venom in this form is convenient to weigh. The amount required is mixed with a little water, five to ten drops, and squeezed through a piece of linen, the clear fluid

* *Vide* "Australasian Medical Gazette," April 15, 1890.

thus obtained is easily manipulated by a hypodermic syringe. A solution of the venom was made fresh for each experiment. The first thing to ascertain was the minimum amount of venom necessary to kill a guinea-pig (full grown guinea-pigs were the animals made use of).

EXPERIMENTS.

1.—1½ grains of venom killed in .. .. 30 minutes
2.—1½ ,, ,, ,, ... 35 ,,
3.—¾ ,, ,, ,, ... 45 ,,
4.—⅓ ,, ,, ,, ... 3 hours
5.—⅙ grains, recovered
6.—¼ grain, killed in several hours; time not exactly known, but over two hours.

From these experiments it is seen that a quarter of a grain is about the smallest dose that will kill. The next thing was to find out what amount of strychnine a guinea-pig could stand.

7.—1/10 grain of strychnine killed in .. 5 minutes
8.—1/20 ,, ,, ,, .. 15 ,,
9.—1/100 ,, ,, recovered
10.—1/60 ,, ,, ,,
11.—1/30 ,, ,, ,, This amount caused well-marked tetanic convulsions; it is the maximum amount that a guinea-pig will stand, at any rate, in one dose.

With these facts experiments were made to test strychnine as an antidote.

12.—½ grain of snake venom dissolved in water was injected under the skin, and at the same time 1/60 grain of strychnine under a different part of the skin. The animal died of snake poisoning in 1 hour 22 minutes.

13.—1 grain of venom with 1/30 grain of strychnine and 10 minims of water were injected together. The animal died in 44 minutes.

14.—¼ grain of venom was injected and at the same time 1/40 grain of strychnine, but at a different part of the skin. The animal died in 30 minutes.

15.—¼ grain of venom was injected, and killed in 3 hours 25 minutes.

16.—¼ grain of venom with 1/60 grain of strychnine dissolved in 10 minims of water were injected together. The animal died in 2 hours 47 minutes.

If the dose of snake venom has been a lethal one, then strychnine is powerless to avert a fatal termination. The effect of the two substances acting together, the one having a stimulating, the other a paralysing property, would be to exhaust the nerve sooner than if the paralysing substance were acting alone. An antidote to snake venom should be such a substance as could decompose the venom or combine in some way with it to make it insoluble. No substance, in our present state of knowledge, can do such a thing, without at the same time killing the organism. Alcohol has no value further than to blunt the finer sensations, and bring about a feeling of well-being; a small amount is sufficient for this purpose. The supposed stimulating properties of alcohol are mythical, as are also those of ammonia. Permanganate of potash is only useful when it comes in contact with the venom itself, that is, by being injected into the wound immediately after being bitten. Theoretically the Digitalis group are the only drugs that could be of any use in snake poisoning. By their action upon the muscular substance of the heart they increase blood-tension, and may avert, to some extent, the low blood pressure caused by the paralysing effect of snake venom upon the vaso-motor centre. Strophanthus, in the form of tincture, would be perhaps the most convenient one of the group to make use of. But by far the best treatment known is to cut through the true skin over the bite, and suck the poison out; if this be done either by himself or by his friend directly one is bitten, there is little to fear, at any rate, in Australia.

An easy way to tell venomous from harmless snakes is by the number of scales between the eye and nostril; in venomous the eye scale joins the nostril scale, whilst in harmless snakes there is an intervening or loreal scale.

SNAKE POISON *v.* STRYCHNINE.

By JOSEPH LAUTERER, M.D.

[*Read before the Royal Society of Queensland. October 24th, 1890.*]

IN that part of Germany where I come from, we have two poisonous snakes, *Vipera berus* and *Vipera redii*. Fifteen years ago I was practising in the valleys and on the mountains of the Black Forest, and I took much pleasure in hunting these vipers, and used to buy them for some pence from the boys for the purpose of making experiments with the poison on the frog and on rabbits. The viper poison kills (as I found by my experiments) not only when injected under the skin, but also when given by the mouth in any larger doses. Death takes place by paralysis of the muscles of the thorax, paralysis of the diaphragm, and finally of the heart. The central nerves are not paralysed at all; only the peripheric ends of the nerves in the muscle are are paralysed, and in large doses only the *nervus vagus* loses its power to regulate the motion of the heart, and the pressure of the blood in the arterial system. The poison always is carried to the muscles through the blood. If you tie the artery of one hindleg of the frog and inject a small dose of viper poison under the skin of the body, the frog gets motionless and apparently dead, only the heart continues to beat, and the leg from which you kept the blood away moves and tries to scratch any irritating thing away from the body. The viper poison is a near relation of the Cunarc (arrow poison), the inspissated juice of *Strychnos toxifera*. To the blood the snake poison generally goes from the place of injection, through the lymphatic vessels, and meets the blood at first in the veins under the collar bones (*Vena subclavia sinistra* and *Vena anonyma*). From there it goes to the right heart, then to the lungs, and finally through the left heart to all parts of the body where it begins to act, as I said, on the peripheric ends of the motorial nerves. If you kill an animal by viper poison, and just before death takes place apply the galvanic battery to the central end of a motorial nerve, the muscle will not answer at all to the irritation. Viper poison is a remedy for all irritation of the central part of tke motorial nerves. I injected viper poison 12 years ago under the skin of a boy suffering from *tetanus traumaticeus* (lockjaw), and slackened the muscles of the whole body by it. Viper poison is a remedy against strychnia, but strychnia is not a remedy against viper poison; it irritates the central part of the nerves, but the irritation is not answered by the intramuscular parts of the nerves affected by the snake poison. Dr. Bancroft's experiments convinced me at once that the poison of our Australian snakes is nearly related with the poison of the European vipers. During the past month I obtained three fresh heads of the black snake (*Pseudechis porphyriachus*) from Pimpama Island. Having no guinea pigs, I experimented with pigeons. The fresh poison glands with the poison bags were cut into small pieces, and the poison was extracted from them by pure water to make a solution of two drachms out of the poison of one animal. About 25 drops of this tincture killed a pigeon in 15 minutes when injected in the *pectoralis major*. Ten drops killed in two hours. If the animal lived longer than two hours it always recovered, but continued very weak and lazy for some days. As Dr. Bancroft had made his experiments with large doses of strychnia to disprove its power as an antidote for snake poison, I injected in some cases large doses, and in some cases very small ones. The fortieth part of a grain of strychnia (*Str. hydrochloras*) is the highest amount which a pigeon can stand without getting convulsions. I had no hopes, but still it might be possible, that a small and not poisonous dose of strychnia would at least help the snake-poisoned animal to live longer and so overcome, perhaps, the effect of the smallest amount of snake poison, which generally killed after two hours. I made many experiments, and I am fully convinced now that neither large doses nor small quantities of strychnia could prevent death, when a deadly dose of snake poison had been injected. If the pigeons lived longer than two hours after the injection of the snake poison they recovered, but did not get on more quickly than ordinarily when I had administered strychnia afterwards. My next experiments will try to find out if Australian snake poison is of use in poisoning by strychnia, and I will only mention here that a solution of tannic acid makes a sediment in a solution of snake poison, arresting the active principle of it, making it insoluble in water, and taking away its effect.

PRELIMINARY NOTES ON SOME NEW POISONOUS PLANTS.

By THOS. L. BANCROFT, M.B., Edin.

[Read before the Royal Society of Queensland, February 7th, 1891.]

(a.) *Pericampylus incanus, Miers; Cocculus Moorei,* F. v. M. Order Menispermaceæ. The bark of the rhizome of this plant has a bitter taste. It contains an active poison which can be precipitated from a decoction by many alkaloidal reagents, but not by alkalies or their carbonates. The poisonous substance is apparently new and worthy of careful investigation by chemists. The physiological action it has upon frogs suggests that it might be a useful therapeutic agent; frogs affected by it remain quiet, ·apparently asleep, no convulsions occur and the heart comes to a standstill in diastole. Neither motor nerves nor muscles are primarily affected.

(*b.*) *Sarcopetalum Harveyanum,* F. v. M., also one of the Menispermaceæ. The stem of this plant has a bitter-sweet taste. An extract of it is very poisonous; in physiological action like Pericampylus incanus. There are two alkaloids at least in this plant; they can be separated in the following manner:—Make a decoction, to which add carbonate of ammonia until no further precipitation occurs; separate the precipitate, which is an alkaloid, whose salts have a bitter-sweet taste and physiologically little effect upon frogs. To the decoction now add tannic acid, which causes a precipitate of the active principle.

(c.) *Melicope erythrococca*, Benth. Order Rutaceæ. Mr. Tryon, some months ago, discovered that the bark of this tree has a pronounced tingling taste, and anticipating that it might contain a poison, gave me a sample of it. The physiological action upon frogs is not unlike that of the allied genus, Zanthoxylum. The active principle might be described as a protoplasmic poison, for it appears to destroy every part of the animal economy. Frogs under the influence of it spring about in an excited manner, become bathed with secretion, and in a few minutes lie paralysed. The primary cause of death is paralysis of the spinal chord. The heart stops in diastole. Fibrillary twitchings of the muscles continue for a long time after death.

(d.) *Acacia Cunninghamii*, Hook. The green pods of this plant are rich in saponin. This acacia is perhaps the most interesting and useful of any. It possesses an excellent cabinet wood, a tan bark second to none in quality and surpassing all others in the amount of yield. It has galls which appear rich in gallic acid. It also has a good adhesive gum-acacia but in small quantity. It is an excellent shade tree and worthily preserves the name of Allan Cunningham.

(e.) *Ægiceras majus*, Goertn. Order Myrsineæ. The River Mangrove. The bark has an extremely nauseating acrid taste, due to saponin, which is present in large amount.

GUMS OF EUCALYPTS AND ANGOPHORAS.

By JOSEPH LAUTERER, M.D.

[*Read before the Royal Society of Queensland, February 7th, 1891.*]

The great demand of tannic acid and its relations in chemistry, medicine, photography, tannery and many trades besides induced me to examine once more the barks and gums of the Queensland Angophoras and Eucalypts, which contain a high percentage of the said compounds. Ten years ago, one of our best medical and scientific men, Dr. Joseph Bancroft, called the attention of the chemists to the gums in question, and pointed out their great usefulness for different purposes. The late well-reputed chemist, Theodore Staiger, analysed for him the gums of *Eucalyptus maculata*, *resinifera*, and *tesselaris*. Baron Mueller gives some notes about the gums in his excellent Eucalyptographia, but he did not investigate the matter himself. I would not tire you with fresh notes on an old subject, if the reports given by the various authors did not differ from each other in a very strange way. *Eucalyptus maculata*, the "spotted gum" of the timber-getters, yields a gum-resin in great quantities, exuding from cracks and wounds through the inner bark. Baron Mueller says that it dissolves entirely in hot water. All other writers state the contrary, maintaining that it is only partly soluble in it. Under certain restrictions Von Mueller might be said to be right, because all the gum-resin of *Eucalyptus maculata* dissolves in the water if boiled with it for a sufficient time, but, if you examine the "solution" under the microscope, you will see that it is only an emulsion, exhibiting the undissolved resin as minute globules suspended in a watery solution in a manner reminding you much of the milk of animals. Besides, if the emulsion gets cold, the globules crowd together and unite in a bottom sediment, sticky and ductile at first, like cobbler's wax, and finally brittle (as Mr. Staiger says) like shellac. Still there is not the least relation between shellac and this sticky residue, for the latter gets quite soft if only warmed to the temperature of the human body, and besides, if boiled with water, again goes in emulsion, quite as it did before. With methylated spirits, it apparently makes a varnish and a pretty good polish for wood, but keeps soluble in hot water, and is therefore utterly useless. The peculiar smell of the gum of *Eucalyptus maculata* reminded Mr. Staiger of benzoic acid and induced him to ascribe it to "benzoic acid contained in the gum in a raw state." Still the said gum does not contain the least trace of benzoic acid, as I have proved by my test experiments. The smell itself does not resemble benzoic acid at all, but it reminds one of the liquid styrax used lately in Europe for the cure of itch. The smell sticks to the insoluble part of the gum and does not go into the watery solution proper. The latter contains tannic acid (kinotannic acid) in a subordinate quantity, and besides this a very bitter extract which I could prepare by imspissation of larger quantities of the gum solution. In the old times of penal settlements in New South Wales the gums of different ironbarks were brought to Europe under the name of "Botany Bay Kino," and though mostly derived from *Eucalyptus siderophloia* are still mentioned in the modern pharmaceutical books as coming from *Eucalyptus resinifera*, which denomination (now restricted to a different species) was given by Allan Cunningham to the *Eucalyptus siderophloia* of the modern botanists. This gum contains a large quantity of arabine, besides a high amount of tannic acid. The solution of it gets more red when a strong acid is added, and more brown when tested with liquor ammoniæ. The gum of *Eucalyptus siderophloia* deposited under the bark and between the layers of the wood, turns after some months into a tough hard substance, quite insoluble in water and quite free from tannic acid. A very fine red gum is yielded by *Eucalyptus corymbosa*, the bloodwood of the timber-getters. If dissolved in water it gets a still higher red colour, when some strong acid is added. It also more readily dissolves in sour media. By addition of some diluted liquor ammoniæ or other basic media, the red colour at once turns into a dark brown. The tingeing substance is a derivate of the tannic acid. Pure tannic acid, when moistened with old oxidised oil of eucalypt, at once gets a red colour, similar to the red gum of bloodwood. Many other species of Eucalypts yield a brownish gum in larger quantities. Nearly all of them contain some bitter extract, which gives to their watery solutions a very bad taste. (*Eucalyptus hemiphloia*, *Eucalyptus saligna*). The gum of *Eucalyptus microcorys* contains an acid principle similar to that of *Eucalyptus maculata*, and is therefore useless for medical purposes. A very good gum, nearly free from bitter and sour ingredients, is yielded by *Angophora lanceolata*. Its watery solution is of a brownish yellow, changed by the addition of alkalies into a darker colour. It is very rich in tannic acid, and the same can be said of the fresh bark, which certainly would be much better for tanning purposes than the bark of the acacias.

NOTES ON THE ABORIGINALS OF STRADBROOKE AND MORETON ISLANDS.

By GEORGE WATKINS.

[*Read before the Royal Society of Queensland, April 17th, 1891.*]

The aboriginals of Stradbrooke and Moreton Islands, when I knew them first, about twenty-three years ago, were but the remnants of the original tribes. To these had been added a small contingent from the neighbourhood of Lytton who had intermarried with the islanders, and were themselves the remnant of their tribe.

Altogether they numbered about thirty to forty adult males, about as many adult females, and from about twelve to twenty children. The majority of these in about equal numbers belonged to Moreton Island and to Amity Point on Stradbrooke; two or three to the neighbourhood of Point Lookout; one only to Dunwich; two or three to the south of the latter place, and the remainder to the mainland.

From many years' contact and association with the white man, they had in a large measure allowed many of their old habits and customs to fall into disuse; others were not rigidly adhered to; while the children were growing up with but little idea of things as they had been.

At the time of the advent of the white man the two islands must have been inhabited by numerous and powerful tribes of well-grown and big-framed individuals. This was due to the fact that they enjoyed large and easily obtained supplies of food, chiefly from the sea. Fully half of them when I knew them first would have been considered above the usual stature amongst ourselves.

Flinders, in 1799, was the first explorer to enter Moreton Bay, but he does not seem to have landed on either Moreton or Stradbrooke. His experiences with the aboriginals were obtained at Bribie.

It was not till about twenty-two years afterwards that the men of Stradbrooke made the acquaintance of the race which was to supplant them. The occurrence which then took place stands very much to their credit. Four men in an open boat were blown to sea from the neighbourhood of Illawarra, or the Five Islands, in New South Wales. After being adrift for twenty-one days they were wrecked on Stradbrooke, near the South Passage. One had died from thirst and exposure, but the other three—Pamphlett, Finnigan, and another—were well received by the blacks, and kindly treated. They were hunted and fished for, and duly painted, etc., when their clothes (probably a poor supply) ran short.

Very strangely, they were under the impression that they were still to the south of Sydney, and with this idea persuaded their new friends after some time, to help them northward. They were rescued by Oxley about two years afterwards when he made a landing in the neighbourhood of Redcliffe in 1823.

The blacks used to call ship's biscuits "Five Islands," which I have always understood to refer to this occurrence. Pamphlett and his companions having a few with them, the name Five Islands from which they were blown became attached in some way to the biscuits.

Oxley returned next year in the brig "Amity" to establish a permanent settlement (hence the name Amity Point for the north-west point of Stradbrooke)

The South Passage between Moreton and Stradbrooke Islands was for many years the only entrance to the Bay that was utilised. The following extract from the diary of Major Lockyer on a visit for exploration in 1828 is interesting:—

"10th October.—Dropped down to Amity Point; anchored there, the wind blowing in with a strong N.E. breeze. Went on shore; a number of natives lying there. Was much amused by their singing a song, pronouncing several English words distinctly, and by their instantly recognising James Finnigan, one of three men who were wrecked on the shore in a boat there three years (a slight mistake) ago, having been driven away to the north from Illawarra or the Five Islands by a gale of wind. These men were kindly treated and taken care of by the natives for nine months until discovered by Mr. Oxley. They were delighted at meeting Finnigan again, and instantly brought a supply of fish which they offered without expecting any return, though I took care, by giving them fishhooks, lines, biscuits, and several other things, looking-glasses, hatchets, to show them we did not slight their good will.

"The stories told of their being cannibals are fabulous and absurd. They are a quiet, inoffensive, good-natured people.

"11th.—Quitted Moreton Bay at 9 a.m., with a land breeze, leaving our friends the natives sitting on the shore at Amity Point watching the vessel until she sunk in the horizon from their view.

"The attachment of these people to their dogs is worthy of notice. I was very anxious to get one of the wild native breed of a black colour, a very handsome puppy, which one of the men had in his arms. I offered a small axe for it; his companions urged him to take it, and he was about to do so, when he looked at the dog and the animal licked his face, which settled the business. He shook his head and determined to keep him. I tried him afterwards with handkerchiefs of glaring colours."

A pilot station was afterwards established at Amity Point, the site of which has long disappeared owing to the encroachment of the sea. I remember on the beach the foundations of what I was told was an outbuilding a long way to the rear of the main station, but this also went a good many years ago.

A branch convict establishment was formed at Dunwich where the convicts were employed sawing timber rafted from the Logan, etc. This necessitated a guard and barracks there.

Trouble followed between the blacks and the authorities, and conflicts took place, well remembered by some of the older aboriginals as having happened when they were lads. The blacks in these encounters suffered considerably. Something of a massacre took place on the south end of Moreton Island, near the head of the fresh water lagoon. The soldiers surprised and surrounded a camp at daybreak, when nearly all were shot down. My informant, a young boy at the time, escaped with a few others; he by hiding in a clump of bushes. Affairs of a similar kind took place on Stradbrooke, one in the neighbourhood of Point Lookout, and another farther to the south. A genuine stand-up fight came off west of the Big Hill on Stradbrooke, when the blacks were badly beaten.

Some time after the convict establishment was broken up, and the buildings at Dunwich were loaned to a party of Italian missionaries for a mission station. So far as I have learnt, the mission was carried on for but a short time and without any success. The blacks would not remain with the missionaries. These buildings have now entirely disappeared. The brick and stone material has been utilised in the construction of the Superintendent's residence and one of the wards of the Benevolent Asylum, and in the shore end of the jetty at Dunwich.

As before said, the aboriginals of these islands rejoiced in an abundant supply of food. The kangaroo is not found on Moreton Island, and is also rare on Stradbrooke except on the the southern end where it is plentiful in the neighbourhood of Swan Bay. Wallabies of two or three kinds range very sparingly over both islands. The native dog is only found in the kangaroo district. The opossum and the native bear do not occur at all. The bandicoot, echidna, and fresh water tortoise are occasionally met with.

Carpet snakes of large size are met with on the south of Stradbrooke in the mangrove swamps. I remember a blackfellow meeting one so large that he was afraid to tackle him, and cleared. Iguanas and flying foxes are common. Ducks, black swan, curlews, parrots, etc., etc., are plentiful at seasons in different localities. All, with the exception of the dog, are eaten; but it is from the sea that the chief supplies of food were drawn.

The beach yielded crustacea and shell-fish; among the latter oysters, pearl oysters, cockles and mussels of which the three last were always roasted. Low water was a working time for the gins especially. They went out with dilly-bags and short spears, returning with the former filled with shellfish, coral, eels, crabs, &c. Fish were speared in the creeks and from the beach at high water. During the winter months shoals of mullet and other fish came in, when a general time of feasting ensued. They were caught in towrows, a kind of hand net, made as a deep long pocket attached to a frame in the shape of a bow. In olden times, and at times in my experience, the twine used was prepared by themselves from the bark of the *Hibiscus tiliaceous* or native cotton tree, (native name, "Talwalpin") and other fibrous plants. A net was held in each hand with the string side of the bow towards the body and the pocket trailing behind. The more men in the party within certain limits, say up to twenty, the better. One man acted as leader usually through the season, and instead of nets carried a roughly notched staff. Upon a school of fish being sighted coming along, this leader, followed in succession by the larger half of the party, waded into the water at the proper moment to meet the fish. The best and most experienced men were placed first, leaving the less experienced and inferior to complete the line behind; the remainder of the party prepared to enter the water behind the fish—the aim being to enclose the fish within a circle of nets. When the right time came a quick rush was made and the circle completed. The fish in the endeavour to escape rushed into the towrows and were there secured by a twist of the wrist. A peculiar gutteral noise was made by the men when making the rush to surround the school, and it was easily known by the short quick ejaculations following, if the catch were a good one. It was a common occurrence for some of the nets to be so full that the individual using them had quite as much as he could do to get to shore with his load.

At Amity Point, where the beach shoals quickly, and the fish often swim too far out to be surrounded by the men without going out of their depth, the blacks had managed to make friends with the grey porpoises so that the latter assisted in the business. On a signal being made from the beach by beating the water with a spear, the porpoises would swim shorewards driving the fish before them, and help to form the surrounding circle. The co-operative principle was so well understood between these fellow-adventurers, that an unsuccessful porpoise would swim backward and forwards along the beach, until a friend from the shore waded out with a fish for him on the end of a spear. The porpoises were regarded with affection and never injured in any way; offence would be taken at any proposal to hurt one, and it is said the blacks even professed to claim individual ones as their own. I have seen a flock of pelicans and a school of porpoises join forces and fish together in a similar way.

In olden days, it is well known that the aboriginals of Moreton Bay caught the dugong, native name 'yungan,' in large nets, staked in favourable positions." Flinders found one of these nets on Bribie, and was much puzzled to find out for what purpose it was intended. Turtle were caught in the same nets, and also by direct pursuit in canoes. Instances have occurred of the turtle nesting in the neighbourhood of the South Passage, but they are very rare.

Various fruits were eaten, but the only one of consequence was the midgen, or Moreton Island myrtle. This grows in a few places on Stradbrooke, but in great abundance on the southern end of Moreton Island. It ripens about March and April, and it was customary in the season to make journeys to gather it. The root of a fern, *Blechnum cartilagineum*, native name 'bung-wal,' formed a staple article of food. It was dug up by the gins on the margins of the swamps, washed and roasted on hot ashes. It was then cut in lengths, pounded between a pair of round stones and eaten. It has a nutty flavour and the reputation of being a very nutritious food.

A drink was made from the flowers of a small species of grass-tree, *Xanthorrhœa hastilis*, native name 'tuckabin,' growing in the swamps. The spikes of flowers, as is well known to the native bee, abound in honey. They were gathered early in the morning and steeped in water. Successive quantities were used till the water was saturated with the honey. This was drunk fresh, and also set aside to ferment. The native bee was followed up and robbed of its honey.

After the introduction of the English bee, great quantities of honey from the latter were obtained. A large trade in honey and wax would have followed to the benefit of the colony had not the Californian bee moth been subsequently introduced.

Many kinds of food were forbidden to women and children, and others to pregnant women.

Huts were made of a framework of small saplings bent over in a bee-hived shape and covered with tea-tree bark "Oodgee."

Considerable intercourse was carried on with the mainland tribes, as witness the passing on of Pamphlett and his companions. A system of barter was maintained. The islanders supplied dilly-bags and "chuleen" or shells and shell ornaments made from the pearly nautilus. In exchange they received "kontans" or shields made from the wood of the "Erythrina" or cork tree which does not grow on the islands. Suitable stones for pounding the "bungwal" are not to be got on Stradbrooke; these were obtained from the Moreton Islanders. The island tribes excelled in the making of their dilly bags which were worked by the women from rushes obtained in the swamps. These were gathered and stripped clean for their length, then steeped for a time in running water, dried, and finally toughened by roasting carefully on hot ashes. These rushes were also used as ties in securing the framework of the humpies.

Spears were made of hardwood and of the wood of the *Dodonæa triquetra*.

Marriage was (as among more civilized peoples) usually a matter of barter. The friends of a man receiving a wife, having in due time to return the compliment, and provide a wife for one of the friends of the other party. Marriages were subject to the well-known septal divisions among them. These among the Stradbrooke people were distinguished as "bandur" "bunta," "barang" and "darawang;" feminine "bandurun" "buntagun" "barangun" and "darawangun." The women, I believe, had very little say in the preliminary arrangements, but a great deal of say afterwards.

In sickness they generally resorted to the white man, but when attended to by themselves, the treatment consisted in the form of massage followed by a prolonged sucking of the seat of pain. This resulted in the production of a stone from the mouth of the operator (one of the old men), which was supposed to have been drawn from the place, and to have been the cause of the trouble. A friend who had once been operated upon said, "He enjoyed the business, and certainly was relieved." Some of these older men had considerable influence, which they cultivated by claims of supernatural power.

In the case of death the body was bound with the upper part bent forward towards the knees, and enclosed in a wrapping of tea-tree bark. It was carried to the place of interment slung to a sapling, and followed for a distance by the whole tribe. The burial place was a considerable distance, in one case two or three miles away. About half way the women and children were left behind. The grave was dug in the sand, and kept from falling in by a framework of saplings. It was lined with tea-tree bark and the body laid in. This was covered with more bark and saplings and then filled in with bush and sand. The body was set down several times on the journey, when one of the friends, who acted as chief mourner and master of the ceremonies, would go to the wrapping, and placing his mouth to the ear, where a hole was made for the purpose, enquire who killed it. Wailing and howling was indulged in to a great extent; and the mourners cut themselves with oyster shells, etc., till the blood streamed down. Wailing would be made every evening for some weeks. The women used feathers and down in the hair for mourning. On the occasion of a death the camp where it took place was deserted, and a fresh camp made in another neighbourhood. The name of the deceased was never mentioned, and in the case of a child or other person being named after the dead, such name was altered. In this way an individual had frequently other names than the one currently in use. After a considerable time the original name was generally reverted to. In course of time the death ceremonies were carried out with less and less of the old forms, until at last some wished to be buried in "white fashion" in the Dunwich cemetery.

As I knew them it was impossible to obtain information as to their original religious beliefs. Only one or two young men grew up requiring to be initiated in manhood, making "kipper" as it was termed. In these cases the necessary ceremonies were conducted in conjunction with the Nerang tribe on the mainland, the party being away some weeks.

It is but fair to mention the accident of the loss of the steamer Sovereign on the bar at the South Passage, while on her way to Sydney, 11th March, 1847. Out of fifty-four souls on board, only ten were saved, and these in a great measure through the instrumentality of the blacks, who swam out in the surf and brought as many as they could to shore. In recognition of the services then rendered, the Government, from time to time, provided them with a boat.

Whenever a large camp was gathered together "corroborrees" were held. These all had a meaning. Several of my old friends were successful composers, and some of their productions had a great run, and in course of time were carried to the mainland and practised there. The composer first took two or three friends into the bush for private instruction and rehearsal; these instructed others, and in course of time a full performance came off, which would be repeated night after night for weeks. One I remember had reference to the pelican, and the performers were painted in white patches to resemble that bird. Another had reference to a sickness, and the springing up of a wind which carried it away. Another to the loss of a leading man while out turtling. Several were comic in their character. The chief performer in these was a well known character, Billy Cassim, or John Alexander Cassim, Esq., as he called himself. A parody on the shooting of a stranded turtle by a white man on Moreton Island was always popular. A man on all fours acted the turtle, while Billy, with a stick for a gun, acted as sportsman. The rest danced round in a circle and joined in the *finale.* Another production of Billy's: mimicked the antics of a party of Chinamen attacked by sharks while fishing near shore.

Among these people no less than three dialects were spoken. The few from the mainland belonged to the Koobenpul tribe, and called their language "tchandi" or "jandi."

The Stradbrooke people were the "Choochibbmehally" tribe and spoke "Moonjan." The Moreton Islanders were the "Boorgammay" tribe and spoke "Gowar." The two first are very much alike and resemble the Yuggera of the Yerongpan tribe, south-west of Brisbane; but the latter, Gowar, is very distinct. In each case the word given is the negative or "No" of the language. The following will show, to a certain extent, these variations:—

	JANDI.	GOWAR.
Father	bing	beeyan
Mother	budiong	nabung
Eldest brother	nabang	kowran
Younger brother	duong	pudnama
Son	naring	yaboolwan
Elder sister	tchudden	butanga
Younger sister	mungunkul	wapoonga
Fire	darlo	dargee
Water	tabbil	kapemb
Sun	bigge	boodloobar
Moon	gilen	talnan
Star	mirigen	mirigen
Eye	mil	mil
Ear	pidna	binneng
Beard	yeren	yereng
Turtle	poobya	poopi
Fresh-water Turtle	binkin	poobie-poobia
Kangaroo	murray	murri
Black Snake	choomgool	choomgool
Death Adder	moon dool koon	moonoom
Plenty	cooroomba	cooroora
One	kunara	kuraboo
Two	budla	budla

When a language has no written standards, it must be very subject to variation. Still, it is difficult to understand the amount of variation which the dialects of the aboriginals in the district of Moreton Bay has sustained. The specimens given will serve to show the great differences which may be arrived at in a short distance. Very strangely some words, for no reason which I can conceive, have remained very constant. Among these may be mentioned "mirigen," star, and "budla" and "bulla," two. These, to my knowledge, remain the same in many dialects.

Frequently the names of places had a meaning of their own, but in others this seems to have been lost, thus :—

Caneipa or Kunipa on Russell Island means the "place for spears."
Kapemba, name of creek on Stradbrooke, means "place of water" in the Gowar language.
Yerool, vine shrub, a creek on Stradbrooke.
Bigoonture, tree, ant's nest, a creek on Stradbrooke.
Coodgee Mudlow, red ground.
Moodloomba, stone, rock west from Point Lookout.
Talwalpin, native cotton tree, Redland Bay.
Wynnum, pandanus or bread-fruit tree.
Tingalpa, fat, or place of fat.

Among those for which I can give no meaning are :—

Moorgumpin	Moreton Island
Bungumba	Mud Island
Noogoon	St. Helena
Tangaree	Green Island
Yerubin	King Island
Meeyantin or Megantchin	The Brisbane
Nindilly	Cleveland
Dairkooreeba	Peel Island
Moopee Millar	Bird Island
Goa wennewar	Goat Island
Coompee	Dunwich
Ballan	Amity Point
Terangeree	Point Lookout

Among personal names are the following :—

Kindara Atta Carrara	Hills on Moreton Island
Pimbeyan Pirrenpirrenba	Hills on Stradbrooke
Ilaroon	Big grass tree
Tuckabin	Small grass tree
Koota	The side of the body
Weedon paregun	Black porpoise
Timbin	North wind
Peea mareeba	Throwing a stick
Kingal moonji pimba (short, Kingal)	A sweet smell

GUINEA GRASS (*PANICUM MAXIMUM*): ITS HISTORY, CULTIVATION, AND VALUE.

By L. A. BERNAYS,

(Past President).

(Corresponding Member of the Royal Horticultural Society of England).

[*Read before the Royal Society of Queensland, June 12, 1891.*]

Unlike the subject of my last paper, I am speaking to you to-night of a plant which has been for some years in Queensland, having—if my recollection serves me aright—been introduced through the instrumentality of that eminent promoter of economic botany, the late Dr. Schomburghk, of South Australia. It is to be seen in cultivation here and there all along our coast, but only here and there; and it is because its value is not sufficiently known that I ask again to be allowed to interrupt the course of purely scientific papers at our meetings, by dealing with a subject belonging to the realm of cultural industry. Were this colony older and the industries pertaining to the products of cultivation more numerous and better developed, the value of a mere fodder plant might better be left to a farmers' society to deal with, rather than to a learned body like ours, founded as it is upon the type of older and still more learned bodies elsewhere. But our colony is comparatively young, and our farmers have still to learn the advantage of banding together for the interchange of experience and information; so that subjects such as that before us must be neglected (unless dealt with through the unsatisfactory medium of a newspaper) if they are not admitted to a place in the transactions of this Society.

Guinea Grass is a native of Tropical Africa, whence it was introduced into the West Indies in the year 1774 by mere accident and in a somewhat curious manner. A cage full of

African birds had been brought to Jamaica and presented to a Mr. Ellis, then Chief Justice of that Possession. With the birds came as food a bag of the seed of a grass indigenous to the coast of Guinea; and, the birds having died, the remainder of the seed was thrown away. Rapidly germinating where it fell, it attracted attention by the eagerness with which the resultant grass was devoured by the cattle. Experiment soon established the fact of its nutritious properties and easy cultivation, and, from this small beginning, the grass rapidly spread in Jamaica, and fouud its way to other countries where the climatic conditions were suitable; but in the West Indies its cultivation has so greatly extended as to make one of the, if not the, most valued fodder plant in use there. It is found, from the coast line up to an elevation of 5,000 feet, covering extensive tracts of country. It agrees with every soil and situation; except where the drainage is defective, being very impatient of stagnant moisture about its roots. Lunan, in his "Hortus Jamaicensis," states that in Jamaica it has rendered many rocky and otherwise barren spots very valuable by providing a fattening pasture for herds of cattle and horses. It resists dry weather for a long time and even when apparently parched up, recovers itself with a rapidity almost marvellous after slight showers. Conditionally upon the soil being drained or naturally porous it will luxuriate in wet weather; but will rapidly succumb if covered with water. I have myself grown it successfully for years, and have found it invaluable for the family cow; but last year's flood, although the water was only 24 hours on my cultivation patch, killed the Guinea Grass completely. I hold it, however, in such high estimation that it was replaced upon an enlarged scale within a week of the subsidence of the flood.

Guinea Grass is perennial, and grows into large clumps which are capable of minute subdivision. Although succeeding upon poor clay and sandy soils, it does best upon a deep moist—but well drained—soil, and is capable of enduring degrees of heat and drought under which many other grasses perish.

The cultivation is quite simple. The ground having been properly prepared, a sufficient number of plants are obtained by subdividing old clumps, and are planted firmly at intervals varying, according to the quality of the soil, from 18 to 24 inches apart. In rich soil there is nothing gained by crowding the plants, which under favouring conditions soon approach each other in every direction by forming stools. A final watering, unless the weather be moist, completes the operation and the results are certain. The grass seeds freely, but the seed is difficult to gather in quantity, owing to its disposition to scatter at the early stage of maturity. If it is desired to plant from seedlings, the seed should be raised in a specially prepared bed, shaded from the hottest sun, sown broadcast, and pressed well into the soil. If the bed when sown is covered with mats for a few days without watering, unfailing success will result. When the young plants are three inches high they can be carefully transplanted, being watered occasionally until they have got fair hold of the ground. Planting by this means is slower, and I only recommend it where clumps for subdivision are not procurable. The best time for planting is spring. In addition to preparation by seed and root division, the plant may be grown from cuttings like sugar-cane—these root rapidly.

For cutting as fodder, it should be taken when still young and tender, a condition which obtains in slightly varying degree until it begins to seed, when it becomes somewhat wiry and there is waste in feeding it to stock; but if allowed to reach that state, it may still be used to advantage by passing through a chaff-cutter.

Under favouring conditions this grass is wonderfully productive. During the whole of the warmer months of the year it can be cut over and over again, the number of times being naturally dependent upon the moisture of the season, four and five cuttings being not uncommon; so that by proportioning the area of your plantation to the number of animals to be fed, the top end may be ready for cutting again when the bottom is reached. Lunan writing in 1814 and Dr. Schomburghk sixty years later, both speak from personal experience in Jamaica of the fattening property of Guinea Grass, whether as green fodder or hay. In that climate one acre will keep two cows or a horse throughout the year.

After each cutting it is a good plan to move the soil between the roots; and, as the plant takes a great deal out of the soil, it pays to manure between the rows every three or four cuttings.

Edwards in his History of the British West Indies, writing nearly ninety years ago, thus speaks of the Guinea Grass:— "This grass may be considered as next to the sugar-cane in point of importance, as most of the grazing and breeding farms throughout Jamaica were originally created, and are still supported, chiefly by means of this valuable herbage. Hence the plenty of horned cattle, both for the butcher and planter is such that few markets in Europe furnish beef at a cheaper rate or of better quality than those of Jamaica. Perhaps the settlement of most of the North side parishes is wholly owing to the introduction of this excellent grass, which bestows verdure and fertility on lands which otherwise would not be worth cultivation."

The performances of the plant in the East Indies and Ceylon are as satisfactory as in the West Indies. Baron Mueller states it to be the best fodder plant raised on the plains of India; and Balfour in his Cyclopœdia of India gives the following instance of what is accomplished with it in Ceylon:—"A small patch near Colombo, which beginning with three quarters of an acre was gradually extended to an acre and a half, for seven or eight years supplied three or four milch cows, and from five to seven horses, continually with all the grass required for their consumption, and latterly left a surplus which was dried for bedding and hay."

A contributor to the transactions of the Agri-Horticultural Society of India speaks of it in the following enthusiastic terms:—"The value of the grass for cattle is very great, and for milch cows there is nothing equal to it. In my own family the want of Guinea Grass is always discovered by the inferiority of the butter."

The grass may be grazed every six or eight weeks, if carefully shut off in the intervening time, and the stock are not allowed to eat it too low; and, if kept solely for pasturage, it will maintain itself for many years, unless the land is very poor.

I have no experience of the effect of frost upon this useful fodder plant as there is none where I live; but Baron Mueller states that the roots can be protected in the ground against light frosts by a thin covering of soil. Differing somewhat from this opinion, I have the testimony of Mr. Soutter of the Queensland Acclimatisation Society that, although Bowen Park is liable to six degrees of frost, the Guinea Grass there is not affected in the slightest.

I hope to see this valuable grass cultivated much more extensively than it is all along our coast line, and as far inland as climate will permit; feeling quite sure that no farmer or planter, who has once given it a fair trial, will ever be without it.

COMPARATIVE NOTES ON THE TEMPERATURE OF THE AUSTRALASIAN COLONIES FOR THE YEAR 1890.

By Mrs. CHARLES COXEN, M.R.M.S.

[Read before the Royal Society of Queensland, June, 12th, 1891].

Month.	Maximum. Brisbane.	Sydney.	Melb'rne.	Adelaide.	Perth.	Hobart.	Minimum. Brisbane.	Sydney.	Melb'rne.	Adelaide.	Perth.	Hobart.
January	81·5	77·1	83·5	91·4	89·0	73·0	69·3	66·1	60·4	68·0	63·0	58·3
February	81·3	75·8	82·0	85·0	85·0	73·7	68·0	66·5	60·4	64·0	63·0	52·2
March ..	80·3	73·4	77·3	81·9	83·0	69·1	67·9	65·5	58·0	60·4	59·0	51·7
April ..	76·2	68·7	69·6	74·4	83·0	64·3	60·8	58·6	50·6	55·1	55·0	48·8
May ..	73·0	63·9	62·9	66·7	71·0	60·0	55·8	54·0	46·5	50·4	52·0	44·8
June ..	69·3	61·9	58·7	61·3	63·0	54·5	51·2	52·5	48·0	49·9	46·0	45·0
July ..	65·9	56·5	54·7	57·1	62·0	51·3	45·1	45·7	40·1	43·3	42·0	37·8
August ..	71·6	61·9	57·9	59·7	64·0	54·5	46·2	46·3	43·1	45·9	47·0	46·5
Sept. ..	77·1	66·8	62·7	66·0	67·0	60·8	54·7	52·5	46·6	50·7	49·0	44·5
October	83·4	74·0	65·5	68·9	68·0	60·3	59·1	56·7	48·5	50·3	50·0	44·2
Nov. ..	84·0	73·2	67·0	73·8	79·0	64·4	62·8	59·6	50·8	54·4	55·0	47·8
Dec. ..	84·7	74·6	70·8	80·6	81·0	65·8	65·9	61·7	52·3	58·3	60·0	49·8
Mean for 1890	77·9	68·9	67·7	72·2	75·0	62·64	58·9	57·0	50·4	54·2	53·0	47·95

THE

Royal Society of Queensland.

PROCEEDINGS

OF THE

ANNUAL MEETING,

WITH

REPORT OF COUNCIL FOR SESSION 1890-91.

AND

PRESIDENTIAL ADDRESS.

Brisbane:
POLE, OUTRIDGE & CO., GENERAL PRINTERS, PETRIE'S BIGHT.

MDCCCXCI.

THE

Royal Society of Queensland.

OFFICERS FOR 1891-92.

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THE

Royal Society of Queensland.

ANNUAL MEETING OF MEMBERS.

REPORT OF COUNCIL FOR THE SESSION 1890-91, AND PRESIDENTIAL ADDRESS.

The Annual Meeting of the Royal Society of Queensland was held on Saturday evening, 25th July, 1891, in the Lecture Hall of the College of Pharmacy, Edward Street. Mr. F. M. Bailey, F.L.S., occupied the chair, and there was a large number of members present.

The President called upon the Honorary Secretary (Mr. W. J. Ryott Maughan), to read the Report of the Council as follows:—

To the Members of the Royal Society of Queensland.

Your Council have pleasure in submitting the report of work done during the past year.

Publication of Proceedings.

In the former part of the session the Council could not undertake the printing of papers on account of the low state of the finances, and also on account of the large debt of £60 3s. 5d. due for publishing the proceedings of 1888-89, and it was thought advisable to defer incurring further expense until this debt was paid.

Thus papers were only taken on the understanding that the authors would have no objection to their remaining unpublished until the funds of the Society would permit of their being printed. This arrangement doubtless has caused the Society the loss of many valuable papers, but it had the effect of placing the Society in a better financial condition, and during the latter half of the session the papers referred to, as also those read before the Society in the session of 1889-90, were printed.

Our meetings have been well attended, and have been of much interest, there having been one or more papers read at each meeting, as well as numerous exhibits, the discussions being of a very interesting and instructive character.

Through the kindly feeling shown towards us by older societies of a kindred character forwarding their publications, our library has been greatly enriched. We have also to thank the donors of many valuable works to the library; at almost every meeting donations of this kind having been recorded, thus showing that many who are not members of the Society are ready to help on the important work the Society is attempting to accomplish—the diffusion of useful, scientific, and general knowledge.

Accommodation.

Your Council regret that they have not yet been successful in procuring independent quarters, and have still to thank the members of the Pharmacy Board for the use of one of their rooms in which to hold the meetings. It is hoped that ere long the Society will have rooms for its own use, as the constant removal from place to place has been the means of seriously damaging the library and property of the Society.

Government Assistance.

In reference to the report of the Council for last session relative to the Government assistance extended to kindred Societies in the other Colonies, your Council has not taken any further action as regards approaching the Government for assistance.

Finance.

Your Council have pleasure in reporting that the income received this year has exceeded that of last year by over £100, and, as will be seen by the Statement annexed, that the whole of the indebtedness for the Session 1889-90 has been paid off, amounting in all to £104 19s. 2d.; in addition to this the amount due for printing Vols. VII. and VIII., Part 1 of this year's proceedings, has been paid. The Society is also in possession of such stationery, forms, and other necessaries (which were very much required) as will be required for some years to come—hence the somewhat large expenditure under this heading.

It will be recollected that during the Session 1888-89, the members of the Council then in office were good enough to advance the sum of £3 each towards the purchase of furniture, amounting in all to £21. This amount has also been refunded to the members referred to.

Field Naturalists' Section.

The Field Naturalists' section during the past year has not continued the practice of making fortnightly excursions; nevertheless, this important branch of the Society has availed itself of longer holidays to visit more distant localities, for on one occasion the Yandina Scrubs were visited, and at another an excursion was taken to the Eudlo Scrubs, and hence to the top of the Blackall Range.

For want of efficient leaders in other branches of Natural History, little other than botanic work was done on these occasions; suffice it to state that good was achieved in this direction. The weather during the past twelve months has been unexceptionally favourable to the development of vegetable life; the various plants have been observed under a more vigorous state of growth, many flowering and bearing fruit, which, during the many dry seasons which we have experienced, have been in a dormant or semi-dormant state; thus the field naturalists have had the opportunity of examining and obtaining specimens of rare and new species.

Ordinary Meetings of Members.

Your Council have pleasure in being able to report a still larger average in the attendance of members at the ordinary monthly meetings, as compared with last session, as follows:—

1890.—September 16th...	Members present ...	17
October 24th ...	,, ,, ...	15
November 22nd	,, ,, ...	40

1891.—February 7th ...	,,	,,	...	18
March 13th ...	,,	,,	...	35
April 17th ...	,,	,,	...	28
May 15th ...	,,	,,	...	23
June 12th ...	,,	,,	...	38
				214

or an average of 26·75 per meeting. This statement does not include the large number of persons who attended the Special Meeting held in the Town Hall, on 5th September, 1890, when the Rev. Robt. Harley, F.R.S., delivered a popular lecture on "The Moon."

Recess.

Following the practice carried out by other societies, your Council decided to go into recess in January.

Attendance of Officers and Members of the Council.

Office.	Name.	No. of Meetings.	Number attended.
President ..	Fredk. M. Bailey, F.L.S., etc. ..	13	13
Vice-President	W. Saville-Kent, F.Z.S., F.L.S., Past-President	13	4
Hon. Secretary and Librarian	Wm. J. Ryott Maughan	13	13
Hon. Treasurer	Geo. Watkins	13	9
Members of Council ..	T. L. Bancroft, M.B.	13	9
	L. A. Bernays, Past-President ..	13	2
	W. Fryar	13	7
	W. H. Miskin, F.L.S., F.E.S. ..	13	10
	J. F. Shirley, B. Sc., F.L.S.	13	8

Obituary.

It is our painful duty to record the death of Mr. E. B. Lindon, A.R.S.M., F.G.S., a member of several years' standing in the Society. Amongst his most valuable contributions to the Society was "A Catalogue of such Minerals as are at present known in Queensland, with their principal associations and places of occurrence," and read before the Society, 15th April, 1887.

New Members and Associates Elected.

Your Council has great pleasure in stating that no less than 32 names have been added to the List of Members of the Society, and 5 others are awaiting election, as follows :—

Date of Election.	—	Name.	Rank.	Address.
1890.				
Sept. 19,	1	Brown, John	Member	Indooroopilly
,,	2	Craig, William	,,	Park-road, Milton
,,	3	Ham, Miss Alice ..	,,	Kangaroo Point, Brisbane
,,	4	Herga, Alphonse ..	,,	Edward-st., Brisbane
,,	5	Huet, Frank	,,	Queen-street, Brisbane
,,	6	Hirschfeld, Eugene, M.D.	,,	Wickham-terrace, Brisbane
,,	7	McFadyen, F.	,,	Toowong
,,	8	Thompson, Robert, M.D.	,,	Queen-street, Brisbane
,,	9	Trackson, James ..	,,	Adelaide-st., Brisbane
Oct. 24	10	Chater, Arthur Brand ..	,,	South Brisbane
,,	11	Fewings, Prescott P. ..	Associate	Toowong
,,	12	Savage, Felix	Member	Edward-st., Brisbane
Mar. 13, 1891.	13	Henderson, J. Bromlie	,,	The Grammar School, Brisbane
,,	14	Donaldson, John, M.L.A.	,,	Elizabeth-st., Brisbane
,,	15	Gailey, Richard ..	Life Mem.	Toowong
,,	16	Edwards, Richard ..	Member	Gregory-terrace, Brisbane
,,	17	Edwards, Mrs. Rd. ..	,,	Gregory-terrace, Brisbane
,,	18	Kelynack, Wm. H. ..	,,	Milton
,,	19	King, R. St. John ..	,,	Cunnamulla
,,	20	Little, Wm., M.D. ..	,,	George-st., Brisbane
,,	21	Mackie, John, M.B. ..	,,	George-st., Brisbane
,,	22	Muir, Alex.	,,	Queen-street, Brisbane
,,	23	Ogilvie, J. S.	,,	Queen-street, Brisbane
,,	24	Phillips, George, C.E...	,,	Adelaide-st., Brisbane
,,	25	Rendle, Richd., F.R.C.S.	,,	Wickham-terrace, Brisbane
April 17	26	Field, William	,,	Ipswich
,,	27	O'Connor, Thos. ..	,,	Oxley
,,	28	Ogg, Allan J.	,,	South Coast Junction
,,	29	Wittenberg, Ludolf ..	,,	Toowoomba
May 15	30	Abercrombie, D. J. ..	,,	Queen-street, Brisbane
,,	31	Hudson, A. H.	,,	Queen-street, Brisbane
,,	32	Marshall, W. H. G. ..	..	Kangaroo Point
June 12	33	*Cohen, J. J., M.A. ..	,,	Adelaide-st., Brisbane
,,	34	*Jack, J. L., F.G.S. ..	,,	Townsville
,,	35	*Kennedy, Wm. ..	,,	Adelaide-st., Brisbane
,,	36	*McLay, Chas. ..	,,	Adelaide-st., Brisbane
,,	37	*Owen, David, M.A. ..	,,	George-st., Brisbane

* Nominated for election.

Members Resigned.

Name.	Address.	Date.
Pells, Miss C.	The Girls' Grammar School, Brisbane	April 13, 1891.
Tryon, Henry	The Museum, Brisbane ..	June 6, 1891.

The following is a list of Societies and Public Institutions with which an exchange of publications has been arranged, or to which our proceedings are forwarded :—

Adelaide	Public Library, Museum and Art Gallery
,, ...	Royal Society of South Australia
Auckland	The Auckland Institute
Batavia	Natuurkundig Tidjschrift voor Nederlandseh-Indie
Bologna	Reale Accademia delle Scienza dell' Instituto
Bonn	Naturhistorischen Nerein
Boston	The American Academy of Arts and Sciences
Brisbane	Acclimatisation Society of Queensland
,, ...	The Museum
,, ...	The Parliamentary Library
,, ...	School of Arts, North Brisbane
,, ...	,, ,, West End
Brussels	L'Academie Royale des Sciences des Lettres et des Beaux Arts
,, ...	Société Royale Malacologique de Belgique
Calcutta	Asiatic Society of Bengal
,, ...	Geographical Survey of India
Edinburgh	Botanical Society of Edinburgh
,, ...	Royal Society
Frankfurt am Main ..	Senkenbergische Naturforschende Gesellschaft
Geneva	Société de Physique et d'Historie Naturelle
Genoa	Musea Civica di Storia Naturale di Genova
Hamburg	Verein für Naturwissenschaft
Hobart	Royal Society of Tasmania
Kazan	Society of Naturalists of the University
Leeds	Leeds Philosophical and Literary Society
,, ...	Conchological Society of Great Britain
London	Royal Geographical Society
,, ...	Royal Society
Madrid	Real Academia de Ciencias Extras Fisicas y Naturales
Manchester	Literary and Philosophical Society
Melbourne	Field Naturalists' Club of Victoria
,, ...	Geological Society of Australasia
,, ...	Public Library, Museum, and Art Gallery
,, ...	Royal Society of Victoria
,, ...	"Victorian Engineer," Editor of
Montreal	Royal Society of Canada
New York	American Geographical Society
,, ...	New York Academy of Sciences
,, ...	Zoological Gardens
Ottawa	Geological and Natural History Survey of Canada
Paris	La Feuille des Jeunes Naturalistes
	La Société d' Etudes Scientifiques

PHILADELPHIA ..	Academy of Natural Sciences
,, ...	Zoological Society
PISA	Societa Toscana di Scienze Naturali
ROCKHAMPTON ..	Natural History Society
SANTIAGO DE CHILI ..	Deutschen Wissenchaftlichen Verein
ST. PETERSBURG ..	La Société Imperiale Russe de Geographie
SAN FRANCISCO ..	California Academy of Sciences
SINGAPORE	Straits Branch of the Asiatic Society.
SYDNEY	Australasian Museum.
,, ...	Department of Mines.
,, ...	Linnean Society of New South Wales.
,, ...	Natural History Association.
,, ...	Royal Society of New South Wales.
TASMANIA	The Royal Society.
TOKIO	Seismological Society of Japan.
TORONTO	Canadian Institute.
VIENNA	Anthropologische Gesellschaft.
WASHINGTON	Smithsonian Institution.
WELLINGTON	Geological Survey of New Zealand.
YOKOHAMA	Asiatic Society of Japan.

Also donations of books, papers, &c., from the Hon. The Chief Secretary (Sir S. W. Griffith, K.C.M.G., Q.C.); F. M. Bailey, F.L.S.; W. Saville Kent, F.L.S., F.Z.S., Brisbane; J. Maiden, F.L.S., Sydney; Prof. Liversidge, F.R.S., F.L.S.; The University, Sydney; Baron Sir F. von Mueller, K.C.M.G., F.R.S.; T. L. Jack, F.G.S., Townsville; W. H. Rands, Maryborough; H. C. Russell, Esq., F.R.S., Sydney; Dr. Thorpe, R.N., Kingston, Ireland; C. French, Melbourne; J. Little, M.B.; J. Mackie, M.B., Brisbane; Executive Commissioners, Melbourne Exhibition; the Hon. The Minister for Mines, Sydney; Director of Agriculture, Sydney; T. Kirk, F.L.S., Wellington, N.Z.; C. L. Wragge, F.R.Met. Soc.; and A. W. Jardine, M. Inst. C.E., Brisbane.

FREDK. MANSON BAILEY, F.L.S.,
President.

WM. J. RYOTT MAUGHAN,
Hon. Secretary and Librarian.

SCIENTIFIC WORK OF THE SESSION, 1890-91.

No.	Title of Paper.	Author.	Date.
1	The Moon	Rev. R. Harley, F.R.S.	Sept. 5, 1890
2	Strychnine, a useless remedy in snake-bite	T. L. Bancroft, M.B.. .	Sep. 19, 1890
3	Snake poison and strychnine not truly antagonistic ..	Joseph Lauterer, M.D.	Oct. 24, 1890
4	Gums of Eucalypts and Angophoras	,, ,, ,,	Feb. 7, 1891
5	Preliminary notes on some new poisonous plants ..	T. L. Bancroft, M.B.	,, ,,
6	Outlines of a grammar of the 'Yerongpan language' or the language of the aboriginals round Brisbane and Ipswich	Joseph Lauterer, M.D.	Mar. 13, 1891
7	A revision of the Australian *Sphingidæ*	W. H. Miskin, F.E.S., F.L.S.	,, ,,
8	On the Time Notation and Prime Meridian	J. P. Thomson, F.R.S.G.S.	,, ,,
9	On the aboriginals of Stradbroke and Moreton Islands	Geo. Watkins	Apr. 17, 1891
10	Observations of the weaving habits of the North Queensland Green Ant, *Formica virescens*, Fabr.	W. Saville-Kent, F.Z.S., F.L.S., Past. Pres. ..	May 15, 1891
11	Notes on the Moreton Bay Mullet	G. Watkins	,, ,,
12	Guinea Grass (*Panicum maximum*), its history, cultivation, and value	L. A. Bernays, Past Pres.	June 12, 1891
13	On the prevalence of tuberculosis in Queensland.. ..	Eugene Hirschfeld, M.D.	,, ,,
14	Meteorological notes for the past year	Mrs. Coxen, M.R.M.S.	,, ,,

THE EXHIBITS AND DESCRIPTIONS, SESSION 1890-91.

No.	Title.	Exhibitor.	Date.
1	Photographs of fish, including the *Pleuronectidæ*	W. Saville-Kent, F.Z.S., F.L.S.	Sep. 19, 1890
2	New Guinea fruits and fibres	F. M. Bailey, F.L.S ..	,, ,,
3 *Microscopic Exhibits*	(*a*) Two apparently new Infusorian parasites in the blood of a frog, *Hyla nasuta*; one of them is referable to the genus Trypanosoma .. (*b*) The tubercle bacillus in a throat tumour of a lumpy beast	T. L. Bancroft, M.B...	Nov. 22,1890
4	Gum resins of different species of *Eucalyptus*	Joseph Lauterer, M.D.	,, ,,
5	A number of sterilised tubes containing specimens of media used for the cultivation of bacteria	Eugene Hirschfeld, M.D.	,, ,,
6	Various species of *Lepidoptera*	T. P. Lucas, L.R.C.P., Edin...	,, ,,
7	Photographs of South Sea Island natives and scenery; also ethnological objects of interest	J. P. Thomson, F.R.S.G.S.	Mar. 13, 1891
8	New species of Queensland *Arachnides*	Joseph Lauterer, M.D.	,, ,,
9	Sphygmograph	John Mackie, M.B. ..	,, ,,
10	Bark of *Casuarina* inophloia	Hon. Albert Norton, M.L.A., Past Pres. ..	April 17,1891
11	New species of *Lepidoptera* ..	Henry Tryon	May 15, 1891
12	An aboriginal	Joseph Lauterer, M.D.	,, ,,
13	Photographs of oyster grounds as exposed at low spring tides more particularly from the Rockhampton district ..	W. Saville-Kent, F.L.S., etc.	,, ,,

THE EXHIBITS AND DESCRIPTIONS, SESSION 1890-91.—*Continued*

No.	Title.	Exhibitor.	Date.
14	*Panicum maximum* (Guinea grass)	L. A. Bernays, Past President	June 17, 1891
15	*Panicum spectabile coapim* ..	Joseph Bancroft, M.D.	,, ,,
16	Specimens of stone from Mt. Morgan Gold Mine	Hon. Albert Norton, M.L.A., Past Pres. ..	,, ,,
17 *Microscopic Exhibits.*	(*a*) Gill of an oyster showing the *cilia* in motion .. .. (*b*) Motion of protoplasm in a water plant (Nitella) (*c*) A new Conferva from the fresh water swamps on Stradbroke Island (*d*) Skin of a mangy horse (*e*) Coccidium of rat's liver	T. L. Bancroft, M.B. ..	,, ,,

ROYAL SOCIETY OF QUEENSLAND.

Statement of Income and Expenditure for Session 1890-91.

Dr.

	£ s. d.	£ s. d.	£ s. d.
To Balance brought forward from Session 1889-90 ..			12 9 5
,, Donations :—			
T. L. Bancroft, M.B.	1 1 0		
Sir C. Lilley, Knt. ..	1 1 0		
J. W. Sutton ..	1 1 0		
W. H. Miskin ..	3 0 0		
B. L. Barnett ..	1 1 0		
		7 4 0	
,, Life Members :—			
R. Gailey	10 10 0		
W. Saville-Kent ..	10 10 0		
		21 0 0	
,, Subscriptions, Members :—			
1888	5 5 0		
1889	7 7 0		
1890	31 10 0		
1891	99 15 0		
		143 17 0	
,, Associates :—			
1890	0 10 6		
1891	2 12 6		
		3 3 0	
,, Entrance Fees		40 19 0	
,, Discount, 14/- ; Exchange, 6d. ..		0 14 6	
,, Sales of Proceedings		9 19 0	
			226 16 6
			£239 5 11

Cr.

	£ s. d.	£ s. d.
By Printing Proceedings for Session 1889-90 :—		
,, Vol VI, and Annual Report ..	104 19 2	
,, Advertising	7 0 6	
,, Office keeper	1 10 0	
Expenditure o/a Session 1889-90 :		113 9 8
By Printing Proceedings Vols. VII and VIII, Part 1, for Session 1890-91	23 13 6	
,, Advertising	8 4 9	
,, Stampage, sundries, and removal expenses	15 11 0	
,, Furniture and Stores	12 0 5	
,, Stationery, including metal stamp, forms, notices, etc.	32 7 10	
,, Office keeper	6 0 0	
,, Cheque book	0 2 6	
Expenditure o/a Session 1890-91 :		98 0 0
By Refund o/a loan from members of Council, 1888-89..		21 0 0
		232 9 8
Queensland National Bank, Cr.		6 16 3
		£239 5 11

GEO. WATKINS, *Hon. Treasurer.*

WM. J. RYOTT-MAUGHAN, *Hon. Secretary.*

Examined and found correct, Brisbane, 24th July, 1891.—ALEX. J. TURNER, *Auditor.*

In moving the adoption of the Report of the Council and Financial Statement the Hon. A. Norton, M.L.A., said it was a matter for congratulation that they had had the meetings so well attended during the year, and that so many valuable papers had been read. It was also satisfactory that they had had such a large addition of new members, and that, instead of the funds, like those of the Government, showing a large deficit, there was now a considerable balance in hand. That was due in a large measure to the energy of their worthy Honorary Secretary, Mr. Maughan. (Applause).

Mr. L. A. Bernays seconded the motion. He also referred to the excellent work the Secretary had done, particularly with regard to the funds. The outstanding liabilities of last session had been cleared off, but there was a credit balance in hand, and there were no liabilities behind. (Hear, hear). Members worked now with much better spirit, for there was no dead horse. He would be glad if the members of the medical profession could be induced to attend their meetings. Besides those who did attend he wished some of the elder members of that learned body would interest themselves in their proceedings. These remarks applied particularly with regard to one branch—the sanitary. They would like to see science combined with the practical as much as possible.

The motion was agreed to.

The retiring President, Mr. F. M. Bailey, F.L.S., then read his Presidential Address as follows :—

PRESIDENTIAL ADDRESS.

JULY, 1891.

It was my intention in this Address to confine myself, when referring to Australian botany, to a notice of what had been done during the past year towards working up the indigenous flora. But a friend to whom I mentioned the matter suggested that I should rather give a brief *resumé* of the history of botanic work in Australia; and when I considered the rather large number of our members who take more or less interest in botany, and Australian botany in particular, I thought the advice good, and that a brief sketch of this phase of the work might not be deemed out of place in my Address.

CONCISE HISTORY OF AUSTRALIAN BOTANY.

At the present advanced state to which our knowledge of the botany of Australia has attained, one is apt to forget the many excellent men who, at no small privations, and often personal risk, first collected in these countries, and thus laid the very foundation upon which we at present build. Therefore, the following epitomized sketch in somewhat chronologic order is offered to the student of botany.

In most cases some species bear the name of the collector or botanist who has assisted in the great work of collecting and describing the plants of our flora. When the person's work is under notice an example of such naming is recorded. This, it is hoped, may assist to retain the name in mind, and also give an enhanced interest in the plant itself. Objections are often made to dedicatory names for plants, and most certainly descriptive ones for species and varieties are far preferable. The objection has mostly been brought about by the habit of a few sycophantic botanists overloading their writings with the names of persons who never assisted in the study of botany, but by chance held some high position in the State. No one, however, will be found to raise an objection to the name of a person who has worked at the science being attached as title to a plant.

1688 and 1699.—The father of the science in Australia was the celebrated buccaneer, Capt. Wm. Dampier, who in 1688 and 1699 collected plant specimens on the west and north-west coasts. These specimens seem to have been the first carried to Europe, and it would appear that they were left undetermined until they were worked out by Wm. Baxter the curator of the Oxford Botanic Garden between 1813-1851. No plant seems to bear the name of this excellent man, the *Baxteria* of Robt. Brown being named after Wm. Baxter, who was a collector of West Australian plants between 1823 and 1830.

A genus of Goodenovieæ—*Dampiera*, R. Br.—is dedicated to Captain Dampier, besides the beautiful Glory Pea, *Clianthus Dampieri*, A. Cunn.

1770.—To Mr. (afterwards Sir) Joseph Banks and Dr. D. C. Solander, the naturalists of Capt. Cook's first voyage in the ship "Endeavour," is due the honor of making the first systematic botanic collection in Australia. Their labours brought to our knowledge about one thousand species of plants; before this only about three hundred species of Australian plants were known. Banks and Solander collected their specimens at Botany Bay, Bustard Bay, Cape Grafton, Endeavour River, Point Hillock, and Thirsty Sound.

Of these early botanic explorers Banks' name is attached to the Australian honeysuckles—the *Banksias* of Linnæus, a genus of Proteaceæ; *Spondias Solandri*, Benth., and a genus, *Solandra*, are named after Dr. Solander, none of which, however, have been met with in Australia. The name of England's greatest navigator is associated usually with the New Caledonian pine, *Araucaria Cookii*, R. Br., although Forster's earlier specific name, Dombeya columnaris, is adopted by many botanists.

1773.—Capt. Cook on his second voyage was accompanied by the botanists J. R. Forster and his son George who touched at Adventure Bay, Tasmania, but did not collect a large number of Australian specimens. The genus *Forstera*, Linn., of the Order Stylideæ, commemorates their work.

1777.—On Capt. Cook's third voyage, David Nelson and the surgeon of the ship "Resolution," William Anderson, collected the botanic specimens, and from a note of this latter gentleman we find that the leaves of *Leptospermum scoparium* were used as a substitute for Chinese tea: he mistook the shrub for a *Philadelphus*, a genus of Saxifrageæ. He says that he drank the infusion and found it of pleasant taste and smell. It may here be pointed out that the word should be spelt "tea" and not "ti" so persistently used by newspaper writers; this latter word is the Maori name for Cordyline, a genus of Liliaceæ. The plants which bear the names of these botanists are—*Nelsonia*, R. Br., a genus of Acanthaceæ, and *Andersonia*, R. Br., a genus of Epacrideæ. This latter is also partly dedicated to Alex. Anderson, a director of the Botanic Garden at St. Vincent.

1788.—Directly after the establishment of the first settlement at Port Jackson, John White, the Surgeon-General of the N.S. Wales Settlement, collected plant specimens about Botany Bay. These were sent for determination to Mr. Wilson, A. B. Lambert and J. E. Smith.

I find no plant bearing Mr. White's name.

1791.—Archibald Menzies, who accompanied Capt. Vancouver's Expedition, made a large collection of plant specimens at King George's Sound.

A genus of Ericaceæ, *Menziesia*, bears the name of this botanist—no species of which are found in Australia. His name is, however, attached to several species of Australian plants, one of which is *Banksia Menziesii*, R. Br.

1792.—J. J. Labillardière, of the French Expedition under General D'Entrecasteaux, visited Tasmania and the south-western parts of Australia, where he made large botanic collections, which furnished much of the material for his work, "The Novæ Hollandiæ Plantarum," in which many were figured.

The geuus *Billardiera*, Sm., of Pittosporeæ, is in honor of this botanist.

1794 to 1810.—Col. William Paterson, collected many of the native plants of N.S. Wales and Tasmania, and during the same years George Caley collected herbarium specimens for Sir Joseph Banks.

Patersonia, R. Br., a beautiful genus of Irideæ, bears the name of the first, and the curious Orchideous genus, *Caleana*, R. Br., noted for the irritable lid-like labellum, records the labours of the latter.

1800.—M. Leschenault de la Tour, the botanist of Capt. Baudin's Expedition, collected plants on the north-west and west coast, in Tasmania and N.S. Wales. Many of these seem to have been published by the French botanist, R. F. Desfontaines

This early collector's name is given by Robt. Brown to a genus of Goodenovieæ *Leschenaultia*, and that of the latter to a section of the same genus, *Latouria*.

1801-5.—Dr. Robt. Brown, one of the greatest botanists of the age, accompanied Capt. Flinders on his voyage, and laid the foundation of a thoroughly scientific knowledge of Australian botany. In speaking of Dr. Brown, Hooker's words are that he "united a thorough knowledge of the botany of his day, with excellent powers of observation, consummate sagacity, an unerring memory, and indefatigable zeal and industry," as a collector and investigator. He had, further, the advantage of being accompanied by a botanic draftsman, Ferdinand Bauer, who proved no less distinguished as a microscopic observer than as an artist; and he had a gardener, Peter Good, to assist in collecting and preserving the specimens. Collections were made at King George's Sound, and along the coast, through Bass Straits to Port Jackson. Brown and Bauer stayed in N.S. Wales and explored the Blue Mountains and other localities. They left for England in the "Investigator," where they arrived in 1805, with a most complete and valuable collection. The plants were published by Dr. Brown in his "Prodromus Floræ Novæ Hollandiæ" in 1810, and in the Appendix to "Capt. Flinders' Voyage" in 1814. The following plants are named after the persons mentioned in this paragraph:—*Brunonia*, Sm., a genus of Goodenovieæ, after Dr. Brown; *Bauera*, Banks, a genus of Saxifrageæ, after F. Bauer; *Grevillea Goodii*, R. Br., after P. Good; and *Flindersia*, R. Br., a genus of Meliaceæ—of particular interest to Queenslanders from containing such useful woods, as the light yellow-wood, crow's ash, Cairns hickory and others which commemorates Capt. Flinders.

1802.—David Burton, who was sent out by Sir Joseph Banks, collected plant specimens in N. S. Wales. *Burtonia*, R. Br., a genus of Leguminosæ, was named after this collector.

1817 to 1829.—Of the early collectors and writers on Australian plants, next in rank to Robt. Brown, must be dlaced the enthusiastic botanist, Allan Cunningham. In 1817 he accompanied Lieut. Oxley on his expedition to explore the Lachlan and Macquarie rivers. On this journey he secured about 450 species of plants, many of which were obtained on the Blue Mountains. After this he was engaged as botanist to Captain P. P. King's surveying voyage, and was enabled to collect about 300 more species, some at King George's Sound at Dampier's Archipelago, and at the Goulburn Islands. In 1818 he visited Illawarra, and accompanied Capt. King to Hobart and Macquarie Harbour. While with Captain King, from 1818 to 1821, he obtained specimens of plans from Port Macquarie, the Hastings River, Rodd's Bay, Percy Isles, Cleveland Bay, Halifax and Rockingham Bays, the Endeavour River, Goulburn Island, the Vernon Islands, Cambridge Gulf, and Port Wanderer, as well as many other places. In 1822 he made collections at Illawarra, the Blue Mountains to the water-head of the Macquarie, the Pandora Pass and Liverpool Plains. In 1824 he collected at the sources of the Murrumbidgee and many other places, including the Brisbane River. In 1825 he collected on the Nepean and Hunter rivers, about Pandora Pass, Liverpool Plains, Wellington Valley, Cox's River, etc., etc.

In 1827-28, he again visited Moreton Bay with C. Fraser, the then Colonial Botanist of N. S. Wales, and collected about Mount Lindsay, the Bremer River, and the Main Range, discovering the pass known as Cunningham's Gap. In 1829 he again collected on the Blue Mountains, Moreton Bay, the Bremer, Campbell's Range, and the Illawarra, etc., etc.

This brief sketch of Allan Cunningham's career, extracted from Dr. Hooker's writings, gives some idea of how much we owe to the zeal and perseverance of this great botanic explorer. He held the position of Colonial Botanist of N. S. Wales from 1836 until the time of his death in 1839. Amongst his published accounts of Australian plants, are the "Appendix to Capt. King's Voyage," and a "Botany of the Blue Mountains, Bathurst and the Liverpool Plains," published in Field's "Australia." Here again the honor of a genus is divided between two botanists of the same name; for we are told that Dr. Robt. Brown in naming the coniferous genus *Cunninghamia* intended it to commemorate the merits of James Cunningham, who is said to have died about 1709, and who discovered the plant, and Allan Cunningham, the Australian botanist. His name, however, is well known to Queenslanders as being attached to our "Hoop Pine," *Araucaria Cunninghamii*, Ait. A genus of Juncaceæ, *Kingia*, R. Br., bears Capt. King's name. Several plants are named after C. Fraser, the Colonial Botanist referred to, and who died in 1832, but one will be enough to mention—a small shrub commonly met with on the side of creeks, *Sophora Fraseri*, Benth. and *Oxleya xanthoxyla*, A. Cunn., now *Flindersia Oxleyana*, F.v.M.; the light yellow-wood was named in honour of the early explorer, Lieut. Oxley.

1818 and 1819.—M. Gaudichaud, when with Capt. Freycinet's Expedition, made collections of the plants on the west coast, and at Port Jackson, Botany Bay, and the Blue Mountains, which were afterwards published by himself and other botanists in Paris. He gave the captain's name to the genus of Pandaneæ—*Freycinetia*, and Dr. Brown named a species of this genus, *F. Gaudichaudii* after the botanist of the expedition.

1823.—Franz Wilhelm Sieber collected herbarium specimens in N.S. Wales. The genus of Umbelliferæ *Siebera*, Reichb., bears his name.

1823 to 1826, and again in 1829.—William Baxter collected specimens of the native plants at King George's Sound, Wilson's Promontory, Cape Arid, and Lucky Bay—all of which were determined by Dr. Brown and Sir Wm. Hooker. As previously stated the genus *Baxteria*, R.Br. of Juncaceæ, bears this collector's name.

1824.—M. D'Urville (afterwards Admiral D'Urville), one of the naturalists to Capt. Duperrey's voyage of discovery in the corvette "La Coquille," collected specimens of N.S. Wales plants, which were published in 1829 by MM. Brougniart, D'Urville, and Bory de St. Vincent. The genus of Algæ, *D'Urvillæa*, Bory, bears the name of this French botanist.

1826 to 1832.—Robt. Wm. Laurence collected plant specimens in Tasmania, which were forwarded to Sir Wm. Hooker, who published them in the "Companion to Botanical Magazine and Icones Plantarum." *Correa Laurenciana*, Hook., a Rutaceous plant, and the moss *Orthotrichum Laurencei*, Mitt., bear this collector's name.

1827—M. Lesson, the naturalist of the discovery ship "L'Astrolabe," commanded by Capt. D'Urville, collected or received the specimens from the Colonial Botanist, C. Fraser, which he took to Europe. A compositæ, *Podolepis Lessoni*, Benth., is named after him.

1830.—John Lhotsky collected N.S. Wales and Tasmanian plants. His name is given to the genus *Lhotzkya*, Schauer, of *Myrtaceæ*.

1831.—Sir Thos. L. Mitchell collected specimens of the indigenous plants of the Hawkesbury and Hunter, the Liverpool Plains and the Gwydyr; these specimens were described partly by Dr. Lindley and partly by Dr. R. Brown.

1835.—Sir Thos. L. Mitchell, in his expedition to the Darling River, was accompanied by the Colonial Botanist, Rich. Cunningham, who it will be remembered was killed by the natives. Many interesting plants were secured by the party, descriptions of which by Dr. Lindley will be found in notes of the Journal of the Expedition.

1836.—Sir Thos. L. Mitchell's party collected specimens on the Darling, Murray, Lachlan, and Murrumbidgee rivers, and at Mount William, the Glenelg River, Discovery Bay, and other places. A Mr. Richardson was collector for this expedition, and the specimens were described by Dr. Lindley. Many plants bear Sir T. L. Mitchell's name, but the one best known to Queenslanders is probably the native pomegranate, *Capparis Mitchellii*, Lindl.

1845.—In this year Sir Thos. L. Mitchell conducted his fourth expedition, this time into Northern Australia, and again added largely to our knowledge of Australian vegetation. Several botanists assisted in the identifications, and the descriptions of the new species are given in notes scattered through the published journal of the expedition.

1832.—Alex. Collie, B.A., Surgeon, R.N., one of the naturalists in Capt. Beechey's voyage, collected plant specimens in south western Australia and Swan River, and from this year to about 1850 Ronald Campbell Gunn collected in Tasmania, and the greater part of our knowledge of the plants of that island is due to his work in collecting the material from which the flora was elaborated. A genus of Ficoidea, *Gunnia*, *F.v.M.*, bears his name.

1832 to about 1838.—James Backhouse during these years collected extensively in Tasmania, Victoria, South Australia, Western Australia, N.S. Wales, and Moreton Bay; many plants of the latter locality, however, are said to have been collected and given to him by Sir Wm. McArthur. *Backhousia*, Hook. and Harv., a genus of Myrtaceæ is named after this collector.

1833.—Dr. J. Milligan for several years collected Tasmanian plants. His name is given by Dr. Hooker to a species of the Australian heath family, *Dracophyllum Milligani*, Hook.

In this year, 1833, Richard Cunningham was appointed Colonial Botanist of N.S. Wales, and while out collecting with Sir Thos. L. Mitchell's expedition in 1835, was killed by the natives. 1833 was also the year that Baron Charles von Hügel made his collection of West Australian plants. *Mollinedia Huegeliana*, Tul., is named after him.

1837.—Capt. (now Sir) George Grey, assisted in collecting the plants of Australia by his expeditions on the west coast, when he secured many rare species. One of the beautiful Darling peas bears his name, *Swainsona Greyana*, Lindl.

1837.—In this and during the few following years, Dr. Bynoe, who was with Capt. Wickham and Capt. J. Lort-Stokes, collected botanic specimens on Dupuch Island, the Abrolhos, the Victoria River, Bass' Straits, as well as in N.S. Wales, all of which were sent to Sir William Hooker for determination. *Acacia Bynoeana*, Benth., is named after him, and *Grevillea Wickhamii*, Meissn., is dedicated to Capt. Wickham.

1838.—John McGillivray, of Sir Gordon Bremer and Capt. Blackwood's Expedition, collected herbarium specimens at Port Essington. About this time, and for some years after, a Mr. Armstrong was resident Collector in the same locality for the Kew Herbarium. The following plants bear the names of the above collectors—*Cochlospermum Gillivræi*, Benth., and *Euphorbia Armstrongiana*, Boiss.

1838.—Dr. Ludwig Preiss about this time made a large collection of Swan River plants, travelling for this purpose, for some time, with J. Drummond. The specimens collected by him were described by various botanists, and published in two volumes under the title of "Plantæ Preissianæ." A small West Australian gum-tree, *Eucalyptus Preissiana*, Schauer., is named after him.

1839.—James Drummond, one of the most zealous of Australian botanic collectors, began work in 1839 and continued for sixteen years, and to his labours we owe most of our knowledge of the West Australian flora. His first collection was mostly determined and published by Dr. Lindley; some, however, were published by the Russian botanist, P. K. N. Turczaninow, in the "Bulletin de la Société Impérialè des Naturalistes de Moscou." *Eucalyptus Drummondii*, Benth., is named in honor of this excellent collector, but in Queensland his name is better known as being attached to the little "caustic creeper" *Euphorbia Drummondii*, Boiss. About this time, also, Capt. Mangles collected many species of West Australian plants, several of which have his name attached to them—the one best known in garden culture, is probably Dr. Lindley's *Rhodanthe Manglesii*, or, as it is now known, *Helipterum Manglesii*, F.v.M. During the year 1839 also, Capt. D'Urville visited Sydney and Tasmania, and the medical officers of his expedition, MM. Hombron and Jacquinot, managed to secure a few herbarium specimens.

1839.—The United States Exploring Expedition under Commodore Wilkes also visited Sydney this year, and the party made large collections of the plants in the neighbourhood of Sydney; these specimens were determined and published in Professor Asa Gray's "Botany of the United States Exploring Expedition." The botanist of this voyage was W. D. Brackenridge, and a genus of Ochnaceæ, *Brackenridgea*, Gray, was named in his honour.

In the same year, John Bailey, the Colonial Botanist of the then young colony of South Australia, arrived at Adelaide, and made collections of plants about the town and district. These were principally sent to his old friends, the Messrs. Loddiges, of London, in a live state, or as seeds. The native flora of the Adelaide district is probably the least interesting of the Australian colonies; it cannot be wondered at, therefore, that we find his energy directed more towards the introduction of useful economic plants than to collecting the indigenous flora. As a tribute to the memory of this early botanist, it may be stated without fear of contradiction, that the high position always held by South Australia in horticulture generally, is in a great measure due to his zeal and perseverance in the introduction of all the finer varieties of fruits, &c., from other parts of the world.

1840.—In the year 1840, John Anderson, the botanic collector of Capt. King's voyage, succeeded Allan Cunningham as colonial botanist of N.S. Wales, and continued the work of collecting specimens of the native plants, and forwarding them to the Kew Herbarium, until the time of his death, when he was succeeded in the directorship of the Sydney Botanic Gardens in 1847 by the present director, Chas. Moore.

In 1840, also, Drs. Hooker and Lyall, when attached to the discovery ships "Erebus" and "Terror," made large collections of Tasmanian plants. *Bauhinia Hookeri*, F.v.M., bears the name of the first, and *Plagiochila Lyallii*, Mitt., that of the other of these well-known botanists.

1840 to 1855.—Messrs. Robertson and Adamson were collectors of Victorian plants, which they forwarded to Sir William Hooker for determination. *Calochilus Robertsoni*, Benth., is named in honour of the first-named collector.

1840.—This was also the year of Edward John Eyre's Expedition from Adelaide to Western Australia; botanically, this journey was of little interest. His name is borne by the Compositæ *Pluchea Eyrea*, F.v.M.

1842.—In this year Charles Stuart began collecting in Tasmania and N. S. Wales, which work he continued for many years, paying special attention to New England. The pretty daisy-like plant, *Brachycome Stuartii*, Benth., is named after him.

In the same year John McGillivray, when naturalist of the "Rattlesnake," made collections of Australian plants; and again, in 1847, he obtained botanic specimens at Port Curtis, Rockingham Bay, Port Molle, Cape York, Goold Island, Lizard and Moreton islands. *Cochlospermum Gillivræi*, Benth., is dedicated to his memory.

1844 to 1846.—The years of Capt. Charles Sturt's Expedition into the interior brought to our knowledge a large number of inland plants, which were described and published by Dr. R. Brown in an appendix to Capt. Sturt's narrative of the expedition. The desert rose, *Gossypium Sturtii*, F.v.M., bears the name of this great explorer.

These were also the years of Dr. Ludwig Leichhardt's expeditions. The botanic collections and notes of this unfortunate explorer have proved of great value in working up the Australian flora. Baron Mueller has dedicated a genus of Menispermaceæ to Leichhardt; but to the Queenslander his name is associated more familiarly with *Sarcocephalus cordatus*, the Leichhardt Tree, and with the Queensland beech, *Gmelina Leichhardtii*, F.v.M.

1847 to 1857.—Augustus Oldfield collected a large number of specimens of Tasmanian and West Australian plants, the whole of which he presented to the Kew Herbarium. *Eremophila Oldfieldii*, F. v. M., is named after him.

1848.—J. S. Roe's journey into the south-western interior was productive of an excellent collection of herbarium specimens, obtained from Cape Riche to Bremer Range, and south of the Russell Range, all of which specimens were determined by Sir William Hooker. The tea-tree *Leptospermum Roei*, Benth, bears his name.

This was also the year that E. B. Kennedy started on his expedition to explore the Cape York Peninsula. To this party W. Carron was attached as botanist; many fresh plants were brought to our knowledge by his exertions, and not least amongst them was the first Australian "Pitcher Plant," which was named by Baron Mueller *Nepenthes Kennedyi*, in honor of the leader. Both before and after this W. Carron was a collector of botanic specimens, and several plants bear his name—*Bauhinia Carroni*, F.v.M., will be enough to quote.

For many years prior to 1851 (when he died), J. T. Bidwill was an enthusiastic collector of plants, particularly about Wide and Moreton bays. The noble Bunya Pine is one of his discoveries, and bears his name, *Araucaria Bidwilli*, Hook.

Here, without date, may be noticed that over a long series of years great service was rendered to botany by collections made or caused to be made by Sir Wm. McArthur, Sir Geo. and The Hon. W. S. Macleay, and Dr. Geo. Bennett. The names of these men are handed down to prosperity in the nomenclature of the following plants :—*Cyathea Macarthurii*, F.v.M., a noble fern-tree of Lord Howe's Island; *Callitris Macleayana*, F.v.M., a tall graceful pine; and *Eupomatia Bennettii*, F.v.M., one of the most curious and beautiful of the small shrubs met with in our river scrubs.

1854.—About this time the learned Dublin professor of botany, Dr. W. Harvey, visited Australia in quest of Algæ, on the plants of which he was one of the greatest European authorities. He made collections at King George's Sound, Swan River, Cape Riche, Victoria, Tasmania, and N. S. Wales. He also persuaded several residents to continue the work of collecting these most delicate and lovely forms of vegetable life, the result of which was the production of his beautifully illustrated work in five volumes, the "Phycologia Australica." Dr. Harvey's name is given by Baron Mueller to a Menispermaceous plant, *Sarcopetalum Harveyanum*. In the work above quoted we find that Dr. Harvey has named several sea-weeds after persons from whom he received specimens. Thus, we have the genus *Cliftonia*, after G. Clifton, R.N., of Fremantle; *Curdiea*, after Dr. Curdie of Geelong; *Dasya Feredayæ*, after Mrs. Fereday, Georgetown, &c., &c.

1847.—This must, for all time, be looked upon as the great epoch of Australian botany, for in this year Baron Ferd. von Mueller, K.C.M.G., the Government Botanist of Victoria, arrived in Australia. His love of the science, combined with some botanic training in Europe, caused him soon after landing on our soil to turn his attention to the indigenous vegetation, and it is greatly due to his zeal in the cause, and indefatigable labour, that the way of the botanist at the present time is so plain and easy

The large herbarium he prepared for Victoria furnished the greater part of the material from which the immortal George Bentham published his great and glorious work, "The Flora Australiensis." It may be safely stated of this publication that no similar work in the English language, either before or after, has ever equalled it for simplicity in the concise descriptions of the plants enumerated in the seven volumes. Baron Mueller's works on the Australian flora are far too numerous to be noticed fully in this sketch. Between 1858 and 1881 he published his eleven volumes of the "Fragmenta Phytographiæ Australiæ"; since then he has issued a "Flora of the Colony of Victoria"; he has also published his "Eucalyptographia," his "Décades of Acacias and Myoporaceous Plants," and "Plants of the Order of Chenopodiaceæ." As one might expect, many plants bear the name of this botanist. Two alone will be sufficient to draw attention to here—the insignificant, leafless, epiphytic orchid, *Tæniophyllum Muelleri*, Lindl., and the magnificent palm of our tropical scrubs, *Licuala Muelleri*, Wendl. and Drude.

Although during the earlier part of this botanist's career he travelled extensively and made large collections himself, by far the greater part of his work has been the determination and description of specimens collected by amateurs or paid collectors, or gathered during the various expeditions; particulars regarding which will now be given, although perhaps not in strict chronologic sequence.

Herbarium specimens were collected in the north-west interior by an expedition conducted by H. Babbage, and in his honour Baron Mueller named a genus of Chenopodiaceæ *Babbagia*. The plant collecting is said to have been done by D. Hergolt, but I find no plant bearing his name.

Many expeditions have been led into the unknown parts of Australia by the Messrs. Gregory, and their notes have added much to our knowledge of the Queensland flora; but the most valuable information was obtained and the largest number of botanic specimens secured when Ferd. Mueller accompanied A. C. Gregory's North Australian Exploring Expedition as botanist during 1855-6. During this journey, when on the Glenelg, the gouty-stemmed tree of other explorers was met with, which has since been named *Adansonia Gregorii* by Baron Mueller, after the leader of the expedition. The name of J. Flood, who assisted Baron Mueller while on the expedition in the work of collecting and preserving the specimens found, is given to *Stylidium Floodii*.

1858 to 1862.—John McDouall Stuart, who was first draughtsman to Capt. C. Sturt on his journey to the interior, in all his expeditions collected specimens of plants which were given to Baron Mueller for determination. The Sapindaceous shrub, *Diplopeltis Stuartii*, F.v.M., is named in honor of this explorer.

Pemberton Walcott and Maitland Brown collected the herbarium specimens on F. T. Gregory's Expedition to the north-west in 1861, and Baron Mueller determined and described them. The plants which commemorate these two collectors are—*Lachnostachys Walcottii*, F.v.M., and *Gomphrena Maitlandi*, F.v.M.; *Acacia Gregorii* commemorates the leader of the Expedition.

Lieut. Smith's Expedition to the estuary of the Burdekin, of which Eugene Fitzalan was the botanic collector, added greatly to our knowledge of the botany of the north-eastern coast. The specimens were all placed in Baron Mueller's hands for report, which was subsequently given in his essay on the plants. It was in this essay that he published the description of that beautiful tree, *Randia Fitzalani*. Not only on this expedition, but for many years afterwards, Mr. E. Fitzalan was in the habit of collecting and forwarding specimens to Baron Mueller.

1861 —Wm. Landsborough's expedition from the Gulf of Carpentaria in quest of Burke and Wills. Baron Mueller determined the specimens obtained by this expedition. An excellent fodder grass, *Anthistiria membranacea*, Lindl., is known as the Landsborough grass. *Swainsona Burkei*, F.v.M., and *Eremophila Willsi*, F.v.M., are named after the unfortunate explorers.

The plant specimens which were obtained by the Expeditions undertaken by Ernest and Christopher Giles were also determined and published by Baron Mueller in his various works. Plants named after these two explorers are—*Eremophila Gilesii*, F.v.M., and *Pholidia Christophori*, F.v.M.

The plants also collected by the West Australian explorer, the Hon. J. Forrest, were similarly determined by Baron Mueller, and published in various papers supplied to societies. *Adenanthos Forrestii*, F.v.M., is named after this explorer.

Having noticed explorers' collections which were determined by Baron Mueller, it may be well to mention some of the private or paid collectors that have sent their collections to him.

First amongst these must be mentioned the Rev. Wm. Woolls, Ph.D., who not only collected most of the plants of the Parramatta district, but made collections from other localities, and induced many in far distant parts to collect and forward to Baron Mueller. Besides this, Dr. Woolls wrote largely on the flora of New South Wales himself. The noble timber tree, *Echinocarpus Woollsii*, F.v.M., is named after him.

The Rev. J. E. Tenison-Woods, when residing in the Tattiara country, collected most of the plants of that district and forwarded them to Baron Mueller, who named the pretty heath-like shrub *Leucopogon Woodsii* after him.

Baron Mueller also received the specimens collected by Dr H. Beckler, at Moreton Bay; in the vicinity of Melbourne; on the Hastings, Richmond, Macleay, and Clarence Rivers; and about the Darling and Barrier Ranges, when the doctor was botanist to the Burke and Wills Expedition. *Ixora Beckleri*, Benth., is named after this collector.

The large gatherings made by that excellent collector, J. Dallachy in the southern parts of Australia, and of late years, about Rockingham Bay, were also described by Baron Mueller, many of them in the volumes of the "Fragmenta Phytographiæ Australiæ." His name will also be found frequently mentioned in the pages of Bentham's Flora. Baron Mueller has given his name to a genus of Rhamneæ *Dallachya*, and one of our most useful native fruits—the Herbert River cherry—*Antidesma Dallachyanum*, Boiss, is also named after him.

Chas. Moore and W. R. Guilfoyle, the present directors of the Sydney and Melbourne Botanic Gardens, in former years collected plant specimens both in New South Wales and Queensland, the greater part of which were sent to Baron Mueller for determination. The large Cycad of Springsure, *Macrozamia Moorei*, F.v.M., bears the name of the first mentioned, and a genus of Simarubeæ *Guilfoylia*, that of the latter.

T. A. and B. Gulliver, some years ago, collected in various parts of Australia, sending their specimens to Baron Mueller for determination. The curious 'Love Grass,' *Heterachne Gulliveri*, Benth., is in honor of them.

W. E. Armit also collected largely of the North Queensland plants for Baron Mueller. *Goodenia Armitiana*, F.v.M., is named in his honour.

W. Bäuerlen has for many years collected specimens of Australian plants, the greater part of which have been determined by Baron Mueller. *Correa Bäuerlenii*, F.v.M., is named after this collector.

The flora of the Rockhampton district was mostly collected for Baron Mueller by M. A. Thozet, who published a pamphlet on the indigenous plants used for food by the natives, with the modes of preparation. The genus *Thozetia*, F.v.M., of Asclepiadeæ, marks his efforts.

Walter Hill, the first Colonial Botanist of Queensland and Director of the Brisbane Botanic Gardens, collected a large number of the Queensland plants. When botanist to G. E. Dalrymple's Expedition in 1873 and 1874 he was the first to collect on the Bellender-Ker Range. The plants gathered by this botanist were in part sent to the Kew Herbarium; others were sent to Baron Mueller. The scrub "Ironwood," *Myrtus Hillii*, Benth., is called after this botanist.

Mrs. Amalia Dietrich collected plant and other specimens in Queensland, especially about Mackay, for the Hamburgh merchant, Mr. Godefroy, and was particularly successful in the discovery of new species. The determinations were made by Dr. Bœckeler, Professor C. Mueller, and Baron von Mueller. *Acacia Dietrichiana* is named by Baron Mueller in memory of this lady's work.

When exploring near the Southern border of Queensland in 1883, Charles Winnecke collected a number of plant specimens which were determined by Baron Mueller, who named one of them *Triumfetta Winneckeana* as a reward for his labours.

J. Nernst for many years collected for Baron Mueller in Southern and Northern Queensland. *Olearia Nernstii*, F.v.M., a showy Composite, bears his name.

Thos. Tate, the botanic collector of Hann's Northern Expedition in 1872, collected a number of specimens which were forwarded to the Kew Herbarium, that Mr. Bentham might examine them for his work on the flora then in progress. Finding no plant named after this collector, I have given a lately-received plant of that district his name, *Premna Tateana*.

For some years past Professor R. Tate and J. G. O. Tepper have collected specimens of the South Australian flora, the new species being described by Baron Mueller, who named a very fine Grass-tree, *Xanthorrhœa Tateana*, after Professor Tate; and a European specialist has named a "Pond-weed," *Potamogeton Tepperi*, A. Benn., after Mr. Tepper.

M. Schultz, in the early years of the Port Darwin Settlement, made large collections of the plants of that district, which were forwarded by Dr. R. Schomburgk to Kew. *Croton Schultzii*, Benth., is named in honour of the collector. The work of plant collecting in this district has since been carried on by M. Holtze, and the specimens have been determined by Baron Mueller, who named *Polyalthia Holtzeana* in his honor.

C. French and his son, both of the Government Botanist's department, Melbourne, have done much towards collecting the Victorian plants, all of which have been determined by Baron Mueller. The Composite, *Helipterum Frenchii*, is named after them by Baron Mueller.

D. Sullivan made a collection of the indigenous plants growing in the vicinity of the Grampians, the fresh species being named by Baron Mueller. The Victorian Mosses—to which he has paid particular attention, being determined by that renowned specialist, C. Mueller, of Germany—*Dicranum Sullivani*, C.M., is named after him.

Thos. Shepherd, formerly of the Darling Nursery, but of late, until the time of his death, agricultural editor of the *Town and Country Journal*, was an assiduous collector of the New

South Wales plants. The curious little orchid, whose leaf so closely resembles a grain of wheat, is named after him as *Bulbophyllum Shepherdii*, F.v.M.

It may here be remarked that where Baron Mueller is said to have determined the specimens, the phanerogams only are to be understood, he having wisely forwarded all the Musci and following Orders of Cryptogams to European specialists.

Some have devoted special attention to the lower cryptogams. The Rev. F. R. M. Wilson, of Kew, Victoria, works at the lichens alone, and of these plants has a most extensive collection of Australian species.

R. D. Fitzgerald, of Sydney, has paid particular attention to the orchideous plants of Australia, and has in course of publication an elaborate illustrated work on the subject. *Eugenia Fitzgeraldi*, F.v.M., and Bail., bears his name.

Mrs. Martin, *née* F. M. Campbell, the enthusiastic mycologist of Victoria, has perhaps exceeded all others in that colony in the work of collecting, describing, drawing, and forwarding specimens of fungi to Europe for final determination. In the early part of her career she sent her specimens to Messrs. Berkeley and Broom, but now for some years she has forwarded them to Dr. M. C. Cooke, who it may be observed is now engaged upon a monograph of the Australian fungi. This lady has done good work also in collecting the Victorian mosses and other plants. The mosses, *Orthotrichum Campbelliæ*, C.M., and *Campylopus Martiniæ*, Broth., as well as several fungi, bear her name.

Some interesting Queensland ferns have been found and their descriptions published by Dr. Prentice in European publications. *Panicum Prenticeanum* has been so named as a mark of respect for this gentleman's knowledge of and interest in the grasses and ferns.

Having now briefly noticed, step by step, the most prominent of the botanists and collectors who have assisted in working out the Australian flora generally, we shall now confine our observations to Queensland only. In 1873, I collected along the northern coast, as far as Rockingham Bay, visiting the Upper Herbert and Seaview Range. In 1876 I travelled on a collecting trip from Brisbane *viâ* Roma, through the Maranoa and Warrego to Tambo, and from thence through the Leichhardt to Rockhampton. In 1877 I visited Cairns and collected on the ranges about the Barron River. These journeys and the many shorter excursions have added greatly to our knowledge of the Queensland flora, but the expedition under A. Meston's leadership to that almost unknown region, the summit of the Bellenden-Ker Range, in 1889, has proved by its results to have been one of the most successful since the days of Cunningham. By it were added to the known Queensland flora about one hundred plants. The rough stringy bark tree, *Eucalyptus Baileyana*, F.v.M., bears my name. In a former part of this sketch has been noticed the principal work of the Government Botanist of Victoria, in whose writings the whole range of the Australian flora is dealt with. In my works, published as Government Botanist for this colony, only the plants of Queensland are described. My principal publications are a synopsis of the Queensland flora, to which has been issued three supplements. The further additions to the known flora of the colony are given in bulletins, of which three have been published during the past year. Another handy work issued on my authority is a catalogue of the indigenous and naturalised plants. In these works both phanerogams and cryptogams are included; the latter, however, from the Order Musci downwards, are all forwarded to European specialists for final determination.

Here may be noticed some of the principal collectors of Queensland plants, whose herbarium specimens have been sent to me as Government Botanist for determination.

L. A. Bernays, in his connection with the Acclimatisation Society, from its commencement, has done much towards the collection of native plants, and personally, whenever travelling, has made a point of collecting herbarium specimens. One of the two Australian pitcher plants bears his name, *Nepenthes Bernaysii*, Bail.

Edward Palmer made extensive collections of the Flinders and Cloncurry plants, and published valuable papers on the uses to which the plants were applied by the natives. The botanic determination of the species being supplied to him by Baron Mueller, Dr. Wm. Woolls, and myself. The beautiful small palm, *Bacularia Palmeriana*, Bail., bears his name.

Dr. Joseph Bancroft has collected the native plants more from an economic than botanic point of view, and to him the colony is indebted for the knowledge of the many valuable properties our plants are now known to possess. *Strychnos Bancroftiana*, Bail., is named after him.

C. H. Hartmann collected herbarium specimens for many years in the southern portions of Queensland, most of which were determined by me, but of late years he sent many of his specimens to Baron Mueller. He not only collected the flowering plants, but was also an extensive collector of fungi, lichens, and mosses. His name is borne by one of the most beautiful of our orchids, *Sarcochilus Hartmanni*, F.v.M., and *Polyporus Hartmanni*, Cooke, a large fungus.

Rev. J. E. Tennison-Woods, when travelling in tropical Queensland, collected specimens of the fungi, lichens, &c. The Italian mycologists, P. A. Saccardo and Dr. A. N. Berlese, named *Melophia Woodsiana* in honour of him.

Rev. B. Scortechini collected the flora of the Logan district and other parts of South Queensland. His name is given to the Epacrid *Brachyloma Scortechinii*, F.v.M.; and by the Italian mycologists, P. A. Saccardo and Dr. A. N. Berlese, to *Actinothecium Scortechinii*; since which, in ackowledgement of his great service in collecting the plants of the Straits Settlements, Dr. Hooker has named a genus of Euphorbiaceæ, "*Scortechinia*," in his memory.

Geo. Watkins, who resided for some years on Stradbroke Island, collected much of its flora, the specimens being sent to me for determination.

T. Barclay-Millar, during the past fifteen years or more, has been in the habit of collecting and forwarding specimens of the native plants of Northern Queensland, especially from the Cape York Peninsula, and latterly from the Walsh River. Many of the plants sent proved new, and some of as much interest as if new. For instance, from the Walsh this collector sent specimens of *Erythroxylon ellipticum*, which was only previously known from the specimens obtained by Robert Brown, now nearly a century ago, on the mainland opposite to Groote Eylandt in the Gulf of Carpentaria. In the flora this plant is described as a shrub, but it seems to attain the stature of a small tree, and supplies a handsome durable wood. *Typhonium Millari*, Bail., is named after this lover of plants, and persevering collector.

R. C. Burton has collected many rare plants when travelling through the unsettled parts of tropical and western Queensland; some of which have proved new; one of the last is named after him—*Trichinium Burtonii*, Bail.

James Keys, a few years ago, collected a great number of the indigenous plants of the Mount Perry district. A velvety leaved wax-flower bears his name—*Hoya Keysii*, Bail., and the moss *Hypnum (Heterophyllum), Keysii*, Kiær.

H. Schneider has for some years past collected the native plants of Southern Queensland, especially about Nerang Creek, several of which have proved new; the very distinctive form of *Asplenium attenuatum, var. Schneideri*, Bail., bears his name, and *Dendrobium Schneideræ*, Bail., of his wife, also a collector and cultivator of our indigenous plants. A few months ago he, in company with H. Tryon, of the Queensland Museum, went on a collecting trip to the Macpherson Range, and again added to our knowledge of the flora.

Alex. Macpherson collected plant specimens in the vicinity of Stanthorpe and other parts of Southern Queensland, all of which were determined by myself. Mr. Macpherson's object in collecting was to obtain species producing fibre of a commercial value. A large collection of fibres formed by him are in the Museum of Economic Botany, Brisbane.

In 1884 J. W. R. Stuart collected orchids in the scrub lands between Mourilyan Harbour and Herberton, by which many new species were discovered. *Dendrobium Stuartii*, Bail., bears the name of this collector.

H. Tryon, of the Queensland Museum, while on entomologic excursions to Fraser's Island, the islands of Moreton Bay, and the Bunya Mountains, has brought to our knowledge some new and many rare plants; in mosses he has been very fortunate. *Bryum Tryoni*, Broth., is named after him.

Dr. Thos. L. Bancroft has done much collecting in tropical Queensland, and to him we owe much of our knowledge of the timber of the Johnstone River district; besides which he has worked out the properties of various indigenous plants which cannot fail to be of great service hereafter. That excellent timber tree—the Johnstone River hardwood—*Backhousia Bancroftii*, Bail., and F.v.M., is dedicated to him.

W. R. Kefford collected plants on the Johnstone River, a few years ago, and obtained several new orchids and other plants. *Cleisostoma Keffordii*, Bail., is named after this collector.

C. J. Wild, who makes a specialty of the mosses, has collected in many parts of Queensland, and has been most successful in the number of new species which he has found. A new genus of the Order Musci, *Wildia*, Broth., bears his name.

Dr. J. Lauterer, who formerly collected in New South Wales, has for the past few years collected many of the plants of the neighbourhood of Brisbane.

C. F. Plant, of Charters Towers, for the past twelve months or so has collected specimens of the indigenous flora of that district, some of which have proved additions to the known Queensland flora. It is to be hoped that he will continue the work, and thus furnish material for a flora of that district.

C. J. Gwyther has collected in the neighbourhood of Warwick, and not the least interesting of the plants found by him was *Loranthus myrtifolius*, A. Cunn., a beautiful mistletoe, which seems to have escaped detection since its first discovery by Allan Cunningham, over half a century ago.

E. Cowley, of Kamerunga, has, during the past year collected specimens of several interesting plants; the most noteworthy, however, is a cassia tree, indentical with one described by Rumphius, in "Herbarium Amboinensis," in 1750. This botanist considered it a *C. Fistula*, and therefore named it *C. Fistula, var. sylvestris*. As it is rather a form of *C. Brewsteri*, it is given in my third bulletin as *C. Brewsteri, var sylvestris*, Bail. The wood of this tree is very beautiful, and when better known will doubtless be in request for cabinet work ; probably it might serve also for tonic cups, as it is quite as bitter as quassia.

For many years I have been anxious for some one to take up the collecting of plant-specimens in that little known region, the Cape York Peninsula, and wrote to the Postmaster-General, the Hon. Theodore Unmack, asking him to urge the officers stationed along the telegraph line in that district to collect specimens of plants and forward by post to the Botanist's office, Brisbane. The request, meeting with the Minister's approval, is now being carried out by Geo. Jacobson, the officer at the Musgrave station, who has already forwarded several small packets, each of which contained novelties. This collector's name is given to a Rubiaceous plant, *Spermacoce Jacobsoni*, Bail.

It may, probably, be in the remembrance of members of this Society, that some few years back Christie Palmerston, a gold prospector, brought from the scrubs of the Russell and Johnstone rivers, the fruits and other portions of native trees. The material, however, in many cases, was not complete enough to allow of correct determination. Two of these trees, of which better specimens have since been obtained, have been named after this collector—the one, a Lauraceous tree, *Cryptocarya Palmerstonii*, Bail., having obtained specimens when on the Bellenden-Ker Expedition ; the other, a kauri pine, *Agathis* (*Dammara*) *Palmerstonii*, by Baron Mueller, who has lately received more complete specimens from a collector.

In 1887 Messrs. Davidson and Sayer collected for Baron von Mueller in tropic Queensland, and were most successful in obtaining new species of great beauty. Notable amongst these were the *Dracophyllum Sayeri*, F.v.M., and *Spiræanthemum Davidsonii*, F.v.M.

W. Persieh was for some years a collector of plant specimens for Baron von Mueller, at the Endeavour River. *Hakea Persiehana*, F.v.M., is named after him.

The Hon. A. Norton has done good work in collecting plant specimens in various parts of Queensland, making observations upon peculiarities of growth and uses to which they may have been put by the natives. *Cyanocarpus Nortoniana*, Bail., is named in his honor.

Quite recently also we find that Baron von Mueller has received specimens of plants collected by Mrs. H. Biddulph near Mount Playfair. One of these, *Astrotricha Biddulphiana*, he has named after this lady collector.

The Rev. F. R. M. Wilson, a Victorian lichenologist, paid a visit to Queensland in quest of these plants during 1890, and was most successful in obtaining new species. The descriptions of many of these will be found in my second bulletin.

In showing how the plants of Queensland are being collected and a love of the science of botany cultivated amongst us, reference must be made to the Field Naturalists' branch of your Society. The first idea of the promotors of this section was that all the various branches of natural history should be represented. This unfortunately was soon found to be unachievable, as suitable leaders could not be found who were willing to give their attendance at the fortnightly excursions. Thus it has drifted into a botanic section, under my leadership and, as such, has done much towards developing a taste for botany, and at the same time materially assisting the work of collecting and making known the Queensland flora. These excursions have also been the means of discovering many new species. The members having become more or less proficient in the science, have formed private herbaria, and by gratuitous or exchange distribution of their duplicate specimens, largely assisted to spread abroad a knowledge of our great botanic wealth. Some who attended this section's early excursions, but removed to distant parts of the colony, have continued their studies, and a few have supplied most interesting accounts in the local papers of the plants of the district in which they are located. It was my hope that some of the members who had the leisure and the requisite abilities would take up certain Orders or genera as specialities, which in our present state of botanic knowledge has become a necessity. Some few made an attempt at this, but their professions requiring them to leave Brisbane, the matter has had, in most instances, to be given up. One, however, J. F. Shirley, who possessed previously a knowledge of English botany, took as a specialty the Lichens, and after assiduous application we now have from his labors a carefully compiled monograph of the Queensland species of this most interesting order of plants. Thus it will be seen that our Field Naturalists' section, while being a pleasure and profit to its immediate members, has also been of use to others outside its circle. As some small recognition of the help rendered to the cause of Australian botany by the members of this section, some of the new species which have been met with on these excursions have been given the names of members. Thus a beautiful slender tall shrub, belonging to Sapindaceæ, is named *Cupania Shirleyana*, Bail.; a noble fig tree, *Ficus Watkinsiana*, Bail.; a rubiaceous shrub, *Psychotria Simmondsiana*, Bail.: and one of the most beautiful of our Proteaceous shrubs *Petrophila Shirleyæ*, Bail.

In this short sketch of the rise and progress of Australian botany conciseness has been aimed at, while, at the same time, so far as possible, all the prominent botanists and collectors who have worked at the Australian flora have been duly brought under notice; some, however, may have been passed over in the cause of brevity, especially when two or more worked at the same time. In the matter of dates, sometimes these may be found wanting; when given, however, such may be relied upon as correct, as all these, as well as the notes on each, have been obtained from undoubted authorities.

In concluding this rather lengthy Address, the opportunity is embraced of expressing the hope that members seeing what has been accomplished for botany by the so-called Field Naturalists' section of the Society, will be roused into activity and form other sections. Leaders are wanting in Geology and Zoology, or branches of these sciences. The leaders are the great desideratum; students are both numerous and desirous to join when once the leader is ready.

Mr. L. A. Bernays moved a vote of thanks to the retiring President for his excellent address, and that the address be printed.

Mr. J. F. Shirley, B.Sc., seconded the motion, which was carried amidst applause.

Election of Officers and Council.

The following officers and members of the council for the session 1891-92 were elected by ballot:—President, W. H. Miskin, F.E.S., F.L.S.; Vice-President, F. M. Bailey, F.L.S.; Hon. Secretary, W. J. Ryott-Maughan; Hon. Teasurer, G. Watkins; Members of Council, T. L. Bancroft, M.B.; L. A. Bernays (Past President); Hon. A. Norton, M.L.A. (Past President); W. Saville-Kent, F.Z.S., F.L.S. (Past President); and J. F. Shirley, B.Sc.; Hon. Librarian, A. E. Harte.

The Australasian Association for the Advancement of Science.

Mr. Roe expressed a wish to consult the views of the meeting on a matter of some importance. As they would remember, he was one of the delegates who attended the meeting of the Australasian Association for the Advancement of Science last year in New Zealand, and although he was only there one day, one of the questions asked him was whether Brisbane would be ready to take its turn as the centre for the annual meeting to be held next year. The arrangements for the meeting were always made a year in advance. For example, the Association decided last year to meet at Hobart this year, and at this year's meeting they would decide to come to Brisbane, or, if arrangements could not be made to receive them, go elsewhere. He confessed that when he went to New Zealand he had a feeling that they could not attempt anything of the sort up here; he thought the picnic part of the programme had a far greater prominence than it really had. The members of the Society attended for the sake of doing work, and he came away impressed with the belief that Queensland was qualified to undertake the responsibility. Then there was the difficulty to consider whether they were sufficiently scientific to undertake such a gathering. His first belief was that they could not do so until we had a University. As a matter of fact, the University did little or nothing to help on the work in New Zealand. Nearly all the University professors were not present at the gathering. He was sure Queensland would be able to produce men who would accept the responsibilities of the work. The address they had had from the President that evening clearly proved they had men of the necessary ability to conduct such a gathering.

Mr. Shirley said he received a letter the previous day from the permanent general Secretary, Professor Liversidge, Sydney, giving the names of those who could sit on a local committee for Queensland. There were three here, and eight in the Royal Society. As Secretary it was his intention to at once call a meeting to consider the subject introduced by Mr. Roe. Nothing on his part should be wanting to make the matter successful. (Hear, hear).

The newly elected President (Mr. Miskin), having taken his seat, briefly thanked the Society for the honour imposed upon him, and expressed his intention of doing all he could to make the Society successful. The Society had a wide scope, and many mattters which came within their range had as yet been untouched. He hoped greater energy would be shown by members, and new subjects entered upon.

Vote of Thanks.

The Hon. A. Norton proposed, and Dr. Hirschfeld seconded, a hearty vote of thanks to the retiring officers and council. Mr. Norton remarked that during the year just ended the executive had done a great deal to bring the Society into the position it now occupies amongst the scientific bodies of Australasia.

The motion having been unanimously agreed to, Mr. Ryott-Maughan thanked the meeting. He said the duties of Honorary Secretary were no sinecure, and he had had to work really hard to keep things going. There was enough work to do now to employ a man the whole year round, and he hoped that at no distant date the Society would be in a position to appoint a paid assistant Secretary, who would do all the detail work. The prospects of the Society were most encouraging, and he was sure there was as much enthusiasm manifested by the members—although the Society received no State-aid—as in the older societies in the southern colonies. The attendances were quite as good, if not better, than in Sydney, and better than in Melbourne or Adelaide. He looked forward with rejoicing to the day when they would have two Honorary Secretaries and permanent accommodation.

This concluded the proceedings.

LIST of the NAMES of PERSONS, DATES, and COMMEMORATIVE PLANTS mentioned in the "CONCISE HISTORY of AUSTRALIAN BOTANY."

Folio.	Person.	Date when such is recorded.	Commemorative Australian Plants.
17	Capt. Wm. Dampier	1688 to 1699 ..	Dampiera, *R. Br.*, and Clianthus Dampieri, *A. Cunn.*
18	Sir Joseph Banks	1770	Banksia, *Linn.*
18	Dr. D. C. Solander	..	Spondias Solandri, *Benth.*
18	Capt. Cook	1770 to 1777 ..	Araucaria Cookii, *R. Br.*
18	J. R. and Geo. Forster ..	1773	Forstera, *Linn.*
18	Wm. Anderson	1777	Andersonia, *R. Br.*
18	David Nelson	1777	Nelsonia, *R. Br.*
19	John White	1788	
19	Archibald Menzies	1791	Banksia Menziesii, *R. Br.*
19	J. J. Labillardière	1792	Billardiera, *Sm.*
19	Col. Wm. Paterson	1794 to 1810 ..	Patersonia, *R. Br.*
19	M. Leschenault de la Tour	1800	Leschenaultia, *R. Br.*, and the Section Latouria
20	Dr. Robt. Brown	1801 to 1805 ..	Brunonia, *Sm.*
20	Peter Good	..	Grevillea, Goodii, *R. Br.*
20	Ferdinand Bauer	..	Bauera, *Banks*
20	Capt. Flinders..	..	Flindersia, *R. Br.*
20	David Burton	1802	Burtonia, *R. Br.*
20	Allan Cunningham	1817 to 1829 ..	Araucaria Cunninghamii, *Ait.*
20	Lieut. Oxley	..	Flindersia Oxleyana, *F. v. M.*
20	Capt. P. P. King	..	Kingia, *R. Br.*
21	C. Fraser	..	Sophora Fraseri, *Benth.*
22	M. Gaudichaud	1818 to 1819 ..	Freycinetia Gaudichaudii, *R. Br.*
22	Capt. Freycinet	..	Freycinetia, *Gaudich.*
22	Franz Wilhelm Sieber ..	1823	Siebera, *Reichb.*
22	Wm. Baxter	1823 to 1825, and in 1829	Baxteria, *R. Br.*
22	M. D'Urville	1824	D'Urvillæa, *Bory.*
22	R. Wm. Laurence	1826 to 1832 ..	Correa Laurenciana, *Hook.*, and Orthotrichum Laurencei, *Mitt.*
22	M. Lesson	1827	Podolepis Lessoni, *Benth.*
23	John Lhotsky	1830	Lhotzkya, *Schauer.*
23	Sir T. L. Mitchell	1831, 1835, and 1836, and again in 1845	Capparis Mitchelli, *Lindl.*
23	Alex. Collie	1832	
23	R. C. Gunn	1832	Gunnia, *F. v. M.*
24	James Backhouse	1832 to 1838 ..	Backhousia, *Harv.* and *Hook.*
24	Dr. J. Milligan	1833	Dracophyllum Milligani, *Hook.*
24	Rich. Cunningham	1833	
24	Baron Chas. von Hugel ..	1833	Mollinedia Huegeliana, *Tul.*
24	Sir Geo. Grey	1837	Swainsona Greyana, *Lindl.*
24	Br. Bynoe	1837	Acacia Bynoeana, *Benth.*
24	Capt. Wickham	1837	Grevillea Wickhami, *Meissn.*
24	John McGillivray	1838 and in 1842 ..	Cochlospermum Gillivræi, *Benth*
24	Mr. Armstrong	1838	Euphorbia Armstrongiana, *Boiss*
24	Dr. Ludwig Preiss	1838	Eucalyptus Preissiana, *Schauer.*
25	James Drummond	1838 to about 1855	Eucalyptus Drummondii, *Benth.*
25	Capt. Mangles	..	Helipterum Manglesii, *F. v. M.*
25	W. D. Brackenridge	1839	Brackenridgea, *Gray*
25	John Bailey	1839 and on ..	
26	John Anderson	1840	
26	Dr. J. D. Hooker	1840	Bauhinia Hookeri, *F. v. M.*
26	Dr. Lyall	1840	Plagiochila Lyallii, *Mitt.*
26	Robertson & Adamson ..	1840 to 1855 ..	Calochilus Robertsoni, *Benth.*
26	E. J. Eyre	1840	Pluchea Eyrea, *F. v. M.*
26	Chas. Stuart	1842	Brachycome Stuartii, *Benth.*
27	Capt. C. Sturt	1844 to 1846 ..	Gossypium Sturtii, *Benth.*
27	Dr. Ludwig Leichhardt ..	..	Gmelina Leichhardtii, *F. v. M.*
27	A. Oldfield	1847 to 1857 ..	Eremophila Oldfieldii, *F. v. M.*
27	J. S. Roe	1848	Leptospermum Roei, *Benth.*
27	E B. Kennedy..	1848	Nepenthes Kennedyi, *F. v. M.*
27	Wm. Carron	before 1848, and after this date ..	Bauhinia Carroni. *F. v. M.*
27	J. T. Bidwill	before 1851, the year of his death	Araucaria Bidwilli, *Hook.*

Folio.	Person.	Date when such is recorded.	Commemorative Australian Plants.
28	Sir Wm. Macarthur	..	Cyathea Macarthurii, *F. v. M.*
28	Sir G. & Hon. W. S. McLeay	..	Callitris Macleayana, *F. v. M.*
28	Dr. Geo. Bennett	..	Eupomatia Bennettii, *F. v. M.*
28	Dr. W. Harvey..	1854	Sarcopetalum Harveyanum, *F. v. M.*
28	G. Clifton	..	Cliftonia *Harv.*
28	Dr. Curdie	..	Curdiea, *Harv.*
28	Mrs. Fereday	..	Dasya Feredayæ, *Harv.*
28	Ferd. Mueller (now Baron von Mueller	1849 to the present	Tæniophyllum Muelleri, *Lindl.*; Licuala Muelleri, *W. & O. Drude*
29	H. Babbage	..	Babbagia, *F. v. M.*
29	Hon. A. C. Gregory	1855 and 1856 ..	Adansonia Gregorii, *F. v. M.*
29	Hon. F. T. Gregory	..	Acacia Gregorii, *F. v. M.*
29	J. Flood	..	Stylidium Floodii, *F. v. M.*
30	J. McD. Stuart	1858 to 1862 ..	Diplopeltls Stuartii, *F. v. M.*
30	R. O'Hara Burke	1860	Swainsona Burkei, *F. v. M.*
30	Wm. John Wills	.. ..	Eremophila Willsi, *F. v. M.*
30	Wm. Landsborough	1861	Landsborough Grass, Anthistiria membranacea, *Lindl.*
30	P. Walcott	..	Lachnostachya Walcottii, *F.v.M.*
30	Maitland Brown	..	Gomphrena, Maitlandi, *F. v. M.*
30	Lieut. Smith	..	
30	E. Fitzalan	..	Randia Fitzalani, *F. v. M.*
30	Ernest Giles	..	Eremophila Gilesii, *F. v. M.*
30	Christopher Giles	..	Pholidia Christophori, *F. v. M.*
30	J. Forrest	..	Adenanthos Forrestii, *F. v. M.*
31	Rev. Wm. Woolls	..	Echinocarpus Woollsii, *F. v. M.*
31	Rev. J. E. Tenison-Woods ..	..	Leucopogon Woodsii, *Benth.*
31	Dr. H. Beckler	..	Ixora Beckleri, *Benth.*
31	J. Dallachy	..	Dallachya, *F. v. M.*
31	Chas. Moore	..	Macrozamia Moorei, *F. v. M.*
31	W. R. Guilfoyle	..	Guilfoylia, *F. v. M.*
32	T. A. and B. Gullivers ..	..	Heterachne Gulliveri, *Benth.*
32	W. Bæuerlen	..	Correa Bæuerlenii, *F. v. M.*
32	W. E. Armit	..	Goodenia Armitiana, *F. v. M.*
32	A. Thozet	..	Thozetia, *F. v. M.*
32	W. Hill	..	Myrtus Hilli, *Benth.*
35	Edward Palmer	..	Bacularia Palmeriana, *Bail.*
40	Hon. A. Norton	..	Cyanocarpus Nortoniana, *Bail.*
32	Mrs. Amalia Dietrich ..	..	Acacia Dietrichiana, *F. v. M.*
32	Ch. Winnecke	1883	Triumfetta Winneckeana, *F.v.M*
33	J. Nernst	..	Olearia Nernstii, *F. v. M.*
33	Thos. Tate	1872	Premna Tateana, *Bail.*
33	Professor R. Tate	..	Xanthorrhæa Tateana, *F. v. M.*
33	J. G. O. Tepper	..	Potomogeton Tepperi, *A. Benn.*
33	M. Schultz	..	Croton Schultzii, *Benth.*
33	M. Holtze	..	Polyalthia Holtzeana, *F. v. M.*
33	C. French and his son ..	..	Helipterum Frenchii, *F. v. M.*
33	D. Sullivan	..	Dicranum Sullivani, *C. M.*
33	Thos. Shepherd	..	Bulbophyllum Shepherdi, *F.v.M*
34	Mrs. Wm. Martin, *née* F. M. Campbell	..	Orthotrichum Campbelliæ, *C.M.*, and Campylopus Martiniæ, *Broth.*
34	Dr. Prentice	..	Panicum Prenticeanum, *Bail.*
34	F. M. Bailey	..	Eucalyptus Baileyana, *F. v. M.*
35	L. A. Bernays	..	Nepenthes Bernaysii, *Bail.*
36	Dr. Joseph Bancroft.. ..	..	Strychnos Bancroftiana, *Bail.*
36	C. H. Hartmann	..	Sarcochilus Hartmanni, *F. v. M*
36	Rev. J. E. Tenison-Woods ..	..	Melophia Woodsiana, *Sacc.* and *Bert.*
36	Rev. B. Scortechini	..	Actinothecium Scortechinii, *S.* and *B.*
36	T. Barclay-Millar	..	Typhonium Millari, *Bail.*
37	R. C. Burton	..	Trichinium Burtonii, *Bail.*
37	J. Keys	..	Hoya Keysi, *Bail.*
37	H. Schneider	..	Asplenium attenuatum Schneideri, *Bail.*, and Dendrobium Schneideræ, *Bail.*
37	J. W. R. Stuart	1874	Dendrobium Stuartii, *Bail.*
38	H. Tryon	..	Bryum Tryoni, *Broth.*

Folio.	Person.	Date when such is recorded.	Commemorative Australian Plants.
38	Dr. Thos. L. Bancroft ..	..	Backhousia Bancroftia, *Bail.* and *F. v. M.*
38	W. R. Kefford	..	Cleisostoma Keffordii, *Bail.*
37	Alex. Macpherson	..	
38	C. J. Wild	..	Wildia, *Broth.*
38	Dr. J. Lauterer	..	
38	C. F. Plant	..	
38	C. J. Gwyther	..	
38	E. Cowley	..	
39	Geo. Jacobson..	..	Spermacoce Jacobsoni, *Bail.*
39	Christie Palmerston	..	Cryptocarya Palmerstoni, *Bail.*
39	Davidson and Sayer	..	Spiræanthemum Davidsonii, *F. v. M.*; Dracophyllum, Sayeri, *F. v. M.*
40	Mrs. H. Biddulph	..	Astrotricha Biddulphiana, *F. v. M.*
34	Rev. F. R. M. Wilson ..	..	Patellara, Wilsoni, *J. M.*
34	R. D. Fitzgerald	..	Eugenia Fitzgeraldi, *F. v. M.* and *Bail.*
41	J. F. Shirley	..	Cupania Shirleyana, *Bail.*, and Petrophila Shirleyæ, *Bail.*
36	Geo. Watkins	..	Ficus Watkinsiana, *Bail.*
41	J. H. Simmonds	..	Psychotria Simmondsiana, *Bail.*

THE

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CONTENTS.

PART III.

NEW SPECIES OF AUSTRALIAN MACRO-LEPIDOPTERA (HETEROCERA).

By W. H. Miskin, F.L.S., F.E.S.

[*Read before the Royal Society of Queensland, July 25th, 1891*].

The two new species of *Ægeriidæ*, of which the following are descriptive, are especially interesting as representing genera hitherto supposed not to occur in Australia; indeed, Mr. Meyrick, in his paper ("Revision of Australian Lepidoptera"), in Proc. L. Soc. N.S.W. (2), I. p. 687 (1886), rather rashly observes "the family (*Sesiadæ*) barely reaches Australia, being only represented by stragglers of one genus (*Sesia*)," thus further illustrating the uselessness of attempted conclusions derived solely from observations of fragmentary representatives of the fauna of any locality.

The insects under notice were collected by Mr. Rowland E. Turner, of Mackay, who has kindly lent them to me for examination.

Family—ÆGERIIDÆ, *Steph.*

Brit. Ent. Haust. I. p. 136 (——); *Walk.* B. M. Cat. Lep. Het. VIII. p. 7 (1856); *West.* Int. Mod. Class. Ins. II. p. 373 (1840).

Sesiariæ, *Bois.*, Ind. Meth. p. 41 (——).

Shalænina Ægeriites, Newm. Ent. Mag. II. p. 384 (——).

Trochiliidæ, *West and Humph.*, Brit. Moths, I. p. 32 (——).

Sesiadæ, Latr.; *Herr Schff*; *Bois.*, Sp. Gen. Lep. Het. I. p. 381 (1874); *Meyr.*, Proc. L. Soc. N.S.W. (2) I. p. 688 (1886).

Genus: *TROCHILIUM, Scopoli.*

Introd. ad. hist. natur. sis. gen. Lep.

Herr Schff; *Staud.*: *Steph.*, Brit. Ent. Haust. I. p. 137 (——).

Sphecia, Hub., Verz. bek. Schmett. p. 127 (——); *Steph.*, Cat. Brit. Lep. p. 30 (——); *Walk.* B. M. Cat. Lep. Het. VIII. p. 8 (1856).

Ægeria, p. *Fab.*, Syst. Gloss.; *Newm.*

Sesia, p. *Laspeyres*; *Fab.*; *Latr.*; *Godt.*; *Oehs.*; *Dup.*; *Bois.*; Ind. Meth. p. 41 (——).

T. Cupreifascia, *n. sp.*

♀ *Primaries:* Costal edge black; outer border narrowly black; fringe black; transverse vein elbowed, narrowly black, bordered outwardly with coppery band; principal veins coppery. *Secondaries*: Costal border coppery; fringe black. Beneath same. Antennæ: above, reddish brown; beneath, lighter. Face, white. Palpi: above, reddish brown; beneath, white. Thorax: black, with narrow orange band in front and behind; beneath, black. Abdomen: black, with two orange bands at base, the hinder of which is widest, and three at anal extremity, all narrow; beneath, black, alternated with narrow creamy bands. Legs: orange, except at base and joints, which are black: tibia of hind legs clothed internally with fringe of long dark hair.

Exp. of wings: 27 mm; length of body, 13 mm.

Hab.: Mackay. Coll.: Turner.

Genus: *MELITTIA, Hubn.*

Verz. bek. Schmett. p. 128 (——); *Walk.* B. M. Cat. Lep. Het. VIII. p. 66 (1856); *Bois.* Sp. Gen. Lep. Het. I. p. 468 (1874).

Trochilium, p. *Westw.*

Ægeria, p. *Harris.*

M. CHALYBESCENS, *n. sp.*

♂ *Primaries* : Costal and hinder borders margined with black, outer borders broadly so; transverse vein broadly margined inwardly the same; central vein margined with black, leaving but a narrow longitudinal transparent area before the tranverse vein, intersected by central vein, and a narrow transverse hyaline band beyond, intersected by three veins; outer marginal band dusted with steel blue, costal band the same sparingly; fringe black. *Secondaries:* With fringe black, well developed, all the veins distinctly black. UNDERSIDE the same, except that the black parts are of a rusty hue, and the blue dusting is hardly discernible. Antennæ: dark brown, palpably hooked. Palpi: brown, beneath white. Face, grey. Thorax and abdomen black, dusted with steel blue; segmental joints, laterally, steel blue; abdomen beneath, white. Legs black; hind pair densely pilose to the claws, with black hairs occasionally interrupted with white and blue, steely blue especially apparent at base, on upper side.

Exp. of wings: 31 mm; length of body, 17 mm.

Hab.: Mackay. Coll.: Turner.

Meyrick gives three species of *Ægeria* (or, as he prefers to term the genus, *Sesia*) as Australian; his two last, however, are doubtfully distinct.

FURTHER NOTE ON AUSTRALIAN SPHINGIDÆ.

By W. H. Miskin, F.L.S., F.E.S.

[*Read before the Royal Society of Queensland, July 25th, 1891*].

Since the publication of my Revision of this group in the Proceedings of the Society, some further information has come to hand, principally through the assistance of Mr. Rowland E. Turner, of Mackay, which enables me to supplement my former article.

Sub-Family—MACROGLOSSINÆ.

Hemaris Kingii, *Macl.*

Cephnodes Bucklandi, Butl., A. & M. N. H. (5) XIV. p. 404 (1884), Port Darwin.

Mr. Tryon, of the Queensland Museum, has called my attentlon to the above quoted reference, which I had previously overlooked.

Walker declares his insect (*Cunninghami*) to be identical with Boisduval's (originally a M. S. name), whose figure exactly pourtrays our species, shewing the dentation on the inner edge of apical marginal band, mentioned by Butler, and which frequently occurs in our specimens, which also vary considerably in size. Walker's description, however, certainly seems to better apply to *Hylas*.

Boisduval, in the Sp. Gen., quotes Walker's description, but with doubt as referring to *Cunninghami*.

Both Walker and Boisduval appear to have overlooked Macleay's description, which is undoubtedly applicable to the species under notice.

H. HYLAS, *Lin.*

Sp. H. Don. Ins. China, p. 72, t. 41, f. 1 (1842), Westwood's ed.

Mac. Yunx. Bois. Sp. Ins. Het. I. p. 376, n. 71 (1874).

I am also indebted to Mr. Tryon for a reminder of this likewise omitted reference.

Boisduval remarks that specimens of this species (*Hylas*) are wrongly named *Cunninghami* in the B. M. collection, and that the true *Cunninghami* was not contained therein at the time of his inspection. Walker's *Cunninghami* will doubtless be more correctly treated as a synonym of this species.

Genus: *MACROGLOSSA*, *Ochs.*

M. HIRUNDO, *Bois.*

Voy. Astr. Lep. I. p. 188 (1832); Sp. Gen. Het. I. p. 346 (1874).

Hab.: Mackay (*Turner*): Otaheite (*Bois.*); New Hehrides (*Mathews*),

In our specimens the tranverse white band of primaries is almost obsolete; in a specimen I have from the N. Hebrides the band is clearly apparent, but presents an intermediate grade between the type, as described by Boisduval, and the Australian examples.

Our insect has been recently described by T. P. Lucas in the *Queenslander* newspaper as a new species, under the name of *Lineata*.

SUB-FAMILY—CHÆROCAMPINÆ.

Genus: *PANACRA*, *Walk.*

P. AUTOMEDON, *Bois.*

(*Deil. A.*) ♀ M. S.; *Walk.* B. M. Cat. Het. VIII. p. 154, n. 1 (1856); *Bois.* Sp. Gen. Het. I. p. 286 (1874); *Swinhoe.* Trans. E. Soc. p. 163 (1890.)

P. Truncata, Watk. ♂ B. M. Cat. Het. VIII. p. 160 (1856); *Bois.* Sp. Gen. Het. I. p. 288 (1874); *Swinhoe.* Trans. E. Soc. p. 163 (1890).

Hab.: Mackay; Silhet: Burmah.

The only example of this species taken in Australia, as far as I know, was captured by Mr. Rowland E. Turner, of Mackay, who observes, "it is very local and extremely scarce."

P. Turneri, *T. P. Lucas.*

Queenslander newspaper.

♀ *Primaries:* Hoary, with transverse, more or less oblique, rich chocolate-brown bands. The first, about one-fourth from base, is broad on hinder margin, and continued in equal width to half way across wing, where it becomes abruptly divided, and is continued on its basal side by a line only, arched, and curving towards base, reaching the costa; the band at its outer side is continued by a narrow branch obliquing towards discal region where it meets a long oval eye-like spot, which is situated at end of cell; this ocellular spot consists of a central point of dark reddish brown within an oval of light grey, surrounded by light brown, having a longitudinal dash of dark brown immediately beneath it, and another spot of like colour above and beyond it apically; a short light brown transverse streak from costa, inside first band towards base; a dark band from hinder margin, about two-thirds from base to apical point, oblique, irregular, and narrow, except at hinder margin where it abruptly expands towards angle, which it nearly reaches; this band is bordered on its outer side by a light silvery line, lunulate between the nervules, succeeded by a light reddish band, a little wider, lunulate in the same manner; costa dark brown; outer margin with a slight lilacine tint. *Secondaries:* Light shining brown, with an indistinct pale reddish transverse band; abdominal margin rather lighter. Head and Thorax: Rich reddish brown; thoracic lateral band buff, extending above the eyes and down face, very wide in front of thorax; an arched lateral gilded line; a dorsal wide band of lavender. Abdomen reddish brown, paler than thorax, with a narrow dorsal lavender line, and a rather indistinct indication of a gilded lateral line posteriorly; segmental joints fringed with dark chocolate. Antennæ, dark brown. Underside: Shining ferruginous; both wings outwardly margined with a tinge of lavender, the secondaries less widely; the primaries with the basal area of a leaden hue; a transverse row of dark specks through both wings, parallel with outer margins. Abdomen with a number of silvery specks along each side. Antennæ pale. Legs whitish.

Exp.: 56 mm. Hab.: Mackay. (Coll.: Miskin).

This very handsome species was collected by Mr. Rowland E. Turner, of Mackay, to whom I am indebted for the example from which the above description is made.

Descriptions in newspapers being unrecognised for scientific reference, the above is rendered necessary.

Genus: *CHÆROCAMPA*, *Dup.*

C. Clotho, *Drury.*

In my paper I omitted localities for this species; they are as follows:—

Brisbane, Mackay, China, Phillipines, Java, India, Burmah

Genus: *DEILEPHILA*, *Ochs.*

D. Livornica, *Esp.*

Mr. Turner informs me that he is aware of an example of this species having been taken at Mackay; this is a rather welcome confirmation of its Australian domicile, upon which point I had previously some slight misgiving.

Upon the authority of Mr. Turner, I add Mackay as an additional locality for the following species, to which it was not ascribed in my Revision, viz.:—

H. Janus, M. Errans, Approximata, and Micacea, A. Sericeus, S. Joanna (? Johanna), C. Ardenia, C. Thyelia, Pinastrina, Oldenlandiæ, Celerio, Scrofa, Erotus, Nessus, and Cloacina, D. Hypothous, and Protrudens, P. Convolvuli, M. Casuarina, and Severina, and N. Subraria.

I observe also in a recent paper by Coll. Swinhoe (Trans. E. Soc., 1890), "On the Moths of Burmah," the following species occurring in that country, which are also in our list, viz.:—*H. Kingii*, and *Hylas*, *C. Pinastrina*, and *Oldenlandiæ*, *Nessus*, and *Latreillii.*

Of other species referred to by T. P. Lucas, in *The Queenslander* newspaper, and of which descriptions are published as of new species, the following may be remarked:—

Macroglossa approximans. This is *M. Approximata, Walk.* (1864).

M. Tenebrosa; is evidently intended for *M. Nox, Butler* (1875). Moreover, the name is preoccupied in a closely allied genus, *i.e.*, *Perigonia Tenebrosa, Feld.* (1865).

Chærocampa Curvilinea. This is *C. Cleopatra* of my "Revision."

C. Queenslandi is *C. Cloacina* of my "Revision."

C. Luteotincta would appear to be *C. Latreillii, Macl.* (1827).

Sphinx Distincta. As far as it can be made out this description would seem to be applicable to *Protoparce Abadonna, Fab.* (1798).

S. Eremophilæ is intended for *P. Minimus* of my "Revision."

ON PSORIASIS IN HORSES, KNOWN IN QUEENSLAND AS MANGE.

By THOS. L. BANCROFT, M.B., Edin.

[*Read before the Royal Society of Queensland, August 7th, 1891.*]

The importance of the subject is so apparent that no apology need be offered in bringing it under notice of the Society.

A great deal has from time to time been written in the colonies about horse mange, most of which, however, can only be characterised as absurd.

Investigations into its pathology have been made in Queensland*, New South Wales†, and in India‡, unfortunately in each case by men lacking the necessary ability. Their conclusions are not only erroneous but in some particulars very misleading. I have studied the disease since 1884, a time, according to some writers, prior to its introduction into Queensland. For a long while I was under the impression that the disease in dogs here called "mange," (giggle giggle)|| particularly

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* Preliminary report of the board appointed to make full inquiry into the origin and nature of a prevalent disease affecting stock, commonly known as "mange."—Queensland, 1888.

† Report on a contagious animal skin disease, by Edward Stanley, F.R.C.V.S., Government Veterinarian for New South Wales.

‡ An investigation into the nature of the common Indian skin disease, by A. J. Haslam, M.R C.V.S., Army Veterinary Department, Karachi, India. —*Veterinary Journal*, March, 1889.

|| Giggle giggle is the name given by the blacks to the dog mange.

common in blackfellows' dogs, might be similarto that in horses, but I now know that these diseases are distinct.

Dog mange I found to be caused by the excessive increase of a parasite in the skin, the *Demodex folliculorum.*

I believe the disease has always been present in horses in the colony, but as attention had not been directed to it, it was generally overlooked. This condition is a skin disease of the scaly or psoriasis type, closely resembling psoriasis in man, and like it difficult of cure, and prone to reappear after apparent cure. It might be classed as a constitutional disease.

It is neither contagious nor infectious in any sense. Affected horses are apparently perfectly healthy in other respects, but as they suffer a good deal from irritation, this may in very severe cases cause emaciation. The cause appears to be climatic, and the disease occurs almost exclusively in horses that are not stabled or groomed.

Mangy horses will generally get well when stabled and otherwise cared for, but they get the disease again if turned out at nights. Stabling at nights appears the essential point in the treatment; arsenic internally and chrysophanic acid ointment by inunction should also be tried. Parasiticide remedies appear to be valueless.

The cause has been frequently stated to be the *Trichophyton* fungus, or one closely allied to it. Now I have never seen a trace of fungus in any of my preparations, and I have made some thousands.

The experts in microscopy at the Brown Institution, London, to whom specimens were submitted from here by the Chief Inspector of Stock, were unable to detect any parasite. There is frequently to be seen a peculiar arrangement of the pigment in the skin which, with low powers of the microscope, might be mistaken for a fungus, but by careful illumination with the Abbé condenser and with high powers, it resolves itself into large branched pigmented cells; it is not confined to mangy skin, but can be seen in healthy skin also, which fact of itself is sufficient to show it to be a normal condition and in no way connected with mange.

NOTE.—SEPTEMBER 8TH.

During the discussion that followed the reading of the above, several facts previously unknown to me were elicited.

I remarked that if my idea of this disease being of a climatic and constitutional nature were correct, removal to a more favourable locality might affect a cure, and it was pointed out by Mr. GORDON thas such was really so, for he knew of several affected horses that were sent from here to Melbourne some years ago, which shortly after their arrival recovered completely, and the disease has never since shown in them.

Mr. MURPHY, M.L.A., pointed out that horses of the colours known to stock-owners as "soft colours" were particularly susceptible to mange.

ON 34 NEW SPECIES OF AUSTRALIAN LEPIDOPTERA, WITH ADDITIONAL LOCALITIES, &c.

By THOMAS P. LUCAS, M.R.C.S., Eng.,
L.R.C.P., Ed., L.S.A., Lond., &c.

[*Read before the Royal Society of Queensland, September 7, 1891.*]

In presenting the following species as new to Science, I must acknowledge the assistance given to me by Mr. E. Meyrick, our well-known Australian authority on Entomology. Mr. Meyrick has examined most of the species here described, compared notes with the British Museum collection, and with French and German authors, and has confirmed or advised me as to the genus. In one species he has established a new genus to receive the species. I cannot too greatly thank him and praise his zeal in the cause of Science, but I have found always with him as with all our greatest scientists, a liberality and a helping hand worthy of Science. I must also thank Mr. G. Barnard, Dr. Turner, Dr. T. L. Bancroft, and others for assistance rendered.

Section RHOPALOCERA.

Family PAPILIONIDÆ.

Papilio Agamemnon, *Lin.*; Yeppoon (Mr. Pilcher).

Papilio Parmatus, *Gray*; Yeppoon (Mr. Pilcher).

Family PIERIDÆ.

Terias Casta, sp. nov.

♂♀. 32-36 mm. Head brownish black. Antennæ finely annulated yellow and brown, and tipped with red. Thorax brownish black, with long yellow hairs. Abdomen brownish black, yellow laterally and on underside; short yellow hairs on dorsum. Forewings, costa rounded, apex rounded, hindmargin obliquely rounded, chrome yellow; the base of the wing is densely covered with black scales, whence they are prolonged to hindmargin, and also along costa, where they form a thin costal line to $\frac{3}{5}$; it then expands to pass obliquely to vein 4 at $\frac{3}{4}$, where it is abruptly angled and bent to half distance to hindmargin, forming two semilunar waves between the veins; here it again bends at a sharp angle to $\frac{3}{4}$ hindmargin and encloses with the costa a glossy brown-black area; there is a minute black disco-cellular spot, also a fine deep black hindmarginal line. Cilia ochreous drab, yellow at anal angle. Hindwings coloured as forewings, with scattered black scales at the base; in ♀ six black hindmarginal dots on veins, diffused in ♂ into a continuous band, interrupted only on folds. Cilia yellow. Undersurface, forewings, lemon-yellow, devoid of markings, excepting the disco-cellular spot, and the darker shade corresponding to the dark apical area of the upper surface; hindwings freely dusted with minute drab specks, and having four reddish ring dots in an irregular rhomboid from base, an irregular row of suffused or elongate dots from $\frac{1}{2}$ costa to $\frac{1}{2}$ inner margin and parallel to hind-margin, three costal dots united by suffusion, a central elongated mark diffused with a ring spot, two smaller spots nearer inner margin, an irregular dentate waved interrupted band at $\frac{3}{4}$ with the two middle fourths broader, and a black hindmarginal dot on each of the veins; in the ♂ all the markings are smaller and less distinctly outlined.

Duaringa, Queensland.

This species comes near to *T. varius*, Misk., but differs from that species in the absence of markings on under surface of fore-wings. It differs materially in arrangement of black border of forewings from *T. smilax*, Don., and it differs from *T. parvula*, Herr. Schaff., in the copious markings on undersurface of hind-wings, which in *T. parvula* are *nil.* The habit of the butterfly is quite different to the allied species. It appears to frequent damp patches of marshy ground, but I failed to find it among reeds or reed-grasses. Mr. Barnard had it in his collection unnamed.

Family SATYRIDÆ.

MELANITES SOLANDRA, *Fab.*

Various authors have divided our Queensland types of this variable genus into a large number of species. Butler has sought to re-arrange the nomenclature and tabulate the distribution. The Australian series are named :—

M. Solandra, *Fab.*
M. Banksia, *Fab.*
M. phedima, *Cram.*
M. ismene, *Cram.*
M. Helena, *West*
M. Leda, *Lin.*; and others.

As far as I can judge, by observing their habits, relations to each other, and general distribution in wide distant localities, I can only come to the conclusion that there are two distinct species in S. Queensland, and, as far as I have seen, in N. Queensland. If that opinion be confirmed, and no large number of specimens can be arranged as this type or that type, without every intermediate variation, all then would appear to be synonyms of M. Solandra, *Fab.*, except the one named M. Leda, *Lin.* Thus grouped, the species may be described as most variable in colouration of browns and reds, but always with the apical third of the hindmargin of the forewings falcate and delicately wavy, and with the inner two-thirds scolloped out one-fifth of the depth of the wing; in colour the forewings are fuscous towards the base and inner margin, light red or golden brown toward the costa and hind margin, and with a broad band of smoked brown or purple shade along hindmargin; there is a larger or smaller triangular chocolate patch subtended from centre of costa, and a similar patch, but darker, midway between this and apex; the black blotch in wing is very conspicuous, and contains two milk-white spots, the one nearer the costa being the larger. The hindwings are fuscous, with two minute dots, one often missing, and with a purple fuscous shading toward hind margin. The under surface is most variable; it is grey, light brown, chocolate brown, sometimes simply marked by two bands, but oftener by bands and patches, and lines of brown and black, by blotches, broken bars, suffusions, specks as coal-dust, &c. The ocelli are very minute, and so differ from M. Barnardi, in which they are large, coloured, and conspicuous. It is a larger butterfly than M. Barnardi.

Queensland; generally distributed.

MELANITIS BARNARDI—(?) sp.nov. or a var. of M. Leda, *Lin.*

This species has been named as M. Leda, *Lin.* Many eminent entomologists are now agreed that the Australian insect varies considerably, and is specifically distinct from the type form of M. Leda, found in India and other parts of Asia.

♂♀. 60-66 mm. Head, palpi, thorax, and abdomen, deep fuscous. Antennæ ochreous red. Forewings, costa deeply arched, *hindmargin straight*, with very finely crenulated outline, deep fuscous, with a patch of ochreous red from costa at $\frac{3}{4}$ to half-way acrcss wing. This patch contains a rich black circular blotch, with two conspicuous white spots; veins fuscous red. A submarginal smoked grey line encloses, together with a fine black marginal line, a cinnabar brown band or space. Hindwings with crenulate margin, angled at vein 4; deep fuscous. Two ocelli, the first nearly opposite vein 4, contains a minute white dot; the second, on vein 2, consists of a white dot, black ring, red ring, and another black ring from within outwards. Underside of wings mottled creamy grey, thickly covered with black and brown strigulæ, with bands of darker suffusion, crossing forewings at $\frac{1}{3}$ and $\frac{2}{3}$, and hindwings at $\frac{1}{2}$. Two minute spots near apex of forewings. A blue-white dot bordered with black, brown, and black, is situate in centre of wing near hindmargin. In the hindwings are six ocelli, containing a white dot, blue suffusion, black ring, brick-red ring and a second black ring, from within outwards; these are situate one near apex; a second, very minute, immediately below; a third small, in middle of wing; a 4th and 5th near vein 4, and a 6th very small near anal angle; the 1st and 5th are large and conspicuous.

Rockhampton to Brisbane, on coast line; never found inland.

XENICA PALUDOSA, sp.nov.

♂♀. 20-24 mm. Head, thorax, and abdomen smoky grey, patagia ochreous brown. Palpi smoky black. Antennæ finely annulated ochreous and black, tipped with black. Forewings elongate, narrowly dilate; costa gently rounded, hindmargin obliquely rounded, rusty brown, with ochreous suffusion and black markings; costa black, basal fourth of wing black with diffused angular extensions along costa and in middle of wing, and extended as a band along inner and hindmargins; a broad black median fascia, attenuated to $\frac{3}{5}$ inner margin, encloses a round ochreous spot near the costa, and also two spots, one on either side of centre dentation, just before inner margin; seven spots of ground colour are arranged on the border of fascia; 1st is costal and indistinct; 2nd and 3rd lie within the ocellus; 4th is immediately below; 5th large, obliquely oval, and 6th and 7th are situated near the inner margin; there is a black fascia posterior to these spots, which becomes a line bounding the ocellus and is then broadly diffused to join a broad fascia which extends from beyond the ocellus to the anal angle: this contains a small ground colour dot in the costa, finely divided into two by a black line, and also a large blotch containing ocellus, and a fine dot immediately below; the ocellus consists of a white speck, bounded by a black ring; beyond this a fine line of ground colour is divided into spots by the black veins; a dark subterminal line is succeeded by a submarginal smoky ochreous line, which divides it from a fine black marginal line. Cilia smoke colour. Hindwings as forewings in colour; basal half black, contains one spot of ground colour near costa, which is projected as an angle into centre and is bounded by five small ground colour elongate spots; ocellus white spot, enclosed by black ring, is bordered by four small lunular ground colour spots; beyond these and near hindmargin is a row of six sublunar ground colour dots; there are subterminal, submarginal, and marginal lines as in forewings; cilia smoky grey. Under surface of forewings as upper side, but with a white subterminal line;—the underside of hindwings has two ocelli, the one is close to the costa at $\frac{3}{4}$, the other is near to the anal angle, and has a white centre, surrounded by a black, an ochreous, and a smoke colour ring, from within outwards; there are three silvered ochreous dots in the basal black and three larger patches beyond the basal black, also a minute dot above ocellus, and a row of six hindmarginal dots, rounded and conspicuous.

Allied to *X. orichora*, Meyr., and *X. correæ*, Oliff., but is smaller and differently marked.

Mr. Barnard; near Launceston, Tasmania.

Section HETEROCERA. Group SPHINGIDÆ.

Family CHŒROCAMPINÆ.

DEILEPHILA LIVORNICOIDES, sp.nov.

♂ 55, ♀ 75 mm.

♂ Head creamy drab, with a patch of olive fuscous on crown and narrowing along face. Palpi creamy drab bordered with fuscous. Antennæ olivaceous creamy drab on under surface. Thorax olive fuscous, with a creamy drab line anteriorly over dorsum, and laterally nearly as far as forewings. Abdomen olive drab; base of segments with a band of creamy drab, broader in fore segments, narrowing to a line in posterior segments, each line banded with a short black stripe on either side of dorsum; the two anterior lines are covered laterally with a broad band of black. Forewings triangular, costa straight, rounded at apex, hindmargin rounded, creamy drab, with two long bands of dark olive fuscous crossed by bands of ground colour along the veins; costal line light olive fuscous; space between costal line and 1st band lighter fuscous; 1st band from entire base of wing parallel to costa, narrowing at $\frac{2}{3}$ to a point just before apex; the 2nd band from a base $\frac{1}{2}$ to $\frac{6}{7}$ inner margin gradually narrows parallel to hindmargin to a point at apex: an olive fuscous hindmarginal line; cilia light drab. Hindwings fuscous black at base, rosy pink in middle third, and with a broad fuscous black band near but not touching hindmargin; hindmarginal line creamy-grey; cilia as forewings.

One specimen; Toowoomba.

♀ Head and thorax olive fuscous with a white drab line from face on either side along base of antenna, and along side of dorsum giving off a bunch of white drab hairs at base of forewing; a white drab line midway between bases of antennæ early dividing into two, and narrowly diverging on either side of centre of dorsum; a line to outer side of this on either side, thus being six lines on thorax, similar to *D. linearis*, Fabs., of America. The abdomen is rich chocolate fuscous, with lines of segments yellow fuscous, each line crossed by a narrow bar of black immediately on either side of dorsum, and laterally by a broad bar of black. Wings as ♂.

One specimen; Rockhampton. This species differs from *D. livornica*, Esp., in lacking the white stripes on thorax in ♂, in lacking the row of white dots and stripes on abdomen, and in the different ground colour of wings. The markings on thorax and abdomen are quite different and vary in the sexes.

Group BOMBYCES.

Family ARCTIADÆ.

DIPHTHERASPIS, gen.nov. Meyr.

Palpi rather short, slender, porrected. Antennæ in ♂ filiform, simple. Forewings in ♂ beneath with large discal patch of flocculent scales; veins 7 and 8 stalked; 9 and 10 stalked. Hindwings in ♂ above with large patch of flocculent scales towards anterior half of costa. Veins 6 and 7 stalked 8 from near end of cell.

D. MODICUS, sp.nov.

♂♀. 15-20 mm. Head, palpi, antennæ, thorax, abdomen, and legs creamy ochreous. Forewings elongate, gradually dilate; costa rounded; hindmargin obliquely rounded; ochreous cream colour, with a semilunar light fuscous line, convex toward base, from $\frac{3}{4}$ costa to $\frac{2}{3}$ hindmargin; a more or less diffused hindmarginal shading of light fuscous. In ♂ the wing is raised up from base to $\frac{2}{3}$ in a pear shape by tufts of scales on the under surface of forewing and upper surface of hindwing. Cilia very light creamy fuscous. On the under side of forewing a brown oblong patch of flocculent scales from near base along middle third of wing to opposite $\frac{2}{5}$ costa. Hindwings ochreous cream, slightly lighter than forewings, with a raised patch of brown flocculent scales from near base along costa to $\frac{2}{5}$. Cilia cream colour.

Brisbane; very rare.

COMARCHIS PALLIDA, sp.nov.

♂. 19 mm. Head white. Palpi short, brown. Thorax white, bordered laterally and posteriorly with black. Abdomen ochreous white, irrorated with smoky-grey. Forewings gently dilate, costa rounded, hindmargin straight, smoky-white irrorated with light-grey and four iron-grey transverse bands: 1st near to base, divides in centre into an oblique line to costa, and two dots on inner margin; 2nd line $\frac{2}{5}$ costa to $\frac{1}{3}$ inner margin, denticulate, angulated inward at inner border; discal spot at $\frac{2}{3}$ near costa, shaded to third line; 3rd line from $\frac{2}{3}$ costa to $\frac{2}{3}$ inner margin, inner half thrice denticulate; 4th line beyond $\frac{3}{4}$ costa, smoky-diffused, waved, dentate and curved round to just before anal angle of inner margin; hindmarginal row of grey dots; cilia grey. Hindwings light fulvous ochreous; hindmargin clouded by a band of grey, narrowing to a line and ceasing at $\frac{1}{2}$ hindmargin; cilia greyish ochreous.

One specimen; Mr. G. Barnard, Windermere, Tasmania, March, 1891.

Family LIPARIDÆ.

Teara farenoides, sp.nov.

♀. 88 mm. Head snow-white. Antennæ white, pectinations very short, fuscous. Thorax snow-white. Abdomen white mottled or shaded with ferruginous. Forewings, costa rounded; hindmargin obliquely rounded, snow-white, with scattered minute dots or dust of smoky fuscous, chiefly towards hindmargin; veins light fuscous more or less covered with snow-white; cilia snow-white, dusted with smoky fuscous. Hindwings snowy-white, base and inner half of wing shaded with light ferruginous; cilia white, dusted with smoky fuscous.

One specimen; Healesville, Victoria.

Teara pura, sp.nov.

♀. 40 mm. Head, palpi, thorax, and abdomen snow-white. Antennæ creamy ochreous. Forewings, elongate, gently dilate, costa rounded, hindmargin obliquely rounded, snowy-white dusted all over with scattered very minute black dots; a sinuous dentate fine black line $\frac{3}{4}$ costa to $\frac{3}{4}$ inner margin; a sinuous dentate fine black line just before apex costa, less defined towards inner margin, a hindmarginal wavy line; cilia white, with a smoky fine lined base. Hindwings and cilia snow-white.

Brisbane; very rare.

Darala cupreotincta, sp.nov.

♂♀. 80-90 mm. Head fuscous grey; collar black; palpi black, mottled with fuscous. Antennæ fuscous grey; pectinations short, black. Thorax fuscous grey, very long hairs. Abdomen fuscous tinted in ♂ with coppery red. Legs fuscous black. Forewings, costa rounded, apex acute, hindmargin obliquely rounded, light fuscous, with shadings of grey; various shades of fuscous and diffused black, dark ferruginous and cupreous tinted scales, costal border dark fuscous and smoky scales, especially toward base; a dark ferruginous fuscous suffused spot at $\frac{1}{4}$ costa, a round discal ferruginous lined discal spot at $\frac{1}{3}$, near to costa, containing light ground-colour space; a broad ferruginous fuscous band, bordered anteriorly by a suffused light-grey from $\frac{2}{5}$ costa to $\frac{1}{4}$ inner margin; a triangular discoidal spot $\frac{1}{4}$th from costa; immediately beyond this line a small dark diffused spot at $\frac{3}{4}$ costa; a series of 8 dots from $\frac{7}{8}$ costa to $\frac{3}{4}$ inner margin; a white-grey wavy line from apex of wing to $\frac{4}{5}$ inner margin, bordered anteriorly by fuscous grey—space between this and hindmargin dark fuscous shading to lighter toward inner margin. Cilia, dark fuscous, tinted with black. Hindwings fuscous, almost hidden by copper red, an undulating black line from $\frac{1}{2}$ costa to $\frac{1}{2}$ inner margin; anterior space copper colour, posteriorly a fine light-grey line diffused gradually to darker fuscous, tinted with cupreous in darkest part, crossed by black dots on veins; a lighter fuscous line $\frac{3}{4}$ costa to $\frac{3}{4}$ inner margin; this borders a broad dark smoky cupreous fascia, which is scolloped on posterior border, where it is bordered by a light cupreous line; thence to hindmargin fuscous tinted with cupreous. Cilia smoky grey.

Gippsland, Victoria; very rare.

PORTHESIA (*Euphrostis*), FULVICEPS, *Walk.* = FUSCA *Walk.* = LEUCOMELAS *Walk.* = ANACAUSTA *Meyr.*

♂♀. 28-45 mm. Head white; face golden orange. Antennæ white or smoke colour, pectinations grey-white or smoky black; long in ♂, shorter in ♀. Thorax white, epaulettes long and bushy, white. Abdomen white, with caudal segment in female orange brown. Forewings ♂ triangular, broadly dilate (in ♀ more elongate); costa gently rounded; hindmargin rounded, white, with a black or smoke colour rounded spot just before anal angle, and almost touching inner border (in ♀ pure white). The undersurface in ♂ is shaded at the base and along costa for one half, and thence throughout hind portion to near hindmargin, narrowing towards inner margin into smoky grey. In some ♂ specimens the upper surface of the forewings is shaded with grey; in others this is darkened into a broad band extending over hind third to hind half of wing; while in others again, the whole wing is rich black. Hindwings white, but in some ♂ specimens the posterior third to half of the wing is smoke colour, and in others again, the whole wing is rich black.

Melbourne and Tasmania; near to *E. obsoleta.*

Mr. Barnard, of Duaringa, bred a female of this species in Tasmania, and in a few hours some forty males, including all the above varieties had flown into the room—thus conclusively proving their oneness of species.

PORTHESIA (?) IRRORATA, sp.nov.

♂. Head and thorax black, mottled with grey and fulvous grey hairs. Palpi black. Antennæ fulvous fuscous, with long black pectinations. Abdomen black, mottled with grey hairs, posterior segments, with dots of fulvous ochreous laterally, and caudal segment fringed with fulvous hairs. Forewings moderately dilate; costa base rounded, nearly straight; hindmargin obliquely rounded; fulvous ochreous, irrorated, dusted, and mottled with fuscous black; a black band at base, projected and diffused along costa to $\frac{1}{2}$, along inner margin to $\frac{2}{5}$, and in a medium band, the black diffused and intermingled with ground colour to join the second fascia, which has its posterior border from $\frac{1}{2}$ costa to $\frac{2}{5}$ inner margin, and with basal band contains a circle of ground colour near inner margin; this basal and median fascia are more or less irrorated into a diffused fascia by the numerous scattered black scales; a third fascia has anterior border from $\frac{2}{3}$ costa in an irregular rounded sweep to $\frac{1}{2}$ inner margin, and posterior border from just before apex of costa to just before anal angle of inner border, attenuated to a point to near $\frac{1}{2}$ hind margin, and thus forming a rounded arch on either side; the space between 2nd and 3rd fascia is equally irrorated ground colour and black; the hindmarginal fourth of wing is sparingly dusted with black; a fine hindmarginal line black. Cilia fulvous ochreous and black. Hindwings fulvous ochreous; inner border, with black scales and hairs, and apical portion of wing dusted with black—in some specimens as a short clouded fascia to $\frac{1}{2}$ hindmargin. Cilia fulvous ochreous, sparingly dusted with black.

Formerly taken at Williamstown, Melbourne, by Mr. Kershaw.

Family COSSIDÆ.

ZEUZERA TRIPARTITA, sp.nov.

♂♀. 44-50 mm. Head bluish grey. Palpi fuscous. Antennæ fuscous grey, pectinations fuscous black, narrowing towards base and toward $\frac{1}{2}$ the stalk, terminal half of stalk simple. Thorax bluish grey, dusted with black, and with a black bar on dorsum anteriorly, which bar is prolonged backward on either side in a fine line along side of dorsum and is contracted inwards at one-third. Abdomen light-blue grey. Forewings very elongate, costa wavy, hindmargin obliquely rounded, reddish fuscous, dusted with light blue-grey, and hieroglyphed in fine interrupted black lines between the veins; costa with thick black line, attenuated to near base, and reaching to $\frac{1}{3}$ costa, making the base of an irregular triangle with apex $\frac{1}{3}$ from costa pointing to inner margin; four dots running into fine lines immediately beyond; a broad black bar at $\frac{2}{3}$ costa, extending half distance to middle of hindmargin, thence bifurcated toward apex and toward anal angle of hindmargin, and diffused with hieroglyphic lines; a hindmarginal row of dots on veins; cilia light-grey. Hindwings light fuscous, dusted with grey, and with indistinct hieroglyphic fuscous lines. Cilia as forewings.

Brisbane; very rare.

A difficult moth to preserve, so easily turning greasy.

Family NOTODONTIDÆ.

NOTODONTA CINEREA, sp.nov.

♂♀. 42-54 mm. Head grey. Antennæ light fuscous. Thorax grey, mottled on the dorsum with brown, and posteriorly with black. Abdomen grey, base of segments light fuscous. Forewings elongate, moderately dilate; costa rounded; hindmargin finely waved, grey, mottled with greyish white, and with shades of fuscous black. Veins dark grey or nearly black. A sharply-defined black line, twice dentate, from costa just beyond base obliquely to median vein; this is often indistinct or absent; a 2nd black line, with seven acute dentations, from $\frac{2}{5}$ costa, to $\frac{1}{2}$ inner margin; a 3rd black line from $\frac{3}{5}$ costa, many times denticulate, runs obliquely half the distance towards centre of hindmargin, thence turns abruptly inward to meet the 2nd line at $\frac{1}{2}$ inner margin. In some specimens the space included by these last two lines is so largely irrorated with black as almost to form a fascia. Beyond the third line are black bars running between and parallel with veins, those toward inner margin are shorter and lighter. A shading of dark grey from middle of third line obliquely to apex of wing; a dark shading from $\frac{2}{3}$ of third line obliquely to $\frac{1}{3}$ hindmargin—in some specimens more or less darkly shaded and diffused to hindmargin. Cilia grey, barred with darker grey. Hindwings brownish grey, moderated by a shading of light smoky-grey, darker on inner margin; veins dark grey. Cilia as forewings; underside of wing grey-white. Hairs on inner margin very long.

Brisbane; on fences and at light.

Group GEOMETRINÆ.

Family GEOMETRIDÆ.

IODIS QUIETA, sp.nov.

♂. 17 mm. Head pale reddish ochreous, fillet white, face ochreous. Antennæ white; pectinations 6, ochreous. Thorax light bluish-green. Abdomen light blue-green, with white on posterior segments. Legs blue-green, whitish beneath. Forewings with costa gently rounded, hindmargin rounded; light-green with two pale glaucous green double bands; costal edge white; a double pale glaucous green line wavy, more diverse at costa and containing a lighter green shading than ground colour from $\frac{2}{5}$ costa to $\frac{2}{5}$ inner margin; the anterior line is nearer base and is less distinctly marked; a second duplicated sinuous denticulated line from $\frac{2}{3}$ costa to $\frac{2}{3}$ of inner margin, duplicated immediately beyond, to contain a lighter band of green than ground colour—the posterior line is less distinctly marked; a pale ferruginous discal spot just before $\frac{1}{2}$ costa at a distance of one-third across wing; cilia ferruginous finely tipped with white. Hindwings as forewings, 1st line not clearly marked; 2nd line sinuous and denticulate from $\frac{2}{3}$ costa to $\frac{2}{3}$ inner margin, indefinitely duplicated; a large size pale ferruginous discal spot opposite costa at $\frac{1}{2}$ and one-third depth of wing from costa. Cilia ferruginous finely tipped with white.

Appears to be allied to *I. halochlora*, Mey. May be easily distinguished by ferruginous cilia, by pale ferruginous discal dots, and by double banded lines.

Brisbane; one specimen, 1891.

Hypochroma quadrilinea, sp.nov.

♂♀. 35-40 mm. Head, thorax, and abdomen creamy drab. Palpi black. Antennæ grey. Forewings, costa nearly straight, hindmargin rounded, creamy-grey or light creamy ochreous, with more or less distinct dotted darker lines, dots, and suffusions; costal margin sparsely dotted with fuscous grey; four dark fuscous grey lines, 1st, from a black dot at $\frac{1}{4}$ costa to $\frac{1}{3}$ inner margin, sinuous—in most specimens broken and more or less indistinct; 2nd line from $\frac{1}{2}$ costa to a narrow black bar joining 1st line on inner margin, and passing through two black dots near costa. These lines enclose a triangular space, darker on either border, and with a dark shading on whole inner half; a 3rd line from $\frac{3}{4}$ costa, sinuous, more or less parallel with hindmargin to inner margin at $\frac{4}{5}$; 4th line crenulate, immediately beyond 3rd line, interrupted and more or less clouded by a suffusion of middle third of wing, extending to hindmargin and in a lighter shade to near inner margin; in some specimens a conspicuous semi-lunar black mark $\frac{1}{3}$ from costa concave to hindmargin; a dark smoky crenulated hindmarginal line. Cilia creamy-grey, crossed by darker bars. Hindwings as forewings with darker crenulate lines at $\frac{1}{2}$ and $\frac{2}{3}$; the 2nd line with dark fuscous spots on veins; 3rd and 4th lines lost in a suffusion in hindmarginal 4th of wing, and diffused with dark smoky-grey, or dusted with shades of grey; hindmarginal black crenulated line. Cilia as forewings.

Brisbane to Mackay; not common.

Family MONOCTENIADÆ.

Aspilates obliquata, sp.nov.

♂♀. 20-24 mm. Head, palpi, antennæ, thorax and abdomen ochreous fuscous. Forewings, costa rounded, apex acute, hindmargin scooped out in costal half, inner half obliquely rounded, light ochreous fuscous or straw colour, dusted profusely but faintly with red fuscous dottings or interrupted very fine lines; costa with numerous minute dark pencillings; 1st line $\frac{1}{3}$ costa to $\frac{1}{3}$ inner margin, curved outwards, more or less indistinct in most specimens; discal spot small, black fuscous at $\frac{3}{5}$; 2nd line a conspicuous dark fuscous bar from $\frac{3}{4}$ costa to $\frac{1}{2}$ inner margin. shaded posteriorly with reddish ochreous; in some specimens the band is split up into a line or lines of dots and the whole is shaded off in a cloudy shading, forming a blotch toward inner half of hindmargin; in other specimens, lines and shading entirely wanting; hindmarginal line dark fuscous. Cilia ochreous, deep fuscous at base. Hindwings as forewings; 1st line wanting; 2nd line in each specimen as forewings—in most specimens dark fuscous shading towards hindmargin. Cilia as forewings.

Brisbane; rare. I found the species flying among ferns, on which I believe the caterpillar feeds.

Xenosuma rubra, sp.nov.

♀. 45 mm. Head carmine-red. Palpi fuscous red. Antennæ red ochreous. Thorax fulvous red. Abdomen fulvous red, posteriorly fulvous ochreous. Legs banded ochreous and fulvous red. Forewings triangular, costa waved, apex acutely prolonged, hindmargin rounded, fulvous red, lightly dusted with black-red or black; an oblique fuscous red spot on costa at $\frac{3}{4}$, a darker diffusion of fuscous red as an inconspicuous fascia, and containing a row of darker dots from $\frac{3}{5}$ inner margin to apex of costa, considerably darker at apex. Cilia dark fulvous red. Hindwings as forewings; fascia or suffused line continuous with that on forewings from $\frac{1}{2}$ costa to $\frac{1}{2}$ inner margin. Cilia as forewings.

Nearly same size and shape as *M. monoda*, Meyr., which I discovered in Gippsland, Victoria. I have also described a 2nd species, *X. metallica*, and this makes the 3rd species of the genus.

Brisbane; one specimen; taken by Dr. Turner.

Oxychodes multicolora, sp.nov.

♂. 35-40 mm. Head grey-white, face fuscous with a white band. Palpi fuscous. Antennæ creamy white, pectinations light fuscous. Thorax fuscous minutely dusted with light-grey and smoky-grey; epaulettes long, lighter fuscous. Abdomen fuscous, lighter posteriorly, dusted with light and smoky-grey.

Forewings triangular, moderately dilate, costa nearly straight, apex acute, hindmargin slightly scooped out beneath apex, rounded, fuscous mottled, dusted and diffused with white-grey, shades of fuscous, purple and salmon-pink, irregularly spotted with black; costa varied with grey and fuscous and black dots: a dark fuscous line varied with darker dots, from $\frac{1}{4}$ costa rounded and sinuous to $\frac{1}{3}$ inner margin: a 2nd line or fascia of same colour or chocolate fuscous from $\frac{2}{5}$ costa, dentate in middle, to $\frac{2}{5}$ inner margin; a 3rd diffused fascia of same colour and character from $\frac{2}{3}$ costa (obliquely angled and dentate at $\frac{1}{4}$ from costa) to $\frac{3}{4}$ hindmargin, chocolate lighter and more diffused in costal half; a more or less distinct discal spot between 2nd and 3rd fascia, two dots or blotches between fascia and hindmargin at $\frac{1}{3}$ from costa, and two small dots opposite anal angle; hindmarginal fourth of wing lighter ground-colour, shot with a purplish-white hue, submarginal area darker in middle third and toward hindmargin. Cilia fuscous, mixed with chocolate fuscous. Hindwings fuscous, shot on costal $\frac{2}{3}$ with salmon-red; inner third shot with creamy-white and dusted with ferruginous and lines and dots of fuscous; a waved fuscous bar from $\frac{1}{2}$ costa to $\frac{1}{2}$ inner margin; a 2nd line from $\frac{2}{3}$ costa to $\frac{2}{3}$ inner margin, bordered near inner margin with a white bar; in some specimens diffused into a long patch and speckled with ferruginous, a fuscous shading more or less dusted with white, grey, aud purplish shades; also in one specimen a square chocolate patch near anal angle of hindmargin. Cilia chocolate fuscous. Undersurface of forewing with a large square blotch of smoky fuscous in middle-third of wing, at its own distance from hindmargin; inner border of hindwings bordered by a white band which shades into purple fuscous toward border.

Mackay, Brisbane, Sydney; three specimens.

MONOCTENIA TURNERI, sp.nov.

♀. 42 mm. Head slaty grey. Palpi reddish-grey. Antennæ black-red, pectinations short, fuscous-grey. Thorax slaty grey, posteriorly wool colour, irrorated with blackish-grey; undersurface white, suffused with carmine. Legs red-grey, tibiæ banded with creamy white. Abdomen light slaty-grey, dusted with black and fringed laterally with light carmine shaded with red; undersurface wool colour, dusted with carmine, segments banded by a deep band of vermillion, narrowly lineated by fuscous red, caudal brush drab-grey. Forewings elongate, triangular, costa waved, apex acute, hindmargin rounded, slightly scooped in anal fourth ; slaty grey, dusted and dotted with black, and with chocolate-red and pink-white diffusions and lines ; costa with black dots on basal third, a white line at $\frac{1}{3}$ runs obliquely inward to opposite $\frac{2}{5}$ and gradually diffuses into ground colour ; a narrow chocolate-red line from $\frac{2}{5}$ to $\frac{7}{8}$ costa subtends a diffusion of chocolate-red, and with it encloses a conspicuous white streak from $\frac{2}{3}$ to $\frac{5}{6}$; the first white subcostal line subtends a broad fuscous chocolate fascia, which shades into ground colour towards base, and is freely covered by minute black strigulæ ; a linear crimson-red discal elongated ring opposite $\frac{1}{2}$ costa contains a central red-white line ; a wavy denticulate line from opposite 2nd white streak at $\frac{2}{3}$ costa to $\frac{3}{5}$ inner margin ; the subcostal chocolate suffusion becomes crimson toward apex of costa, and diffuses into chocolate and slaty-grey toward median fold ; a sharply defined chocolate band $\frac{7}{8}$ costa to $\frac{3}{4}$ margin, waved to inner 4th and bordered posteriorly by a bright white line, tinted with pink; the space between this and hindmargin is light carmine, irrorated with fuscous drab in costal half, and bordered with a suffusion of chocolate on anal half of hindmargin. Cilia fuscous drab. Hindwings light carmine, suffused with slaty-grey in centre and costal half; four dark chocolate fuscous lines, 1st, $\frac{2}{5}$ inner margin to $\frac{1}{2}$ costa, with a short cream-white undulating line posteriorly opposite the centre ; 2nd, from $\frac{3}{5}$ inner margin to $\frac{3}{4}$ costa, narrowly lined posteriorly with cream white ; 3rd, from $\frac{4}{5}$ inner margin, crenulate and afterwards diffused to near 2nd line before costa ; 4th, from anal angle of inner margin consists of interrupted dots, and is sinuous and wavy to just before apex of costa ; space between 4th line and hindmargin freely speckled with black. Cilia as forewings. Undersurface of forewings is crossed obliquely by a basal bar and by a median bar of umber-brown, and at costa before apex by a short oblique bar and a dot of same colour. Hindwings undersurface crossed by a median red umber bar, and by an ochreous short line ; hindmarginal third of wing deeply suffused with vermillion, dotted with ochreous. Allied to *M. venosa*, Gn. *and M. Digglesi*, Gn.

Brisbane; one specimen; Dr. Turner. This is, perhaps, the most beautiful species of the genus; very rare.

MONOCTENIA PUNCTUNCULUS, sp.nov.

♂ ♀. 35-44 mm. Head fulvous fuscous, Antennæ cream-colour, pectinations smoky-brown. Thorax fulvous fuscous; epaulettes fuscous ochreous. Abdomen fulvous fuscous, lighter in middle of dorsum, dusted with black posteriorly. Forewings, costa nearly straight, hindmargin straight in costal third, inner two-thirds obliquely rounded, fulvous fuscous, irrorated with short transverse slaty-grey, interrupted bars or dots, with dots on costal band; a blackish fascia from $\frac{1}{3}$ costa to $\frac{1}{5}$ inner margin, rounded and angled in centre to form two arches; a 2nd fascia from apical angle of hindmargin to $\frac{3}{5}$ inner margin; a discal spot near costa at $\frac{1}{2}$; a dot or blotch beyond 2nd fascia, near apical angle. Cilia fuscous. Hindwings as forewings, 1st fascia wanting, a discal spot just before 2nd fascia, and 2nd fascia forming a dark bar from $\frac{3}{4}$ costa to $\frac{1}{2}$ inner margin. Cilia dark fuscous. Undersurface of hindwings as upper surface, but lighter, and with three dark fuscous blotches between veins on hindmargin near apical angle; the apical blotch with a grey-white centre; the sub-apical with a larger grey-white centre, but crossed by a dark fuscous line. Allied to *M. venosa*, Gn.

Brisbane; rare.

Group NOCTUÆ.

Family ORTHOSIDÆ.

LEUCANIA LABECULIS, sp.nov.

♂♀. 26-35 mm. Head, palpi, antennæ and thorax reddish fuscous. Abdomen reddish fuscous anteriorly, ochreous drab posteriorly. Forewings elongate, gently dilate, costa nearly straight, hindmargin rounded, reddish fuscous — in some specimens sparingly dusted with black, in many specimens not traceable; a small black discal spot at $\frac{1}{2}$ near end of cell; in some specimens a hindmarginal row of minute black dots, in others not distinct. Cilia dark fuscous. Hindwings grey white, with dark, smoky fuscous; marginal area narrowing toward anal angle; veins fuscous; hindmarginal line dark fuscous, bordered by pink ochreous line. Cilia ochreous, becoming fuscous at base.

Brisbane; rare. This species may be known by the uniform colour of the forewings, by the absence of conspicuous markings, and by the narrow dark marginal border of hindwings.

LEUCANIA LINEARIS, sp.nov.

♂♀. 26-30 mm. Head, palpi and antennæ red or grey fuscous. Thorax ochreous fuscous. Abdomen light wainscoat drab. Forewings elongate, gently dilate, costa nearly straight, hindmargin rounded, light wainscoat drab; veins dark fuscous or smoky black, giving off numerous parallel and ramifying lineations; the median vein is conspicuous as a white or ochreous line bordered by black from $\frac{1}{6}$ to $\frac{2}{3}$, where it bifurcates into three main divisions containing two subdivisional lines each—a patch of black is spread out between lines at the bifurcation; black dots more or less developed on costa near base and at $\frac{1}{5}$, a conspicuous black dot close to centre of median vein and a second opposite and near $\frac{1}{3}$ of inner margin; an irregular row of black dots or bands round lineations, from $\frac{2}{3}$ costa keeping near costa to $\frac{4}{5}$, thence bending round and parallel to hindmargin to $\frac{3}{5}$ of inner margin; a dark area across lineations forms a diagonal fuscous fascia from the middle of the row of dots to just before apex of hindmargin, leaving a lighter area between it and a parallel dark area from bifurcation of median to apex of wing; a hindmarginal row of minute black dots. Cilia ochreous drab. Hindwings very light white grey, with very narrow smoky marginal area, becoming diffused or indistinct at $\frac{2}{3}$ of hindmargin; veins light fuscous. Cilia, silver grey.

Brisbane.

This species is near *L. diatrecta* of Butl.; but the lineations and oblique fascia easily distinguish it.

Family AGROTIDÆ.

AGROTIS ENUNCIATUS, sp.nov.

♂♀. 30-36 mm. Head fuscous grey. Palpi iron-grey. Antennæ fuscous grey; ♂ finely pectinated, ♀ plain. Thorax iron-grey or fuscous grey, collar light fuscous or chocolate. Abdomen ochreous grey, covered anteriorly by long down. Forewings, costa straight, hindmargin rounded, ochreous fuscous, with mottled markings of purple-grey, iron-grey and sepia shadings all over ground colour; a black discal spot at $\frac{2}{3}$, at a distance of one-fourth from costa, bordered in ♂ with fuscous red and ground colour, and fine interrupted lines of black dots, the last less distinct in ♀; a number of denticulate sinuous transverse black lines; 1st near base, followed by two or three interrupted lines from a broad bar on costa to $\frac{1}{5}$, less conspicuous or more or less absent in ♀; an irregular shading of black into sepia, from near base through middle third of wing to $\frac{2}{3}$ where it approaches inner border; this is crossed by lines and shades of black, ground colour and sepia, less variegated in ♀; a sinuous zigzag black line from $\frac{2}{3}$ costa to $\frac{2}{3}$ inner margin, bordered posteriorly with a ground colour line, and another similar line near hindmargin; between these two lines is a diffusion of fuscous, grey or sepia, with patches, dots or lines of ground colour, darker in ♀; a submarginal row of sepia round dots bordered on either side by ground colour; a wavy hindmarginal black line. Cilia light fuscous or iron-grey, with two dark lines crossing. Hindwings translucent greyish-white, hindmargin broadly smoke-colour; in ♂ narrowing to inner margin, in ♀ only a line. Cilia very light-grey, with one or two darker lines crossing.

Brisbane.

Family HYPOGRAMMIDÆ.

Hypogramma distincta, sp.nov.

♀ ♂. 40-48 mm. Head and palpi smoky grey. Antennæ drab-grey; pectinations very short. Thorax ashy grey, epaulettes iron grey. Abdomen and legs ashy grey. Forewings elongate, gently dilate, costa slightly waved, hindmargin rounded, oblique: white grey, marbled by different shades of grey, fulvous and black; costa with grey dots and lines; basal fifth of wing pearly-white, slightly dusted with grey and with a small dot of fulvous on inner margin at $\frac{1}{6}$ and bounded posteriorly by a sharply-defined waved double black line from $\frac{1}{5}$ costa to $\frac{1}{4}$ inner margin, darkest and diverged at costa; a second sharply-defined black wavy line from $\frac{3}{4}$ costa to anal angle of inner margin, darkest at costa—this, with the first line, encloses the darkest half of the wing, and is mottled with fuscous shadings, iron-grey interrupted and dotted lines and short black lines, and contains a round inconspicuous fuscous spot, bordered by ashy grey, a more or less triangular to kidney-shaped black discal ring edged internally with grey, and an interrupted more or less broken square of black bars on inner margin at $\frac{5}{6}$; a sharply-defined black line at $\frac{5}{6}$ costa runs obliquely towards second line, giving off a shorter line to the second line, and forming a black triangle on costa, but is itself continuous as a wavy grey line more or less distinct to anal angle—there are several indistinct grey broken lines across the wing in its whole depth, the markings being darker on the veins; hindmarginal line black, interrupted between veins. Cilia grey. Hindwings pale grey-white with iron-grey veins and a deep band of iron-grey on hindmargin, narrowing to anal angle. Cilia light grey.

Brisbane to Mackay.

Family ANTHOPHILIDÆ.

Thalpochares dividens, sp.nov.

♂ ♀. 18·20 mm. Head, palpi, and antennæ light wainscoat drab. Thorax white, collar wainscoat drab, epaulettes white bordered with wainscoat drab. Abdomen creamy white. Forewings triangular, broadly dilate, costa straight, apex acute, hindmargin rounded; wainscoat white, barred and diffused with purplish grey or grey fuscous; costa with a fine brown band crossed by six short oblique fuscous stripes in posterior half, each subtending a line across wing; 1st stripe at $\frac{1}{2}$ of costa subtends a line which crosses cell obliquely at $\frac{1}{2}$; 2nd stripe just beyond the 1st, subtends a line crossing to inner border at $\frac{1}{4}$, costal portion often interrupted and indistinct; 3rd stripe at $\frac{2}{3}$ costa is obliquely prolonged half the distance to $\frac{1}{4}$ hindmargin, thence at an angle to $\frac{2}{3}$ inner margin: this line is bounded posteriorly by a ground colour line; line from 4th stripe indefinite; 5th and 6th stripes unite to form a line below apex to $\frac{7}{8}$ inner margin—this line is dotted with minute black dots and is edged with ground colour on anterior border; a dividing purple grey or fuscous fascia from costa just before apex runs obliquely to $\frac{1}{2}$ inner margin, having two minute black dots close to apex, and is bordered by a patch of ground colour; the spaces between the lines are light fuscous diffused toward inner margin; a minute black or dark brown discal spot beyond 1st line and nearer to costa ; a submarginal reddish-brown line bordered posteriorly by a line of ground colour and by a marginal band of light fuscous. Cilia brown, creamy white at base. Hindwings light wainscoat ochreous with indistinct brown diffused lines at $\frac{2}{3}$ and $\frac{3}{4}$; a submarginal dark-brown line bordered posteriorly by a band of ground colour ; a light brown hindmarginal band. Cilia creamy wainscoat.

Brisbane ; rare.

Family FOCILLIDÆ.

ZETHES CONSCRIPTA, sp.nov.

♂ ♀. 16-23 mm. Head fuscous grey. Palpi fuscous grey, apex tinted with black. Antennæ grey. Thorax fuscous grey. Abdomen lighter grey. Forewings elongate, moderately dilate, costa basal half rounded, slightly waved, hindmargin apical third scooped out, inner two-thirds obliquely rounded, greenish-grey, marbled with white-grey, fuscous grey, smoky-grey and black ; a dot, in some specimens diffused at $\frac{1}{8}$ costa, subtends a fine black line which runs obliquely to base near inner margin ; a 2nd fuscous line at $\frac{1}{3}$ costa, rounded, dentate, and denticulate to $\frac{2}{5}$ inner margin ; a 3rd fuscous line immediately beyond and almost parallel ; a 4th double fuscous line at $\frac{2}{3}$ of costa forms a half circle to just before $\frac{1}{2}$ hindmargin, a fine black dentate line from the centre of this runs obliquely inward to $\frac{3}{5}$ inner margin ; a short bar from centre of first line obliquely toward 2nd line ; a long black bar from base near inner margin runs parallel to inner margin as far as third line, often more or less wanting ; in some specimens a grey shading or even fascia beyond third line ; two short waved dentate lines before apex within semicircle of 4th line and sometimes a suffused dot and blotch, a submarginal row of black dots, a fine black hindmarginal line. Cilia light fuscous with tints of grey and black. Hindwings fulvous grey, three more or less distinct wavy lines from just before anal angle of inner margin toward costa, at $\frac{1}{3}$ lighter toward costa dark and spotted at inner margin : a dark spot at anal angle subtending a light fulvous line across wing ; a hindmarginal lunulate fuscous line. Cilia fulvous fuscous crossed by darker lines.

Brisbane ; rare.

ZETHES CHORDOPHOIDES, sp.nov.

♂ ♀. 30-36 mm. Head light fuscous. Palpi dark fuscous. Antennæ light fuscous on upper surface, ochreous beneath. Thorax and abdomen fuscous grey; in some specimens with a few scattered black dots. Forewings, costa slightly waved, apex acute, hindmargin scooped out to vein 4, thence obliquely rounded to anal angle, dark fuscous, sparsely dusted with black, or in some specimens fuscous diffused with ochreous; costa dotted with darker spots and shadings, veins light fuscous, in others smoky fuscous; a minute cream dot on median at $\frac{2}{5}$, a kidney-shaped light ochreous or rich fuscous discal spot at $\frac{1}{2}$ bordered by fine ochreous and black lines and shaded toward costa: a short fuscous black line from near base of costa obliquely to median vein, sometimes wanting; a 2nd interrupted irregular crenulate fuscous or fuscous black line from $\frac{1}{5}$ costa to $\frac{1}{3}$ inner margin; a very short black line at $\frac{1}{2}$ costa obliquely to a minute ochreous dot near discal spot; a 4th line fuscous and fuscous black at $\frac{3}{5}$ costa joins with another indefinite or black suffused line beyond discal spot, and after enclosing discal spot runs along its inner border along median vein to middle of wing, and thence curves round to $\frac{3}{5}$ inner margin; a submarginal row of black dots, larger at inner margin; a fine interrupted hindmarginal line of dots or lunules: these lines vary in different shades of ground colour, and conspicuous short strokes of rich black; an ochreous line bordered by fulvous fuscous parallel with hindmargin from $\frac{7}{8}$ costa to $\frac{7}{8}$ inner margin. Cilia light fuscous. Hindwings as forewings, with darker fuscous lines at $\frac{1}{3}$ and $\frac{2}{3}$; the 2nd with dark fuscous spot on veins, often indistinct; ochreous line as in forewing from $\frac{3}{4}$ costa straight to anal angle of inner margin, hindmarginal third of wing dusted with grey and diffused grey; submarginal line black and scalloped. Cilia as forewings.

Brisbane to Mackay.

Family THERMESIIDÆ.

THERMESIA TENEBRICA, sp.nov.

♂ ♀. 40-50 mm. Head dark fuscous. Palpi fuscous, terminal joint ochreous fuscous. Antennæ dark fuscous, short pectinations in ♂. Thorax fuscous, with rich black velvet collar.

Abdomen silky grey fuscous. Forewings broadly dilate, costa slightly wavy, hindmargin rounded, fuscous or fuscous drab, with shadings of grey and fine dotted and interrupted irregular transverse wavy black lines chiefly on basal half and hindmarginal fourth; a broad dark sepia fascia, anterior border beyond $\frac{1}{2}$ costa to $\frac{1}{2}$ inner margin, posterior border $\frac{5}{6}$ costa to $\frac{3}{4}$ inner margin and gradually shaded to $\frac{5}{6}$ inner margin; in some specimens there is a purple or violet shading; a transverse dark line more or less distinct passes through the centre of this band or fascia, a black dot on the hind border $\frac{1}{4}$ from costa; a hindmarginal row of black dots. Cilia reddish fuscous, darker in median line. Hindwings as forewings, the dark band of fascia filling middle third of the wing, shading toward hindmargin and becoming light viole towards apex. Cilia as forewings; a tuft of long hairs on under-side of forewings to protect upper costal margin of hindwings in flight. This species varies in colour—some specimens being light-fawn colour, others ochreous brown.

Brisbane; rare.

Family DELTOIDÆ.

Herminia delicata, sp.nov.

♂ ♀. 26-34 mm. Head, palpi, antennæ, thorax and abdomen light wainscoat or fuscous drab. Forewings, costa gently rounded, apex acute, hindmargin rounded, fuscous drab, with darker suffused fuscous at $\frac{1}{3}$ and before hindmargin; a fine dark fuscous line lighter on posterior border from apex of costa in a semicircle to anal angle; a dark crenulate hindmarginal line bordered posteriorly with a lighter drab line. Cilia fuscous drab. Hindwings as forewings, darker toward hindmargin round vein 4, a very light line from $\frac{2}{3}$ costa to $\frac{2}{3}$ hindmargin; a scalloped line bordered by a lighter line from $\frac{5}{6}$ costa goes to meet a second and darker scalloped line also bordered by a lighter line which comes from apex of costa at vein 4 of hindmargin and becomes lighter toward anal angle. Cilia as forewings. Lines darker on undersurface.

Brisbane.

Group PYRALIDINA.

Family SICULODIDÆ.

Siculodes hemicycla, *Meyr.*

I found this species, new to science, seven years agoin Fiji, I have received it from Dr. T. L. Bancroft, taken at Burpengary. Brisbane; also from Mr. Turner, Mackay. Not previously recorded as Australian.

Family BOTYDIDÆ.

GODARA ILLUSTRIS, sp.nov.

♂ ♀. 24-28 mm. Head, palpi, antennæ, thorax and abdomen reddish fuscous. Legs ochreous, femora of first and second pairs with bushy tufts of hairs. Forewings, costa rounded, hindmargin rounded, light pearly fuscous, irrorated with red, chocolate and purplish, and marbled with varying shades of darker fuscous with dispersion of black specks and lines; a dark suffusion at base, a raised feathered tuft near base of costa, rich black; a sinuous wavy red and black line $\frac{1}{3}$ costa to $\frac{1}{3}$ inner margin; a nearly parallel red-black line $\frac{2}{3}$ costa to $\frac{2}{3}$ inner margin; these lines enclose a space dark fuscous in some specimens, black on inner half, the middle third is extended toward hindmargin, while it is prolonged beyond the inner border line in a semi-lunar prolongation, 2 or 3 fine crenulate lines immediately beyond, a blackish diffusion in some specimens toward hind border in middle third of wing; submarginal and marginal lines dark interrupted dots and suffusions. Cilia fuscous, barred and dotted with dark brown or black. Hindwings pearly grey, tinted with smoky-black and purplish at base, suffused with and banded by a deep dark hindmarginal fascia or border. Cilia as forewings. The markings or rather distribution of tints are very variable, but the moth may be at once described as a blotched chocolate or fuscous brown on a pearly iridescent grey or purplish fuscous ground.

In scrub, Brisbane; larger and considerably darker than *G. comalis*, Gn.

ANTHAERETIS ERIDORA, *Meyr.*

I found this as new to science seven years ago in Fiji. I have taken it near Brisbane, and received it from Mr. Turner Mackay. Not previously recorded as Australian.

NOTARCHA ADIPACTIS, Z.

Bred by Dr. T. L. Bancroft, Brisbane. Not previously recorded as Australian.

PYRAUSTA, *Botys*; EPITROTA, *Meyr.*

Two specimens obtained from Newcastle, N. S. Wales, Australian Museum, Sydney. Dr. T. L. Bancroft has bred this from Burpengary. New to Queensland.

EURTHRYPARODES BRACTEOLATIS, *Z.*

Brisbane. Not hitherto recorded as Australian.

OMIODES BIANORALIS, *Meyr.*

Brisbane; in scrubs. Mackay; Mr. Turner. Not previously recorded as Australian.

Family SPILOMELIDÆ.

NAUSINOE MARMORATA, sp.nov.

♂ ♀. 30-34 mm. Head creamy grey, fuscous on crown. Palpi black, white or creamy grey at the base. Antennæ light fuscous, silvered beneath. Thorax light fuscous, bordered by silvered grey, and in some specimens by a few black dots. Abdomen silver grey anteriorly, light fuscous posteriorly, a black band anteriorly, and an interrupted dotted dark line laterally. Forewings elongate, moderately dilate, costa slightly sinuous, apical portion rounded, hindmargin nearly straight in apical half, inner half obliquely rounded, light creamy fuscous, marbled, blotched and dotted with various shades of darker fuscous; costa with a series of dark spots alternating with light ground colour spots on basal half, and sparingly to apex; a small brown dot beneath centre of median vein; the pattern of the wing embraces a light space of ground colour, having its anterior border from $\frac{2}{5}$ costa obliquely outward to median vein for $\frac{1}{8}$ extent of wing along the vein, and thence at an acute angle to $\frac{2}{3}$ inner margin, and having the posterior border from $\frac{4}{5}$ costa nearly parallel with hindmargin for $\frac{3}{5}$, thence bent over at right angles anteriorly for $\frac{1}{8}$ of wing, and thence turned at an obtuse angle to meet anterior border at $\frac{3}{5}$ inner margin; this light space thus enclosed contains a dark rhomboid blotch neat costa anteriorly; beyond the posterior border the dark fuscour shades into lighter patches—in some specimens to form a lighs fuscous shading below costa to $\frac{1}{4}$ hindmargin, and another from $\frac{2}{3}$ to $\frac{3}{4}$ hindmargin. Cilia light fuscous, with dark fuscous dots. Hindwings as forewings, with three irregular dark fuscous broken bands or fascia bordered by marblings of creamy fuscous or almost white ground colour, lighter toward centre of costa; a dark rhomboid fuscous blotch on apical fourth of costa. Cilia as forewings.

Very rare; on flowers in August and September, and in scrubs at light in March. Brisbane.

Family PHYCIDÆ.

EPICROCIS SEMINIGRA, sp.nov.

♂ ♀. 30-34 mm. Head fuscous grey. Palpi fuscous, grey at joint. Antennæ fuscous. Thorax light fuscous, tinted with drab grey anteriorly. Abdomen fuscous, base of segments drab grey. Forewings elongate, narrowly dilate, costa gently rounded, hindmargin obliquely rounded, whitish grey with basal third and costal fourth thickly dusted with fuscous grey and black; a median broken line or bar from base to $\frac{2}{3}$ dark fuscous or fuscous black, inner half of wing irrorated with chocolate and fuscous grey and black markings, marbled with grey-white; hindmargin reddish on veins and tinted with fuscous grey, submarginal line of broken black bars separated by an ochreous line from a fuscous grey line. Cilia grey, with a fuscous grey band. Hindwings white, veins light fuscous, submarginal line dark fuscous. Cilia grey, with a fuscous grey band.

Very rare; at light. Brisbane.

TERASTIA SUBJECTALIS, *Ld.*

I have taken half a dozen specimens in Brisbane. Not previously recorded from Australia.

HOMŒOSOMA (?) ALBOCOSTALIS, sp.nov.

♂ ♀. 12-16 mm. Head drab with a fuscous spot on crown. Palpi and antennæ fuscous. Thorax drab with a fuscous line on either side of dorsum. Abdomen drab on dorsum, laterally and posteriorly fuscous. Forewings very narrow, elongate, costa gently rounded, hindmargin obliquely rounded, drab, shot with chocolate fuscous, costal third of wing almost white, narrowly edged with fuscous, veins fuscous, hindmarginal line deep chocolate. Cilia chocolate fuscous. Hindwings light grey, veins fuscous, hindmarginal line chocolate fuscous. Cilia light fuscous.

Brisbane; rare. I found a web of caterpillars of this species feeding on a broad-leaved bush shrub.

Family PTEROPHORIDÆ.

TRICHOPTILUS (?) INCLITUS, sp.nov.

♂ ♀. 23-26 mm. Head fuscous, closely irrorated with ochreous. Palpi dark fuscous. Antennæ ochreous fuscous. Thorax fuscous grey, irrorated with ferruginous fuscous. Abdomen ochreous fuscous, longitudinally streaked with grey, black and fuscous. Tibiæ alternately banded light ochreous, fuscous and dark fuscous, anterior pair specially thickened with scales on origin of spurs. Forewings cleft from before middle, segments linear, ferruginous ochreous with dark fuscous, darker toward hindmargin; an ochreous white spot on costa at $\frac{5}{6}$. Cilia smoky-grey, on costa narrowly based with fuscous ochreous, darker toward apex; 2nd segment with cilia of darker shade toward base. Hindwings cleft first from before $\frac{1}{3}$, secondly from base, segments linear, ferruginous fuscous. Cilia of 1st and 2nd segments smoky grey; 3rd segment darker ferruginous with black cilia.

This appears much the largest species of the genus taken in Australia. Mr. Boyd of Toowoomba found the first specimen and Dr. T. L. Bancroft found a second near Brisbane which unfortunately got damaged by ants.

ON THE OLEO-RESIN OF *CANARIUM MUELLERI*, Bailey; TOGETHER WITH NOTES ON *MANILA ELEMI.*

By J. H. MAIDEN, F.L.S., F.C.S., &c.

(Curator of Technological Museum, Sydney).

[*Read before the Royal Society of Queensland, December 11th, 1891.*]

Part I.

I have received from Mr. F. M. Bailey, F.L.S., Colonial Botanist of Queensland, a small quantity of an exudation from the above species, obtained from the Johnstone River, Queensland, by Dr. T. L. Bancroft. A description of the species will be found in Add. to 3rd Suppl. to Syn. Ql. Pl., in Catalogue of Ql. Pl., page 106, where the following note occurs :—" Upon cutting a log of this tree, Dr. Bancroft observed a flow of honey-like liquid of a turpentine-like odour, some of which has been analysed by Mr. Mar, Government Analyst, who says: 'The substance in bottle marked turpentine is a resin resembling elemi in its general chemical characteristics.' "

The substance is, as has been indicated, of the consistence and general appearance of honey. It has a delicious turpentinous odour, admixed with lemon, very different to the odour of the official Elemi. When digested in cold alcohol, the lemon odour is so strongly brought out as to almost bring this substance into the category of a perfume.

The substance at my disposal (three or four ounces), has not been sufficient for an exhaustive examination of the exudation from *Canarium Muelleri*, but quite sufficient to indicate its nature, and I trust that there may be placed at my disposal a pound or two of it at the least, in order that I may complete the research.

First of all I will give a brief resumé of the exudations from other *Canariums*.

The *Genera Plantarum* of Bentham and Hooker (I. 321) gives 16 genera and two doubtful ones, belonging to the Burseraceæ, and speaks of the members of the Natural Order in general as "Arbores v. frutices, sæpe elatæ, balsamifluæ v. oleiferæ." Lindley speaks of them as "abounding in balsam or resin," and this property is an important aid in the allotment of a plant to this Natural Order, particularly when the botanical material is imperfect.

CANARIUM.

Queensland has another species, *C. Australianum*, F.v.M., in *Fragm.* III., 15, transcribed *Australasicum* in B. Fl. I., 377, but no exudation from it is recorded.

C. Vitiense, A. Gray, occurs in Fiji, and *C. Harveyi*, Seem., in Tonga, but Seemann does not record any exudation from them.

Africa.—Oliver, in the *Flora of Tropical Africa*, makes no allusion to any exudation in either of the two African species. This is significant, as he usually takes cognizance of such matters. However, I find in Moloney's *Forestry of West Africa*, the following statement referring to *C. edule*, Hook. f.: "Under the bark are large masses of scented gum (? resin, J.H.M.), used by the natives in fumigating themselves."

India.—The Indian Burseraceæ are dealt with very fully by A. W. Bennett, in the *Flora of British India*, and in his "Notes on Indian Burseraceæ" (*Pharm. Journ.* [3], VI., 102), he goes even more fully into the matter of exudations in this Natural Order. As regards *Canarium*, Mr. Bennett only refers to the exudations of three species, *commune*, *strictum* and *bengalense*.

C. strictum, Roxb., yields the well-known Black Dammar, found in every museum collection, and it bears no resemblance to Elemi or the product of *C. Muelleri*.

C. bengalense, Roxb., exudes a clear, brittle, amber-coloured resin resembling copal, *see* Kurz. *Forest Flora of British India*, Bennett, *op cit*, and others.

C. commune is, however, the species of most interest to us, because it is by some people supposed to yield the ordinary Elemi (Manila) of commerce. I proceed to quote the best authorities, from which it will be seen that the origin of Manila Elemi is still a matter of uncertainty, and it is therefore dangerous to make any assumption as to the composition and properties of the exudation of *C. Muelleri* based on the further assumption that Elemi is the product of a *Canarium*.

The British Pharmacopœia of 1885, speaking of Manila Elemi, says :—"The botanical source of which is undetermined, but is sometimes referred to *Canarium commune*, Linn., and the latest official Guide I have of the Kew Museums (1886), expresses similar uncertainty.

In the *Pharmacography* of Hanbury and Flückiger, these authorities do not think that Manila Elemi is the product of a *Canarium*.

Cooke (*Gums and Resins of India*), speaking of *C. commune* says, "Commercially no Elemi is derived directly or indirectly from India, and although the tree is found there, under the name of Java Almond, or *Junglee badam*, its resin seems to be unknown; Dr. Cooke had charge of the gums and resins in the Indian Museum, London, and had special facilities to acquire exact knowledge on the subject.

I now turn to authorities on the other side. "The tree produces resin so abundantly that it hangs in large pieces and conical tears from the trunk and principal branches. The resin is at first white, liquid and sticky, but afterwards becomes yellowish and of the consistence of wax (Rumphius)."

We are told by Horsfield, in his list of medicinal plants of Java, "that the gum has the same virtues of Balsam of Copaiba"...(Ainslie). Both the above quotations are from the *Pharmacographia Indica*, Pt. II.

"The bark yields an abundance of limpid oil with pungent turpentine smell, congealing in a buttery camphoraceous substance; it has the same properties as Balsam of Copaiba." (Lindley, quoted in Drury's *Useful Plants of India*).

These three statements of old authors form the basis on which nine-tenths of subsequent notes on the resin are made in books. It is a reflection on botanists—(1) That the nature of the resinous exudation of so common a tree as *C. commune* is not placed beyond doubt; and (2) that the source of Manila Elemi is not settled absolutely.

The most recent note of all is:—"The resin of *C. commune* occurs in large dry masses of a yellowish-white colour; it readily softens when heated, and has then an odour like Elemi," *Pharm. Indica*, Pt. II. I hope to soon see a fuller examination of this resin, *i.e.*, the indubitable product of *Canarium commune*.

Part II.

The oleo-resin of *Canarium Muelleri* is readily soluble in light petroleum, chloroform, ether, absolute alcohol, rectified spirit (.843 sp. grs.), but only partially so in 50 per cent. alcohol.

If exposed to the atmosphere the oleo-resin steadily diminishes in intensity of odour, while the viscosity increases. The following are the results of an actual experiment:—A quantity of the oleo-resin was exposed to the atmosphere on the 18th April; on the 7th May it had lost 3.331 per cent in weight; on the 7th July 5.531 per cent., and on the 10th October over 7.165 per cent. There is no doubt that if exposure to the atmosphere be maintained for a sufficiently long period, the residual substance would become brittle and destitute of odour.

If the exudation be treated with dilute alcohol, and exposed to the heat of a water bath, a volatile oil is driven off which may be condensed and separated from the accompanying alcohol without much difficulty, while a resin is left behind. The whole of the volatile oil is with difficulty driven off at this temperature within a reasonable period, unless solution in alcohol be effected; the operation may be expedited by means of an air-bath (temperature 110°-120° C).

When cold the residual resin is beautifully transparent, and of the colour and general appearance of gelatine. The contraction on cooling is great, as the resin cracks in all directions. In other words it is a brittle resin, and it therefore powders with great facility, forming an impalpable powder like Sandarach, with the difference that it is far easier to powder than that substance.

The exudation (henceforth in this paper to be alluded to as oleo-resin), contains 26.67 per cent. of a lemon-scented volatile oil which may be distilled over in the above operation. The quantity of oil obtained by me was not even sufficient to determine its boiling point, much less its constitution.

The melting point of the residual resin is 75·76° C (167-168·8° F). Like the original oleo-resin, it is readily soluble in light petroleum, chloroform, absolute alcohol, and ether.

It is proper to quote at this place the characters of Manila Elemi as given in the B.P. of 1885 :—" When fresh, soft, granular, resinous, and colourless, but by keeping it becomes harder, and of a pale yellow tint. Odour, strong and fragrant, somewhat resembling fennel and lemon. Moistened with rectified spirit it breaks up into small particles, which when examined by the microscope, are seen partly to consist of acicular crystals."

(1) The most careful tests have failed to detect any acicular crystals (Amyrin) in the oleo-resin of *C. Muelleri*, nor have attempts to obtain a crystallisable resin from the same substance been successful.

(2) There is no fennel odour in the balsam of *C. Muelleri.*

(3) The latter is not, at any time, whether fresh or after keeping, of a granular consistence.

The oleo-resin has in fact been very carefully worked at with the view to obtain the crystallised substance (elemin or amyrin) obtained by Flückiger * from Elemi, but without success.

With the oleo-resin of *Canarium Muelleri*, under the microscope, no trace of crystalline form can be discovered either from solution in alcohol, ether, chloroform, &c. The pseudo-crystalline appearance this oleo-resin assumes when treated with either ether or alcohol is found, when examined under the microscope, to be caused by minute oil-globules.

On the other hand, when Elemi is treated with alcohol a large quantity of blade-like crystals are seen under the microscope ; these crystals are present in large quantities.

From these and other comparative tests, it appears that this oleo-resin and Elemi are neither identical nor allied. Besides Flückiger's paper already quoted, those interested in the chemistry of Elemi are referred to the following :—

1. Contribution to the history of Elemi, Eugen Buri., *Pharm. Journ.* [3] VII., 157, Absts. from *Neue's Repert, F. Pharmacie* XXV., 193.

2. Elemic acid Contribution to the Chemistry of Elemi, Eugen Buri., *Pharm. Journ.* [3], VIII., 601.

3. Article *Canarium commune* in Vol. I. of Bentley and Trimen's "Medicinal Plants," which is an admirable *resumé* of the subject.

CONCLUSIONS.

1. The exudation of *Canarium Muelleri* consists of a solution of an amorphous resin in a volatile oil, and is therefore an oleo-resin.

2. It possesses no particular affinities to Manila Elemi. Composition of Oleo-resin of *Canarium Muelleri* :—

Resin (soluble in alcohol and ether ..	73.33
Volatile Oil	26.67
	100.00

I desire to express my obligations to my assistant, Mr. H. G. Smith, for help in the chemical portion of this investigation.

* "On the Chemistry of Elemi," by Prof. Flückiger, *Pharm. Journ.* [3], V. 142.

THE NATIVE GRAPE VINES OF AMERICA AND AUSTRALIA.

By J. F. SHIRLEY, B.Sc.

[*Read before the Royal Society of Queensland, December 11th, 1891.*]

Whoever has read the story of the Norse discovery of America by Leif, the son of Eric the Red, will remember that Tyrker, the German, a follower of Leif, discovered grapes at one of their landings, and with these the Norsemen filled their boat; to the country they gave the name of Vinland or Wineland, a region probably identical with Rhode Island. The fame of this voyage became the theme of Scandinavian poets, but was hidden from the rest of Europe, until five centuries later Columbus made America known to the old world.

In 1565 a Spanish colony was successfully established at St. Augustine in Florida, and vine cuttings from Europe were planted without success. From this time the English in Virginia and Carolina; the French in Louisiana; and the Spaniards in their numerous colonies made frequent but unsuccessful attempts to cultivate the European vines on American soil. Experience finally proved that no variety of *Vitis vinifera* would flourish between the Atlantic coast and the Rocky Mountains. The cause of this failure remained a mystery for more than a century. Foiled in one direction, European colonists were driven to make experiments with native species of the *Vitis* family, with which plants North America has been richly endowed; but generally with fruits of a foxy smell and disagreeable flavour. Before the close of the sixteenth century wine is said to have been made from native grapes by European settlers in Florida. In 1620 the London Company in Virginia formed a vineyard from native vines, and in 1651 premiums were offered by the authorities of that colony for wine production. In 1796 French settlers in Illinois were reported as making 110 hogsheads of strong wine from native grapes. In 1801 Swiss settlers planted native vines at Vevay in Indiana, and their vineyards were soon a success.

The native American grapes that have become objects of culture throughout the United States are:—

1. *Vitis æstivalis*, Mich., the Summer Grape of the middle and eastern states of North America. From this have been produced the vineyard varieties known as Jacques, Herbemonte, Norton's Virginia, Elsinbourg, Cunningham, Rulander, and Pauline; all resist the attacks of *Phylloxera vastatrix* as has been fully demonstrated in the United States as well as in the south of France. Jacques and Norton's Virginia gained prizes in competition with the wines of Southern France at an exhibition held at Montpellier.

2. *Vitis Labrusca*, Linn., the Isabella grape, found in North America from Canada to Texas and Florida, and also a native of Japan. The Schuylkill, American Alexander, Concord, Catawba, Isabella, Martha, Ives Seedling, and Hartford Prolific are derived from this species. A pale fruited variety furnishes Bland's Grape. The Concord takes first rank for wine and dessert in the East United States; it is not quite proof against *Phylloxera*, but suffers less than most other varieties of this species. This and other hardy North American vines are seldom attacked by *Oidium*.

3. *Vitis riparia*, Michaux, is found from the Atlantic to the Rocky Mountains. To this species belong the Clinton, Franklin, Taylor, and probably *Vitis Solonis*. The latter seems destined to revive agriculture in Southern France, where *Phylloxera vastatrix* has annihilated such a vast extent of vineyards.

They serve as grafting stocks for European vines, the majority showing a sufficient if not a complete resistance to the pest, and for the most part they are not difficult of propagation.

4. *Vitis vulpina*, Linn., is the muscadine or Fox-Grape of the S.E. States of America; and extends also to Japan, Manchuria, and the Himalayas. This species includes as vineyard varieties the Bullace, Mustang, and both kinds of the Scuppernong. The berries are of a pleasant taste, but in some instances of strong flavour; they are the largest among American grapes. All varieties derived from *Vitis vulpina* are perfectly proof against the attacks of *Phylloxera vastatrix*: in infested districts a few insects may sometimes be found on it, yet no ill effects are ever manifested. This species must be raised by seeds or by layering.

When American grapes had won a reputation for themselves, cuttings were sent to France, Portugal, and Germany for experimental cultivation; wherever they were planted the now dreaded enemy of the European vine, *Phylloxera vastatrix*, made its appearance; and scientific inquiry proved that America was the home of the destructive insect. The reason why European vines always failed west of the Rocky Mountains was now clear. With the native grapes it was a case of the survival of the fittest; those which could not resist the *Phylloxera* became extinct, while the species found flourishing by European settlers were *Phylloxera* proof; the insects attacked them but their vitality was not impaired. The co-existence of the vine and the insect since time immemorial, the struggle which was carried on between them, must have necessitated, as a consequence, the formation of vines capable of resistance.

The French vineyards having been ruined by an American insect, it was from America that relief was obtained. That Southern France is now a vine producing country is solely due to the use of *Phylloxera* resisting American grape stocks, upon which the well-known French vineyard varieties are grafted.

Having shown at length what has been done in America, mainly within the present century, I have now to point out that in Queensland we have fifteen species of native grapes, none of which, as far as my inquiries reach, have been experimented upon in our public gardens, or by vineyard proprietors. Three of these, *Vitis acetosa*, *Vitis antarctica*, and *Vitis hypoglauca* have large well-formed fruit, which could readily be improved in size and flavour by cultivation. From the wild grapes of *V. acetosa* Mr. A. Giles is said to have made wine of fair quality resembling claret. It has been suggested by my friend Mr. F. M. Bailey, that since our native vines are all evergreens, while the cultivated species of Europe and America are deciduous plants, this fact might prove an obstacle. But the possession of evergreen foliage has not prevented the improvement under cultivation of such plants as the cacao, coffee, mango, olive, orange, lemon and citron; while in the same order may be found deciduous and evergreen cultivable plants, as the apple and loquat in *Rosaceæ*. Possibly the improved Australian species might be found to possess blight-resisting properties which would render them of exceptional value.

DESCRIPTION OF A NEW SPECIES OF TRUE BARRIMUNDI, *OSTEOGLOSSUM JARDINII*, FROM NORTHERN QUEENSLAND.

By W. SAVILLE-KENT, F.L.S., F.Z.S.

COMMISSIONER OF FISHERIES, QUEENSLAND.

[*Read before the Royal Society of Queensland, December* 11*th*, 1891.]

THE chief interest attached to the record of the new species of fish now under notice is associated with the circumstance that up to the present date but three species of the same genus have been reported, and these from remarkably remote localities. The one species familiar to many members present is the Queensland *Osteoglossum Leichardti*, popularly known in the district from whence it was first obtained as the Barrimundi, or Dawson River Salmon. The second species, *Osteoglossum formosum*, inhabits the region of the Malay Archipelago, having been obtained from both Borneo and Sumatra. The third variety, *Osteoglossum bicirrhosum* hails from the more distant locality of British Guiana. Two other fish only physiologically related to *Osteoglossum* and referable to the same family group, are as yet known to exist, these being the giant *Arapaima gigas* of Brazil, which may attain to a length of fifteen feet, and *Heterotis niloticus* of tropical Africa. All of the known species of the family group of the *Osteoglossidæ* are highly esteemed for food and the addition of a new form to the Queensland fauna is consequently a matter of congratulation from an economic as well as from a scientific standpoint.

It is now more than two years since my suspicions were raised concerning the probable existence of a second species of *Osteoglossum* or true Barrimundi in Queensland waters. On submitting a copy of my preliminary Report on the Food-fishes of the colony to Mr. Frank Jardine, of Somerset Station in the Albany Pass, Torres Straits, he assured me that a fish very closely resembling the Dawson River *Osteoglossum Leichardti*, of Gunther (diagramatically illustrated in Plate xv, fig. 56 of that report), was an inhabitant of the Batavia River and its associated lagoons in Cape York Peninsula. In this opinion he was also supported by Mr. Urquhart, the then sub-inspector of police for that district. In the opinion of both these gentlemen, however, there were apparently minor points of difference that favoured the possibility of its being a distinct species. Mr. Jardine's assistance towards obtaining specimens was heartily accorded. His earlier efforts, however, were not attended with complete success; while failing to secure and preserve a perfect specimen, he nevertheless provided me a single scale taken from the fish's lateral line which gave support to the suspicion of its representing a second species. This scale, in fact, was ornamented with four small red spots in place of the single one, or at the most two only of relatively larger size that are characteristic of *Osteoglossum Leichardti*. Quite recently, this last November, I received from Mr. Jardine three perfect specimens, one of moderate size, $20\frac{1}{2}$ inches, and two small about 12 inches, that completely substantiate their claim for recognition as a distinct species. The diagnostic characteristics of the Cape York Peninsula and Dawson River species are placed side by side for convenient comparison at the end of this communication, and the broad distinctions which can be readily apprehended by any ordinary observer may be thus summarised:—The cleft of the mouth in the Cape York species is conspicuously more oblique, while the posterior edge of the maxillary bone extends further back than obtains in the Dawson River form. The number of rays in both the dorsal and anal fins of the Cape York type are considerably in excess of those of *Osteoglossum Leichardti* and there is also the important feature that the last named fin is destitute of the conspicuous spine that precedes the jointed rays of the same fin in the southern fish. The colour marks, which from a scientific stand-point are of but secondary import, are nevertheless, so conspicuously distinct as to warrant consideration. As previously intimated three or four relatively small spots occupy the place of the single one, or at most two large spots found in *O. Leichardti*. These smaller spots usually form a chain-like band, and moreover below the fishes' lateral line are for the most part represented by narrow and crescent shaped bands, such as are to be found in no position in the southern type. These colour bands or chains of spots are again developed much nearer to the posterior edge of the scales than the single or double spots in *Osteoglossum Leichardti* and in which last named species they are nearly central.

There being no doubt left as to the specific distinctness of the two forms under notice, it is incumbent that a suitable specific title should be associated with the new form that has been obtained from Cape York. In this connection it affords me much pleasure to associate with this interesting fish the name of Mr. Frank Jardine, to whom the scientific world in general and myself in particular are indebted for its discovery.

It remains for me to relate that since securing Mr. Jardine's specimens, I have obtained positive evidence of *Osteoglossum Jardinii* being widely distributed among other rivers that discharge their waters into the Gulf of Carpentaria. The examination of the spirit collection of fishes contained in the Queensland Museum resulted in my finding a specimen from the Gregory River, debouching upon the south-western watershed of the Gulf, that coincides in every detail with the Batavia River type, and I may further mention that during my recent excursion to the Norman River I was apprised by a local fisherman of the existence of a species of *Osteoglossum* in the upper waters of that river which in its characteristic markings agreed with the Batavia River species.

The newly-introduced form, *O. Jardinii*, in fact seems, so far as present evidence will allow of a decision, to be the characteristic species of the Gulf of Carpentaria watershed and the original type, *O. Leichardti*, to be similarly limited in its distribution to the watershed of the eastern coastline of Queensland.

I have much pleasure, in conclusion, in recording my acknowledgements to Mr. De Vis for his co-operation in the detecting the many diagnostic features that distinguish *Osteoglossum Jardinii* and the co-type of which new species has been presented by me to the Museum which he so ably supervises.

COMPARATIVE DIAGNOSES OF *OSTEOGLOSSUM LEICHARDTI*, *Gth.*, AND *OSTEOGLOSSUM JARDINII*, *S-K.*

Osteoglossum Leichardti, Gth.	Osteoglossum Jardinii, S-K.
D. 15 : A 26.	D. 20 : A. 30.
A conspicuous anal spine.	No anal spine.
End of pectoral fin reaching to base of ventral fin.	Pectoral fin terminating some distance in front of base of ventral.
Mouth cleft nearly vertical.	Mouth cleft conspicuously oblique.
Maxilla not extending beyond posterior edge of orbit.	Maxilla extending beyond posterior edge of orbit.
Diameter of orbit contained $7\frac{1}{2}$ times in total length of head.	Diameter of orbit contained $5\frac{3}{4}$ times in total length of head.
Colour markings consisting of one or at most two largish red spots on an individual scale.	Colour markings represented by a crescent shaped linear band or a chain of three or four red spots on an individnal scale.

THE PROCEEDINGS OF THE ROYAL SOCIETY OF QUEENSLAND

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PART IV.

THE RIBBON FISH.

(A Regalecus in Queensland Waters).

By C. W. De VIS, M.A.

(Past President.)

[*Read before the Royal Society of Queensland, January 8th, 1892.*]

No apology for recording the appearance on our coast of one of these curious and interesting fishes, with its message from the deep-sea realm, is likely to be needed by the professed ichthyologist or by those who take an unmethodical though very real interest in fish, more especially as it is the first instance of the kind of which we have information. So unexpected an occurrence on the shores of Queensland tends to show that there may be more species of Ribbon fish in existence than we at present know of.

In fish lore the Ribbon fishes form a family known as the *Trachypteridæ*, having in common a peculiar form, immensely long drawn out, narrow and thin, and, what is of still greater interest, an organization fitted to endure the pressure exerted upon their bodies at great depths below the surface. Some writers distinguish from the rest of these fishes, under the name of Oar-fish, a group, *Regalecus*, having the elongation of the body carried to an excessive degree and accompanied by a short compressed head, a large eye, a small feebly armed mouth, a dorsal fin continued from head to tail and raised at its fore end into a high crest, and by a pair of long filamentary ventral fins ending in small discs. It does not, however, seem necessary to multiply popular names in this case, as the term ribbon fish applies equally well to all, but if it should be held advisable to adopt it, then our new acquaintance may be termed an Oar-fish.

To an accidental glance at a dead fish lying upon the beach, or rather to an intelligent appreciation of the value of the accident, we are indebted for the present discovery. The circumstances attending it are these: Mr. F. R. Chester-Master, Usher of the Rod in the Legislative Council, happening to be travelling by coach along the coast, observed an object on the sands near the Tweed River which excited his curiosity. Alighting to examine it he found it to be a fish of extraordinary length, narrowness, and flatness, coated with brilliant silver paint, and bearing on its head "feelers" of great length, and judging that such a fish would in all probability be at least rare and of scientific value, determined to convey it to the Museum, notwithstanding that it was sadly mutilated. The greater part of its back had been torn away; Mr. Master therefore detached the less injured portions, about 18 inches of the fore end and 24 inches of the hind (after determining the whole length to be by actual measurement 8 feet 9 inches and the greatest depth 11 inches), and relinquishing the rest took such excellent care to preserve his prize that he was able to bring it in three days later in a perfectly fresh condition.

On consulting the literature of the Ribbon fish (a task deprived of most of its terrors by the classical labour of Professor Parker, published in the "Transactions of the New Zealand Institute"), it was found extremely probable that our Queensland fish was foreign to all the species hitherto made known. It is more nearly allied to *Regalecus banksii*, a British fish, described by Professor McCoy as an inhabitant of Victorian waters, but from this it is entirely distinct.

If it be a compliment to the discoverer of the fish to connect his name with the genus to which it belongs it is a compliment well earned, and, as he good naturedly accepted it, I venture to suggest that the species be known as *R. masterii*.

Diagnosis.

The first seven dorsal rays very elongate, not detached at the base from the rest; longitudinal ridges of body obsolete; lateral line interrupted, naked; no teeth.

DESCRIPTION.

B, 6; D, (?); A, o; C, o; P, 11.; V, i.

The length of the head is more than one-eleventh of the total length, the height of the body more than one-ninth, its breadth about one-sixth of its height. The height of the head is one-fourth less than its length. The second and third dorsal rays (which alone are perfect) are two and a half times as long as the head. The head is obtuse in front, the snout truncated, the mouth deep and nearly vertical, entirely without teeth, and moderately protractile. The long diameter of the eye is one-fifth of the length of the head, its centre is in the upper half of the head over the anterior two-fifths of its length. The trunk is not traversed by any longitudinal ridge other than the tumid mass of muscle over the vertebral column. The lateral line commences over the eye, passes obliquely downwards behind the head and disappears at a distance from the head about equal to its length; it is free from scales. The skin is covered on the abdomen and over the interspinous bones of the back by flat soft warts which are smaller between the interspinous bones, on the middle of the sides by small round bony tubercles, but there is no definite line of demarcation between the two forms of dermal outgrowth. On the caudal region the bony tubercles are not confined to the centre, but, in irregular lines and bands, occupy the whole of the side; near and upon its lower edge they acquire more distinctness and asperity, and towards the root of the tail form a line of rather sharp points. The pectoral has eleven rays and is about as long as the vertical diameter of the mouth. The ventrals are broken off near their roots. The elongate dorsal filaments were connected by membrane nearly to their tips, as is attested by its remnants. The dorsal is rather high, about two-fifths of the height of the body. The ground colour is uniform silvery, relieved on the anterior region by irregular transverse bars and blotches of black.

Though there is hardly sufficient evidence, either in fact or inference, to show that the Ribbon fishes inhabit the profoundest depths of the ocean, we may reasonably conclude that their habitats are far below the levels of coastal soundings and in this sense they are entitled to be considered deep-sea fish.

Their structure, as we see it, delicate and incoherent to such a degree that, as befell in Mr. Master's experience, they hardly bear to be lifted from the ground in their entirety, is adapted to waters not only of great density, but almost perfectly free from agitation—conditions existing only at great depths. Here they exist under the all round pressure of the superincumbent mass of ocean and by that pressure their tissues are rendered as firm, their framework as rigid as is needed for all the purposes of life. So long as they remain in the depth of water suited to them, their health and safety are conserved, but if from any cause, pursuit of prey, upward current or what not, they rise to a somewhat higher stratum, pressure relaxes, the condensible constituents of the body expand and it tends to disintegrate, suffering and debility ensue; then efforts to escape death, sometimes mis-spent, may carry the creature to still higher levels, till at length it floats on the surface unable to return—a wave shattered wreck. In this helpless state it has been often met with on the high seas, and may be occasionally, as in the present instance, drifted ashore.

Among the many phenomena which meet the eye of the sailor, and have at various times been supposed to account for the often reported appearance of the "Sea Serpent," the Ribbon fish seems to hold its place more tenaciously than it does its own structure under adverse circumstances. Its long flexible body, undulating with the waves, is still considered by many to be the origin of the tales told of mysterious and appalling monsters. We may confess that this is by no means the least plausible of the explanations given by ingenious sceptics, but the admission serves only to throw fnrther discredit on the less plausible. It is, in truth, hard to conceive how a feeble ribbon of fish at the mercy of the seas, and unable at its best to raise itself above the surface, a fish of which the largest authentic specimen is but 20 feet long, could have been converted by the most vivid fancy, much less by the common sense of men under no stress of terror, into a snake-like creature of extraordinary size and activity, rising from the ocean before their eyes, then sinking into its depths. The sailors certainly seem to score one by the improbability, since an unwise explanation is worse than none.

As to the truth of the existence of "sea serpents" those only can positively assert it who have had occasion to believe the evidence of their own eyes. The strangeness of the fact, the possibility of delusion amounting in some cases to great probability, the absence of specimens living or dead or of bones dredged from the sea bottom—these are the chief objections urged by the spirit of unbelief, and together they are weighty. But on the other hand the frequency of encounters, occasionally at close quarters, the plain circumstantiality of the accounts logged while fresh in the memory by men actuated by no hope of gain, ambitious purpose, or eagerness to found a doctrine, and supported by the testimony of whole crews, are considerations not to be overlooked as unscientific. It is neither sensible nor prudent to set aside sober testimony in favour of ill-furnished doubt because the witnesses were uncritical observers, and could not by effecting a capture secure the means of obtaining the verdict of science. The utmost liberty we should allow ourselves at present is to doubt with modesty and reserve. To frankly accept the evidence we have as good enough as well as plentiful enough to warrant our belief in the "Sea Serpent" would, perhaps, be more consistent with justice; at any rate that evidence is hardly bad enough to convict us of over-weening credulity if we opine that the non-existence of "sea serpents" is "not proven."

ASBESTOS.

By EDGAR HALL, F.C.S., and HENRY G. STOKES, F.G.S.

[*Read before the Royal Society of Queensland, January 8th*, 1892.]

From time to time the newspapers of Australia announce the discovery of Asbestos, and in places widely apart, and the announcements are always accompanied by the statement that the mineral is of first class quality, and that the working of it will speedily become an important and profitable industry. So far these prophecies remain unfulfilled.

The writers were called upon some three months ago to visit, in a professional capacity, an asbestos-bearing property, and have since given a closer study to the economic occurrence and value of the mineral, and think that a short paper drawing attention to certain points of importance connected with the industry, and giving a short account of its possibilities, may be of interest to the society. As the development of the asbestos field as a commercial enterprise has fallen through, there will be no breach of confidence in using the information gained in the professional visit aforesaid as a basis for remarks on the occurrence of the mineral in Queensland.

The short time available for the preparation of this paper will not allow of an unexhaustive examination of the subject, but necessitates confining our remarks to information likely to be valuable from a strictly industrial point of view.

Asbestos is a mineral known slightly to everybody since the introduction of gas-heating appliances, but the technical knowledge necessary to form a just estimate of the value of different samples seems rare even among mineralogists and geologists. Asbestos is the name given by mineralogists properly to the fibrous variety of hornblende, but is applied generally to the fine fibrous forms of many minerals whose composition is essentially that of a hydrous silicate of magnesia and other bases. In commerce practically the term "asbestos" is confined to the mineral chrysotile which is not a variety of hornblende, but is supposed to be a fibrous serpentine, and consists of a hydrated silicate of magnesia of the following average composition :—

Water	14·0 per cent.
Silica	43·5 per cent.
Magnesia	40·0 per cent.
Other bases	2·5 per cent.
	100·0

This mineral occurs very widely distributed throughout the world, but apparently not very often in quality and quantity sufficient to be of industrial value. At the present time, the chief, if not the only sources of supply are Italy and Canada, the latter country furnishing by far the larger quantity. Italian and Canadian Asbestos agree closely in chemical composition, but differ materially in physical characters and in mode of occurrence, each possessing certain peculiarities rendering it more suitable for certain purposes, but in the main they are of equal value. The Italian is noted for its great length of fibre and extreme silkiness, but it is said to be less fitted for spinning than Canadian. The first manufactured asbestos goods were made from Italian Asbestos, and for a time it was supposed that the short fibred Canadian variety could not be spun, but now the short fibres are utilised without difficulty, and are said to possess more cohesion than the long silky Italian fibres. As the asbestos found hitherto in Australia resembles the Canadian article, the following remarks apply chiefly to Canadian chrysotile :—

Asbestos occurs in serpentine formation in irregular veins from the size of minute threads up to 4, 5, and 6 inches wide.

These veins are irregular in thickness and follow no regular course, and terminate often abruptly, pinch out or join other veins; but as a rule are roughly parallel to one another. In Italy the quantity and quality are stated to vary according to the direction of the rock surface, being good and abundant when facing southerly and westerly, good but scarce when facing eastward, but of bad quality when the rock faces towards the north. In Canada the quality and quantity seem to depend upon proximity to certain eruptive dykes, and the same feature as regards quantity seems to obtain in Queensland. The chrysotile fibres occur always at right angles to the sides of the fissures, and are often accompanied by long brittle fibres of an allied mineral known as picrolite, whose fibres run in a contrary direction, viz, parallel to the sides of the fissure. Mica, talc, and certain rare minerals are found also with it, and in Canada granules of chrome iron ore are said to be an invariable accompaniment.

The great serpentine belt passing through the eastern townships of Quebec is traversed by masses of dioritic or doleritic rocks, of which it is supposed by some to be an alteration product. The serpentine is frequently associated with dykes of whitish rocks composed of quartz and felspar, at times forming a granitoid rock known as granulite, the presence of which have a marked influence upon the quantity and quality of the asbestos. The veins at the surface are discoloured and decomposed, rendering the mineral of small value, and where the rock is much shattered this is more noticeable, but at a depth the quantity and quality of the fibre increase, and this increase is an established fact in all the mines. The veins have the character of true segregation veins, and the containing walls are often changed in character for a distance of ½ to 3 inches at each side. The mineral is rather quarried than mined, and is blasted out from large open cuts, broken and cobbed by hand, and sorted into three qualities according to length and quality of the fibre. The long fibres are often discoloured, and the bulk of the mineral sent into commerce is obtained from veins varying from ¾ of an inch to 2½ inches wide, and these are numerous in all the mines and of excellent quality. The marketable mineral forms about 5 per cent. of the total rock broken down, and of this about one-sixth is of first grade quality. As a rule the harder and darker coloured serpentines are the most productive, the soft rock being seldom workable; and hill sides barely covered with soil are the sites where the best quality occurs. Until recently all the work at the mines was done by hand, and the cost per ton of mineral averaged £5, but lately machinery has been introduced which both cheapens the work and enables smaller veins to be worked at a profit. The market price of asbestos at the present time is from £15 to £60 per ton, so that the margin of profit is large. Only the very best quality brings the higher price, and in some mines the bulk of the mineral is fit only for inferior purposes and is sold for from £5 to £8 per ton. The supply seems to be less than the demand, as the present quotations are much above those ruling up to 1888, which were for 1st, £20 to £25 ; 2nd, £10 to £15 ; 3rd, £5 to £8 per ton of 2000lbs.

As mined, chrysotile is as heavy as the rock in which it is enclosed—the fibres being tightly packed together, but when once disintegrated which is easily done by the fingers, it is impossible to compress them together again. In colour it varies from white to pale green and yellow, and is silky and flexible. The more flexible varieties can be spun and weaved into textile fabrics, and for this purpose the fibres need not be of long staple. Its value depends upon its possessing lubricating properties and upon its unchangeability when subjected to high pressures and temperatures, and hence its largest employment in steam machinery. It is spun and woven into cord and cloth for piston-packing, and it is made into millboard and paper—the methods of manufacture being similar to those employed in the manufacture of textile fabrics and paper. It has been made into theatre curtains and firemen's dresses, and its use as a non-conductor for boiler coverings and in gas stoves is well known. It forms the chief material for packing fire-proof safes, and in America is largely used as a fire-proof roofing felt. Asbestos fire-proof cement, asbestos lubricant, and asbestos paint are also made and used; and latterly it is becoming of great value to the electrician. Its uses appear to be rapidly increasing, and although it is only 20 years since its manufacture was seriously begun, it has already become a highly important industry. The output of Canadian Asbestos was about 6,000 tons in 1889, making the total since the mines were opened in 1879 of 25,047 tons. The industry is highly profitable notwithstanding the fact that it can only be prosecuted for half the year on account of the rigorous climate, and it has turned a previously sparsely populated district into a thriving community.

These few particulars will suffice to prove that if asbestos of the right sort can be found in quantity in Australia, a profitable industry is assured and one which can be started and developed under Australian conditions, as it requires no capital but labour.

Asbestos, as we remarked at the beginning, is found in many places in this country, widely apart, and reports are constantly coming to hand of the discovery of "big reefs" of it, of excellent quality (*vide* last issue of *The Australian Mining Standard*). It is found in South Australia and Tasmania, at Broken Hill, Gundagai, Bingera and Gordonbrook in New South Wales, and near Rockhampton, Gladstone, Kilkivan and other places in Queensland, and appears to exist, as might be expected, wherever serpentine rocks are found; but in spite of the big reefs of excellent quality, of the newspaper accounts, and the high price of the article, we believe it has never been worked at any place except at Gundagai in New South Wales. The deposits at this place were worked a few years ago and yielded material of first-class quality, and on the strength of this a company was formed in Melbourne to carry on the manufacture of asbestos goods. About 25 tons were raised (valued at £20 per ton) when the quantity ran out, and the mine is now shut up. So far as the writers can learn there is nothing abnormal about the asbestos deposits of Gundagai. At Gordonbrook on the Clarence in New South Wales a mass of serpentine about 3 miles wide extends for a distance of 20 miles and contains veins of asbestos of excellent quality. A sample of this is on the table to-night. The asbestos veins are very numerous, and can be found in the road metal of the district; but all we have seen are too narrow to be profitably worked without some mechanical appliances for separating the mineral from the rock. We are told that no intrusive rocks accompany this serpentine, and if that is so, it seems unlikely that larger veins will be found. In Queensland, asbestos seems to have been overlooked by the prospector, although serpentine formations are extensive. Daintree in his report on the geology of the Rockhampton district mentions it as occurring in the serpentine about Mount Wheeler. It is to this district we wish to refer to-night as a probable future source of asbestos.

From Mount Wheeler, not far from Rockhampton, a belt of serpentine runs northwards to Marlborough, near Broad Sound, and forms semi-detached masses of low hills, which in some places, have weathered into fantastic and picturesque shapes. The serpentine where visible is soft, seems much decomposed, and most of the streams contain water heavily charged with magnesia. We are informed that asbestos is found all through this belt of serpentine, but our observations were confined to a portion about 60 miles north of Rockhampton, near the junction of Tilpal, Princhester, and Glen Prairie runs. At this place some mining work has been done, and the asbestos veins exposed. The site of the work is a hill about 500 feet above sea level, which rises about 300 feet above the country immediately around it, and which we are informed is the northern end of the serpentine belt. The formation is serpentine traversed by dykes of dolerite and granulite, and, as is the case in Canada, these dykes appear to have affected the asbestos veins favourably, the miners stating that nowhere in the range are the veins so large as here. At our visit the hill had been opened in many places, all of which showed veins of asbestos of size varying from half an inch up to two feet in thickness, the larger veins consisting, as would be anticipated, of the imperfect mineral picrolite. The work done was entirely in decomposed country, the unchanged serpentine not having been reached, and owing to the ignorance of the workmen of where best to look for the mineral, most of the work was useless. It was sufficient, however, to bring out prominently the chief features of the deposit, a section 85 feet long being obtained across the strike in one tunnel, and a quarry face 20 feet long exhibiting a section at right angles to the tunnel. These sections show numerous veins of asbestos following the general dip of the rocks, and appearing as segregation veins, the enclosing walls being slightly altered for a short distance from the veins. The smaller veins contain chrysotile properly crystallized at right angles to the walls of the veins, the larger veins containing long fibres of picrolite running diagonally and also parallel to the vein walls. The asbestos is discoloured and harsh, and has evidently suffered from the influences which have decomposed and altered the serpentine, but the quality of the fibre was most decidedly better in the lowest exposed portions of the veins. At one place there are two veins containing fibre of fairly good quality about three inches wide, but the workmen had neglected these for the longer-fibred picrolite. The best quality seen was in a very small excavation where there were four parallel veins varying from four to nine inches wide of soft regular fibre, but the excavation had been abandoned at a depth of only 2 feet. Most of the mineral, however, although evidently affected by weathering, can be separated without much difficulty, and by kneading and washing made to produce soft fibres which are somewhat brittle, but which are well suited for millboard and the less delicate asbestos goods. Associated with the veins of asbestos are much talc and thick crystals of mica too small to be of value, and also small quantities of a pale green mineral containing nickel. It will thus be seen that the veins are of more than average size, and that the quality improves as depth from surface increases, and we think there can be little doubt that in the undecomposed serpentine the veins will be workable and productive. Specimens of the mineral found at Princhester, together with the accompanying rocks, are on the table for inspection.

We think the above general description of the occurrence of asbestos, near Rockhampton, will be sufficient to prove the analogy between the deposits there and those of the eastern townships of Quebec, and that this analogy leads to the belief that on proper search being made, veins of asbestos of good quality and payable size will be discovered, and that a permanent industry will be the result. We think also that a wider knowledge of the modes of occurrence and methods of working may lead to search being made in other serpentine areas, and will conclude with a short summary of the points chiefly to be remembered.

1. Asbestos veins may be expected in all serpentine rocks; the darker and harder varieties as a rule furnishing the best material.

2. Where the serpentine is traversed by diorite, dolerite or granulite dykes (*and particularly by the last named*) the veins may be looked for as larger and of better quality than where these dykes are absent.

3. The best quality asbestos is found in the unaltered serpentine and below the limits of atmospheric influences, *i.e.*, quality improves in depth.

4. Chrysotile, the valuable asbestos mineral, is always found with its fibres crystallized at right angles to the walls of the veins.

5. Long fibres need not be looked for, as length of fibre is not so important as fineness and tenacity. Veins from $\frac{3}{4}$ of an inch up to 3 inches wide furnish all that can be desired.

6. The mineral is usually worked from a face like ordinary quarrying, and its preparation for the market involves nothing beyond manual labour.

Australasian Association for the Advancement of Science.

HOBART MEETING, JANUARY, 1892.

REPORT OF DELEGATES FROM THE ROYAL SOCIETY OF QUEENSLAND.

[*Read before the Royal Society of Queensland, February 12th, 1892, by John Shirley, B.Sc.*]

HOBART was chosen as the fourth meeting-place of the Association at the Melbourne gathering of January, 1890; the President, Sir Robert G. C. Hamilton, K.C.B.; the Vice-Presidents, the Revd. Thos. Blackburn, Hon. A. Norton, M.L.A., Professor Kernot, and Mr. H. C. Russell; and the General Secretary, Mr. A. Morton, were elected at the Christchurch meeting of January, 1891; the officers of the various sections were nominated by the Hobart local committee, the sectional presidents being selected from men of scientific attainments outside Tasmania, while the remaining sectional officers were mainly Tasmanian. Prior to the meeting, arrangements had been completed by which associates could travel by rail and steamer at reduced rates. Members giving notice of their intention to be present at Hobart were supplied with pamphlets containing full information as to the objects of the Association, its rules and officers, with a list of papers to be read, and a handbook giving a concise account of Tasmanian history, trade, statistics, &c.

The proceedings of this fourth session of the Association commenced with a meeting of the General Council on January 7th, 1892, when the chair was taken by Baron F. v. Mueller, K.C.M.G., owing to the absence through ill-health of Sir James Hector, the retiring President. There were present the past and present officers of the Society, and delegates from the Australasian scientific societies.

The Chairman tendered a hearty welcome to the members of Council, and congratulated them on the presence of two of Her Majesty's representatives, the Governors of Queensland and Tasmania. The minutes of the Christchurch meeting were taken as read, and adopted ; Sir James Hector's letter of apology was read, and an expression of regret at his absence was inserted in the minutes. A hearty vote of thanks by acclamation was accorded to Mr. A. Morton, the General Secretary, for his excellent arrangements ; and after various correspondence had been read, and a statement made as to accounts by the Hon. Treasurer, the Council confirmed the election of the sectional officers, already nominated by the Tasmanian local committee. A recommendation committee, consisting of the President, General Treasurer, General Secretaries, Professors Hutton and Tate, and Messrs. Roe, Ellery and Sachse, was then appointed ; and on the motion of His Excellency, Sir Henry Norman, G.C.B., seconded by Professor Bragg, of Adelaide, Brisbane was unanimously selected as the sixth place of meeting of the Association. The following officers were then elected for the fifth or Adelaide meeting :—President, Professor Tate ; Vice-Presidents, His Excellency Sir Robert Hamilton, Baron F. v. Mueller, Sir James Hector, Hon. A. Norton, and Mr. H. C. Russell ; General Secretaries, Professors Rennie and Bragg ; local Treasurer, Mr. F. Wright. The appointment of trustees and auditors, and the confirmation of new rules drafted at Christchurch, brought the meeting to a close. At 3 p.m. the same day, a garden party was given at Government House, and the numerous invitations issued brought together a large concourse of visitors. The guests were met at the entrance to the lawn by Sir Robert and Lady Hamilton ; the beautiful views of the river, the lovely grounds, and the picturesque ranges in the distance called forth many expressions of admiration; while Government House itself received a fair meed of praise, contrasting very favourably with vice-regal residences elsewhere. Unfortunately, the pleasure of the event was marred by a storm, which caused the visitors to disperse at an early hour. In the evening there was a large gathering of members at the Town Hall to witness the induction of the President, Sir Robert Hamilton, K.C.B., Governor of Tasmania, and to hear his presidential address. After a vote of thanks to the retiring President, Sir James Hector, Baron von Mueller addressed a few words of welcome to Sir Henry Norman, G.C.M.G., who was referred to as "not only a representative of Her Majesty, Queen Victoria, but also a delegate from the Royal Society of Queensland and the Royal Geographical Society." Sir Henry replied in suitable terms, apologizing for the absence of the Honourables A. Norton and A. C. Gregory, the presidents of the two societies which he represented. Sir Robert Hamilton then delivered his address, in which he stated that although he took the greatest interest in every movement tending in the direction of the advancement of science, he could lay no claim to be regarded as a man of science; but, in order to be of service to the Association, he had invited several scientific friends from home to attend, including Sir Lyon Playfair, Sir Norman Ball, and Dr. Giffen. The former excused himself on account of his age, but sent a most interesting letter, which His Excellency read. Dr. Giffen had accepted his invitation, and would deliver a lecture to the members. Sir Norman Ball could not attend, but contributed a paper entitled "The Astronomical Explanation of a Glacial Period." Sir Robert referred at considerable length to the admission of ladies as members, and pointed out the directions in which they could render the greatest help. In conclusion, he urged that "science tends to the elucidation of truth. The love of truth is the greatest force in the moral elevation of the human race, and it is directly generated and fostered by the pursuit of science. The more the scientific habit of mind is cultivated, the more will a habit of absolute truthfulness be established in all relations of life."

Friday, January 8th, was devoted to addresses by presidents of sections, which were so timed during the day as to give members opportunity to hear any four of the ten addresses. The lectures on geology by Professor David, on biology by Professor Spencer, on anthropology by the Rev. Lorimer Fison, and on literature by Professor Morris, drew the greatest audiences, and the two latter gentlemen proved themselves as witty in their discourses as they are learned. At 8 p.m., Dr. Giffen lectured on "The Rise and Growth of the British Empire," contrasting the affairs of to-day with those existing in 1812, showing an increase of population from 61 millions to 340 millions, and of wealth from 4,000 millions sterling to 15,000 millions sterling. The subject was dealt with in five sections: first, the United Kingdom; second, the English-speaking, self-governing colonies of North America and Australasia; third, India; fourth, the Cape Colonies; and fifth, the Crown colonies and dependencies.

On Saturday, January 9th, the reading of papers commenced in the various sections; members grouped themselves according to their scientific tastes, and took part in the discussions which followed the reading of each paper. The only contribution by a Queenslander on this day was Mr. J. P. Thomson's "Explorations and Discoveries in British New Guinea since the Proclamation of Sovereignty," read by His Excellency Sir Henry Norman. The afternoon was devoted to a garden party, given by Mr. and Mrs. Henry Dobson at The Chalêt, Huon road, a most picturesque spot on the slope of Mount Wellington. The weather was delightfully fine, and assisted in making the affair a most enjoyable fête. The track to the celebrated fern bower on Mount Wellington lies opposite the gate of The Chalêt, and many visitors availed themselves of this opportunity to ascend the glen as far as the Silver Falls.

On Sunday, science sermons were preached at the Davey-street Congregational Church, at 11 a.m., by the Rev. Geo. Clarke, Vice-Chancellor of the Tasmanian University; at 7 p.m., at St. Joseph's Church, by the Rev. Father Kelsh; and at St. David's Cathedral, at the same time, by the Rev. Dean Corlette.

On Monday, January 11th, the reading of papers continued in the various sections, including Mr. Saville-Kent's paper on

"The markings of fish with relation to their hereditary or phylogenetic import;" Mr. F. M. Bailey's paper on "Queensland fungus blights;" and Mr. C. M. Tenison's paper on "Shakespeare and Bacon." In the evening, Mr. C. W. Adams lectured on the Great Sutherland Waterfall, discovered as recently as 1880, at the head of Milford Sound, in the South Island of New Zealand. This fall is said to be the highest in the world, falling 1,904 feet in three leaps. The surrounding scenery is grand and picturesque, as was shown by the lime-light views by which the lecture was copiously illustrated.

Tuesday, January 12th, saw the close of the session in the astronomical, chemical, and biological sections; the only paper by a Queenslander was the "Review of Queensland Lichens," by Mr. John Shirley, B.Sc. In the evening, through the kindness of the Hobart Musical Union, the members of the Association were given a little relaxation from weightier matters, by a concert at the Town Hall. An excellent programme, varied and interesting, was drawn up for the occasion, and solos and choruses were alike excellently rendered.

On Wednesday, January 13th, the reading of papers was completed in the remaining sections, including Dr. E. Hirschfeld's communication on "The Modes of Infection in Tuberculosis." In the afternoon members were invited to a garden party at Bishopscourt, by the Bishop of Tasmania and Mrs. Montgomery, the latter a daughter of Canon Farrar. A lecture on "Early Hobart" by Mr. J. B. Walker, closed the work for the day.

On Thursday, January 14th, a final meeting of the General Council was held to complete all outstanding business in connection with the Association. Correspondence was first submitted, including a letter from Captain Parker, R.N., on the formation of a new flora of Tasmania, and from Mr. J. H. Harvey on the photographic work of geological surveys. Committees were then formed to deal with the following matters:—1. The composition and properties of Australian mineral waters: 2. A census of Tasmanian minerals: 3. The protection of native animals: 4. An investigation of Australasian seismological phenomena: 5. Evidences of glacial action in Australasia: 6. The publication of the Hobart proceedings. On the motion of

Professor Spencer, seconded by Professor Bragg, the following additional officers for 1892-3 were elected :—Treasurer, Mr. H C. Russell ; Secretary for Tasmania, Mr. Alexander Morton ; for New Zealand, Professors Packer and Thomas, and Mr. Brandon ; for Victoria, Mr. A. H. S. Lucas ; for Queensland, Mr. John Shirley. The meeting closed with votes of thanks to the principal officials.

One of the most striking features of the Hobart gathering was the well-attended and successful session of the literary section under the able presidency of Professor Morris. It commanded the largest body of adherents, and its papers were discussed with a point and zest which left little to be desired. Lady Hamilton, the Ven. Archdeacon Hales, Mr. Justice Denison, Professor Bragg, and Messrs. Roe, Piguenit, and T. A. Browne ("Rolf Boldrewood") were regular attendants in this section. As an outcome of these successful gatherings, on the motion of the Bishop of Tasmania, it was decided to form a Home Reading Union of Australasia. A committee met on Thursday and Friday, January 14th and 15th, at which Messrs. Roe and Shirley represented Queensland, and drew up a code of rules for the union, in which it is hoped to include all existing literary circles and reading unions in Australasia, for whom a journal on Chautauquan lines will be published. For the fortnight following the actual session of the Association, a series of excursions had been planned, of which the principal were :— Jan. 13th, Mount Wellington ; 14th, Mount Rumney ; 15th, The Salmon Ponds and New Norfolk ; 16th, Lake St. Clair ; 18th, Port Davey and Mount Zeehan ; 25th, Mount Bischoff and the N.W. coast. Pamphlets containing full information concerning the last four trips were issued to members on arrival in Hobart.

About 500 members attended the fourth or Hobart gathering, of whom 17 were from Queensland. At Sydney, the Association obtained a grant of £1200 from the N.S.W. Government, and at Melbourne a grant of £1000 ; the Tasmanian Government made no donation, but franked all the postage of the Society for the year, and has agreed to print the whole o the proceedings.

(Signed on behalf of the Delegates) H. W. NORMAN

NOTES UPON SOME PLANT SPECIMENS COLLECTED BY DR. THOS. L. BANCROFT ON THE DIAMANTINA.

By F. M. BAILEY, F.L.S., Colonial Botanist.

[*Read before the Royal Society of Queensland, 6th May, 1892.*]

When that excellent scientist, my friend Dr. T. L. Bancroft, is called upon to visit distant parts of the colony he invariably makes it a rule to bring back with him as many specimens of the flora as time will allow. Thus while on his recent visit to the Diamantina to make enquiry into a disease affecting the live stock of the district, he then collected specimens of a number of the indigenous plants, particularly those of an economic character. These specimens having been presented to me, I thought a few notes on the most interesting species might be worthy of a place in the Society's Proceedings. It would occupy far too much space to enumerate all the plants, so only those of economic or botanic interest will be brought under notice.

Capparis spinosa, var. nummularia. This, the Australian representative of the caper of commerce, is found more or less abundantly from Western Australia to the coast lands of Tropical Queensland. In appearance it rather closely resembles the common caper plant, yet, strange to say, seems never to have had its young unexpanded buds gathered for pickling. The fruit, however, which is about the size of a pigeon's egg, and longitudinally ribbed, is eaten when ripe, like that of C. sarmentosa, *A. Cunn*, which is so plentiful in the Brisbane district.

C. Mitchelli, *Lindl.* This bears a fruit about 2 inches in diameter, the pulp of which is sweet and agreeable, and known to bushmen as the Pomegranate. The tree is one of the best for shade on the inland plains.

Portulaca oleracea, var. grandiflora, *Benth.* The small seeds of this plant furnish the natives with a highly nutritious food. The whole plant is often roasted by them also for food.

Tribulus occidentalis, *R. Br.* The specimens obtained by Dr. Bancroft leave no doubt upon my mind as to their being identical with the above species partly described by Dr. Robt. Brown in appendix to Capt. Sturt's expedition, and also the flowers referred to by Mr. Bentham, *Flora Australiensis*, Vol. I., p. 289, as having been gathered near the Fink River. The flowers are large, showy, and well worthy of garden culture.

Psoralea patens, *Lindl.* This plant is said to attain the height of 6ft., and to produce a large quantity of strong tough fibre. P. Archerii, *F. v. M.*, is another species of the genus, from the stems of which the natives obtain fibre for bag and net-making. These two plants should be worth cultivating for the sake of their fibre. Mr. E. Palmer gives the mode adopted by the natives to obtain the fibre as follows:—"They pull the plants up, soak in water for some hours, then take them out and allow to dry, when the fibrous bark peels off and is ready for use."

Tephrosia rosea, *F. v. M.* This small shrub is reported both in Port Darwin and Queensland as a poison bush injurious to stock.

Sesbania aculeata, *Pers.* (the Pea-bush), is a useful plant. The stems yield a good fibre, and seeds are largely depended upon by the natives for food. In India the same use is made of the seeds.

Cassia Sturtii, *R. Br.* During the last year or so, specimens of this shrub have been sent to me as a suspected poison bush.

Acacia peuce, *F. v. M.* A useful timber tree. The wood is extremely hard, and known in the district as "Ironwood." The long needle-shaped leaves give to the tree a pine-like appearance, and the broad thin curled pods somewhat resemble those of the American Honey-locust.

A. aneura, *F. v. M.* (The Mulga). Amongst Dr. Bancroft's specimens are two or three forms of this useful cattle-bush.

A. HAKEOIDES, *A. Cunn*, and A. SALICINA, *Lindl*, are of interest on account of the natives using the ash of the burnt green leaves to mix with pitchery.

BAUHINIA CARRONI, *F. v. M.* The natives are said by Mr. E. Palmer to make a drink by steeping the flowers of this tree in water. The flowers of one of the grass-trees were used by the natives on Stradbroke Island for the same purpose.

CUCUMIS TRIGONUS, *Roxb.* The small melon-like fruits of this trailing plant are eaten when ripe by the natives in many parts of Queensland. The plant has also the reputation of having caused the death of many horses in this district.

EUCALYPTUS BICOLOR, *A. Cunn.* Seeds used for food by the natives. Dr. Bancroft tells us that this tree, like E. microtheca, is known by the name of "Coolibar."

AMMANNIA MULTIFLORA, *Roxb.* The minute seeds of this small plant are produced in great abundance, and furnish food for the natives.

GNAPHALIUM LUTEO-ALBUM, *Linn.* This, according to Mr. E. Palmer, is one of the plants used by the natives as a medicine in fever cases. For a like purpose we are told they use the leaves of the Gidya mistletoe—Loranthus Quandong and Moschosma polystachyum; specimens of these latter were also in Dr. Bancroft's collection.

SARCOSTEMMA AUSTRALE, *R. Br.* (The Caustic plant). This fleshy climber is generally considered a dangerous poison to sheep. It is said to be used by the natives at Port Darwin in cases of smallpox.

SOLANUM OLIGACANTHUM, *F. v. M.* A very pretty little plant not before met with in this colony. Fruit small and very bitter.

S. ESURIALE, *Lindl.* A dwarf shrub; the fruit eaten by the natives either raw or roasted.

LYCIUM. Amongst the specimens were a few fragments, which may prove a new species of this genus, but the material is insufficient for determination. In foliage it agrees with L. australe, *F. v. M.*, while the flowers closely resemble those of L. vulgare.

NICOTIANA SUAVEOLENS, *Lehm.* (The native tobacco plant). This is firmly believed poisonous to stock by many stockowners. The collection contained about 17 species of those known under the names of Blue-bush, Cotton-bush, Salt-bush, &c. It will be sufficient to mention a few of the most useful fodders amongst them, viz., Chenopodium auricomum, *Lindl*, the Blue-bush; Kochia brevifolia, *R. Br.*, the Cotton-bush; Atriplex nummularia, *Lindl*, the Old Man Salt-bush; A. vesicaria, *Heward*—this is considered at the Diamantina as the best for fodder of all the salt-bushes.

Eremophila polyclada, *F. v. M.*, and Muhlenbeckia Cunninghamii, *F. v. M.*, are both frequently met with growing together, and have each received the local name "Lignum," which is probably an abbreviation of Polygonum—a genus to which the latter is closely allied. By some they are considered useful fodder bushes.

Loranthus Exocarpi. *Behr.* The fruit of this and other mistletoes is eaten by the natives.

The three Euphorbias which the collection contained, viz., E. Drummondii, *Boisd*; E. eremophila, *A. Cunn*; and E. serrulata, *Rim*, are all considered poisonous to stock.

The grass specimens of the collection numbered about thirty kinds, including the Spinifex, Mitchell-grass, Blue-grass, Star-grass, and many of the Love-grasses. The most interesting of all, however, were two growths of that excellent pasture grass, *Sporobolus virginicus*, var. pallida. The one of these gathered on the Cooper, spreads over the land by its long trailing stems, forming distant plants in a somewhat similar manner to that of the Strawberry. The other, obtained on the Georgina, was of a more slender habit, the stems frequently forming tufts at the joints. Many of the shorter erect stems were coated with a peculiar substance, probably of fungus origin, and approaching the genus Epichloe, which seems to excite a growth of adventitious leafy short shoots, which are said to fall from the stems and take root in the mud.

Marsilea Drummondii, *A. Br.* (The Nardoo). This plant produces at the present time, as in the days of Burke and Wills, the staple food of the natives of the Diamantina. Dr. Bancroft brought some of the damper made by the natives from the pounded involucres and spores to Brisbane, one of which may be seen on the table this evening. Besides furnishing food for the natives, the plant is prized as a fodder for stock.

LICHENS FROM WARWICK AND NEIGHBOURHOOD.

By JOHN SHIRLEY, B.Sc.

[*Read before the Royal Society of Queensland, May 6th, 1892.*]

The following lichens, of which a few are new to science, were gathered from the southern portion of the Darling Downs by Mr. C. J. Gwyther, whose numbers have been appended. Descriptions of new species, and notes on rare lichens or lichens new to Queensland are also supplied.

Order I.—COLLEMACEÆ, *Mull. Arg.*

Tribe I.—COLLEMEÆ, *Körb.*

Physma byrsinum, *Ach.*, n. 358 pro p. and n. 379. A small and stunted form, but not otherwise differing.

Leptogium tremelloides, *L.*, n. 358 pro p. and n. 373.

Order II.—EPICONIACEÆ, *Mull. Arg.*

Tribe II.—CALICEÆ, *Mull Arg.*

Calicium glebosum, *Mull. Arg.* The thallus is greenish glaucous and the spores, ·005 - ·006 x ·002 mm., are smaller than the type, but there is no doubt about the identity, n. 335.

Order III.—LICHENACEÆ, *Mull. Arg.*

Tribe III.—CLADONIEÆ, *Mull. Arg.*

Cladonia fimbriata, *Del.*, n. 363.

Clathrina aggregata (Sw.) *Mull. Arg.*, n. 357.

Tribe IV.—USNEÆ, *T. M. Fries.*

Usnea barbata, *Ach.*, n. 392 pro p.

Usnea barbata v. dasypoga, *Fr.*, n. 369.

Tribe V.—RAMALINEÆ, *T. M. Fries.*

Ramalina Eckloni, *Mnt.*, n. 392 pro p. and n. 360 pro p.

Ramalina leiodea, *Nyl.*, n. 360 pro p.

Ramalina minuscula v. alba, *C. K.*, n. 360 pro p.

Thamnolia vermicularis, *Sw.* Thallus consisting of stipites or podetia, which are 1½ inch long, cylindrical or subcompressed; cornute, imperforate, chalky-white or sordid whitish, ascending or erect, simple or bifurcate, smooth or longitudinally rugulose, internally fistulose. Sterile. n. 414.

Tribe VI.—PARMELIEÆ, *Mull. Arg.*

Stictina retigera (Ach.) *Mull. Arg.*, n. 371 pro p.

Stictina quercizans, *Ach.*, n. 371 pro p.

Sticta pulmonacea, *Ach.*, n. 371 pro p.

Sticta aurata, *Ach.*, n. 371 pro p. and n. 380.

Ricasolia plurimseptata, *C. K.*, n. 383, and n. 372 pro p.

Ricasolia Hartmanni, *Mull. Arg.*, n. 372 pro p.

Parmelia revoluta, *Flk.*, n. 376 pro p.

Parmelia tenuirima v. corallina, *Mull. Arg.*, n. 334

Parmelia tinctorum, *Despr.* Published in Dr. Jean Müller's "Lichenologische Beiträge," n. 191, as P. praetervisa, *Mull. Arg.*, n. 362 pro p.

Parmelia laceratula v. minor, *Shirley*, var. nov. Differs from the type in the thallus being almost coralloid-dissect at the margins and in the smaller spores, which are ·01 x ·004 mm. n. 367, 332, 362, and 361 pro. p. and 373. Species first collected by Baron F. v. Mueller in Moreton Bay, but not reported since 1860.

Parmelia caperata, *L.*, n. 376 pro p. and 361 pro p.

Parmelia physodes, *Ach.*, n. 372 pro p.

Parmelia limbata, *Laur.*, n. 387.

Theloschistes chrysophthalmus v. Sieberianus, *Laur.*, n. 382 pro p.

Theloschistes chrysophthalmus v. leucoblepharus, *Mull. Arg.*, n. 382 pro p.

Theloschistes chrysophthalmus v. alatus, *Shirley*, var. nov., n. 382 pro p. Described in Bulletin No. 7, Department of Agriculture, Brisbane, p. 32, as Physcia comosa v. alata, *Wilson*, but the specimens named above show all the gradations from

v. *alatus* through v. *leucoblepharus* and v. *Sieberianus* to the typical form.

Anaptychia leucomelæna, *Fries.*, n. 356.

Anaptychia speciosa, *Wainio.*, n. 366.

Physcia picta, *Sw.*, n. 365 pro p. and 367 pro p.

Physcia stellaris, *L.*, n. 385.

Tribe VII.—PANNARIEÆ, *Körb.*

Coccocarpia aurantiaca (Mnt.) *Ach.*, n. 364 pro p.

Tribe VIII.—PSOROMEÆ, *Mull Arg.*

Psoroma sphinctrinum, *Nyl.*, n. 377.

Tribe IX.—LECANOREÆ, *Mull. Arg.*

Lecanora Queenslandiæ, *C. K.*, n. 385 pro p.

Lecanora caesio-rubella, *Ach.*, n. 368.

Tribe X.—LECIDEÆ, *Mull Arg.*

Patellaria (Bacidia) multiseptata, *Shirley*, sp. nov. Thallus cinereous, opaque, rugose, diffract; apothecia cinereo-suffused or naked, from sordid carneous to fusco-atrous; when young plane, and with thickish thalline margin—the margin faintly crenulate and roughened; when mature, plano-convex and with margin obscured; spores eight, narrow acicular-clavate, 12-21 septate, broad at one end and very finely acuminate at the other, the thickest part about the fifth segment from the blunt end; paraphyses not readily separating. n. 376 pro p.

Buellia tetrapla, *Mull. Arg.* Thallus thin, cinereous, opaque, sparingly fissured, surface uneven, from glebulose to rugose; apothecia black; ·3·5 mm., from innate when young to closely adnate when mature, disk plane, margin persistent and slightly tumid; spores 8, brown, broadly ovate, bilocular, ·009 x ·0045 mm. n. 365 pro p. and 336.

Buellia parasema v. saprophila, *Körb.*, n. 398 pro p.

Tribe XI.—DICHONEMEÆ, *Mull. Arg.*

Dichonema sericeum, *Mnt.*, n. 412.

Tribe XII.—THELOTREMEÆ, *Mull. Arg.*

Leptotrema Wightii (Nyl.) *Mull. Arg.*, n. 333.

TRIBE XIII.—GRAPHIDEÆ, *Mull. Arg.*

Graphina (Aulacographina) tenuirima, *Shirley*, sp. nov. Thallus albido-cinereous, opaque, even but not smooth; lirellæ numerous, crowded, straight or flexuous or curved, simple or pauciramose, 1-2 mm. long, sulcate, terminations acuminate, lips gaping, disk nude, rimiform, black; spores 5-septate, each loculus with 1-3 locelli, ·027 x ·01 mm., ovate oblong or pupæform, hyaline; paraphyses short, slender, readily separating, of globular cellules. n. 388.

SPECIMENS OF BLACKALL RANGE PLANTS.

By F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST OF QUEENSLAND.

[*Read before the Royal Society of Queensland, June 11th, 1892.*]

I HAVE brought for an exhibit at this evening's meeting a few mounted specimens from a collection made at the beginning of May on the Blackall Ranges in the vicinity of Eumundi, by my son and Mr. J. H. Simmonds. Of several plants belonging to this locality the fruit was wanting to complete the description, and I hoped that they might be fortunate enough to meet with some after a summer so favourable to the development of plant life. This proved the case in several instances: one, the *Macadamia Youngiana*, F. v. M. The fruit of this shrub it was most important to obtain, as it has been considered to possess highly poisonous properties. Some of these fruits I have handed to Mr. Mar for analysis, and we may hope soon to hear if they are as dangerous as suspected. The collection also contained two undescribed plants—the one a fern (a species of *Aspidium*, now *A. Eumundi*), the other a small tree (a species of *Bursera*, since named *B. Australasica*) not previously described, and of more than ordinary interest, as the genus had not before been met with in Australia. Trees of this genus are usually of a resinous character; the present species, however, is not particularly so.

ON THE COMPARATIVE NECESSITY FOR THE DRAINAGE OF DRAYROADS AND RAILROADS.

By GEORGE PHILLIPS, C.E.,

(LATE INSPECTING SURVEYOR, QUEENSLAND RAILWAYS).

[*Read before the Royal Society of Queensland, June 11th, 1892.*]

Put in as few words as possible, the duty of a drayroad is *to carry concentrated loads at a comparatively low speed*, whilst the duty of a railroad is precisely the reverse, namely, *to carry distributed loads at a comparatively high speed.*

In detail, the duty of a drayroad is to sustain on any portion of its comparatively wide surface, without undue crushing, grinding, or displacement, concentrated loads of about 1100 pounds per square inch; whereas on railroads the loads are so distributed that those parts of the road that correspond in strength with the component parts of a drayroad are only called upon to sustain without displacement an ultimate pressure below the sleepers of from 6 pounds to 10 pounds per square inch.

Well compressed dry earth can sustain a weight of many tons per square foot without serious displacement, but when surface soils are moistened by long-continued rain the particles tend to *slide* one upon another, and become displaced under comparatively small pressure—the amount of displacement being pretty well in proportion to the amount of pressure, provided the pressure is applied in the same manner.

On well-kept railroads there is practically very little difference in effect, so far as the foundation is concerned, between a rolling load and a stationary load, because the distributed load to be sustained is small in itself, and, owing to the girder action of the rails, even that little is applied gradually.

In the case of drayroads, there is only one way in which the tendency to displacement of the soil due to traffic can be effectually prevented, and that is by covering the surface with a continuous and sufficiently thick layer of some non-absorbent, hard, and tenacious substance, which, in the absence of any better material, generally consists of timber, stone, or gravel. This covering serves three purposes:—

1st—It sheds the rain-water, and keeps the foundation comparatively dry;

2nd—It serves to distribute the rolling load over a greater area of subsoil;

3rd—It provides a hard and unyielding surface upon which the wheels may revolve with less friction.

It may be accepted as an axiom that both railroads and drayroads constructed in uneven country must be systematically, even if not thoroughly, drained to ensure their existence as roads, quite apart from any consideration of the safe conduct of traffic thereon. But when we come to deal with even country the conditions are totally different, and the question becomes much more complex—not only as regards the necessity for drainage, but also the amount that should be provided.

The question of climate also is a factor that should be taken into account, for in countries subject to severe frost the thorough drainage of railroads at all events becomes a much more pressing matter than in tropical or sub-tropical countries where frost is almost unknown. The road engineer generally solves the difficulty, to his own satisfaction at all events, by forming the road with soil taken from the side ditches, and providing a good thick layer of stone or gravel. In the course of time he finds out the weak places where water will persist in breaking across the road and carrying away the gravel, etc., and if he is a sensible man and has sufficient money at his disposal, he will put in culverts or inverts at those places. If the country is deficient in stone or gravel (as even country is very apt to be), but is well supplied with suitable timber, the engineer will probably make a 'corduroy' road, and eventually discovers that if he has taken care to select logs cut from straight trees of about the same diameter, well laid and bedded in the soil with close joints, no inconvenience will be experienced from the action of water running across the road.

Now let it be assumed that it is desired to convert a corduroy road over even country into a railroad by the simple process of spiking rails to the timbers. If this be done, the rolling load will be still more effectually distributed by the rails acting as girders, and it will be found in practice that if the rails are spiked to every third or fourth log, according to their diameter, the intervening logs may be conveniently removed, and by doing so there is not only a saving in timber but a very appreciable space is provided for natural drainage between the remaining logs, which we may now term *sleepers*; if these are embedded a few inches in the soil, the road will be found sufficiently firm for all practical purposes, and a good pioneer railroad will be obtained without further expense in the direction of artificial drainage, because the wheels, not coming into contact with the soil between the sleepers, do not disturb it, and consequently there is no tendency to scour.

THE

Royal Society of Queensland.

ANNUAL MEETING OF MEMBERS.

REPORT OF COUNCIL FOR THE SESSION 1891-92, AND PRESIDENTIAL ADDRESS.

The Annual Meeting of the Royal Society of Queensland was held on Saturday evening, 23rd July, 1892. There were present :—The President (Hon. A. Norton, M.L.A.), Messrs. L. A. Bernays, C.M.G. ; Hon. W. F. Taylor, M.D., M.L.C. ; Dr. E. Hirschfeld, J. Shirley, B.Sc. ; F. M. Bailey, F.L.S. ; C. W. De Vis, M.A. ; R. L. Jack, F.G.S. ; A. Meston, H. G. Stokes, F.G.S. ; R. H. Roe, M.A. ; A. J. Turner, J. R. Sankey, A. J. Norton, H. J. Oxley, J. Trackson, T. Russell Brown, G. Watkins, D. B. McCullough, A. Preston, F. J. Timbury, —. Jack, junr., E. Gibbs-Maitland, F.G.S. ; and several ladies and visitors.

The Report of the Council for the Session 1891-92 was read by the Honorary Secretary (Mr. Wm. J. Ryott Maughan) as follows :—

To the Members of the Royal Society of Queensland.

In accordance with the usual custom your Council have much pleasure in submitting their Report for the year 1891-92 of Proceedings and other matters in which the Society is interested.

Several changes have taken place in the *personnel* of the Council during the past twelve months. On 11th September, Mr. W. H. Miskin, who was elected President at the last annual meeting, placed his resignation in the hands of Mr. Bailey, the Vice-President, and a little later on notified his resignation of membership. Under the circumstances your Council were required by Rule XI to appoint another President, and their choice fell upon the Hon. A. Norton, M.L.A., a member of the Council, and that gentleman accepted the office. On 11th December Mr. W. Saville-Kent resigned his seat on the Council, as he was about to return to England. The two vacancies thus created were filled in accordance with Rule XI, by the appointment of the Hon. W. F. Taylor, M.D., M.L.C., and Mr. W. Fryar, who duly signified their acceptance of office. Mr. A. E. Harte was offered and accepted the office of Honorary Librarian—this office having had specially assigned to it a seat on the Council by resolution agreed to on 16th August, 1889, but on 4th April, 1892, that gentleman resigned his appointment, and the duties connected with it have been temporarily attended to by the Hon. Secretary, Mr. W. J. Ryott Maughan.

In January a meeting of the Australasian Association was held in Hobart. His Excellency Sir H. W. Norman, G.C.M.G., &c., was kind enough to represent this Society on that occasion, and with him were associated Messrs. F. M. Bailey, R. H. Roe, and J. Shirley, who have since their return reported most favourably of the meeting and of the cordial welcome which was extended to them on behalf of the Association and of the colony of Tasmania by His Excellency Sir Robert Hamilton, K.C.M.G., the President for the year.

Since the last annual meeting your Council have continued to publish the Society's Proceedings; Parts 2 and 3 of Volume VIII have been distributed amongst members and Part 4 is in the printer's hands. This important branch of work is still somewhat retarded by the limited funds at the disposal of the Council, for while the general depression is so largely felt throughout the colony it would be vain to look for as liberal support as might be confidently expected under less adverse circumstances.

Reference has been made on former occasions to the pecuniary assistance which is extended by the Governments of sister colonies to kindred societies. Here no such aid is given, and it is a subject for congratulation that so much has hitherto been accomplished with funds which are derived from subscriptions, entrance fees, and donations of members. Your Council, however, desire to thankfully acknowledge the consideration which has been shown the Society by the Pharmacy Board, in one of whose rooms the meetings are generally held.

During the year there have been 14 council and 11 ordinary meetings, and it is satisfactory to be able to report that the latter have been well attended, and much interest is taken in the proceedings.

The Field Naturalists' section have continued the practice of making excursions into the country whenever convenient opportunities present themselves, and the accounts of these explorations, and of the collections made and natural objects noted, have been as interesting as during previous years. Many of the specimens thus obtained have been carefully prepared and submitted for inspection at the ordinary meetings.

During the year 17 names have been added to the List of Members and 2 to that of the Associates, and there have been 3 resignations. Many valuable donations have been received from other societies and public institutions, and some have come to hand from members and well-wishers of the Society.

The Council have to record with deep regret the deaths of Dr. Vereker-Bindon and Mr. R. St. J. King.

The condition of the finances on 30th June is shown by the Treasurer's Statement. Other information relating to the business of the Society is given in detail in the Appendices attached hereto.

On the motion of Mr. L. A. Bernays, C.M.G., seconded by Mr. J. Shirley, B.Sc., the Report was adopted.

The Treasurer's Statement was read by the Honorary Treasurer (Mr. G. Watkins)—who moved the adoption thereof, which was seconded by Mr. F. M. Bailey, F.L.S., and carried, as follows :—

THE ROYAL SOCIETY OF QUEENSLAND.

Dr. *Statement of Receipts and Expenditure for the Session ending 30th June, 1892.* Cr.

Dr.			£ s. d.
To Balance brought forward, 1890-91			6 16 3
,, Entrance Fees		10 10 0	
,, Subscriptions :—			
1888	£1 1 0		
1889	2 2 0		
1890	4 4 0		
1891	11 0 6		
1892	39 18 0		
		58 5 6	
,, Donation		1 1 0	
			69 16 6
			£76 12 9

Cr.	£ s. d.	£ s. d.
By Postage and Fittings	10 5 0	
,, Advertising	1 1 0	
,, o/a Printing Proceedings, etc.	11 10 6	
,, Caretaker	4 10 0	
,, Honorary Secretary (Allowance for Sundries)	27 1 8	
		54 8 2
,, Interest		0 7 0
,, Balance to Credit of Society in Queensland National Bank		21 17 7
		£76 12 9

Examined and found correct.—ALEX. J. TURNER, *Auditor.*

I observe there are outstanding obligations amounting to *£60 17s. 4d., almost entirely consisting of printing and advertising accounts; but the outstanding subscriptions (believed to be good), together with the balance in bank, should still leave a considerable surplus in favour of the Society after these obligations are met.—ALEX. J. TURNER.

BRISBANE, JULY 12TH, 1892.

* Since reduced to £40 11s. 10d.

GEO. WATKINS,
Honorary Treasurer.

WM. J. RYOTT MAUGHAN,
Honorary Secretary.

APPENDICES.

Appendix I.

Attendance of Officers and Members of the Council.

Office.	Name.	No. of Meetings.	Number attended.
President ..	* W. H. Miskin, F.L.S., F.E.S. ..	14	1
,, ..	† Hon. A. Norton, M.L.A. ..	14	13
Vice-President ..	F. M. Bailey, F.L.S.	14	9
Hon. Treasurer..	G. Watkins	14	7
Hon. Secretary ..	Wm. J. Ryott Maughan	14	14
Hon. Librarian ..	‡ A. E. Harte	14	4
Members of Council	T. L. Bancroft, M.B.	14	9
	L. A. Bernays, C.M.G.	14	8
	W. Fryar	14	9
	§ W. Saville-Kent F.Z.S., F.L.S.	14	..
	J. F. Shirley B.Sc.	14	8
	‖ Hon. W. F. Taylor, M.D., M.L.C.	14	..

* Resigned 11th September, 1891. ‡ Resigned 4th April, 1892.
† Elected 11th September, 1891. § Resigned 11th December, 1891.
‖ Elected 4th January, 1892. [Professional duties prevented attendance at Council meetings.]

Appendix II.

THE FIELD NATURALISTS.

Although during the past year this section has made few excursions, these were well attended and the results satisfactory. The members were enabled to add to their collections of the various branches of natural history several species which were new or not previously collected. On two occasions Mr. J. W. Sutton took the members up the river in his little steamer "Ariel," landing them at spots which appeared good collecting ground. On one of these excursions an unusual number of forms of fungi was observed, and several of those collected proved new; at the same time, also, some rare entomological specimens were secured. A pleasing feature in the year's meetings has been that the sciences—Geology, Botany, and Zoology—have each had a share of the members' attention. As, however, a large number of the members pay particular attention to Botany, this seems an apt opportunity of recording the additions made to the Queensland flora by new species of plants, viz.:—In the Order *Dilleniaceæ*, 1 Tetracera; *Guttiferæ*, 1 Garcinia;

Rutaceæ, 1 Citrus ; *Burseraceæ*, 1 Bursera ; *Meliaceæ*, 1 Dysoxylon ; *Celastrineæ*, 1 Hypsophila, 1 Siphonodon ; *Sapindaceæ*, 1 Cupanis, 1 Nephelium, 1 Dodonæa ; *Leguminosæ*, 1 Millettia ; *Saxifrageæ*, 1 Polyosma ; *Myrtaceæ*, 1 Myrtus, 6 Eugenias ; *Samydaceæ*, 1 Homalium ; *Rubiaceæ*, 1 Wendlandia, 1 Lasianthus, 1 Spermacoce ; *Compositæ*, 1 Glossogyne ; *Myrsineæ*, 1 Embelia ; *Sapotaceæ*, 1 Lucuma ; *Apocynaceæ*, 1 Wrightia ; *Verbenaceæ*, 1 Dicrastyles, 1 Premna ; *Piperaceæ*, Peperomia ; *Laurineæ*, 1 Beilschmiedia, 4 Endiandras, 1 Cinnamomum ; *Monimiaceæ*, 3 Mollinedias ; *Euphorbiaceæ*, 1 Phyllanthus ; *Orchideæ*, 1 Dendrobium, 1 Bulbophyllum, 1 Pterostylis, Palmæ, 1 Areca. *Filices*, 1 Ophioglossum, 2 Trichomanes, 1 Asplenium, 1 Aspidium, 1 Polypodium ; *Musci*, 1 Trematodon, 2 Weisias, 3 Bryums, 1 Porotrichum, 1 Entodon, 1 Rhynchostegium, 1 Amblystegium, 2 Fissidens ; *Hepaticæ*, 1 Eulejeuna, 1 Frullania, 1 Anthoceros. *Lichens.*—1 Pertusaria, 1 Thelotrema, 1 Ocellularia, 1 Melaspelea, 1 Graphis, 1 Mycoporellum, 1 Diplogramma (representing a new genus), 1 Campylothecium, 1 Porina, 1 Clathroporina, 2 Pyrenula, and 1 Anthracothecium. *Fungi.*—1 Agaricus, 1 Cyphella, 1 Polysaccum, 1 Hypocrella, 1 Dimerosporium, 2 Asteromella, 1 Entyloma.

Appendix III.

The following is a list of Societies and Public Institutions with which an exchange of publications has been arranged, or to which our Proceedings are forwarded :—

Adelaide	Public Library, Museum and Art Gallery
,, ...	Royal Society of South Australia
Auckland	The Auckland Institute
Batavia	Natuurkundig Tidjschrift voor Nederlandsch-Indie
Bologna	Reale Accademia delle Scienza dell' Instituto
Bonn	Naturhistorischen Nerein
Boston	The American Academy of Arts and Sciences
Brisbane	Acclimatisation Society of Queensland
,, ...	The Museum
,, ...	The Parliamentary Library
,, ...	School of Arts, North Brisbane
,, ...	,, ,, West End
Brussels	L'Academie Royale des Sciences des Lettres et des Beaux Arts
,, ...	Société Royale Malacologique de Belgique
Calcutta	Asiatic Society of Bengal
,, ...	Geographical Survey of India
Edinburgh	Botanical Society of Edinburgh
,, ...	Royal Society
Frankfurt am Main ..	Senkenbergische Naturforschende Gesellschaft

GENEVA ..	.. ..	Société de Physique et d'Historie Naturelle
GENOA ..	.. ..	Musea Civica di Storia Naturale di Genova
HAMBURG	.. ..	Verein für Naturwissenschaft
HOBART ..	.. ..	Royal Society of Tasmania
KAZAN ..	.. ..	Society of Naturalists of the University
LEEDS ..	.. ..	Leeds Philosophical and Literary Society
,, ..	.. ..	Conchological Society of Great Britain
LONDON ..	.. ..	Royal Geographical Society
,, ..	.. ..	Royal Society
MADRID	.. ..	Real Academia de Ciencias Extras Fisicas y Naturales
MANCHESTER	.. ..	Literary and Philosophical Society
MELBOURNE	.. ..	Field Naturalists' Club of Victoria
,,	.. ..	Geological Society of Australasia
,,	.. ..	Public Library, Museum, and Art Gallery
,,	.. ..	Royal Society of Victoria
,,	.. ..	"Victorian Engineer," Editor of
MONTREAL	.. ..	Royal Society of Canada
NEW YORK	.. ..	American Geographical Society
,,	.. ..	New York Academy of Sciences
,,	.. ..	Zoological Gardens
OTTAWA ..	.. ..	Geological and Natural History Survey of Canada
PARIS ..	.. ..	La Feuille des Jeunes Naturalistes La Société d' Etudes Scientifiques
PHILADELPHIA ..	..	Academy of Natural Sciences
,,	.. ..	Zoological Society
PISA ..	.. ..	Societa Toscana di Scienze, Naturali
ROCKHAMPTON ..	..	Natural History Society
SANTIAGO DE CHILI	..	Deutschen Wissenchaftlichen Verein
ST. PETERSBURG	..	La Société Imperiale Russe de Geographie
SAN FRANCISCO ..	..	California Academy of Sciences
SINGAPORE	.. ..	Straits Branch of the Asiatic Society
SYDNEY ..	.. ..	Australasian Museum
,, ..	.. ..	Department of Mines
,, ..	.. ..	Linnean Society of New South Wales
,, ..	.. ..	Natural History Association
,, ..	.. ..	Royal Society of New South Wales
TASMANIA	.. ..	The Royal Society
TOKIO ..	.. ..	Seismological Society of Japan
TORONTO	.. ..	Canadian Institute
VIENNA ..	.. ..	Anthropologische Gesellschaft
WASHINGTON	.. ..	Smithsonian Institution
WELLINGTON	.. ..	Geological Survey of New Zealand
YOKOHAMA	.. ..	Asiatic Society of Japan

Also donations of books, papers, &c., from the Hon. The Chief Secretary (Sir S. W. Griffith, K.C.M.G., Q.C.); F. M. Bailey, F.L.S.; W. Saville-Kent, F.L.S., F.Z.S., Brisbane; J. Maiden, F.L.S., Sydney; Prof. Liversidge, F.R.S., F.L.S.; The University, Sydney; Baron Sir F. von Mueller, K.C.M.G., F.R.S.; T. L. Jack, F.G.S., Townsville; W. H. Rands, Maryborough; H. C. Russell, Esq., F.R.S., Sydney; Dr. Thorpe, R.N., Kingston, Ireland; C. French, Melbourne; the Hon. The Minister for Mines, Sydney; Director of Agriculture, Sydney; C. L. Wragge, F.R.Met. Soc.; A. W. Jardine, M. Inst. C.E., Brisbane; and J. F. Shirley, B.Sc., Local Hon. Sec. Australasian Association for the Advancement of Science.

ALBERT NORTON, *President.*

WM. J. RYOTT MAUGHAN,

Hon. Secretary and Librarian.

APPENDIX IV.

SCIENTIFIC WORK OF THE SESSION, 1891-92.

No.	Title of Paper.	Author.	Date.
1	Psoriasis in Horses, known in Queensland as Mange ..	T. L. Bancroft, M.B...	Aug. 7, 1891
2	(*a*) On the gradual elevation of land on the shores of Moreton Bay .. .. (*b*) Petrified Timber	Alexander McPherson	,, ,,
3	Effects of Stocking on Native Pastures	Edward Palmer, M.L.A.	Sep. 11, 1891
4	Further Notes on the prevalence of Tuberculosis in Queensland (second paper)	Eugen Hirschfeld, M.D.	,, ,,
5	On 30 New Species of Australian Moths	T. P. Lucas, M.R.C.S., Eng.	,, ,,
6	On the Natural Law of Attenuation	Hon. A. Norton, M.L.A., President	Nov. 7, 1891
7	(*a*) Some Botanic Specimens obtained by C. J. Wild, F.L.S. of the Queensland Museum (*b*) The Field Naturalists' Excursion to Eudlo	F. M. Bailey, F.L.S., Past Pres.	Dec. 11, 1891
8	The Value of Economic Botany in Education	Lewis A. Bernays, C.M.G., Past Pres.	,, ,,
9	The Description of a New Species of the Barrimundi, *Osteoglossum Jardinii* ..	W. Saville-Kent, F.L.S., F.Z.S., Past Pres. ..	,, ,,
10	On the Oleo-Resin, *Canarium Müelleri* (Bailey), with notes upon *Manila Elemi*	J. H. Maiden, F.L.S., Sydney	,, ,,
11	The Native Grape Vines of America and Australia ..	John Shirley, B.Sc. ..	,, ,,
12	The Ribbon Fish	C. W. DeVis, M.A., Past Pres.	Jan. 8, 1892
13	Asbestos	Edgar Hall, F.C.S. ..	,, ,,
14	Report of Delegates to the Australasian Association for the Advancement of Science	John Shirley, B.Sc., local Sec. Q'land Bch.	Feb. 12, 1892
15	Meat Export and Inspection..	Eugen Hirschfeld, M.D.	,,

No.	Title of Paper.	Author.	Date.
16	Influenza Bacillus (an Address)	Eugen Hirschfeld, M.D.	Mar. 11, 1892
17	The Flora of Tasmania ..	John Shirley, B.Sc. ..	,, ,,
18	Plants collected upon Mount Wellington, Tasmania ..	F. M. Bailey, F.L.S. ..	,, ,,
19	Fruits recently collected at the Bellenden-Ker Ranges (an Address)	Archibald Meston ..	,, ,,
20	The Value of Indigenous Plants for the purpose of Cultivation	Hon. A. Norton, M.L.A., Past Pres.	April 8, 1892
21	Leprosy	Eugen Hirschfeld, M.D.	,, ,,
22	Lichens from Warwick and neighbourhood	John Shirley, B.Sc. ..	May 6, 1892
23	On Some Plant Specimens collected by Dr. T. L. Bancroft, in the Diamantina district	F. M. Bailey, F.L.S. ..	,, ,,
24	The Comparative Necessity for Drainage of Drayroads and Railroads, illustrated by photographic exhibits ..	George Phillips, C.E...	June 11, 1892
25	An Address, with exhibits, on Queensland Ethnological Specimens	Archibald Meston ..	,, ,,
26	Notes, with exhibits, of New Plants	F. M. Bailey, F.L.S., Past Pres.	,, ,,
27	Notes, with exhibits, of New Plants from Nanango district	John Shirley, B.Sc. ..	,, ,,
28	Presidential Address	Hon. A. Norton, M.L.A., Past Pres.	July 23, 1892

APPENDIX V.

ORDINARY MEMBERS ELECTED DURING THE SESSION, 1891-92.

Date.	Name.
1891—7th August ..	J. J. Cohen, M.A. (Sydney); R. L. Jack, F.G.S.; C. McLay; David Owen, M.A. (Oxon.); W. Kennedy.
,, 11th September	W. J. Byram; F. D. G. Stanley; James Irving.
,, 7th November ..	Rev. Wm. Whale.
,, 11th December..	E. S. Jackson, M.B. (Melb.)
1892—12th February ..	Edgar Hall, F.C.S.; D. B. McCullough; T. Russell Brown.
,, 11th March ..	Archibald Meston
,, 6th May ..	Captain Campbell, R.N.R.; Miss Downs (Girls' Grammar School, Rockhampton).
	ASSOCIATE MEMBERS.
1891—10th October ..	Edward Hobson.
1892—6th May.. ..	E. H. Alder.
,, 11th June ..	Arthur Preston.

The retiring President (Hon. A. Norton) then delivered his Presidential Address as follows :—

PRESIDENTIAL ADDRESS.

JULY, 1892.

WHEN thinking over the subjects which it occurred to me were appropriate for the address which it is my privilege to deliver this evening, I experienced a difficulty which probably presents itself to all non-scientific members who have the honour to fill the presidential chair. Those who have had a special scientific training have abundant resources to draw from, while we, who are as it were trying to feel our way towards the light, must confine ourselves to the well-known tracks, using our best endeavours to catch up whatever is of interest as we press onwards. Two courses, it seemed, were before me—I might look backwards and review the work that the Society has already accomplished; or I might risk a more venturesome task, and (bearing in mind what the past year has directed our attention to) might refer to any special subject which it seems likely will engage more attention in the future than it has done at any previous time. I hope I shall not seem presumptuous for having decided upon the latter course.

In his presidential address last year, my esteemed friend, Mr. Bailey, gave the Society a concise history of Australian botany. No other of our members could have handled the subject more ably, and none are entitled to speak upon it with so much authority as he; and the special value of the address he then delivered lies in the fact that a large number of our members interest themselves in the collection, study, culture, and nomenclature of plants. Many of the papers which are read at our monthly meetings are connected with this subject and they are listened to with profit and appreciation. Prominence has also been given to other subjects during the last twelve months, and it is most gratifying to know that the influence of the Society is certainly not decreasing as time goes by. The number of our members continues to increase and additional contributors of papers help to augment our store of knowledge.

Having made special reference to the subject of botany, I propose now to invite attention to a new and special branch of this subject—one which has within the last few years most deeply impressed the learned as well as the unlearned, and, because of its intimate connection with our everyday life and the important part it plays for good and for evil, has become a science in itself.

Before proceeding further, let me explain that I shall carefully avoid saying anything which might give offence to the most fastidious or the timid. Let me also, as an apology for seeming to intrude upon a domain which specialists are disposed to claim as their own, point out that others as well as myself have been induced to read up the subject of bacteriology because our interests have been endangered by the writings of irresponsible persons whose information has not always been derived from reliable sources and the tendency of whose teaching was to excite unreasonable alarm. Had those gentlemen to whom we are accustomed to look for enlightenment dealt more fully with this important question, I should not have done more this evening than casually refer to it; but while it is known that they have been carefully inquiring into it, only one or two have given us the benefit of their investigations. And here I should like to express an opinion that our Society is indebted to Dr. Hirschfeld for having given so great prominence to the science of bacteriology. I do this with much pleasure, because, having ventured to dispute on more than one occasion the reliability of information from which his deductions were made, it would be ungenerous were I not to give him credit for desiring to use his knowledge and skill for the public good. It will also be understood that in most instances the statements I venture to make are not derived from personal observation, but from the writings of scientists who have devoted years to the most careful investigation of the life history of what were once called "microbes," but are more commonly referred to now as "bacteria" or "bacilli."

So far as the general public are concerned, the science of bacteriology unfortunately has come before them almost exclusively in connection with the relation of bacteria to disease. Timid persons have shuddered at the idea that disease may be communicated from one victim to another by the agency of microscopic organisms whose presence cannot be detected until they have commenced their often fatal attacks. It does not occur to them that what we have hitherto known as infection or contagion is the same thing under a less clearly defined name; nor has it yet come to be understood that very many bacteria work for the good of the human race, and that even those which are noxious are only capable of doing harm when, if I may so express myself, the soil is favourable to their growth.

During the last few months the disease commonly known as leprosy has furnished a subject which has been greedily seized upon by newspaper correspondents; but, setting aside the evidence of specialists, can it be seriously believed that the danger of infection is so great as many persons have represented? At one time there were thousands of lepers in Europe; even in Great Britain it was a common disease in the Middle Ages, whereas now very few cases are known there. Is it then reasonable to believe that a disease which has long since been practically banished by the application of very imperfect remedies is so greatly to be dreaded as some persons persuade themselves it is? It very rarely happens that medical men, and others whose habits are cleanly, who are brought into contact with lepers are attacked with leprosy; and, although segregation is commonly recommended as a precautionary measure, the means by which the disease is communicated—as is shown by papers forwarded to and published by the Leprosy Investigation Commission—has not yet been definitely determined. Drs. Hansen, Arning, and some others are convinced that it is conveyed by direct communication, while apparently equally reliable authorities hold an opposite opinion. Dr. Woodhead indeed, with a full knowledge of Dr. Arning's inoculation of the convict Keanu and his subsequent fate, writes in 1891—"Even the inoculation of fragments of leprous tissue gave rise in all recorded experiments to no true leprosy, unless the patients were already the subjects of the disease." The leprosy bacillus is, however, a factor which is common to all forms of the disease, and although its agency in the communication of leprosy has not been positively traced, "we must, from what is known of the presence and action of bacilli in other diseases, assign to it the *rôle* of leprosy-producer, until much stronger evidence than we have yet obtained can be adduced in favour of any other cause."

And in connection with the question of communicability of diseases by means of bacilli, I venture to assert that the fear of this will very soon moderate, as the public become more familiar with the subject. We all know how terrible is tetanus, or lockjaw as we commonly call it. This, too, has a bacillus, and persons who are the victims of lockjaw must be attacked by the bacillus before they can contract the disease. Well, if we were told that we meet with this bacillus almost every day of our lives and that its contact with a wound exposes us to the risk of dying from lockjaw, nervous people, unless the danger was explained away, would begin to conjure up all sorts of horrors; and yet thousands or even millions of these bacilli must come into contact with wounds without doing harm because, unless the condition of their victims is favourable to their multiplication, they are innocuous. Some of our most healthful and enjoyable occupations expose us continually to their attacks, and yet how seldom—how very seldom considering the circumstances—do persons suffer from tetanus. The bacillus of tetanus abounds in most kinds of soil, and so almost universal is it that M. Bassano, who obtained soil "from forty-three different regions in various parts of the globe, got positive results with twenty-seven of them." White mice and guinea pigs were inoculated with these forty-three samples of soil and in twenty-seven tetanus was produced in from two to four days. Like many other persons I have been a gardener all my life, and when engaged in this pastime almost invariably have scratches and abrasions on my hands which are wholly unprotected from contact with the soil, and yet for half a century I have escaped the dangers of tetanus although in garden soil the tetanus bacilli are so abundant that—"Speaking colloquially, a worker at the Brown Institute told a friend that they grew the tetanus bacillus in the garden there." How is it then that we enjoy this immunity from the attacks of these enemies which surround us on all sides? It is because Nature, which allows these bacilli to exist in such countless numbers, provides also a protection against their deadly attacks. The bacilli, which are multiplied by spores, are anœrobic; they cannot live when exposed to the oxygen of the air. In their germ condition they are not sensitive to oxygen; but when spores are introduced into a wound and the bacilli are hatched, there is the danger to them of being destroyed by the oxygen with which they are liable to come into contact, and it is only in a particular condition of the wound that they can multiply; on its actual surface the oxygen of the air destroys them; immediately beneath the wound they are exposed to a similar risk from the fresh supplies of oxygen to the tissues which are being constantly brought up by the red corpuscles of the blood. They flourish only in "a condition of anœrobiosis, or oxygen famine," and here alone are they able to generate the ptomaine, the virulent poison which is the cause of tetanus. The extent to which we are naturally protected is suggested by Woodhead when he says—"It is an undoubted fact that failures to produce tetanus with pure cultivations are of very common occurrence, even in the hands of those who are best fitted to carry on experiments of this kind."

So far I have referred to some of the means by which we are protected against the attacks of the very virulent micro-organisms whose power under conditions favourable to their multiplication is so enormous. I might, if time permitted, refer to other circumstances which exercise a protective influence against these and other diseases the bacilli of which are in some cases, like those mentioned, anœrobic, and in others are œrobic, living only where they can obtain a supply of oxygen. The bacillus tuberculosis belongs to the latter class; human subjects and many of our domesticated animals are liable to its often fatal attacks, and it is commonly contended that the bacillus which is the *causa causans* of human tuberculosis is identical with that which attacks cattle and other animals. To ascertain the truth or otherwise of this contention was one of the motives which led me to inquire more particularly into what has proved an exceptionally interesting study. In my own experience I had found nothing to justify the belief that human subjects could contract the disease by contagion or infection in any form from the lower order of animals, and I had known innumerable cases where the opportunity to do so was afforded, no precautions whatever being taken against it because no danger was suspected. Notwithstanding the undoubted character and special ability, therefore, of some of the scientists who insisted upon the identity of the disease in all cases, I freely admit my St. Thomas-like want of faith. Either the disease could not be contracted from domestic animals, or else the natural protection against it was so nearly perfect that the danger was practically removed by agencies which operated without our knowledge. After much careful reading with the object in view which I have already indicated, I have been able to arrive at what I believe to be fairly reliable conclusions on several of the most important points, and these conclusions are most reassuring. First, with respect to the identity or otherwise of the disease; and here I refer to Woodhead because, having had a long special training as Director of the Laboratories of the conjoint Board of the Royal Colleges of Physicians (Lond.) and Surgeons (Eng.), and having for some years been privileged to hold a Sanitary Research Scholarship to the Honourable Grocers' Company, he avails himself very fully of the knowledge gained by all the most prominent scientists in the course of their bacteriological investigations, and combines this with the results of his own researches. Referring to a series of experiments reported by Klein in 1886, by which it was found that the activity and power of growth of bacilli might be modified outside the body by variations of temperature—a discovery, by the way, which had already been made by Pasteur—and possibly also by introducing them into animals "whose normal temperatures and other general metabolic conditions are different," he points out that "it has been proved experimentally that, although the organisms in human and bovine tuberculosis are morphologically identical, they are not absolutely the same in all their vital and pathogenic characteristics." The inoculation of a cow with human tubercle bacilli causes acute general tuberculosis, but where the inoculation is from the cow to the human subject, this "almost invariably gives rise to the *perlsucht* form of tuberculous disease, and rarely, or never, to the acute generalised form." Here, then, we have evidence of a close similiarity without absolute identity, and the difference is one which, as George Stephenson might have put it, is "bad for the coo!" There is, however, a possibility of infection by ingestion from the consumption of tuberculous meat; but this, I may say without referring particularly to the evidence which can be adduced, has been greatly exaggerated by local writers. The risk of infection being conveyed by the agency of milk from tuberculous cows is more real, but even in this there seems to have been abundant exaggeration.

I will now turn to the other side of the subject and briefly allude to the natural methods by which the human subject is protected against dangers which, without such wonderful provisions against the contraction of the disease, would be most formidable — "A perfectly healthy individual, placed under favourable conditions as regards food, fresh air, and exercise is never attacked successfully by tubercle bacilli, the active vigorous tissue cells being perfectly competent to destroy any bacilli that may make their way into the lungs, the pharynx, or the intestine; whilst even in cases of direct inoculation into a wound, if the wound heals rapidly no tubercular process may result, the tubercular bacilli, as we have said, being destroyed by the cells." In a paper which I read at one of the Society's meetings some months ago, I alluded to Menchnikoff's discoveries in connection with the part played by the phagocytes, the white corpuscles of the blood, in the destruction of bacilli. I will now quote Woodhead on the same subject; for here he refers to those cases where tubercle bacilli and other pathogenic organisms have already effected an entrance into the human body—"It has been observed," he says, "that a process of localisation occurs even when large caseous patches have been formed, and it has been found that around these patches, just as around an abscess, there is always erected a kind of barrier, made up of vigorous connective tissue cells, small, round, and larger epithelioid cells; the blood vessels in this cellular zone being comparatively numerous and of considerable size. We have, in fact, in this arrangement of the blood vessels and cells, a making of roads (the blood vessels) for the bringing up and massing of forces (the active cells) around the enemies' camp (the tubercular or caseous mass with the contained bacilli or spores), and by a process of close siege preventing the organisms from making their way outwards, and confining them entirely to their own territory, so that, when they have utilised what food material there is in the degenerated cells, they are no longer able to exist as vegetative bacteria, and only the spores remain—which may, however, remain latent for a long period awaiting a favourable opportunity for another attack on weakened tissues. These spores or hibernating germs are confined within the same area, and the *débris* with its contained spores is gradually encroached upon by the surrounding tissues until, eventually, if the mass is not large it may be entirely absorbed, though, owing to the amount of fibrous tissue that is formed by the attacking cells after their activity is somewhat diminished, this process of absorption sometimes goes on very slowly."

Dr. Koch's tuberculin treatment was suggested by the discovery made in the course of a long series of investigations that the bacilli of tuberculosis are not the direct agents by which the tissues are destroyed. They have the power of generating a poison which, if produced in sufficient quantity, weakens and destroys the protecting cells which then become the prey of the invading bacilli; but the effect produced by small quantities of this potaine is to stimulate the action of the cells, at the same time causing a dilatation of the vessels, by which means a larger amount of food material is brought up for the nutrition of the cells, while the exhausted matter is more readily carried off; and it was with the idea of assisting these cells to resist the encroachments of the bacilli that he adopted the method of treatment which for a time excited hopes that unfortunately have not been fully realised; his inoculating material is not the attenuated bacillus tuberculosis, but what he himself describes as "a glycerine extract of pure cultivations of tubercle bacilli," and, although it has failed to produce the beneficial results that were anticipated, there seems no reason for doubting the existence of the principle of which his tuberculin was an attempted artificial adaptation.

As a partial explanation, therefore, of the comparative immunity from diseases which would carry off tens of thousands of victims if the conditions were always favourable to their attacks, we have—first, the power of the tissue cells in healthy persons to destroy and in others to resist the attacking bacilli; we have the invigorating effect of the toxic products of the bacilli upon the tissue cells when these find their way into the body; and we have also the insuperable difficulty *to the anærobic organisms* of pursuing their course when the oxygen of the air reaches them directly from without, or indirectly from within through the agency of the tissue cells; and to *the ærobic organisms* when the supply of oxygen they require is curtailed by the demand made upon it by the tissue cells or by other and innocuous ærobic bacilli.

And now let us remember that, although the old theory of abiogenesis, or spontaneous generation, has been completely demolished by the discoveries of Pasteur and others who have followed in his footsteps, and that it is now allowed that every disease is attributable to the agency of organisms in the absence of which it could not have originated, the number of pathogenic bacteria is small compared with those which are harmless. The air we breathe, the water we drink, the food we consume,—everything, in fact, with which we are continually brought into contact is the abode of innumerable micro-organisms whose presence is necessary to us. Many of the processes of everyday life are intimately associated with their specific activities, and, says Woodhead, "it is now proved, beyond all dispute, that their presence is not merely accidental but is absolutely essential to the carrying on of, one might almost say, the most commonplace operations." These bacteria are a vast army of chemists, and they are employed by Dame Nature in the great work of reducing dead organic matter and separating and releasing its constituent parts in order that these may be employed in the building up and support of new life. "This," says Trouessart, "is at once the beginning and the termination of the endless chain which sustains the equilibrium of nature, in which there is no creation, no destruction. Plants draw their nourishment from the soil and the air in the form of mineral solutions, and are devoured by animals or other parasites; animals are in their turn devoured by microscopic plants or microbes, and return by means of putrefaction to the condition of mineral salts, which are distributed in the soil, and serve anew for the nutrition of plants."

The knowledge which has been acquired in recent times of the life history of septic bacteria has not only been invaluable in surgical operations, where it has been the means of saving numbers of valuable lives, but it has led to the re-establishment on a prosperous footing of great industries which were threatened with destruction until Pasteur began his wonderful course of investigation and discovery. Hundreds of scientists are now engaged in the study of bacteria and their life history, and the general result of their investigations has been to throw new light into what was once more or less obscure, to enable them to determine with accuracy questions which were previously unintelligible, and to clear the way to a more perfect understanding of the methods by which effect is given to natural laws.

The exact study of such questions can be carried on only by specialists; but may not ordinary observers gain much by acquainting themselves with the results of their investigations? Few of us are acquainted with the science of astronomy, but that does not prevent us from reading with delight the books which astronomers have given to the world. In the same modest way we may devote some of our spare hours to the acquisition of bacteriological knowledge; by doing so we shall not only become dispossessed of those foolish fears which haunt uninformed minds, but there will be opened up to us new revelations of the creative wisdom by which all things mundane, from the highest to the lowest, are made to operate for the general good. This, and the intimate connection between micro-organisms and our commonplace daily avocations, must be my excuse for addressing you on this subject this evening, and for commending it specially to the attention of the younger members of our Society.

On the motion of Mr. Shirley, seconded by Dr. Hirschfeld, the thanks of the Society were accorded to the retiring President for his address.

THE ELECTION OF COUNCIL, 1892-93.

A Ballot was taken for Members of Council, which resulted as follows:—

President, John Shirley, B.Sc.; *Vice-President*, Robert Logan Jack, F.G.S.; *Hon. Treasurer*, J. R. Sankey; *Hon. Secretary*, Wm. J. Ryott Maughan; *Hon. Librarian*, H. G. Stokes, F.G.S. *Members of Council*, L. A. Bernays, C.M.G. (Past Pres); F. M. Bailey, F.L.S. (Past Pres.); C. W. De Vis, M.A. (Past Pres.); Eugen Hirschfeld, M.D.; Hon. A. Norton, M.L.A. (Past Pres.). *Trustees*, Joseph Bancroft, M.D.; Hon. A. C. Gregory, C.M.G., F.R.G.S., M.LC.; W. Alcock Tully, B.A. *Hon. Auditor*, Alex. J. Turner.

The newly elected President (Mr. John Shirley, B.Sc.) returned thanks.

VOTES OF THANKS.

A vote of thanks to the retiring Council was proposed by Mr. R. H. Roe, M.A., seconded by Mr. R. L. Jack, F.G.S., and carried, and the Hon. A. Norton replied on behalf of the retiring council.

Mr. A. Meston proposed and Mr. Bailey seconded, and was carried, a vote of thanks to the Hon. Auditor (Mr. A. J. Turner); Mr. A. J. Turner replied.

NEW MEMBER PROPOSED.

On the motion of Dr. Hirschfeld, seconded by Mr. F. M. Bailey, Mr. Christian Heussler as a member of the Society.

The proceedings then terminated.

PROCEDINGS

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ROYAL SOCIETY

QUEESLAND

SESSIO 1892-93.

VOLU E IX.

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PRINTED AND PUBL TRIE'S BIGHT, BRISBANE.

POLE, OUTRIDGE & CO., 3.

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THE ELECTION OF

A Ballot was taken for Meml
as follows :—

President, John Shirley, I
Logan Jack, F.G.S. ; *Hon. Treas*
retary, Wm. J. Ryott Maughan ;
F.G.S. *Members of Council*, L. A.
F. M. Bailey, F.L.S. (Past Pres.)
Pres.) ; Eugen Hirschfeld, M.D.
(Past Pres.). *Trustees*, Joseph I
Gregory, C.M.G., F.R.G.S., M.L
Hon. Auditor, Alex. J. Turner.

The newly elected President
returned thanks.

VOTES OF

A vote of thanks to the retiri
Mr. R. H. Roe, M.A., seconded l
and carried, and the Hon. A. Nort
retiring council.

Mr. A. Meston proposed and
was carried, a vote of thanks to th
Turner) ; Mr. A. J. Turner replied.

NEW MEMBER

On the motion of Dr. Hirschf
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The proceedings then terminat

THE

PROCEEDINGS

OF THE

ROYAL SOCIETY

OF

QUEENSLAND

FOR

SESSION 1892-93.

VOLUME IX.

PRINTED AND PUBLISHED FOR THE SOCIETY
BY
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1893.

THE

Royal Society of Queensland.

Patron:
HIS EXCELLENCY SIR HENRY WYLIE NORMAN, G.C.M.G., K.C.B., C.I.E.

OFFICERS, 1892-93.

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JOHN SHIRLEY, B.Sc.

Vice-President:
ROBERT LOGAN JACK, F.G.S., F.R.G.S.

Hon. Secretary:
WM. J. RYOTT MAUGHAN.

Hon. Treasurer:
J. R. SANKEY.

Hon. Librarian:
H. G. STOKES, F.G.S.

Council:
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F. M. BAILEY, F.L.S. (PAST PRES.)
C. W. DE VIS, M.A. (PAST PRES.)
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W. ALCOCK TULLY, B.A.

Hon. Auditor:
ALEX. J. TURNER.

THE

Royal Society of Queensland.

ANNUAL MEETING OF MEMBERS.

REPORT OF THE COUNCIL FOR SESSION 1892-93.

The Annual Meeting of the Royal Society of Queensland was held on Saturday evening, 22nd July, 1893, at the Society's Rooms, Edward Street. At no Annual Meeting of the Society has there been a larger attendance. There was also a large number of ladies and gentlemen present as visitors; amongst the members present were :—Messrs. J. Shirley, B.Sc., (President), R. L. Jack, F.G.S., F.R.G.S., (Vice-President), A. Norton, L. A. Bernays, C.M.G., F. M. Bailey, F.L.S., C. W. De Vis, M.A., Past Presidents, J. R. Sankey, (Hon. Treasurer), W. J. Ryott Maughan, (Hon. Secretary), H. G. Stokes, F.G.S., (Hon. Librarian), Dr. Hirschfeld, W. Fryar, G. Watkins, R. Edwards, D. Owen, M.A., R. H. Roe, M A., D. O'Connor, A. J. Turner, D. B. McCullough, Rev. W. Whale, J. Fenwick, J. Irving, P. R. Gordon, J. Brown, A. Preston, J. F. Bailey, F. Savage, A. Meston, W. J. Byram, J. H. Simmonds, S. W. D'Arcy-Irvine, A. B. Chater, A. Armstrong and Mesdames Coxen and Edwards. Amongst the visitors, were Messrs. Geo. Scott, M.A., J. P. Thomson, F.R.S.G.S., (Hon. Secretary Royal Geographical Society—Queensland Branch); —. Wright, Mesdames D'Arcy-Irvine and Sankey, and Misses Cox, Shirley (2), Edwards, Aberdeen, and Meston. The President, Mr. John Shirley, B.Sc., presided.

The President called upon the Honorary Secretary (Mr. W. J. Ryott Maughan) to read the Report of the Council as follows :—

To the Members of the Royal Society of Queensland.

In accordance with custom your Council submit their Report for the year 1892-93, of proceedings and other matters in which the Society is interested.

No change has taken place in the *personnel* of the Council during the past twelve months.

Arrangements have been made by the Governing Council of the Australasian Association for the Advancement of Science to hold the next meeting at Adelaide during the month of September, 1893 ; and, carrying out a previous practice, your Council appointed Messrs. Norton, De Vis, and Shirley as Delegates from this Society, and His Excellency Sir Henry Norman has been invited to again act as one of your representatives, and has expressed his willingness to accede to your Council's request, provided his official duties do not prevent him from so doing.

As a result of the general depression and a consequent alling off of income, it was found necessary to temporarily curtail the cost of printing, and many valuable papers, which as soon as funds permit will be printed, have had to be held over. Volume VIII., Part 4, to which reference was made in the previous Annual Report, has been published and distributed.

The Field Naturalists' Section continued the practice of making excursions into the country whenever convenient opportunities presented themselves, and the accounts of their explorations, and of the collections made and natural objects noted, have been as interesting as during previous years. Many of the specimens thus obtained were carefully prepared and submitted for inspection, accompanied with descriptive sketches, at the ordinary meetings.

During the year there were held 12 Council and 8 ordinary meetings, and it is satisfactory to be able to report that the latter, notwithstanding the many months of inclement weather, were well attended, and much interest has been taken in the proceedings.

Five new members were elected during the past year, and one was added to the list of Associates. There were 14 resignations; and your Council have, with regret, to record the deaths of Dr. J. H. Griffin and Messrs. B. Potthoff and A. W. Clarke.

During the year many communications were received from kindred Institutions, forwarding valuable presents to the library, and seeking to exchange publications. Particulars of exchanges are given in Appendix III.

The statement of accounts for the past year is shewn by the Honorary Treasurer's report, from which it will be observed that the income is slightly in excess of that of the previous year.

Your Council have to again express their indebtedness to the Pharmacy Board, in one of whose rooms the meetings of the Society have been held.

Important communications were received during the past year from the Royal Society of New South Wales and the Smithsonian Institution, relative to prizes offered for original research, particulars concerning which may be obtained from the Honorary Secretary.

For some years back your Council have had under consideration the necessity of revising the Rules. Early in the year a Committee was deputed to draft a new code of rules, and, at a special meeting called on 8th April, 1893, they were, after slight amendment, agreed to. Members who were not present at this meeting will observe that by Rule XVII. the annual meeting of the Society will take place in January instead of, as heretofore, in June.

Information concerning other matters of interest to members of the Society is given in detail in the Appendices.

ROYAL SOCIETY OF QUEENSLAND.

Statement of Receipts and Disbursements for the Year 1892-93.

Dr.

	£	s.	d.	£	s.	d.
To Balance brought forward from 1891-92				21	17	7
,, Entrance Fees..	5	5	0			
,, Subscriptions	67	4	0			
				72	9	0
				£94	6	7

Cr.

	£	s.	d.	£	s.	d.
By Printing Publications and Rules ..	50	0	0			
,, Advertising	8	15	6			
,, Office Keeper..	7	15	0			
,, Allowance to Hon. Secretary for sundries to 31st December, 1892 ..	12	10	0			
,, Exchange, Stamps, Cartage, Petties, &c.	5	5	10			
				84	6	
Credit Balance—						
At Bank	5	16	3			
Cash with Treasurer	2	2	0			
Cheque held over	2	2	0			
				10	0	
				£94	6	7

LIABILITIES—Printing	£28	14	7
Advertising	2	17	0
	£31	11	7

JNO. R. SANKEY,
Hon. Treasurer,

Examined and found correct.
ALEX. J. TURNER,

21st July, 1893.

APPENDICES.

Appendix I.

Attendance of Officers and Members of Council.

Office.	Name.	No. of Meetings.	Number Attended.
President ..	John Shirley, B.Sc.	14	10
Vice-President ..	R. L. Jack, F.G.S.	,,	7
Hon. Treasurer ..	J. R. Sankey	,,	7
Hon. Secretary ..	W. J. Ryott Maughan	,,	14
Hon. Librarian ..	H. G. Stokes, F.G.S.	,,	11
Members of Council	F. M. Bailey, F.L.S.	,,	11
	L. A. Bernays, C.M.G.	,,	6
	C. W. De Vis, M.A.	,,	7
	Eugen Hirschfeld, M.D. ..	,,	9
	A. Norton	,,	8

Appendix II.

FIELD NATURALISTS' SECTION.

It is to be regretted that only a few excursions of this section have been made during the past year. The unprecedented rainfall has prevented most of our projected outings, and nearly every public holiday was altogether unsuitable for plant collecting. The few excursions that have been made, however, have not been without value, as was proved by the mounted specimens of plants of special interest which have been shown at several of our monthly meetings.

Appendix III.

The following is a list of Societies and Public Institutions with which an exchange of publications has been arranged, or to which our Proceedings are forwarded:—

Adelaide	Public Library, Museum and Art Gallery
,, ...	Royal Society of South Australia
Auckland	The Auckland Institute
Batavia..	Natuurkundig Tidjschrift voor Nederlandsch-Indie
Bologna	Reale Accademia delle Scienza dell' Instituto
Bonn	Naturhistorischen Verein
Boston	The American Academy of Arts and Sciences
Brisbane	Acclimatisation Society of Queensland
,, ...	The Museum
,, ...	The Parliamentary Library
,, ...	School of Arts, North Brisbane
,, ...	,, West End
Brussels	L'Academie Royale des Sciences, des Lettres, et des Beaux Arts
,, ...	Société Royale Malacologique de Belgique
Calcutta	Asiatic Society of Bengal
,, ...	Geographical Survey of India

Edinburgh	Botanical Society of Edinburgh
,, ...	Royal Society
Frankfurt-am-Main ..	Senkenbergische Naturforschende Gesellschaft
Geneva	Société de Physique et d'Histoire Naturelle
Genoa	Musea Civica di Storia Naturale di Genova
Hamburg	Verein für Naturwissenschaft
Hobart	Royal Society of Tasmania
Kazan	Society of Naturalists of the University
Leeds	Leeds Philosophical and Literary Society
,, ...	Conchological Society of Great Britain
London	Royal Geographical Society
,, ...	Royal Society
,, ...	Patent Office
Madrid	Real Academia de Ciencias Extras Fisicas y Naturales
Manchester	Literary and Philosophical Society
Melbourne	Field Naturalists' Club of Victoria
,, ...	Geological Society of Australasia
,, ...	Public Library, Museum, and Art Gallery
,, ...	Royal Society of Victoria
,, ...	"Victorian Engineer," Editor of
Montreal	Royal Society of Canada
New York	American Geographical Society
,, ...	New York Academy of Sciences
,, ...	Zoological Gardens
Ottawa	Geological and Natural History Survey of Canada
Paris	La Feuille des Jeunes Naturalistes La Société d' Etudes Scientifiques
Philadelphia	Academy of Natural Sciences
,, ...	Zoological Society
Pisa	Societa Toscana di Scienze Naturali
Rockhampton	Natural History Society
Santiago de Chili ..	Deutschen Wissenchaftlichen Verein
St. Petersburg ..	La Société Imperiale Russe de Geographie
San Francisco	California Academy of Sciences
Singapore	Straits Branch of the Asiatic Society
Sydney	Australasian Museum
,, ...	Department of Mines
,, ...	Linnean Society of New South Wales
,, ...	Natural History Association
,, ...	Royal Society of New South Wales
Tasmania	The Royal Society
Tokio	Seismological Society of Japan
Toronto	Canadian Institute
Vienna	Anthropologische Gesellschaft
Washington	Smithsonian Institution
Wellington	Geological Survey of New Zealand
Yokohama	Asiatic Society of Japan

Also donations of books, papers, &c., from the Hon. The Chief Secretary; F. M. Bailey, F.L.S.; W. Saville-Kent, F.L.S., F.Z.S.; J. Maiden, F.L.S., Sydney; R. L. Jack, F.G.S.; H. C. Russell, Esq., F.R.S., Sydney; the Hon. The Minister for Mines, Sydney; Director of Agriculture, Sydney; C. L. Wragge, F.R.Met. Soc.; J. Shirley, B.Sc., Local Hon. Sec. Australasian Association for the Advancement of Science.

JOHN SHIRLEY, *President.*

WM. J. RYOTT MAUGHAN, *Hon. Secretary.*

Appendix IV.—Part 1.

SCIENTIFIC WORK OF THE SESSION.

No.	Title of Paper.	Author.	Date read.
1	On the Prevention of Infectious Diseases	Eugen Hirschfeld, M.D.	13 Aug., 1892
2	On the occurrence of a Green Mineral in the Schists in Ann Street, Brisbane ..	H. G. Stokes, F.G.S. ..	,, ,,
3	The Drought-resisting Properties of Eucalypts ..	J. Lauterer, M.D. ..	10 Sept., 1892
4	Leprosy in the North of Europe and its contagious character	J. Lauterer, M.D. ..	8 Oct., 1892
5	The Flora of Moreton Island	John Shirley, B.Sc. ..	10 Dec., 1892
6	On a new Eucalypt	F. M. Bailey, F.L.S. ..	10 Mar., 1893
7	Queensland Scorpions ..	J. Lauterer, M.D. ..	8 April, 1893
8	Sewage Disposal	W. F. Taylor, M.D., M.L.C.	17 June 1893
9	Botanical Excursion to the Macpherson Range	John Shirley, B.Sc. ..	17 June, 1893

Appendix IV.—Part 2.

LECTURES, EXHIBITS, AND DESCRIPTIONS.

No.	Title.	Exhibitor.	Date.
1	Plates and maps illustrative of Geology of Queensland ..	R. L. Jack, F.G.S. ..	13 Aug., 1892
2	Meteorology of Australasia, illustrated by charts, instruments, etc.	Clement L. Wragge, F.R.Met. Soc. ..	10 Sep., 1892
3	Native Weapons	Archd. Meston ..	,, ,,
4	A number of moths varying in size from one millimetre to the large Hawk moth (*Charocampa Celerio*)	T. P. Lucas	,, ,,
5	Pituri and Pituri Blacks ..	B. A. Purcell	11 Nov., 1892
6	The Dugong	Archd. Meston ...	,, ,,
7	Australian Lichens sent from Washington, U.S.A., for determination	John Shirley, B.Sc. ..	
8	Meteorological Reports ..	Mrs. C. Coxen, M.R.M.S.	Monthly

APPENDIX V.

ORDINARY MEMBERS ELECTED DURING THE SESSION 1892-93.

Name.	Qualification.	Date of Election.	Name of Proposer	Name of Seconder.
Preston, Arthur J. O.	Associ'te	13 Aug., '92	C. W. De Vis	H. G. Stokes
Maitland, A. Gibb ...	Member	10 Sep., '92	H. G. Stokes	J. Shirley
Irvine, S. W. D'Arcy-	,,	8 Oct., '92	E. Hirschfeld	Wm. J. Ryott Maughan
Illidge, Thomas ..	,,	11 Nov., '92	C. W. De Vis	A. Norton
Potthoff, B.	,,	10 Dec., '92	E. Hirschfeld	Wm. J. Ryott Maughan
Bailey, John F. ..	,,	8 Apr., '93	J. Shirley	A. Norton

ADOPTION OF REPORT.

Mr. RICHARD EDWARDS moved the adoption of the report, which was seconded by the Rev. W. Whale, and carried.

Mr. J. R. SANKEY (Honorary Treasurer) presented the statement of income and expenditure, the adoption of which he moved, seconded by Mr. S. W. D'Arcy-Irvine, and carried.

PRESIDENTIAL ADDRESS.

By JOHN SHIRLEY, B.Sc., *District Inspector of Schools.*

READ AT THE ANNUAL MEETING, JULY 22, 1893.

A REVIEW OF RECENT BOTANICAL WORK IN AUSTRALIA.

DURING the past fifteen years my spare time has been given to the study of Australian botany. Thanks to the position held by me as Inspector of Schools, I have been most favourably situated for the pursuit of this study, having by constant travel acquired an intimate knowledge of the whole of the settled districts of Queensland, during which time I have gathered and mounted specimens of 2,500 different species of plants, or about one-half of the known flora of the colony. Naturally, when considering the subject matter of a presidential address, my sympathies pointed in the direction of botany, and it was felt that a general review of recent Australian work in that science would be the most popular form to which my reading and experience could be directed.

The foundation of a thorough knowledge of the plants of Queensland was first laid in 1883, when the "Synopsis of the Queensland Flora" was published by Mr. F. M. Bailey, now Government Botanist. This work is mainly a compilation from the celebrated "Flora Australiensis" of Bentham and Mueller, and from the "Fragmenta Phytographiæ" and other numerous productions of Baron F. von Mueller. The system of classification is that known as the Candollean, which is now so universally adopted, and which is set forth at length in the "Genera Plantarum" of Bentham and Hooker. This synopsis was at first intended to be much more concise than the form it afterwards attained, and the descriptions of species belonging to the series Thalamifloræ and Discifloræ have lost much of their value from curtailment. Supplements to the main work were published in 1886, 1888, and 1890, giving full descriptions of all new, additional, and naturalised plants. In 1889 the Department of Agriculture was constituted, and the Colonial Botanist became an officer of that department; and with this alteration of position there was instituted a change in the manner of publishing botanical information, which cannot be too highly commended. As soon as new and additional species have been determined in sufficient number, full descriptions of these plants are furnished in pamphlets entitled "Bulletins," of which seven have been issued, being those numbered 4, 7, 9, 13, 18, 20, and 21 by the Department; an eighth is now in the printer's hands. These bulletins are freely supplied to such as may require them, and have been the means of gaining collectors of plants for the Department in all parts of the colony, and have evoked much interest from squatters, planters, farmers, and gardeners, who are constantly in communication with its officers respecting fodder plants, reputed poisonous plants, economic plants, and native species deemed worthy of cultivation.

Mr. Bailey, who is the author of a "Fern World of Australia," published in 1892 a most useful companion to this work in his "Lithograms of the Ferns of Queensland," giving 191 plates of ferns copied by direct impression of the fronds off the stone. This book is now familiar in many households, and has done much to render popular the study of our numerous and beautiful native ferns. In 1893, from the pen of the same author, we had "A Companion for the Queensland Student of Plant Life," which is a combined botanical dictionary, vegetable physiology, and general *vade mecum.*

Information respecting Queensland plants has been as fully given with regard to cryptogams, no matter how lowly in form, as it has respecting the more noble phanerogams. Bulletin No. 20 deals with freshwater algæ only, mainly the collections of Dr. Thomas Bancroft and Mr. W. J. Byram, and which were determined by Professor Martin Mœbius of Heidelberg. Descriptions of nearly one hundred species are given, and about two-thirds of the plants are also figured. Of this bulletin the late Dr. Woolls wrote just before his death, "I thank you most sincerely for sending me Bulletin 21, and your account of freshwater algæ in No. 20; the latter is a new departure for you. You deserve great credit for venturing on unfrequented paths." The publication, in 1892, of Dr. M. C. Cooke's "Handbook of Australian Fungi," illustrated with thirty-six coloured plates, has placed this section of Australian botany on a sure footing. The work was undertaken at the joint cost of the Queensland, New South Wales, Victorian, and South Australian governments, and Mr. F. M. Bailey of Brisbane, and Mrs. Martin of Melbourne, his friend and pupil, are specially thanked by the author for the help they gave by sending specimens from their collections. At the Hobart meeting of the Australasian Association, Mr. Bailey read a very valuable paper dealing with the minute fungi that prove such pests to the florist, the gardener, and the husbandman, giving concise information respecting the range of each species, and the plants infested. The rich moss flora of this colony is being gradually elucidated by the labours of Dr. V. F. Brotherus of Helsingfors, Finland, working in conjunction with the celebrated Dr. C. Müller of Halle; and many new species are described in pamphlets dated 1890 and 1893 respectively, and published at Helsingfors. A "Lichen Flora of Queensland," published by myself in 1889, gives descriptions of all species known to inhabit this colony to the date of issue, being 485 in number. Since 1889 I have supplied to Mr. Bailey for publication in his bulletins the descriptions of 174 additional species or marked varieties; and have in hand material for a further issue containing information concerning 76 plants not previously reported from our colony. A parcel of Australian lichens, the property of the United States Government, was lately forwarded to me from Washington for determination, and exhibited at the June meeting of this Society.

The want of a supplement to the "Flora Australiensis" having long been felt in Queensland, Mr. F. M. Bailey has frequently been requested by his numerous friends and correspondents in this colony to supply the required volume. Recently the Hon. A. Norton visited Sydney, and found that a similar desire was evinced in the scientific circles of the mother colony. In response to this request Mr. Bailey, on March 16th, 1893, issued a circular to Australasian scientific workers and societies, showing the pressing necessity for the issue of a supplement to the "Flora," laying stress upon the fact that it must follow on Bentham's own lines of classification, and in consenting to undertake the work asking for the co-operation of all Australian workers. Stirred by this action of our Colonial Botanist, Baron F. von Mueller, who occupies a similar position in Victoria, issued through the medium of the "Victorian Naturalist" a counter circular to that published by Mr. Bailey, stating that "it had long been his intention to furnish a supplementary volume to the 'Flora Australiensis,' more especially as after fifteen years' previous botanical researches in Australia he was the collaborator of Mr. Bentham in the 'Flora,' the first and as yet the only one for any of the great divisions of the globe. A vast proportion of the plants, thus rendered known, were from his own writings; and moreover the illustrious author, in the preface to the seventh volume, expressed a particular wish that he (the Baron) should continue this great work. Ever since the last volume appeared in 1879, the Government Botanist of Victoria has zealously and perseveringly followed up his elucidation of the Australian native vegetation." As causes for the delay in issuing a supplementary volume the following reasons were advanced:—

(1) "As new plants continued to be discovered . . . an early supplement would soon have proved incomplete."

(2) "The novel species, gradually and connectedly added through the 'Fragmenta Phytographiæ Australiæ' and other publications, were all given in the Baron's first and second 'Census of Australian Plants' np to 1889—a third being soon due."

(3) "Hitherto, with a single exception, no desire for a compact supplement was expressed."

With regard to the first reason, it will probably be as weighty in 1993 as it is at the present day; and if seriously regarded might defer the publication of a supplement until the Greek Kalends; the second is valueless, as the publication of a list can never supply the place of any portion of a 'Flora'; and the third is an opinion on a matter of fact in which the Baron has probably been misinformed.

These two great specialists, Baron von Mueller and Mr. Bailey, are now in correspondence on the matter, and our Colonial Botanist is willing to withdraw if the Baron will undertake to issue a supplement in accordance with the system of classification employed by Bentham; and, this promise being given, will then co-operate with the Baron to the fullest and most unselfish extent.

Although the colonies of Victoria, Queensland, South Australia, and Tasmania have each their respective floras, the botanists of the mother colony of New South Wales were without this aid to their studies until the present year, when a "Handbook of the Flora of New South Wales" was published under the joint names of Messrs. Charles Moore and Ernst Betche, giving descriptions of all flowering plants and ferns indigenous to that colony. The systematic arrangement of the Handbook is that of Baron von Mueller in his "Census of Australian Plants," and it is claimed by the authors that it seems to approach more nearly the ideal of the natural system than De Candolle and Jussieu's system used in most colonial floras. It differs mainly from the classification employed by Bentham in the distribution of the orders of the great division Monochlamydeæ, which it is asserted is "generally considered by the best authorities to be entirely artificial, but the difficulty of assigning the right position in the system to this heterogenous collection of orders induced most English authors to adhere to the old system in spite of its acknowledged defects." It is claimed for the Muellerian system that it "is an easy sequence of closely-allied orders, partly" arranged "by original investigations, and partly by adopting the good points of other more recent French and German systems, and perhaps, with the exception of the disputable position of Gymnospermæ, and the anomalous position of such difficult and isolated orders as Aristolochiaceæ, Cupuliferæ, Casuarinæ, etc., may be regarded as natural."

It is eminently unscientific to regard even the best system of classification as anything higher than a temporary expedient; and this applies to the scheme of the "Genera Plantarum" as much as to any other system; though the greatest living botanical authority in England has given it as his dictum that Bentham's classification will satisfy the requirements of our generation. Yet it is clearly evident that the retention of the sub-class Monochlamydeæ cannot be longer justified, and in this respect Baron von Mueller is moving on lines which daily command more serious attention. There are matters regarding the nomenclature employed in the new "Flora" of our southern neighbour, as also in the "Census of Australian Plants," which cannot be so readily justified. The unearthing of fossil names to replace others, which, though of later date, have at least the authority of years of acceptance, may prove an operation of doubtful value. The replaced name, when ousted, probably has priority in a totally different order, and changes may thus be extended *ad infinitum*. It would be well to fix a certain term of years, general recognition during which would give fixity of title, as against obscure and forgotten names of greater age.

Mr. F. Turner's work on the "Forage Plants of Australia," although written for practical men, pastoralists, farmers, and stockmen, is none the less of scientific value. The illustrations and descriptive matter first appeared in the columns of the *Town and Country Journal*, and awakened considerable interest in Australia and America. The plates are specially valuable, as many of the plants are figured for the first time; and, where the descriptions are not sufficiently lengthy for the botanical student, references to the "Flora Australiensis" are attached, the author having most wisely retained what is, so far, the Australasian classification.

New South Wales has sustained serious loss during the past year through the deaths of Mr. R. D. Fitzgerald and Dr. Woolls. Mr. Fitzgerald, who retired from the public service of New South Wales in 1887, had spent much time and energy in the study and delineation of Australian orchids; and on laying down the office of Deputy Surveyor-General devoted himself to the production of a monumental work on these gloriously adorned gifts of the Almighty, producing under authority from his Government one complete volume of seven parts, with a coloured plate of each species, and four additional parts towards a second volume, when death brought his labours to a close. One of his last works was to revise the Orchideæ of Moore and Betche's recently published Flora of New South Wales, and to place all his unpublished drawings at the service of the authors. Writing to Dr. Woolls, on receiving intimation of Mr. Fitzgerald's death, Baron von Mueller says "It is indeed an irreparable loss, not only to our favourite science, but to ourselves personally, who had learned to appreciate his sterling character in life. So long as the lovely orchids of this part of the world embellish with singular and varied beauty the natural features of Australia, so long will the memory of our leading orchidologist be held dear." The death of Mr. Fitzgerald occurred on Friday, the 12th of August, 1892, at his late residence, Adraville, Hunter's Hill, Sydney, in the sixty-second year of his age.

Dr. Woolls of Parramatta, a fellow-worker of Mr. Fitzgerald, published in October, 1892, a poem in memory of his friend:

before six months more had passed he too was in his grave. Landing in Sydney at the age of seventeen, he became, in 1832, an assistant master at King's School, Parramatta, and later on classical master at Sydney College. In 1873, after conducting a private school at Parramatta, he was admitted to holy orders in the Church of England. Taking up the study of natural science with ardour, he contributed many papers on natural science to newspapers and science journals. His work on the "Plants of Parramatta," published by the University of Göttingen in Germany, won him the degrees of Master of Liberal Arts and Doctor of Philosophy (Ph.D.). His "Plants of New South Wales" was until quite recently the only substitute for a flora of that colony available for botanical students. It is interesting to Queenslanders to know that his last labour was a review, contributed to the *Sydney Mail*, of Mr. F. M. Bailey's twentieth and twenty-first bulletins.

The journals of the scientific societies of New South Wales have added little to the study of botany during the past year, the only paper of importance in the proceedings of the Linnean Society being notes by Dr. Woolls on some plants collected by Mr. H. Willis at King George's Sound. In Victoria, botanical progress is mainly the outcome of Baron von Mueller's genius and energy, which remain undiminished in spite of advancing years. The Baron was a fellow-worker with Bentham in the production of that model work the "Flora Australiensis," his collections formed the largest quota of the required material, and he brought to the literary partnership that practical knowledge which only years of travel with definite scientific aims, and of study acquired during such travel, could possibly supply. For many years Colonial Botanist of Victoria, the Baron has published in rapid succession a series of volumes on Australian botany which have gained him a world-wide reputation. In his "Fragmenta Phytographiæ Australiæ" he has given descriptions of new plants from all parts of the continent, as they from time to time came to hand. His "Census of Australian Plants" is the acknowledged authority—appearance in which places new species, no matter by whom named, beyond cavil or challenge. His monographs on the Eucalypts, Acacias, Myoporineæ, and

Salsolaceous Plants are marvels of learning, finish, and completeness. Baron von Mueller is also the author of a handy little Flora of Victoria, furnished with a useful dichotomous key; and his "Select Extra-Tropical Plants" is not nearly as well known as it should be among our planters, orchardists and farmers. However much we may regret the break in classification and nomenclature between our standard "Flora" and the productions of the Baron, we must at least concede to a worker of such genius and experience the right to take his own course, since he has, to guide him in his decisions, such an intimate knowledge of his subject as is seldom vouchsafed to a single worker. During the past year the monograph on the Salsolaceæ closed with its tenth decade, having supplied illustrations and anatomical drawings of all known Australian plants of this order so valuable economically, since under the names of salt bush, blue bush, grey bush, silver bush, cotton bush, and goosefoot, they yield the major portion of the fodder in the Australian interior, and are invaluable to our western graziers. The main feature in the nomenclature of this order is the swollen genus Bassia, which has swallowed like Aaron's rod the whole of its neighbours and allies. At the present date the Baron has in hand an "Iconography of Candollaceous Plants," of which one decade has passed through the press. This is the order denominated in the "Flora" Stylidieæ. By replacing Labillardiere's title Decandollea or Candollea for Swartz's generally accepted name Stylidium, a series of intricate changes has been effected, Stylidium has been ejected into Cornaceæ, and Candollea has been ousted from Dilleniaceæ; and, while students are puzzled, the only visible result has been the affixing of *F. v. M.* to whole columns of plant names in the "Census," and the casting into shadow of such reputations as those of Robert Brown, Bentham, and Lindley.

The valuable work done by the Field Naturalists' Club of Victoria is deserving of mention, and the sphere of usefulness of the Club is daily increasing; its organ the "Victorian Naturalist" commands the attention of every Australian student of botany, being now the vehicle through which Baron von Mueller publishes to the world his descriptions of new plants, annotations, etc. Among Victorian cryptogamic botanists Mr. J. Bracebridge Wilson continues his valuable work in the collection and determination of marine algæ, having lately published in the Proceedings of the Royal Society of Victoria, Vol. IV, Part II, a classified list of the seaweeds of Port Phillip Heads and Western Port. The Revd. F. R. M. Wilson also supplies, in Vol. V, the first part of a lichen flora of his colony. Considering the large sums spent on botany in Victoria, very little has been devoted to the study of the native fungi; although a single plant of this order may wreck the year's labour of a whole farming community. In Mrs. Martin Victoria possesses a mycologist who has supplied by her private energy the wide gap that would otherwise have existed in the plant-lore of her native colony; and her collection of fungi is one of the most complete in the southern hemisphere.

The principal contributors of recent papers on botanical subjects to the Royal Society of South Australia are Messrs. M. Holtze and Ralph Tate. The former gives details of introduced plants in the Northern Territory, which exhibit close resemblance to similar lists published respecting Queensland; and he also supplies interesting notes concerning a botanical trip to Melville Island, at the entrance to Van Diemen Gulf. Professor Ralph Tate, whose scientific energy flows in so many different channels, gives a list of plants from the Northern Territory, the collection of Dr. E. C. Stirling. The Elder Expedition to Central Australia offered opportunities for the study of the inland flora that were eagerly seized upon by the lovers of botany in South Australia. Mr. H. Elmes was appointed collector for the expedition; and the plants obtained are being determined on the joint authority of Professor Ralph Tate and Baron von Mueller, the first portion of their work appearing in a special issue of the Royal Society of South Australia of December last. Specimens of the plants gathered have been promised to the Queensland Government herbarium, and species of special interest will doubtless be exhibited by Mr. Bailey.

The necessity for the publication of a new flora of Tasmania was prominently mentioned at the Hobart meeting of the Australasian Association; but so far without effect. Tasmania has been well supplied with lovers of cryptogamic botany, and Mr. W. A. Weymouth's name figures largely in Professor Brotherus' latest contribution to the study of Australian Musci, as a fellow-worker and correspondent. The study of Tasmanian lichens has been further advanced by the publication, in the Proceedings of the Royal Society of Tasmania, of papers by the Revd. F. R. M. Wilson and by myself, after holidays spent in that most beautiful island. Mr. Wilson was assisted in his collections by Messrs. Bastow, Morton, and Weymouth; and Mr. Weymouth also gave me specimens from his gatherings.

A knowledge of the botany of New Guinea is gradually being acquired, mainly through the exertions of its able Administrator Sir William McGregor; and all plants gathered by himself or officers are sent to Baron von Mueller for determination. In his "Brief Notes on some Papuan Plants" published in the "Victorian Naturalist" of November, 1892, the Baron says "already towards the end of last year I described for the tenth part of the 'Papuan Plants' several remarkable novelties." Bearing in mind the fact that the eastern colonies of Australia are jointly responsible for the cost of government in New Guinea, information respecting the plants collected at their joint expense should flow a little more freely from Melbourne than it does at present.

Before closing my address reference must be made to Mr. Otto Nordstedt's monograph on the Australian Characeæ, published at Lund in 1891, and giving illustrations and descriptions of plants of the genera Chara and Nitella, such as should prove invaluable to the botanical student.

It must not be thought for a moment that a complete knowledge of our Queensland flora has been gained. The opening of the North Coast Railway has shown that many so-called northern species have a much more southerly range than has hitherto been suspected; while along the same line new species continue to be brought to light. In Cape York Peninsula, on the shores of the Gulf of Carpentaria, and on our western frontier, there are large areas practically as yet untouched. There is also a large field for collectors in the long narrow strip known as the "desert belt," which runs parallel to and west of the main range, and is crossed by travellers to Hughenden, to Aramac, and to Goondiwindi. Although poorly grassed this belt is rich in flowering shrubs, many of them bearing large and showy blossoms, and among these are yet to be found plants unclassed by the botanist.

In relinquishing the presidential chair of the Royal Society of Queensland, I may be permitted to explain that my reason for refusing all requests to be again nominated for office is due to the pressure of duties in other well known directions, and which require such scant leisure time as is now at my command.

Discussion.

Mr. R. Gailey, in moving a vote of thanks to the retiring President, said that Mr. Shirley deserved the best thanks of the members of the Society for his untiring efforts on behalf of the institution, and the zeal he had displayed in connection with the special branch of investigation which he had taken up. He trusted that in making future appointments to the presidential chair, choice would be made of men who would be ready, as Mr. Shirley had been, to devote much time and undoubted ability to the advancement of the Society.

Mr. A. Meston, in seconding the motion, stated that Mr. Shirley possessed special qualifications for the position he had so ably filled, and it was to be regretted that other duties compelled him to decline to be nominated again for the office.

Mr. L. A. Bernays referred to the disinterested action taken by Mr. Bailey in the matter of the publication he had contemplated, which was very much what his oldest friends would have expected from him; and he had no doubt whatever that if the conditions were really fulfilled, Mr, Bailey would render willing and earnest services as the collaborator of Baron von Mueller. (Applause.)

The Retiring Secretary.

The Retiring President said that it would be observed that a change would this year take place in the position of Honorary Secretary. The retiring Hon. Secretary, Mr. Ryott Maughan, had rendered able service to the Society during the past four years. He had devoted much time and not a little business ability to carrying on a most important branch of the Society's work—work which had been performed honorarily, while his courteous demeanour at all times had been appreciated by all the members of the Society. It was with regret that the Council learned that Mr. Maughan intended to retire from the position, and he therefore had pleasure in moving a hearty vote of thanks to the Honorary Secretary, Mr. Ryott Maughan, for the able services he had rendered to the Society during the past four years.

Mr. J. R. Sankey (Hon. Treasurer), seconded the resolution, and endorsed the remarks of the President. The vote was carried with applause.

Mr. Ryott Maughan thanked the President and members of the Society for their kind appreciation of his services. His interest in the Society would not diminish, and his successor (Mr. Bailey), the son of a very respected citizen as well as a real scientist, would have all the assistance in his power. (Applause).

Election of Council, 1893-94.

The following gentlemen were elected for their respective offices for the ensuing year :—President, Mr. R. L. Jack, F.G.S., F.R.G.S.; Vice-President, Dr. Hirschfeld ; Hon. Treasurer, Mr. J. R. Sankey ; Hon. Secretary, Mr. J. F. Bailey. Members of Council, Messrs. F. M. Bailey, F.L.S., C. W. De Vis, M.A., J. Lauterer, M.D., W. Ryott Maughan, and A. Norton ; Hon. Auditor, Mr. Alex. J. Turner.

Votes of Thanks.

Mr. Felix Savage moved, and Mr. W. J. Byram seconded, a vote of thanks to the retiring Council, which was carried unanimously.

Mr. O'Connor moved a hearty vote of thanks to Mr. Turner, the Honorary Auditor, who had for so many years given them the benefit of his services. Mr. John Brown seconded the motion, which was carried unanimously.

Mr. A. J. Turner, in replying, referred to the fact that his duties had been rendered comparatively light owing to the method and care exercised by the retiring Secretary.

The New President.

The newly-elected President, Mr. R. L. Jack, F.G.S., F.R.G.S.; Government Geologist, having been escorted to the chair amidst loud applause, thanked the members for his election to so honourable a position, and expressed the hope that ere long the Council would be enabled to print the many valuable papers which had been held over.