THE

PROCEEDINGS

OF THE

LINNEAN SOCIETY

OF

NEW SOUTH WALES.

FOR THE YEAR

1904.

Vol. XXIX.

WITH TWENTY-SIX PLATES.

[*Note.*—The last Plate should have been lettered Pl. xxvi., instead of Pl. xxvii.]

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LIST OF CONTRIBUTORS AND TITLES OF PAPERS.

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PART I. (No. 113).

(Issued August 10th, 1904.)

PART II. (No. 114).

(Issued September 20th, 1904.)

Note.—Attention is called to the following Corrigenda in Mr. Andrews' paper "Notes on the Geography of the Blue Mountains and Sydney District" in Part 4 of the Proceedings for 1903.

Page 790, line 11—*for* loss *read* loads.
Page 810, line 2—*for* coastal *read* crustal.
Plate xxxix., fig. 1—*for* Tertiary Sandstone *read* Triassic Sandstone.

PART III. (No. 115).

(Issued December 16th, 1904.)

PART III. *(continued).*

PART IV. (No. 116).

(Issued April 10th, 1905.)

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LIST OF PLATES.

PROCEEDINGS, 1904.

LIST OF NEW GENERIC TERMS

PROPOSED IN THIS VOLUME (1904).

PROCEEDINGS

OF THE

LINNEAN SOCIETY

OF

NEW SOUTH WALES.

WEDNESDAY, MARCH 30TH, 1904.

The Twenty-Ninth Annual General Meeting of the Society was held in the Linnean Hall, 23 Ithaca Road, Elizabeth Bay, on Wednesday evening, March 30th, 1904.

Dr. T. Storie Dixson, President, in the Chair.

The Minutes of the preceding Annual General Meeting (March 25th, 1903) were read and confirmed.

The President delivered the Annual Address.

PRESIDENTIAL ADDRESS.

By way of prelude to a brief review of the past year's history, I may remind you that the Members are regularly kept in touch with the Society's work by means of the monthly Abstracts of the proceedings of the Meetings, and by the issue of the Parts of the Proceedings with as little delay as possible. Hence at the Annual Meeting it becomes unnecessary to attempt to report in detail upon many matters which, under other circumstances, it would be desirable to recapitulate at some length.

No better evidence of the Society's activity is needed than is furnished by the four Parts of the Proceedings published and distributed during the year—Part 4 for 1902, and Parts 1-3 for 1903. These Parts represent a volume of 948 pages, illustrated with 52 plates. But the Proceedings for 1903, comprising thirty-three papers, will, on completion, represent a volume of slightly over 1000 pages, with 50 plates, some of them folding maps, which in respect of cost mean more than an equivalent number of these. An annual volume of such dimensions is not only above the average size, but, except under very favourable conditions of income, it makes an undesirable approach to or even exceeds the extreme limit of our financial resources in this direction; and accordingly the Hon. Treasurer will presently have occasion to tell you that, for the first time for some years, our expenditure has exceeded our income, the financial year ending with a debit balance of £23.

The drainage arrangements of the Society's premises are about to be remodelled, consequent upon the availability of the new low-level sewerage system recently completed in this neighbourhood. This will necessitate an expenditure of an unusual and special character. In addition, circumstances which cannot be controlled, will shortly require a change in the mode of transmission of an important section of our exchanges to Societies and Institutions abroad; and this will entail an additional annual expense which must be allowed for. For these reasons, therefore, during the current year it will be necessary to exercise an extra check upon our publishing enterprise. It is desirable that attention should be drawn to these matters because we are beginning the year with a number of papers (including some held over from last year) sufficient to keep the Society busy for about one-half the Session, or say until the August meeting—a state of things without precedent. This announcement may cause the Hon. Treasurer some little anxiety; and if so, it will be necessary to make provision for its alleviation: but on every other ground this evidence of unwonted scientific activity is extremely gratifying. It is true that we commence

the year slightly but not ruinously in debt; but as a set-off we have had the gratification of welcoming to our ranks three new contributors whose papers are especially worthy of a place in the Society's Proceedings.

During the year seven Ordinary Members were elected, and two Members resigned. The Membership had not, therefore, very materially altered.

Since the last Annual Meeting the Council has had under consideration the question of continuing the suspension of entrance fees. During the period of five years (1899-1903) in which the entrance fees were given up, 81 Members were elected, of whom about 41 are effective at the present time. After considering the matter carefully, the Council has decided to recommend that the suspension of the payment of entrance fees should not be continued, but that the amount of the entrance fee should be reduced from £2 2s. to £1 1s. for Ordinary Members and given up altogether in the case of Associate Members. An opportunity for considering this recommendation will be afforded to Members at an early date.

The additions to the library for the year amounted to 1087, received by gift or exchange from 179 Societies and eleven individuals.

The Macleay Bacteriologist has during the past year continued his researches into the bacterial origin of the vegetable gums. In September, 1902, he showed that arabin, the soluble wattle-gum, was formed in the tissues of certain Leguminosæ by a micro-organism, *Bacterium acaciæ*, and that metarabin, the insoluble wattle-gum, was the product of another, *Bact. metarabinum*. Following up this discovery, he has during the past year read to the Society papers which deal with the other byproducts of these bacteria, with the causes of gum-formation in plants of other natural orders, and with kindred subjects. One or both of these microbes have been isolated from the vine, the cedar, the almond, the peach and the plum, all of which were affected with gum-flux. Having found the source of arabin and metarabin, Dr. Greig Smith studied the pararabin gum of Sterculia, and after isolating

a bacterium, showed that it produced pararabin. Thus the origin of the chief members of the arabin group of gums has been traced to certain organisms which convert the sap of the host plant into gum.

Although the chief agents in gum-formation are these three bacteria, yet others may be present in the plant tissues, and contribute a portion of the exudate. This was found to be the case with *Bact. persicæ*, which produces a gum allied to the members of the arabin group.

Occasionally a yeast-like mould, *Dematium pullulans*, is found in the tissues of gummed fruits, and as it has been credited with being the cause of certain cases of gum-flux, its investigation was undertaken. It was, however, found to produce a pararabin gum, and could not, therefore, be responsible for the arabin and metarabin gums of the fruit. It had been previously shown that an organism, *Bact. sacchari*, which normally inhabits the tissues of the sugar-cane, was capable of producing a slime. This was investigated, and found to consist essentially of a galactan gum.

This work, which had been done by the Society's Bacteriologist, has thus greatly advanced our knowledge concerning the formation of the chief vegetable gums; and not only has it been of scientific value, but it has also been of considerable economic importance. The world's supply of gum acacia can now be increased, as well as improved, by the infection of suitable trees with a selected bacterium.

During the year two students received full courses of laboratory instruction.

In August last we were called upon to mourn the death of Lady Macleay, after a brief illness. This sad event closed a most interesting chapter of colonial family-history. Her grandfather, Sir Richard Bourke, K.C.B., was one of the most enlightened and popular of Australian Governors. Her father, the late Sir Edward Deas Thomson, C.B., K.C.M.G , is still remembered by some of us as the courtly Chancellor of the University of Sydney. Sir Edward came out to New South Wales in 1828, about three years later than Mr. Alexander Macleay, whom he succeeded, as Colonial

Secretary and Registrar of the Records, in the year 1837. In the year 1857, Miss Emmeline Susan Deas Thomson, Sir Edward's second daughter, was married to Mr. William Macleay, who with his cousin, Mr. W. S. Macleay, arrived in Sydney in 1839.

Lady Macleay is sincerely mourned by a large circle of relatives and intimate friends; and by many whose sorrows and needs were lightened by her sympathy and help. Since her death, the old home, which for so long a period was almost uninterruptedly in the occupation of one or another member of the Macleay family, has been given up. Many memories of interest to scientific men cling about Elizabeth Bay House. It is difficult to ascertain with certainty the names of distinguished visitors or of others who were there welcomed as guests, but the list would certainly, or very probably, include Dr. George Bennett (before he became a resident), John Gould, Captain Fitzroy and Charles Darwin, Thomas Henry Huxley, Joseph Hooker, Robert Lowe (afterwards Viscount Sherbrooke), the officers or naturalists of various British and foreign Expeditions, Wyville Thomson, Henry N. Moseley and their colleagues, of the 'Challenger' Expedition.

Some New Light on the Society's Earliest History.

On the present occasion, and in a special manner, the turn of events once more directs the attention of the Society to a subject of two-fold interest—Sir William Macleay in relation to this Society, and also in his relation to the greater matter of Science, and its promotion.

In the fulfilment of his desire to advance science, Sir William Macleay made this Society, in its day, the chief medium through which he elected to work and act during his life-time; and upon it, accordingly, have now devolved in their entirety the responsible duties of acting as his chief trustee in scientific matters. And yet, notwithstanding his close connection with the foundation and early management of the Society, hitherto it has not been possible to find documentary evidence as to what actually transpired before the Society became fully fledged and held its first meeting for the reading of papers and for other scientific business, on January

25th, 1875, as reported on pp. 1-13 of the first volume of the Proceedings. For this deficiency there are at least two reasons. In the first place, of the four gentlemen who were most intimately connected with the formation of the Society, Sir William Macleay was the last survivor. And in the second place, the absolute destruction of the Society's early official records in the disastrous Garden Palace fire, in the year 1882, once and forever closed up this source of information. Under these circumstances you will be pleased to hear that Sir William Macleay's own notes on the Society's earliest history have quite recently come to light, and that, very appropriately, I am able to present them to your notice on the present occasion. It is also possible to indicate more clearly than heretofore some of the circumstances which almost certainly helped to lead him to identify himself so readily and so closely with the projected new Society just when he did.

The records of the Entomological Society of New South Wales seem to have shared the lamentable fate of the Linnean Society's early records. No trace of them was ever found among Sir William's papers and books after his death; and it seems reasonable to suppose that they were handed over to this Society and kept with its own records.

The last paper in the second and last volume of the Transactions of the Entomological Society of New South Wales is marked "Read 7th July, 1873," from which it would appear that no meetings were held after this date, and that the Society thereupon came to an end.

In December of the same year (1873), Sir William Macleay took the important step of notifying to the Senate of the University of Sydney that he was prepared to bequeath his library and collections to the University, and to endow the Curatorship; and at the same time he forwarded a copy of the terms of his bequest. The Senate accepted the offer, and at the University Commemoration on the 28th March, 1874, the Chancellor, Sir Edward Deas Thomson, C.B., made reference to the matter in the course of his address (as reported in the daily papers of March 30th.)

Mr. Barff's "Short Historical Account of the University of Sydney"* affords some most interesting information about the Macleay Collections, derived from the University records, and previously unpublished. Two items are worthy of notice. First, Sir William's estimate that the joint Alexander and William Sharp Macleay Collection comprised the contents of about 480 drawers, and his own collection, 320 drawers, or a total of 800 drawers. Also, that his own own collection had been accumulated during the preceding fifteen years; so that he must have begun to take an active interest in entomology about the year 1858 or 1859.

The year 1874 must have been one of the most important in the history of the Macleay Collections, for it was characterised by an expansion and development thereof to an extent which Sir William did not contemplate when he made his offer to the Senate. Without going into details, perhaps the most important factor in this progress may be mentioned — Sir William's decision to appoint a Curator, and the engagement of Mr. George Masters in that capacity.

On February 5th, 1875, Sir William made the following note: — "This day completes the first year of Mr. Masters's Curatorship, and I think the additions to my museum during that time have been very large indeed. I have now over 1,000 species of birds, and of these 395 are Australian. There is a fine collection of fishes, and the reptiles are rapidly increasing. A large number have been added from the Endeavour River, California, and elsewhere, to the entomological collection; while of shells, and marine animals, we have accumulated a vast number."

But if Sir William had penned his note on some day towards the end of September or in the early part of October of the previous year, he would still have been in a position to speak of his very extensive and comprehensive acquisitions of material, including the results of a systematic and successful attempt to obtain a representative collection of the marine fauna of Port

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* In connection with the Jubilee Celebrations, 1852-1902, 8vo., Sydney, 1902, p. 119.

Jackson. Moreover, attention was directed to other matters besides the collection and acquisition of specimens, for Sir William and Mr. Masters, with the occasional help of Professor Stephens and Mr. Brazier, devoted much time to the sorting and preservation of the marine and other forms. They also made a brave beginning in the work of attempting to identify the representatives of the species already known to science, but of which named specimens were wanting in the Collection. Thirty years ago such a task as this would be a very discouraging one to a colonial zoologist. Sooner or later, Sir William must have realised that he had upon his hands enough material, much of it undescribed, to occupy the attention of several specialists for some time; and that if it were to be turned to account, sooner or later something would have to be done.

At some such juncture as this, when Sir William was as busy with the matter of museum development as he could well be, the formation of a new Scientific Society was mooted. The following is Sir William's account of how this came about, and to what it led, until the doings of the Society began to be chronicled in the Society's Proceedings. Of course it was never intended for publication, and it appears here as a continuous narrative because of the omission of irrelevant matter.—

Oct. 13th, 1874.—Dr. Alleyne and Captain Stackhouse are trying to get up a Society of Natural History. I hope they may succeed. Such a Society, embracing all branches of Natural History, and issuing a Monthly Magazine, ought to be both useful and successful.

Oct. 24.—Stackhouse has a number of signatures to the Natural History Society proposition, and has called them [the signatories] together to consult, on Thursday next, at 4.30, at the Free Public Library.

Oct. 29.—At 4 o'clock my cab came for me, but I did not go to town as it threatened rain, and my cold is still troublesome. I sent an excuse to Stackhouse, this being the day of the preliminary meeting of his proposed Society.

Oct. 30.—Stackhouse called this morning about preparing rules for the new Society. At the meeting yesterday the name was fixed as "The Linnean Society of New South Wales"; and I was elected President. . . Stephens, Alleyne, Stackhouse, and I were for an hour at the Club this afternoon drawing up rules for the Society.

Oct. 31st.—I had to go into town before 12, as at that hour I had to meet Stackhouse, Stephens and Alleyne about the rules of the Society. We agreed upon the rules to be laid before the meeting on Thursday next; also upon the form of a circular inviting members.

Nov. 5th.—I was detained so long . . . that I was unable to attend the meeting of the Linn. Soc. of N.S. Wales, but I believe the rules were gone through, and passed.

Nov. 16th.—I sent off to-day, at Stackhouse's request, a number of circulars of the Linnean Society of N.S. Wales addressed to people in Yass, Gundagai, and Wagga Wagga. There is considerable difficulty in getting suitable premises for the Society.

Nov. 21st.—I went to a picnic to-day of the Linnean Society; about 20 members were present. We started from the Circular Quay at 10 o'clock, in a small and dirty steamer; and after picking up a fishing boat, &c., we fished Vaucluse Bay, the top of North Harbour and Quarantine Bay, where we had our dinner. The catch of fish was small; at Quarantine Bay we got a good many white Trevally, pronounced by those who ate some, a good fish, and a few salmon and flathead. I got for my collection a swimming crab, a salmon and a small barred sole. Masters, who was of the party, got also, I believe, some small shells. At Quarantine Bay we saw a large sunfish rolling about for some time. We got back by 6 o'clock.

Dec. 4th.—The room in George-street [Lloyd's Chambers, 362 George-street] taken for the Linnean Society, is now ready for use.

Dec. 15th.—Stackhouse came out this forenoon to see my bottles, vases and tanks; he wishes to get a supply for the Linnean Society's room. . . . When in town I went with Stackhouse to Elliott Brothers on Linn. Soc. business, and attended a meeting of the Managing Committee of the Society at the room in George-street.

Dec. 18.—Went to town at 4 o'clock, taking with me, at Stackhouse's particular request, my harpoon, which he wishes to take with him on a Linnean Society fishing picnic to-morrow.

Dec. 19th.—A pleasant day, though rather hot. Masters came here in the morning, and at 9.30 a.m. he and I drove to the Circular Quay to join the Linnean Society's picnic, which was to start thence at 10 o'clock. At 10.30 a.m. we got away; the steamer, a very small and dirty one, and the party, numbering 16—Ramsay, Brazier, Badham, Dalley, &c., &c. We hauled the seine in Chowder Bay, Obelisk Bay, and above Shell Cove in Middle Harbour, where we had dinner. We did not get much either by the net or dredge (we had Mulhall's dredge with us), but plenty of fish to eat of good quality, which was skilfully cooked by Dalley. We got back to the Circular Quay about 6.30 p.m., a good deal tired and very much sunburned.

Jan. 13th, 1875.—At 4 p.m. Masters went with me to the Annual General Meeting of the Linnean Society of New South Wales. The meeting was well attended. The Officers and Council for the year were appointed, and the last Monday of each month fixed for the Ordinary Meetings. I was re-elected to the Presidency.

Jan. 22nd.—Purchased yesterday for presentation to the Linnean Society a very nice microscope. Our first meeting is on Monday; as I have not prepared any address, I wish to give something as a substitute.

Jan. 25th.—Went to town at 8 o'clock to attend the Linn. Soc. Meeting. The attendance was good (16). Brazier described some shells, Ramsay a new bird, and I read some notes on the Entozoa of the Sunfish, and exhibited the animals. I also presented a microscope.*

This interesting account leaves little to be desired, except that it does not disclose the identity of the member who was responsible for the choice of the Society's name; though apparently it was not Sir William. The Society possesses a copy of the Rules adopted at the Meeting held on 5th November, 1874, but lacks a copy of the circular referred to above in the entry for 31st October. Perhaps some of the older Members may be in a position to afford some additional information, or, it may be, to find a copy of the circular; and if so, the Secretary will be grateful for their co-operation.

The first edition of the Rules, bearing date 1874, includes the names of the first Officers and Council, and the names and addresses of the Original Members, numbering 107. The first Officers were:—*President*, Wm. Macleay, F.L.S.: *Vice-President*, The Hon. Sir Wm. Macarthur, M.L.C.: *Council*, H. G. Alleyne, M.D., J. C. Cox, M.D., F.L.S., H. H. Kater, Captain A. A. W. Onslow, R.N., E. P. Ramsay, C.M.Z.S., W. J. Stephens, M.A.: *Secretary*, Commander T. Stackhouse, R.N.: *Treasurer*, H. H. Burton Bradley.

Of the Original Members, only eight survive or have maintained their connection with the Society.

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* Proc. Linn. Soc. N.S. Wales, i. p. 13. This instrument, together with the larger one by Ross, subsequently presented to the Society by Sir William, perished in the Garden Palace fire.

Sir William Macleay and the Endowment of Research.

With a reticence which was characteristic, Sir William Macleay himself never publicly referred to his benefactions, nor did he commit himself to any declaration upon the subject, beyond what he deemed to be necessary to give legal effect to his arrangements.

Sir William's intention to make due provision for the endowment of Research Fellowships, first became publicly known through an announcement by the Chancellor of the Sydney University, in the course of his Commemoration Address delivered on May 2nd, 1885. The announcement had its inspiration mainly in Sir William's appreciation of the memorable character of the occasion; though doubtless it was also a diplomatic move to enable the Chancellor, under the most favourable conditions, to participate in the duty of keeping "prominently before the public the advantages to be derived from scientific education and training." At the Commemoration of May 2nd, 1885, for the first time, the University exercised extended powers conferred by the 'University Extension Act of 1884,' and granted degrees other than those provided for in the original Charter of 1858. The first two science students who had completed the prescribed course were on this occasion admitted to the degree of B.Sc.

As the management of matters in connection with the Fellowships is about to become an integral part of the administrative work of this Society, it will be of interest to ascertain, if possible, when and under what circumstances Sir William decided to establish them.

Up to the year 1880, the amount of the endowment received by the University from the State was £5,000 per annum. But this sum was scarcely more than sufficient to provide for four Chairs (Classics, Mathematics, Chemistry and Physics, and Geology and Mineralogy), in addition to what was requisite for administrative and incidental expenses. In the year 1881 this grant was increased by an additional amount of £1,000 per annum; and in the following year the total was again augmented by the sum of £5,000 per annum. "It is from this time," says

Mr. Barff (*l.c.*, p. 94), "that the expansion of the University began. The announcement in that year [1880] of the great Challis bequest, to accrue at a future time, stirred the University to fresh life, and an extended scheme of teaching, involving the establishment of chairs or lectureships in Natural History, Modern Languages, Engineering, and the opening of a Medical School, was adopted by the Senate, and approved by the Government of the day [in 1881]. . . . The Arts Curriculum was made much wider in its range . . . while a separate Faculty of Science was established, with a curriculum of pure Science, leading to the Degree of Bachelor of Science, and with a sub-department of Engineering" [in 1882].

Sir William Macleay, as a Member of the Senate, took the keenest interest in the developments outlined above, and especially in all that related to the Faculty of Science. But he was quite as much interested in them as a private individual devoted to science, and the moving spirit of a Scientific Society which existed solely for the cultivation and study of the Science of Natural History in all its branches. In the former capacity, he had already made some progress in arranging a comprehensive scheme for the present or future utilisation of the greater portion of his private fortune, for the advancement of science; though still leaving himself scope for new developments.

As one direct result of University expansion, opportunities for scientific study and facilities for scientific training had now become available in wholly new directions, or to an extent previously unknown in New South Wales. On the other hand, the extent to which science students might be disposed to respond to these opportunities, under existing conditions, was theoretically subject to some hampering limitations. The tantalising dilemma in which a scientific aspirant may find himself is lucidly indicated in one of Huxley's Addresses.* If Science is to take its proper place in a University, it must be accorded due "recognition as a Faculty, or branch of study demanding recognition and special

* "Universities: Actual and Ideal." 'Science and Culture,' pp. 47 and 55.

organization, on account of its bearing on the wants of mankind." But when the University has done its duty by Science, and the Faculty of Science, in its turn, is prepared to do its duty by the Science Student, the latter, before committing himself to the Faculty, may do well to ponder such words as these:—"If a student of my own subject shows power and originality, I dare not advise him to adopt a scientific career; for, supposing he is able to maintain himself until he has attained distinction, I cannot give him the assurance that any amount of proficiency in the Biological Sciences will be convertible into, even the most modest, bread and cheese."

One circumstance in particular—the date of the Will in which he incorporated his scheme for Fellowships—seems to show clearly that, concomitantly with the inauguration of the Faculty of Science, Sir William's attention was arrested by this question of the science student's disabilities; and that out of its consideration arose the idea of establishing Fellowships, and a little later, that of offering Exhibitions* for country students; and also his recognition of a duty, to which he directed the attention of this Society, in an address delivered on the occasion of his dedication of the Linnean Hall to the Society, in October, 1885, in the following words:—"The importance of the subjects [Natural History in all its branches] coming within the scope of this Society can scarcely be over-estimated; and one of our chief duties, it seems to me, is to keep prominently before the public the advantages to be derived from scientific education and training." (The continuation of his remarks on this point, and their bearing on the question of the improvement of the status of the science student, will be found in the extract given below, p. 17.)

Sir William's determination to establish Fellowships, once arrived at, must have taken definite shape rather rapidly. The

* For particulars, see Proceedings of this Society. Vol. viii. p. 548. One Exhibition was awarded; the offer of others was eventually withdrawn, a the candidates for them were not up to Matriculation standard.

Senate first learned that Parliament had voted an increased endowment of £5,000 for the year 1882, early in the month of December, 1881; and such prompt action was taken that a "Scheme of University Teaching in accordance with the increased endowment lately voted by Parliament," was drawn up by a special committee, adopted by the Senate, and forwarded for the approval of the Government before the end of the same month. About three months after this date Sir William Macleay had already matured his scheme, and executed a new Will, with a view to giving legal effect to it. In a letter to the Chancellor, of date March 29th, 1885, after enumerating the qualifications for a Fellowship, he added—"These are, as far as I recollect, the chief conditions made in my Will three years ago."

In his Commemoration Address of April 23rd, 1892, the Chancellor of the University, Sir William Manning, once more referred to the Fellowships in the following words:—"Four Fellowships, of so great an amount, exclusively for our graduates in Science . . . . can hardly fail, when available, to cause a great expansion in a School which has hitherto languished for lack of prospective advantages, except in its contributions to the School of Medicine. The want of candidates for graduation in pure science was well known to Sir Wm. Macleay; and he must, therefore, have distinctly contemplated that his endowment would, after the more or less remote date at which it would come into operation, give new life to the School, and multiply graduates who would fill his Fellowships."

No exception can be taken to this statement of the case, except that it leaves out of sight the important point that Sir William's scheme for Fellowships was based entirely upon foresight, and not upon experience, as the Chancellor's remarks might, perhaps, be taken to imply.

The Chancellor's announcement is now only of historical interest. Sir William Macleay's plan, as therein outlined, provided for an endowment fund of £30,000, but otherwise did not differ materially from the later one. It was subsequently set

aside in favour of the scheme embodied in Sir William's last will, executed in December, 1890, and to this effect :—

Subject to a life interest on the part of his wife, the Testator directs his executors and trustees—

" Upon trust to pay the sum of thirty-five thousand pounds in cash or invested funds to that value to the Linnean Society of New South Wales which Society shall invest and keep invested and reinvested from time to time the said sum in the manner hereinbefore mentioned and shall hold the income thereof upon trust for the foundation and endowment of four Fellowships to be called the Linnean Macleay Fellowships which shall be maintained for the following purposes and upon the following conditions

The Fellowships are intended to encourage and advance research in Natural Science by enabling those who wish to continue their studies at the University or elsewhere after having completed the regular curriculum and taken a Science degree to do so

The qualifications necessary for a Fellowship are

The Candidate must be a member of the Linnean Society of New South Wales and reside in New South Wales must declare his intention of employing himself during the period of his Fellowship in original investigations in Natural Science and must have taken a Science degree in the University of Sydney

The appointments to the four Fellowships shall be made annually by the Council of the Linnean Society of New South Wales at such times in such manner and under such regulations as it shall determine but it shall not be necessary to fill up all or any of the vacancies if eligible candidates do not present themselves The same Fellows may be and it is my intention and wish that they should be re-elected from year to year so long as the Council of the Linnean Society of New South Wales is satisfied with the quantity and quality of their work

The results of their work and investigations of the Fellows shall be published regularly with the Proceedings of the said Linnean Society

The salary of each Fellow shall be four hundred pounds a year the interest accruing from vacant Fellowships shall be added to the principal

The interest on the endowment over and above four hundred pounds a year for each Fellow shall be taken for the general use of the said Society at the discretion of the Council thereof

No Fellow shall be permitted to occupy any salaried position or undertake any employment for payment during his Fellowship nor shall he without the special sanction of the Council take fees for teaching any pupil either publicly or privately If in the opinion of the said Council of the said Society or a three-fourths majority thereof any Fellow shall have trangressed the last preceding rule they may by the vote of such majority remove him from Office

Every Fellow before entering on Office shall engage in writing to accept his office on the terms of this will and that the decision of the said Council on any dispute arising between him and them on the subject of his Fellowship his employment thereunder and his tenure of office shall be final and conclusive without appeal

The subjects of investigation undertaken or assigned to Fellows shall be all branches of Natural History Biological and Geological."

It will be noticed that, whatever other desirable qualifications a candidate for a Fellowship may possess, it is indispensable that he shall have taken a degree in Science. From Sir William's point of view this condition was both reasonable and logical. It was the outcome of his strong convictions upon the advantages to be derived from a scientific education and training, and the need of a more appreciative recognition thereof; coupled with a realisation of the fact that, at present, the study of Natural History leads to little or nothing in the shape of profitable occupation. But Sir William clearly outlined his standpoint in the address delivered on the occasion of the dedication of the Linnean Hall. This was published in the newspapers of the day, and subsequently as a pamphlet,* but as it is easily overlooked, atten-

* Linnean Society of New South Wales. Record of Proceedings. Linnean Hall, Ithaca Road, October 31st, 1885. 8vo. Sydney, 1885.

tion may well be called to it again. On the occasion referred to, Sir William said :—

"It is only of late years that Natural Science has found its proper place in University education in England and among English-speaking people, who are, in this respect, far behind France and Germany. It is now, however, making rapid strides, and the ancient University of Cambridge bids fair to become as famed as a science school as ever it was for mathematical excellence. Other Universities are now emulating its example, and I trust that Australia will not permit herself to be left behind in the race for knowledge. Up till now, biology has as a rule never [? not usually] been taught except as a compulsory part of the medical profession, and the time required for the study of the specialities of that profession precludes the possibility of acquiring more than elementary knowledge of general biology, yet it is from the ranks of the medical profession that the most eminent biologists of the day have been drawn. Those branches of science which treat of the forces of nature, and the changes brought about by combination, viz., natural philosophy and chemistry, lead to so many profitable occupations and employments that there is little risk of their being neglected; but it is not so, at present at all events, with the science of natural history. I do not admit that the value of knowledge should be tested by the amount of money it will put into the pockets of its possessor, or that the acquisition of wealth is the sole aim and intention of education, but there can be no doubt that to the mass of people the consideration 'what will it lead to' must take a prominent place in the training of youth. Is, then, a knowledge of natural science financially worthless? Does the degree of B.Sc., which necessitates a knowledge of both ancient and modern languages and of all the sciences, not involve a higher and more general culture than that of B.A., which has a recognised value for teachers, clergymen, and barristers? Will not a like, if not a higher value, be placed on the science degree, when its superiority is ascertained and admitted? The time, I am sure, is not far distant when the graduate in science will be eagerly sought, not only for

the education of youth, but for the many and important offices under Government, in which scientific attainments are desirable, as in the departments connected with agriculture, pastoral pursuits, fisheries, woods and forests, horticulture, mining, metallurgy, geological surveys, &c. . . . But reform in our system of education must begin with our schools, and to reform them is by no means an easy task."

With regard to the pecuniary value of the Fellowships, as compared with that of Research Fellowships available for investigators in other parts of the world, I am unable to say very much, as the necessary data have not been available. But, remembering that Sir William had practically settled the essential details of his benefaction so long ago as the year 1882, the following statement is not devoid of interest. In the year 1881, the Owens College, Manchester, was able for the first time to offer five Fellowships, each of the value of £100, to be awarded, not on the results of examination, but after consideration of documentary or other evidence, and with the prospect of a re-appointment for a second, and in like manner for a third year, the successful candidates being expected to devote their time to the prosecution of some special study, &c. Now, the point to which attention may be called is, that in the announcement of the results of the first award of these Fellowships in *Nature* (October 27, 1881, p. 605) it is stated that "These are remarkable as being the only fellowships given in any University or College in the United Kingdom solely for the encouragement of research." No doubt since then there has been considerable development in this direction in Great Britain or elsewhere in Europe, and America; but I am unable to give you details. One thing, however, is certain, the pecuniary value of the Linnean Macleay Fellowships will be very considerable, even perhaps exceptionally high—a consideration which will be not without its responsibility for all concerned. But this responsibility, after all, will take care of itself, if Fellows accept their Fellowships in the right spirit, and for what they are intended to be—"aids to

do work; not rewards for such work as it lies within the reach of an ordinary, or even an extraordinary, young man to do."

If Sir William Macleay's endowment of research were a matter which concerned this Society, the University, and men of science only, there would not be much need to enlarge upon its significance and importance. But Sir William Macleay's prolific benefaction is something which concerns a very much larger social aggregate than the members of this Society and of the University only. In reality it is a most munificent gift to this Society upon trust for New South Wales. But even this statement does not fully meet the case; because, though the Fellows must be New South Welshmen, in the sense that they must have graduated in science at the University of Sydney, and that as Fellows they must be domiciled in New South Wales, the results of their work are to be added to the common stock for the benefit of humanity at large. Therefore, I think I am not mistaken in my views when I venture to say that it seems to be the duty of the Society, as the administrator of the trust declared by Sir William, to consider what can be done to arouse some intelligent public appreciation of the heritage which his munificence has provided; and at the same time to shed light upon what perhaps to those outside the ranks of the strictly scientific is not, at first sight, quite evident—its inner or hidden meaning.

The term research, in its widest sense, has been defined "as indicating those efforts of the human mind which result in the extension of knowledge, whether such efforts are exerted in the sphere of literature, of science, or of art." The entire field is so vast, that the individual who desires to encourage research must keep his plans within the limit of his resources. Sir William Macleay was a naturalist, and therefore his provision for the growth of knowledge took the form of the encouragement of scientific research in those branches in which he himself was specially interested and for whose promotion this Society was instituted.

In Australia, under present conditions, research mainly devolves upon University teachers, the officers of Museums and of

various Government Departments, and amateurs; and therefore, as a rule, in conjunction with, or in subordination to, official duties. The only important exception, as far as I know, is the Macleay Bacteriologist to this Society. But there is another class of investigators, at present only casually or intermittently or not at all provided for, in the above classification; and it was for this special class that Sir William accepted the responsibility of providing an improved *locus standi*. Leaving the Macleay Bacteriologist out of account, Sir William Macleay's liberality is then correctly characterised as the endowment of Post-graduate Research in Natural Science.

The case for the endowment of research of this special character has been well stated by Mr. Addison Brown in an excellent Address upon "Endowment for Scientific Research, &c.," delivered in New York in 1892.* He says:—

"Upon the post-graduate workers, the future of science and the recruits for future teachers and professors, must necessarily depend. In that view the importance of post-graduate endowments in science can scarcely be magnified. The great majority of the young men from whom all the new recruits must be drawn have little or no pecuniary means. After graduating, often through many difficulties, they must face the question of their future calling. They must consider what promise of a reasonable and comfortable support a life devoted to science affords. If this risk should not deter them, still there are many with talents of a high order who would be absolutely unable to proceed further in the advanced scientific studies necessary to qualify them to enter upon remunerative scientific work, or to obtain situations as professors or assistants, except by the aid of substantial endowments for their support, during the three or four years more of necessary assiduous study.

"In the stress of modern life, and in the allurements towards more certain pecuniary results, nothing but such endowments

* Reprinted in the Annual Report of the Smithsonian Institution for 1892, p. 629.

can avert the withdrawal from scientific pursuits of many young men of high promise, whose genius and tastes and ambition strongly incline them to science, and who would be secured to it if this temporary support were afforded."

At the University of Sydney, at the present time, "besides this [the Dalton Fund], the James King of Irrawang Scholarship of £130 per annum, and the Frazer Scholarship for History are the only scholarships for post-graduate work in the gift of the University. The Royal Commissioners of the Exhibition of 1851, at Kensington, have, however, on six occasions awarded Science Research Scholarships of £150, tenable for two years, to graduates in science."* The Dalton Fund now provides for the Woolley Scholarship of £150 per annum, tenable for not more than two years, and is intended to encourage post-graduate study of one or more subjects falling under the heads of Language, Literature, History and Philosophy. The James King of Irrawang Travelling Scholarship is of the annual value of £130, is tenable for not more than two years, and is intended to foster post-graduate study in Mathematics, Chemistry, Physics, or Natural History. The Frazer Scholarship is of the value of £70, and in part is awarded for historical study or research during at least one year after graduation. The Science Scholarship of H.M. Commissioners for the Exhibition of 1851 is of the value of £150, is tenable for two years, and is awarded for "the prosecution of study and research in some branch of Science with a view of developing the manufactures and industries of his [the scholar's] country." (See Note, p. 31.)

The interests of Natural Science in relation to post-graduate study certainly cannot be said to have been lavishly provided for in New South Wales, up to the present.

Reverting to the subject of the endowment of research, it is to be noted that we have no record of any very explicit expositions of Sir William Macleay's views upon such questions as the importance of research work, or the best way of improving its prospects

* Barff, "Short Historical Account," &c., p. 94

in this part of the world. But his actions leave us in no doubt as to what his ideas about these matters were.

Sir William Macleay was a man characterised by remarkable foresight, by unwavering energy, by broad views and strong convictions. Above all things he was a man of deeds rather than a talker; and he put the mark of his personality on all his important scientific enterprises. He had identified himself closely with the cause of higher education. He knew that the pursuit of knowledge without regard to obvious, immediate, or necessary results is not an income-producing profession; and that, except in a few exceptional cases, such work must ultimately depend for its support either upon the State or upon private munificence. He knew, also, that it did not matter from which of these sources the support came, provided it was adequate, reliable and permanent in character. His knowledge of Australian matters was the harvest of half a century's experience. As a politician, he knew much about the claims upon the State in a young and developing country, and the limitations of its powers. Nevertheless he was silent upon the matters referred to. But one thing he did not fail to do. He would seem to have put the case of Australia's need of more workers forcibly to himself, and to have done it in a convincing manner. And then, once more we discern the man of action. For by his deeds, though not in so many words, Sir William has said something to this effect—"I recognise Australia's need for a greater advancement in science. I estimate that, to New South Wales, the capitalised money value of a capable Bacteriologist and four able and qualified Research Fellows, engaged in active work, untrammelled by routine, is not less than £47,000 sterling. After my death, and when certain necessary arrangements which I have made shall have been fulfilled, let the men be found and set to work, and the endowment shall be a charge upon my estate."

In this way Sir William Macleay has provided for a new and perennial source and spring of knowledge; and he has placedits care and maintenance in the charge of this Society.

At the Meeting of the American Association for the Advancement of Science in 1891, the President, Professor Prescott, spoke these remarkable words :—

"There is no greater need in this land—unless it be the exclusive need of righteousness itself—than the need of advancement in science. Let this be understood by all, if America is not to fall short in the nurture of manhood, in the reach of mind and in the arts of peace, if she is not to fall short altogether, she must advance in science, and must cherish her workers in scientific research."

Is such a statement of the case one whit less applicable to Australia than to America or to any other country?

Then it is not too much to say that by no one in Australia has this need been realised more fully than by Sir William Macleay; for his actions were but the corollary to his beliefs. Looked at separately and from without, his various important scientific undertakings—the development of the Macleay Museum, the development and endowment of the Linnean Society of New South Wales, the endowment of Bacteriological research, and the endowment of Fellowships—may seem to the uninitiated to be merely so many unconnected enterprises. But when viewed from within, they are seen to dovetail into one another, and yet all to hinge on to a central idea, which is their raison d'être—the advancement of science.

Some American Object Lessons.

During my recent visit to the United States, Canada and Europe, I made it my endeavour, as far as possible, to look into several matters which are of special interest to me. And here I should like to express my heartiest appreciation of the courtesy and kindness everywhere extended to me, by perfect strangers, no matter how high their official positions. On the present occasion I shall confine myself to the consideration of two or three American topics which I think will not bed evoid of interest to you. At the same time I would point out that it is not the impressions

of what I saw that I wish to emphasise so much as the suggestive facts that lie behind them.

First, then, I will take America's successful exploitation of exotic vegetable products, and for the sake of simplicity, I will confine myself to the consideration of some Australian vegetable products—and notably Eucalypts, Tan-bark Wattles, and Saltbushes. Just at this point it will be becoming to remind you of the late Baron von Mueller's share in these and other extra-Australian developments on similar lines. His zeal in distributing seeds and in disseminating information has borne fruit abundantly abroad, though the results of his efforts nearer home, perhaps, may not have been so satisfactory.

Among my very pleasant American experiences was a visit to the University of California at Berkeley, and among the first objects to arrest my attention on entering the University ground were some Eucalypts and Saltbushes. The University includes within its scope an Agricultural Department in charge of Professor Hilgard. This Department comprises a Central Experiment Station, with some half-dozen affiliated substations in different localities. I would draw particular attention to one of these—the Santa Monica Forestry Substation. It was established in 1887-8 by the State Board of Forestry, and in 1893 it was taken over by the University from the State. At the latter date there were established here representatives of forty-four species of Eucalyptus, as far as the botanists could determine them, many of them represented by only one or two specimens. In 1903 the number had risen to "something more" than one hundred species, many of them with fifty or more representatives, of different ages, and growing upon different soils. In order that you may appreciate this remarkable fact, I may remind you that, out of a total of about 150 Australian and Tasmanian species of Eucalyptus, Queensland may be credited with about 61 indigenous species, New South Wales and West Australia (Extra-Tropical) with from 50-60 each, Victoria and South Australia (Extra-Tropical) with from 30-40 each, and Tasmania with about 17. The Mallees, or shrubby forms of Eucalyptus, are of less value from

an American point of view than those which are forest trees, and are probably neglected. But here, in this one locality, you have flourishing a choice selection amounting to something between 50 and 75 per cent. of the known species of Australian and Tasmanian Eucalypts. Why, such a sight as this, I believe, cannot as yet be seen in Australia itself.

These Eucalypts are grown for a purpose, and not as curiosities. Their life-histories in detail are known; their behaviour under varying conditions of climate and soil, their rates of growth in height and girth, the flowering periods, and everything else about them of interest are regularly noted, tabulated, and recorded, and the results are from time to time published with most artistic illustrations from life; and the knowledge so gained is diffused broadcast for the benefit of everybody who can make use of it—"The Station Reports and Bulletins will be sent to any citizen of the State on application, so long as available," is the official announcement about them. Seeds and plants are also freely distributed.

Two other points of interest may be mentioned. With such a large number of species under observation, it is found that quite a number of them are in flower all the year round. Results of this kind are recorded and tabulated; and then made available for bee-keepers. Another advantage presents itself, too, in the shape of opportunities for systematic hybridisation, with results that promise to be of great interest and value.

California is very suitable for the acclimatisation of Eucalypts, and the Eucalyptus industry has already grown to such an extent that Professor McClatchie says—"Over much of the State of California Eucalypts are the principal wind-breaks, shade and fuel trees, and the number of useful purposes they serve is continually increasing. Without the Eucalypts, California would be a very different State, and their value to the Commonwealth is beyond calculation."

But Eucalyptus culture is not by any means confined to California. The value of Eucalypts is fully recognised, and their cultivation steadily spreading wherever climatic conditions will

allow. They "are now grown in America, especially in Southwestern United States, more extensively than any other exotic forest tree," says Prof. McClatchie.

Of the strides which Eucalyptus-culture has made and is making, and of its rapid rate of growth, you will be able to judge almost at a glance by comparing two books on the table before you—one the pioneering work, in a literary sense, of Ellwood Cooper entitled "Forest Culture and Eucalyptus Trees," published in 1876; the other the elaborate and most attractively illustrated work of Professor A. J. McClatchie, entitled "Eucalypts cultivated in the United States," published in 1902, by the U.S. Department of Agriculture.

Much the same sort of story can be told about American enterprise in regard to Acacias and Saltbushes. For the sake of brevity I shall content myself with mentioning the verdict of the late Prof. Myers, Director of the West Virginia Experimental Station, who said—"I have no connection with the University of California, but I have been greatly interested in their experiments with Australian Saltbush (*Atriplex semibaccata*). The work of the California Experiment Station in introducing and developing this plant for the use of the farmers of California is worth more to the State than the entire Experiment Station has cost since its beginning, or will cost for the next fifty years."

Such developments as I have very imperfectly and briefly indicated—the enterprise, the patience, the foresight, the strictly scientific basis of work, the keen appreciation of the value of knowledge—surely all this may be fairly commended to the notice of Australia as an object lesson. If Americans value so highly and treat so handsomely certain Australian plants which they have acclimatised only by a great expenditure of trouble, time and money; how, one may ask, do *we* value Nature's freely given resources, and what sort of treatment do we mete out to them? This only will I say. If as a community we, and our rulers, had a truer insight into the importance of knowledge, and a keener appreciation of its value, how differently some things would be done, or would have been done, in New South Wales and I might even say in Australia.

One of my most delightful American experiences was a visit to the "Children's Room" in the Smithsonian Institution. The story of this notable departure in museum organisation, wholly in the interests of the little ones, has been charmingly told by Mr. Albert B. Paine, in an article contributed to the St. Nicholas Magazine for September, 1901, subsequently reprinted, with most beautiful illustrations, in the Annual Report of the Smithsonian Institution for 1901. The idea of the Children's Room originated in the fertile brain of Dr. S. P. Langley, the distinguished Secretary of the Smithsonian Institution; who accordingly officially appointed himself Honorary Curator, with explicit instructions "to see that a room was reserved and properly prepared for little children who wished only to look and wonder, and find out such things as little people most want to know." In carrying out his self-imposed task, Professor Langley had, on the one hand, the approval and support of the Board of Regents of the Institution; and, on the other, the loyal and enthusiastic co-operation of his colleagues; and, withal, the resources of the Smithsonian Institution and of the affiliated U.S. National Museum to draw upon. Special attention was devoted to the painting and decoration of the room, to the planning and arrangement of the show-cases, and also to the labelling of the contents. The specimens exhibited are, above all things, choice rather than numerous. "Each object is chosen just to give the child pleasure. If the child receives instruction, too, well and good; but first of all he must be attracted and pleased, and made to wonder, for in wonder lie the beginnings of knowledge." The Children's Room was opened to the public in 1901, and has fully justified its originator's expectations as to its appreciation by those for whose entertainment and pleasure it has been specially provided. As time goes on no doubt it will be still further developed, so as to fulfil yet more perfectly the aim and object for which it was instituted. "The subjects represented are mainly zoological; familiar American birds, common European birds, large birds of prey, interesting water-birds, curious birds, brilliantly coloured birds, illustrations of protective mimicry among birds

and insects, and curious shells, corals, sponges, &c. There are also some minerals, fossils, two aquaria with living fishes, and a number of bird pictures on the walls." Here, in the capital of the great Republic, even young children are coaxed by pleasant ways to become acquainted with the bypaths of Science.

But the "Children's Room" is, after all, only a natural outcome of advanced American ideas upon the subject of the evolution of the purely educational side of Museums. In such institutions, for example, as the United States National Museum at Washington, the Field Columbian Museum at Chicago, and the American Museum at New York, while the other functions of a museum are in no way neglected, special attention is paid to the subject of directly interesting and instructing the general public. Among the methods made use of in the attempt to achieve this object, may be mentioned careful selection of the objects exhibited, improved methods of mounting and displaying in an artistic and realistic manner both individual specimens and groups of individuals, and also a more intelligent and intelligible mode of labelling the specimens. Some of the ethnological grouped exhibits in the U.S. National Museum are especially worthy of notice. In these, the introduction of lay figures for the purpose of illustrating the family life, the exercise of crafts, the ceremonial or other aspects of the tribal life of the American Indians, has been used with admirable results. A very good idea of the success already attained in the directions indicated above may be gained by referring to the illustrations in recent Annual Reports of the three Institutions mentioned. Of the method of visual instruction in connection with the American Museum of Natural History in New York, I shall have occasion to speak elsewhere.

Just one other phase of American museum development may be noticed, namely, the zeal displayed in the acquisition of new material, not merely in the ordinary way by purchase or by exchange, but especially as the result of work done in the field by individual collectors or of collecting expeditions, sent out for the purpose. Such collectors or collecting expeditions not only

visit out-of-the-way localities in the United States, but also other parts of the world such as Peru, China, Egypt, Siberia, and so on.

Such, in brief review, are some of the ways in which American enterprise manifests itself in connection with the expansion and development of public Museums. To what extent it is primarily attributable to the appreciation of knowledge for knowledge' sake, which characterises the Americans, I am not prepared to say. But, however that may be, the developments I have outlined are matters which one would like to see claiming an equal amount of attention in Australia, and especially in New South Wales, the mother State of the Commonwealth. The only real obstacle in the path of progress is the old familiar one of lack of resources. In the last Annual Report of the Australian Museum, the Trustees again found occasion to urge upon the Government the inadequacy of their resources for maintaining its efficiency and for developing the collections. Everywhere in Australasia and Polynesia land-faunas are becoming more and more disturbed, rare species are becoming rarer, and aboriginal peoples are becoming more and more sophisticated or are vanishing. And in the meantime our own Museum too often is unable to obtain a share of the material available, partly because of the competition of the better subsided National, State or private Museums of Europe and America. Nevertheless, experience plainly shows that opportunities once lost are often lost for ever; and that for Museums to stand still under such circumstances really means they are falling behind, while others win the place of honour which they should have occupied themselves.

Undoubtedly such brilliant results as are seen in museum development in the United States could hardly have been achieved unless aid had been offered by the princely and unselfish munificence, not of a few, but of many well known citizens of the Republic. In short, in order that our Institutions may hold their own it is absolutely necessary that they receive the sympathy and generous financial support of Australians similarly endowed with the good things of this world. Needless to remark that we

have had a few brilliant instances of generous endowment of Science. More are needed.

Other interesting experiences were my visits to the Leland Stanford Junior University, and to the University of California. These Western, as well as some other American, Universities have introduced some innovations which seem to be worth consideration. The following is an extract from the Regulations in force at the Leland Stanford Junior University:—

"Every student upon entering the University is required to report to the assistant professor of hygiene for a brief medical examination of his eyesight and general health. Any condition which may place a limitation on the amount or kind of work planned by the student is discussed with him, or made the subject of a report to his major professor, or to the Committee on Registration.

"Students intending to train for any of the athletic teams, or to register for gymnasium work, are required to pass a careful physical and medical examination at the beginning of each semester.

"All students are entitled to medical consultation, and to individual advice in other matters directly or indirectly relating to their health, at any time during the year; but no treatment is undertaken by the University."

Similar regulations are in force at the University of California. The parental care over the health and welfare of students officially exercised in accordance with these regulations, seems to me to be a very admirable movement, and one which is calculated to justify large expectations that a recognisable outcome of it will be a distinct improvement in the mental work of students.

In conclusion, it affords me pleasure to say that in the endeavour to put before you some matters of history which fittingly command attention on the present occasion, I have gladly availed myself of the co-operation of the Secretary, to whom everything relating to the history and welfare of the Society, and to Sir

William Macleay in any capacity in which we are entitled to speak of him publicly, is, as we all know, of the deepest interest.

In the unavoidable absence of the Hon. Treasurer, the Secretary, on his behalf, presented the balance sheet for the year 1903; and on the motion of Mr. C. Hedley it was received and adopted. The Society's income for the year ended December 31st, 1903, was £1,008 9s. 6d; the expenditure £1,075 3s. 1d.; with a credit balance of £43 13s. 7d. from the previous year, leaving a debit balance of £23. The income of the Bacteriological Department was £554; and the expenditure £533 9s. 6d.; with a credit balance of £194 2s. 5d. from the previous year, leaving a credit balance of £214 12s. 11d. In regard to the Macleay Fellowships Account (Capital), the sum of £33,250 had been received from Sir William Macleay's executors, and invested at 4 per cent.

No nominations of other Candidates having been received, the President declared the following elections for the current Session to have been duly made :—

PRESIDENT: T. Storie Dixson, M.B., Ch.M.

MEMBERS OF COUNCIL (to fill five vacancies): Messrs. W. S. Dun, Prof. W. A. Haswell, D.Sc., F.R.S., Hon. James Norton, LL.D., M.L.C., Perceval R. Pedley, Edgar R. Waite, F.L.S.

AUDITORS: Messrs. Duncan Carson and Edward G. W. Palmer, J.P.

On the motion of Mr. A. H. Lucas, a cordial vote of thanks was accorded to the President for his interesting Address.

ADDENDA.

Page 11, line 20, *for* in the original Charter of 1858, *read* in the Act of Incorporation of 1850, and the Royal Charter of 1858.

Page 21, line 28, *add* The Caird Scholarship of £50 for the encouragement of the study of Chemistry, tenable for one year, is available for post-graduate research work provided there is "no available Candidate at the Second Year Examination."

GENERAL ACCOUNT (CAPITAL).

	£	s.	d.		£	s.	d.
Amount received from Sir William Macleay during his life-time... ...	14,000	0	0	Loan A (secured by Mortgage)	5,000	0	0
Further Sum bequeathed by his Will £6,000, less Probate Duty, £300 ...	5,700	0	0	Part of Loan B of £27,000, the Balance of Loan being Bacteriology Capital ...	14,700	0	0
	£19,700	0	0		£19,700	0	0

BACTERIOLOGY (CAPITAL).

	£	s.	d.		£	s.	d.
Amount bequeathed by Sir William Macleay, £12,000, less Probate Duty, £600	11,400	0	0	Part of Loan B of £27,000, the Balance being General Account Capital ..	12,300	0	0
Amount of accumulated interest ordered by Council to be added to Capital ...	900	0	0	Loan C	1,050	0	0
Further Amount ordered by Council to be added to Capital	700	0	0				
Interest invested	350	0	0				
	£13,350	0	0		£13,350	0	0

Audited and found correct.

15th March, 1904.

E. G. W. Palmer, Duncan Carson, } Auditors.

J. R. Garland, Hon. Treasurer.

Linnean Society of New South Wales.

BALANCE SHEET, 1903.

Dr. GENERAL ACCOUNT (INCOME). **Cr.**

Receipts.				£	s.	d.
To Balance from 1902				43	13	7
,, Subscriptions for 1903 ...	£81	19	0			
,, ,, Arrears ...	9	9	0			
,, ,, in advance ...	8	8	0			
				99	16	0
,, Exchanges paid by Members				0	3	0
,, Sales				120	10	6
,, Interest on Investments				788	0	0
,, Balance to debit of Income Account ...				23	0	0
				£1,075	3	1

Expenditure.				£	s.	d.
By Salaries and Wages				478	0	0
,, Printing and Stationery				325	3	2
,, Illustrations				139	10	6
,, Freights and Charges				1	10	6
,, Telephone				9	0	0
,, Ground Rent	£64	0	0			
,, Rates	17	1	1			
	81	1	1			
Less amount charged to Bacteriological Account	15	0	0			
				66	1	1
,, Insurance				8	17	7
,, Repairs				8	17	3
,, Framing Pictures...				2	1	6
,, Cheque Book, Bank Charge and Exchange				1	4	10
,, Petty Cash (Secretary)				33	16	8
,, ,, (Hon. Treasurer)				1	0	0
				£1,075	3	1

Audited and found correct,

15th March, 1904. E. G. W. Palmer, Duncan Carson, } Auditors.

J. R. Garland, Hon. Treasurer.

BACTERIOLOGY ACCOUNT (INCOME).

Receipts.	£	s.	d.	Expenditure.	£	s.	d.
To Balance from 1902	194	2	5	By Salaries and Wages	427	12	6
,, Interest on Investments	534	0	0	,, Journals	10	0	0
,, Tuition Fees	20	0	0	,, Printing	1	2	6
				,, Apparatus and Chemicals	38	11	5
				,, Duty and Charges	1	19	4
				,, Gas...	7	0	8
				,, Insurance	0	16	5
				,, Share of Ground Rent, Rates, &c. ...	15	0	0
				,, Tuition Fees to Bacteriologist	13	6	8
				,, Petty Cash	18	0	0
				,, Balance to credit	214	12	11
	£748	2	5		£748	2	5

MACLEAY FELLOWSHIPS' ACCOUNT (CAPITAL),

Receipts.	£	s.	d.	Expenditure.	£	s.	d.
To Amount bequeathed by Sir William Macleay £35,000 0 0				By Amount invested in Inscribed 4% Funded Stock, due 9th August, 1907	33,250	0	0
Less Probate Duty ... 1,750 0 0	33,250	0	0				
	£33,250	0	0		£33,250	0	0

Audited and found correct. We have also seen the Securities.

15th March, 1904. E. G. W. Palmer, Duncan Carson, } Auditors. J. R. Garland, Hon. Treasurer.

WEDNESDAY, MARCH 30TH, 1904.

MONTHLY MEETING.

Dr. T. Storie Dixson, President, in the Chair.

MR. H. G. CHAPMAN, M.D., Demonstrator in Physiology, University of Sydney, was elected a member of the Society.

Notice of a Special General Meeting was given, to be held on Wednesday, 27th April, 1904, at 8 o'clock, to take precedence of the Ordinary Monthly Meeting on the same date. *Business:* to consider the Council's recommendations that the suspension of entrance fees should be given up, and that Rule vi. should be amended so as to provide for the reduction of the entrance fee for Ordinary Members from two guineas to one guinea, and for the omission of the entrance fee of one guinea for Associate Members.

The Donations and Exchanges received since the previous Monthly Meeting (28th November, 1903), amounting to 51 Vols., 215 Parts or Nos., 81 Bulletins, 15 Reports, 38 Pamphlets, 20 Maps, and 10 Miscellanea, received from 123 Societies, &c., and 7 Individuals, were laid upon the table.

NOTES ON THE WEST AUSTRALIAN PITCHER-PLANT *(CEPHALOTUS FOLLICULARIS*, Labill.*)*.

By A. G. Hamilton.

(Plates i.-ii.)

This beautiful and extremely interesting pitcher-plant is found only near Albany, West Australia. During a visit to Albany in December, 1902, in company with Mr. C. R. P. Andrews, we searched for the plants to the eastward of the town towards the forts. We succeeded in finding a few stunted plants, and one very fine one, in a little gully running down to the beach. They grew among the long grass, almost in running water. This one specimen was the largest and most beautifully coloured that I saw. I then explored a heathy flat to the north-west of the town, but could not find any, till Mr. Andrews most obligingly guided me to a spot where it was very plentiful—a creek running parallel to the rifle-range, to the north of the town. Some yards away from the creek and on the western side, beyond the targets, there was a sloping bank of peaty soil, which was kept very sloppy by the soakage from the hill above, and here we found many of the plants, growing in little rosettes, but in the open, and on little elevations all round the bases of woody shrubs. Even at the season when I was there, which was in the middle of the dry time of the year, the ground was very wet. In the wet season it must be almost a running stream.

Judging from what I have read, and also heard from competent observers, of the plentifulness of the plants in former years, I think that in the locality I visited they are on the way to become extinct—the cause, so far as I could judge, being the trampling of stock feeding on the common. I had not the time to go farther afield, and so do not know if it is holding its own farther

out. But the very fact that it is restricted to one locality goes to show that it is a species in process of becoming extinct. I observed only one living, but quite a number of dead plants on the opposite bank of the creek, and here the ground was trampled bare by cattle.

In Kerner and Oliver's 'Natural History of Plants' (1), p. 130, *Cephalotus* is spoken of as coming from *Eastern* Australia, a mistake which has been made, or copied by other authors; and in Grant Allen's 'Story of the Plants' (2), p. 72, a *Sarracenia* is figured as "An Australian Pitcher Plant which eats insects." An excellent figure is given in Curtis' 'Botanical Magazine.' (3).

The plants are extremely attractive in appearance, both from the graceful shape and bright colouring of the pitchers. The prevailing colours are bright red to purplish-crimson, vivid green, and on the lids areolæ of translucent white. The plants growing in the open were much more brilliantly coloured than those in the shade. Indeed many of those in deep shade were without any red at all, the colours being light green and transparent patches. Pitchers which were dying off changed the green into yellow, and the crimson into orange-red, adding greatly to the variety of colour which a clump showed. The ordinary leaves, too, often assume bright crimson and yellow coloration when beginning to die.

At the time of my visit in mid-December, the plants were in very early bud, the flower-stalks being 10·2 to 20·4 cm. high; but the buds were so little advanced that the floral structure could not be made out even by dissection, and Mr. Andrews, who stayed some weeks longer than I did, informs me that up till the time of his leaving no flowers had opened. I was told by a resident that the flowers did not open till January and February. When the plants grew in the open, they were perfect rosettes, the pitchers on the outside, and the ordinary leaves (when there were any) in the centre. But there were not many of the latter, and for the most part they were small. I believe that the ordinary leaves develop in the autumn, reaching their full maturity in spring, and then gradually going off; while the

pitchers grow in winter and spring, and are fully formed and functional in summer, when the insects which they capture are most plentiful. They then probably die in autumn, and a fresh crop begins to grow in winter again. This was the case with plants which I have in cultivation, but a series of observations on the plants in their native habitat is needed to settle this and many other interesting points in their economy.

The pitchers vary much in size, independently of their age. Many of the mature pitchers were of small size.

The ordinary leaves are ovate, the length a little more than the breadth, narrowing into the petiole, which is about equal to the blade in the length. The average measurements are:—Total length 5 cm., breadth 1·8 cm. They are rather thick, and of a tough consistence when mature, and not grown in shade. The surface is very glossy in young leaves, less so in those which are mature. The margin is entire, and ornamented with a row of stiff hairs, white when young, and brownish in old leaves. Hairs of the same kind occur also on the wings and lids of the pitchers. Their peculiar structure will be alluded to later. Among the leaves we observed at Albany, my son discovered a very interesting monstrous form (fig. 1), and among the leaves on my cultivated plants several have appeared. These monstrosities are apparently common, as Professor Dickson has described and figured a series occurring in cultivated plants in the garden at Edinburgh University (4). There are stomata on the lower surface of the leaf, and small glands (to be described later) on both surfaces, rather more in number on the under than the upper side. In young leaves these pour forth quantities of some fluid which gives the leaves the varnished gloss they have, but I could not detect any sweet taste in the fluid. The stomata are of the ordinary character (fig. 2). I have been inclined to think that the small glands might be modified or altered stomata, but against this view there is the fact that they are found on the upper surface of the leaf, where there are no stomata. Glands of the same description occur on the inner and outer surface of both pitchers and lids, and are associated with stomata on the

outside of these. MacFarlane also found them "on the scales of young rhizomes; on the long, slender flower-stalks, and on the bracts which these bear. . . . On the outer surface of the sepals they are even more numerous and larger" (5). The epidermis cells in surface view are irregularly wavy, but less so on the under than the upper side (fig. 3). In section they are thin-walled and straight-sided, with a conical base. The mesophyll consists of rounded cells, with many air-spaces, and the palisade tissue on the upper surface is very slightly differentiated from the spongy tissue. The chlorophyll masses are fairly large, and in young leaves very brilliant green. Spiral conducting tissue, such as is usually associated with the carriage of water, is plentifully developed.

The pitchers (fig. 4) are roughly pitcher-shaped, but not symmetrical. They resemble the front part of a loose slipper. The petiole is attached below the junction of the lid and pitcher, and the veins spread palmately from the insertion. The lid is almost circular, and curved over the mouth. From the attachment of the lid four ribs run to the margin, the two centre ones forking so that at the edge there are six ribs, composed of thickish tissue. These ribs are green in young, purplish-red in mature pitchers. Between the ribs lies thin transparent tissue with no chlorophyll granules. These areolæ have a frosted appearance, like the similar tissue in the flowers of many species of *Pterostylis*, and similar areolæ are found in the pitchers of *Sarracenia* and *Darlingtonia*. The veins of the lid branch dichotomously at the base, and then form reticulations in the ribs. They pass through the areolæ transversely, but rarely fork there. On the ribs of the lid the stiff white hairs occur sparsely, and there is a fringe of the same hairs on the edge, some being quite double the length of others; they are white in young pitchers, rusty-brown in old ones. Besides these, short thick hairs with rounded heads, which stain with saffranin much more readily than the long ones, are found on the outside of the lid near its attachment (fig. 5). The interior of the lid is white or pinkish, with crimson streaks marking the situation of the ribs.

Dr. W. Woolls (5) says:—"In the pitcher-plant of Western Australia some of the leaves are converted into ovoid, or nearly globular pitchers, which have a lid attached to them. This lid is very irritable under certain conditions." I do not know what authority Dr. Woolls had for this statement, but as a matter of fact the lid is not irritable. In the very young state, the lid closes tightly over the orifice, and as it gets older, gradually opens, being most widely opened in mature pitchers, but there is no hinge, and it is only by using force sufficient to rupture the tissues of the attachment that it can be opened or closed more than in its natural state. Probably the mistake arose from seeing the lids in all degrees of openness in pitchers of various ages. Goebel, quoted by Strasburger (6), says the lid does not shut.

All round the orifice of the pitcher, from the base of the lid, there is a corrugated roll, the diameter being small near the lid, and thickest in the middle of the front aspect. The corrugations are produced internally in downward hooked teeth, 20 to 24 in number usually. The colour of the rim is red-brown to dark purplish-brown in mature specimens, and the surface is glossy. The texture is tough.

The pitchers have three projections or wings externally; one in front, beginning just under the corrugated rim, at the centre (fig. 4 *a*), narrow at first, and widening downwards towards the toe of the pitcher, when it suddenly narrows to a point. The wing consists of a narrow rib standing up at right angles to the pitcher surface, and on the upper edge spreading out into lateral free margins, so that a transverse section of it is like a broad-angled Y. These lateral expansions are thickly margined with the stiff, pointed hairs already mentioned, and these are found between the expansions in young pitchers, but are absent in mature ones, although the papillæ from which they rose can be seen with a hand lens. The other wings are lateral, beginning under the rim more than half-way back from the centre and running obliquely forwards and downwards (fig. 4 *b*), and terminate rather more than half-way down the pitcher, where

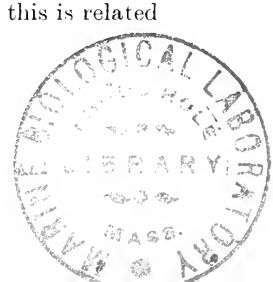
they narrow off to the surface, the lower end being just at the upper extremity of the lateral gland-mass of the interior. These lateral wings are thin ribs, widest at the upper end, and standing perpendicularly to the surface, but not extending laterally as the front wing does; they also have a border of stiff hairs.

As before said, the pitchers vary much in size when full grown. The largest, which I saw in our first search, I did not collect, or measure, but it was not less than 5·5 cm. long. The figure in Curtis' Botanical Magazine shows very large pitchers. The following are some measurements :—

	Length.	Breadth.		Diameter of Orifice.	
		Front to Back.	Side to Side.	Front to Back.	Transverse.
No. 1.	4 cm.	2·35 cm.	2·45 cm.	0·7 cm.	1·3 cm.
No. 2.	3·6 cm.	2·0 cm.	2·2 cm.	0·11 cm.	1·3 cm.
No. 3.	3·25 c.m.	1·7 cm.	2·2 cm.	0·7 cm.	1·2 cm.

The coloration of the pitchers varies. Generally speaking, it consists of irregular markings of red or purplish on a green ground, and the general arrangement is similar to that in the pitchers of *Nepenthes*. The young pitchers are bright green. The outer surface is smooth but not glossy. The interior varies from green in very young pitchers, bright red in full grown specimens, and a deep glossy black in old ones. This when examined by transmitted light is a dark purplish-crimson. Young specimens in spirit bleach almost white, while older ones remain dark brown or blackish, the spirit becoming pink, which afterwards changes to dull brown. The deep colour of the interior, I think, depends on the amount of animal matter they contain, and I should not be surprised to learn that the exterior colouring has some relation to the same factor. This is a matter in which observations on the plant in its native habitat are required. When the pitchers are fading, the green parts turn yellow and the purple bright red.

The pitchers rest on the ground so that they slope forwards, throwing the surface line of the contained fluid higher up at the stalk end than in front, and it will be seen that this is related to the distribution of the internal glands.



The stiff hairs alluded to before are thus described by Professor Dickson (4) "Each is an elongated cell with pointed extremity, and a broad truncated base imbedded in a slightly elevated group of epidermis cells. This unicellular hair is solid from the tip to within $\frac{1}{2}$ or $\frac{1}{3}$ of the distance from the base. The cell cavity thus reduced is bounded by a distinct and highly refractive wall, and the *appearance* is thus produced of one cell encapsulated in another. According to the modern view of cell-thickening by interstitial intussusception, this would be a remarkable case of the differentiation of thickened cell-wall into two layers of different character. The hairs are minutely tuberculated on the outer surface." This is a very good description of these curious emergences, and needs little to be added. On the young pitchers the hairs are silvery-white (and almost as long as they are in older ones, so that they look like little vegetable porcupines), but when cleared with clove oil and examined under the microscope, there is a faint yellow coloration in the interior of the hair; and in older hairs it becomes a dark brown, sometimes quite opaque. In both old and young hairs the contents are granular. Altogether they bear a strong resemblance to those of some mammals. Some of them show one or more constrictions along their length (fig. 5 *b*). They are largest on the petioles and shortest on the wings. They are, as Prof. Dickson mentions, tuberculous on the external surface, but this can only be seen in dry and spirit-mounted specimens, the tubercles disappearing in clove oil or glycerin. The older hairs very often have the hyphæ of a fungus wound round them in spiral lines (fig. 5 *c*), and sometimes these penetrate to the cavity, in which case they grow straight up along the sides. I sent a slide to Mr. D. McAlpine, who was good enough to send me the following note:—"*Helminthosporum* spp. Hyphæ olivaceous, wavy, septate, not constricted at septa, branching, $2\frac{1}{2}$-3 μ broad, permeating cuticle and passing into hairs. Spores smoky-brown, 3-septate, constricted at septa, rounded at both ends, cylindric to fusiform, produced at the end of the branches, 20-23 $\times$ $4\frac{1}{2}$-6 μ, average 22 $\times$ 5 μ." It will be noticed in the figure that some of the spores are 4-septate.

The inner structure of the pitchers is simple. From beneath the incurved teeth of the rim, a thick ledge or collar, named by Prof. Dickson the conducting shelf, hangs down all round for a short distance—10-12 mm. It is produced clear of the pitcher walls, so that it forms an inner collar like that in a lobster-trap. The inner surface of the pitcher below this is very smooth and glossy, and with the lens, or even with the naked eye, this portion is seen to be full of small dots, which are glands similar to those found on all the exterior surface of the plant. They are most closely placed just round the insertion of the petiole, and extend downwards to the line of the top of the lateral gland mark at the sides, but lower in front. This downward limit is the highwater mark of the contained fluid, none occurring below (fig. 7). For this reason I am inclined to think that they are secretive and attractive in their nature. At any rate they are not likely to be absorptive. Prof. Dickson (4) points out that, unlike the glands of *Nepenthes*, they have no apparent connection with the vascular system. Thus the inner surface of the pitcher may be divided into the conducting shelf, the glandular, and the eglandular regions.

On each side, below the glandular surface, commencing at about the level of the lower extremity of the external lateral wing, and running obliquely downwards and forwards, is a slight elevation, called by Prof. Dickson the lateral coloured patch, but which I prefer to call the lateral gland mass (fig. 7 *glm*). These are kidney-shaped in outline, and with the naked eye small rounded projections from the surface are seen, most plentifully at the posterior margin, where also the substance of the mass is thickest. Examined with the hand lens, these are seen to be hemispherical elevations, and the microscope shows them to be glands of a larger size and more complete structure than those of the upper glandular region. In young pitchers the masses are lighter than the rest of the inner surface, but at length become purplish-red, the glands remaining yellowish. In fully matured pitchers, the masses are undistinguishable from the rest of the surface except by their rising above it, and by the lighter colour

of the glands. They are sometimes covered with a network of hyphæ, apparently of the same kind as those found on the hairs externally. Several of the main veins of the pitcher enter the gland mass and send out anastomosing branches.

Minute Structure.

Epidermis of lid, outer surface.—The epidermal cells have a wavy outline (fig. 3) like that on the ordinary leaves. There are many stomates also like those on leaves (fig. 2). The small glands are very numerous, and consist of 2-8 cells (fig. 8). They resemble the glands of *Sarracenia* figured by Geddes (7). The walls are thicker than those of the ordinary epidermal cells, and are very refractive. The simplest form is rhomboidal, and divided into two by a curved partition across the shorter diameter (fig. 8 *a*). These are comparatively rare, the ordinary type being 6-8-sided, sometimes with a re-entrant angle, with an internal rhomboid divided into two, so that there are six cells (fig. 8 *b*). They average 0·0508 mm. in length. The contents stain very readily with saffranin, and the walls also take the stain. Sometimes, however, the latter remain unstained, and from their strong refractile powers, contrast brilliantly with the stained contents. The stiff hairs stand on raised papillæ formed by two circles of pentagonal cells radiating from the base of the hairs, the cells of the outer circle being larger. The epidermis on the areolæ of the lid is similar to that on the rest of the surface; no hairs emerge here.

Epidermis: inner surface of lid.—In surface view the cells are roughly hexagonal, with the greater length lying along the lid. The epidermis pouches downwards and backwards (that is, towards the hinge) in each cell, so that the apex or point overlies the base of the next cell, as the scales on a fish overlap (fig. 9), and from the base fine lines converge to the point. In section the cells show as teeth pointing backward (fig. 10) and becoming longer as the cells are nearer the insertion. These projections continue from the lid down the inner collar, becoming longer till they reach their greatest length at the reflection of the ledge

into the pitcher walls. The small glands already described occur plentifully here, and invariably stain in all parts.

Mesophyll of lid.—Beneath the outer surface there is a layer of deeply-staining cells, corresponding to the palisade-tissue of the ordinary leaf, containing chlorophyll, rounded in shape, but with their greater length lying parallel to the surface. They lie closely, and have no intercellular spaces. These deeply-staining cells also surround the vascular bundles. The cells lying under this layer are rounded in form, but longer and larger than the outer cells; and have large intercellular spaces They take the place of the spongy tissue of the ordinary leaf. They contain little or no chlorophyll and do not stain much. Their walls are thin and sometimes pitted. Under the inner lid epidermis there is a layer of large straight-sided cells with hemispherical bases; these also stain faintly. In the areolæ the cells beneath the outer surface are also of this type. All the mesophyll cells contain starch. There is a considerable amount of vascular tissue with spiral thickenings all through the mesophyll. Blind endings occur here and there under the deeply-staining layer beneath the outer surface; they are thin-walled and have very loose spiral thickenings.

Body of pitcher: epidermis of outer surface.—The cells are irregular in shape, and sometimes slightly crenate. The surface presents many small elevations which have a stomate at the top (fig. 15).

Corrugated rim.—The epidermis consists of six-sided cells, at least twice as long as broad, the length running along the tooth. Scattered about among them are many of the small glands already described. Beneath the overhanging curved point of the tooth the cells become shorter and gradually change into the imbricated form occurring on the under side of the lid, and their free points lengthen as they near the inner base of the teeth where these join the ledge, till just at the junction they are decided short hairs pointing outward and downward, and they continue down the ledge. At the base of the teeth the hairs reach a length of 0·0381 mm.

Mesophyll.—Beneath the epidermis is a layer (4-5 cells thick) of deeply-staining cells, containing much chlorophyll. This layer contains few intercellular spaces, but there are small cavities under each gland similar to those under each stoma. Beneath this layer there is an open network of cells which contain few chlorophyll granules, and stain lightly. This layer is similar to that in the lid, and indeed in the middle layer of all parts of the pitcher. Vascular bundles are very plentiful all through the rim, but are most plentiful in the outer dense layer under the epidermis, where also blind terminations occur, sometimes near glands. After close examination of many preparations, however, I am unable to say that they bear any constant relation to the glands. In the loose interior tissue, wherever the vessels occur, they are surrounded by a sheath of the dense tissue mentioned above as lying under the epidermis. Starch is found plentifully in these cells, and also, but less plentifully, in the middle layer. The substance of the teeth, like that of the lid, and of the pitcher body, is evidently actively assimilative.

Epidermis of collar.—This is of the same character as that on interior of lid, but the conical hairs are longer, reaching their greatest length at the interior angle where the collar joins the interior surface. Each cell has a very distinct nucleus. There are no glands, and yet the surface seems attractive to insects, as they stay on it and lick it for a long time.

Mesophyll of collar.—The surface view just under the epidermis shows regular hexagonal cells of large size, but none of the granular deeply-staining cells of the corrugated roll. The walls are thin, and the cells gradually pass into the loose network of cells with little chlorophyll and a little starch. Forking vascular bundles are found here, which terminate in loosely spiral blind endings. Here also the vessels are invested with a sheath of dense tissue. The mesophyll is so open that it can be seen to be spongy with the naked eye.

Interior of pitcher: upper glandular surface.—The whole of the interior of the pitcher is very smooth and glossy, and as Prof.

Dickson has pointed out (4), when fractured, usually rolls back. The epidermal cells are crenate in surface view. In section, the sides are straight, but the bottom of each cell is hemispherical. The side walls are often pitted—the pits narrow elliptical with the long axis perpendicular to surface of epidermis. The mesophyll cells are rounded in outline, and the cells immediately under the interior epidermis have long narrow pits. The cells under the exterior epidermis are of the deeply-staining variety. This description applies to the mesophyll of all parts of the pitcher.

The glands of this region are of two kinds—(1) Glands like those of the external surface, with few cells, but rather large on the whole. Their sides are straight, so that the glands are roughly cylindrical. (2) Spherical glands resembling those of the lateral gland patches, but smaller. They consist of a large number of rounded cells, 12-20 in number, showing in surface view; and the mass is enclosed by a sheath of flattened cells. Their average size is 0·03 mm. Intermediate forms between the cylindrical and spherical forms occur. The glands are very plentiful, and, so far as I can make out, are not directly connected with vessels, being usually situated between the meshes of the venation.

Lateral gland patches.—These are designated by Prof. Dickson the lateral coloured patches. Their position has already been described.

Epidermis.—This is composed of crenate cells in all respects like those of preceding region. The glands are spherical (fig. 13), and they are similar to those described for the glandular surface, except that they are much larger—0·1016 mm. Sometimes two are so close together that they fuse and form an elliptical mass. They are most plentiful on the anterior edge of the patches. In some but not all the specimens I examined, the walls of the inner cells of the glands were pitted. The surrounding mesophyll cells stain very deeply, and there is usually much starch present. At the anterior point of the gland mass, where it runs into the ordinary surface, there occur some cells which

are very puzzling. They are remarkably like stomates (fig. 14), but there is not always an opening between the guard cells as shown in figure. In fact, that part stains more readily than the two guard (?) cells.

Eglandular surface.—This covers the part of the pitcher occupied by the fluid. It is glossy, and the cells resemble in all respects those of the glandular surface, except that there are no glands at all.

Development of the Pitchers.—In the very young pitchers, the wings and lid are the most prominent features. The body of the pitcher is very small, and the wings and lid are in consequence all close together, and as they are densely covered with the stiff silvery hairs, the pitcher has the appearance of a little vegetable porcupine rolled up, with its quills standing on end. In this stage—about 2·5 mm. long—if cut open longitudinally, a very small cavity only is seen. There is no sign of the lateral gland patch, and the collar shows a slight thickening. The top edge of the anterior wing overlaps the lid (fig. 11) so that it looks as if the lid and pitcher were joined there; and the lateral wings cover the lid's edge in the same way. In a later stage (6 mm. long) the lid is clasped as before by the wings; the collar shows distinctly, but has no free downward produced edge. There is no sign of the gland patch (fig. 11). In the third stage examined (1 cm. long) the lid is still held by the wing in front, but is free from the lateral wings. It is still closely adpressed to the rim. The collar is beginning to form a free edge, and on the rim the teeth are formed. The gland patch is seen as a thickening of the pitcher wall in that region, and a similar thickening indicates the course of the main vascular bundles. In the later stages, by the growth of the tissue between the wings, the pitcher begins to assume its characteristic form. The first sign of coloration appears on the teeth of the rim, which turn a warm brown; then a crimson line appears on the down-hanging edge of the collar, and on the anterior edge, where the glands are most numerous, of the lateral gland patch.

Variations of Pitchers.—The size is variable. I have, on cultivated plants, pitchers only 8 mm. in length with the lid open and insects captured, and a small amount of liquid present. Sometimes the corrugated rim is quite smooth, with only 3 to 5 narrow teeth standing straight up, instead of overhanging the edge of the pitcher (fig. 17).

Contents of Pitchers.—The mature pitchers contain liquid up to the lower edge of the glandular surface. The quantity naturally varies with the size of the pitcher. Those measured contained 5, 3·2 and 2·35 ccm. I regret that a quantity collected for analysis was lost by leakage. Lawson Tate gives an account of the digestive principle in *Cephalotus* (8), but I have not been able to see his paper. The liquid is greenish-black in colour from the large quantity of animal remains contained in it, but occasionally one finds a pitcher with only a few victims, and then it is quite clear. Among the débris in the pitchers, I recognised wings of various insects, legs, chitinous plates from thorax and abdomen, balancers of mosquitoes, scales of moths, the claws of a chelifer, living larvæ of a fly, and large numbers of unicellular algæ, consisting of a green cell with a gelatinous envelope; it is probably *Protococcus*, and certainly lives and multiplies in the liquid.

While watching some plants in their native habitat, we noticed flies hovering around the pitchers and occasionally entering them. One of these I captured. Mr. Froggatt informs me it is one of the Tabanidæ. It had the appearance and blood-sucking habits of the ordinary March-fly of New South Wales. It is possible that the larvæ found in the liquid are those of this insect, and that the individuals we saw entering it were intent upon depositing their eggs in the mass of digesting or decomposing insects inside. In any case, the living larvæ are an example of one of those cases, not of symbiosis, but of one organism taking advantage of the conditions created by another for its own benefit. There are many examples of this among insectivorous plants. Geddes (9) mentions an American flesh-fly which lays its eggs on the rim of *Sarracenia* pitchers, and the larvæ when hatched make

their way down into the decomposing mass below, live there, and finally make their way underground to pass the chrysalis stage. Associated with the plant is a bird which slits up the pitchers in search of the larvæ.

In Borneo (10) a spider lines the upper part (the conductive or slippery part) of *Nepenthes* pitchers with a thin web, to give it foot-hold, and there lies in wait for visitors. If disturbed the spider dives into the liquid. We have a parallel case in New South Wales in a bug which lives on *Drosera binata*, and feeds on the insects captured by the sticky tentacles.

At the same time that we observed the flies, we saw a frog, alarmed by our movements, dive wildly into the nearest pitcher, where he was able to hide his head and shoulders.

Purposes of Structure.—It is rather a hazardous matter to attempt to account for all the structures of the pitcher, but some are such manifest adaptations that I may venture to point them out. The glands on the outer surface certainly secrete a fluid, and although I have not been able to detect any taste in it, yet I think we are justified in concluding that it is attractive to insects, as they certainly visit and lick the exterior of pitchers. The colours have been supposed to attract as flowers do, but I think this is unlikely, as green mature pitchers had just as large a number of victims as the brightly coloured ones. Indeed, I think the coloration, as in leaves, is a sign of the failure of the vital powers of the pitchers.

In *Nepenthes*, *Sarracenia* and other genera, the wings have been described as staircases leading to the little parlour, and in confirmation of this, it is said that some species of *Nepenthes* which, when young, have short-stalked pitchers resting on the ground, have wings which act as footpaths to creeping insects; while in the mature plants which have the pitchers pendent on the long tips of the laminæ, and which depend on flying insects, there are no wings. Probably the wings in *Cephalotus* have some such function, but although I have seen insects on the pitchers, I never saw one on the paths. It may be that they are designed to overlap the edge of

the lid in very young pitchers, and so prevent the ingress of insects when their presence would be undesirable. But again this does not account for their downward production. The lid probably acts as a cover against rain, but it also prevents insects jumping or flying out, and it has been suggested that the transparent windows are designed to cause the insect to fly upwards and be stopped, instead of escaping laterally between the rim and the lid. The recurved teeth and the collar act as the recurved tips in a lobster-pot in preventing exit. The collar acts in the same way as a similar ledge does in a safety ink bottle—it prevents the liquid running out when the pitcher is turned upside down. A pitcher containing the normal amount of fluid lets very little escape when inverted. Insects visiting the pitcher delay a long time licking the surface of the collar before proceeding lower. The fine hairs on the under surface of the lid and on inside of collar are said to prevent insects from crawling up, but they are so very minute that I imagine only very small insects could be stopped by them, unless indeed by getting into the joints of the feet they cause discomfort, or clog their steps. There is no doubt, however, that they facilitate the downward passage of the victim. Below the collar extends the very slippy glandular and eglandular surface, and here the purpose is obvious. Small insects cannot get up it, especially when wet. In some of my plants I found, before the liquid appeared, live harvest-bugs, both crimson and black, and the larger ones could come out at will. Probably many of the victims go into the pitchers as a hiding place.

The purpose of the fluid is a problem worth investigating. Two views are taken: First, that it is merely a culture fluid for bacteria which dissolve or decompose the captives, and so render them available as food for the plant. The pepsin which has been detected in the liquid of some pitchers is said to be derived from the bacteria. In this case there would be a true instance of symbiosis between a high plant and a very low one (11, 12, 13). But this view has been ably combated by Vines (14), whose experiments, made under conditions excluding the action of

bacteria, showed that true digestion, caused by a digestive ferment, took place. And he has also shown that the digestive principle, which is found in various organs of very many plants, is trypsin or some allied ferment. I regret that I have been unable to experiment in this direction, from the difficulty of procuring enough of the fluid, but I hope, as my cultivated plants increase, to be able to do so, and communicate the results in another paper.

There is no doubt that the liquid contains azerin or some similar principle, as the insects falling into the fluid were immediately wetted through, and drowned.

The plants would certainly repay close observation by any one resident in their native locality, and if I am correct in my surmise that they are becoming extinct, it is to be hoped that some one will take up the study before it is too late. I think the trustees of one of our great national parks might well try the experiment of getting some plants and placing them in some of the swampy places with a view to acclimatisation. The swamps occurring in places in the National Park at Waterfall are of exactly the same character as the swamp at Albany where they grow.

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EXPLANATION OF PLATES.

Plate i.

Fig. 1.—Monstrous ordinary leaf.
Fig. 2.—Stoma, ordinary leaf.
Fig. 3.—Epidermal cells, surface view, ordinary leaf.
Fig. 4.—Outline of pitcher; *a.* anterior wing; *b.* lateral wing; *c.* corrugated rim.
Fig. 5.—Hairs from wings; *a.* short hair; *b.* hair with constrictions; *c.* hair with hyphæ and spores.
Fig. 6.—Club-shaped, from insertion of lid.
Fig. 7.—Diagrammatic section of pitcher; *l.* lid; *cr.* corrugated rim; *cl.* collar; *gls.* glandular surface; *aw.* anterior wing; *egl.* eglandular surface; *glm.* lateral gland-mass.
Fig. 8.—Small glands; *a.* two-celled; *b.* six-celled.
Fig. 9.—Imbricated cells, interior of lid, surface view.
Fig. 10.—Imbricated cells, interior of lid, in section.
Fig. 11.—Very young pitcher.
Fig. 12.—Section of young pitcher.
Fig. 13.—Section of large glands of gland-mass.
Fig. 14.—Cells resembling stomata, gland-mass.
Fig. 15.—Section of stoma, exterior of pitcher.
Fig. 16.—Front view of young pitcher.
Fig. 17.—Undeveloped rim of pitcher.

Plate ii.

Figs. 18, 19.—Photographs of growing pitchers.
Fig. 20.—Photograph of section of pitcher ($\times 2$).

STUDIES ON AUSTRALIAN *THYSANOPTERA*: THE GENUS *IDOLOTHRIPS*, Haliday.

By Walter W. Froggatt, F.L.S., Government Entomologist.

(Plate iii.)

When Darwin visited Australia in 1836 on the memorable voyage of the "Beagle," among many other interesting specimens, he collected some Thrips remarkable for their great size, in comparison with other known species.

When the collections were distributed, these specimens were handed over to Mr. A. H. Haliday, who had recently published his classification of the British species of Thysanoptera. It was not, however, until sixteen years later that the descriptions were given to the world, in Walker's "List of Specimens of Homoptera in the Collection of the British Museum." Pt. iv. (p. 1096) Physapoda. In this Catalogue, Haliday's definition of the genus was given and three species described. But from a study of a large quantity of material it is evident to me that Haliday described the two sexes as distinct species, and a smaller and more variable form of the male as a third.

These interesting little creatures, though very plentiful and widely distributed in Tasmania and the eastern portion of Australia, seem to have escaped the notice of most collectors. From the study of an unlimited supply of living specimens in all stages of development, I am able to give the following account of their habits and life-history:—

Idolothrips spectrum, Haliday (♂).

I. marginata, Haliday (♀), and *I. lacertina*, Haliday (♂).

Eggs white, elongate and attached at the base to the surface of the dead leaves of Eucalypts in irregular rows, forming clusters of from 50 to 250 in number, touching each other so that they can be detached in an unbroken mass. Apex of egg rounded,

and curiously pitted like the top of a thimble; the young larvæ irregularly breaking the summit as they work their way out. Hiding among the eggs usually are to be found a great number of small semitransparent mites, which crawl on to the baby Thrips as soon as they are clear of the egg-shell; sometimes one Thrip may have six or seven clustered together on its back, and where the adult Thrips are confined among the infested eggs they also become covered with the mites. The adult Thrips often stand guard over the egg-masses, evidently with the idea of protecting them. In one case in particular, a male remained all day over the eggs; when touched, it crawled round to the under surface of the leaf, but returned as soon as the glass lid was replaced.

Larva, on emerging from the egg, about 1 line in length. General colour semitransparent, antennæ distinctly banded; eyes, sides of thorax and abdomen edged with bright red, with a slender dorsal stripe of the same colour down the centre of abdomen, merging together at the fuscous tubular segments at apex. Irregularly covered with long, scattered fine hairs. Head broad, antennæ thickened, eyes small, thorax long, abdomen short.

Larva: second stage.—Head more rounded, widest behind; antennæ long, eyes black, the rest semitransparent to dull white, marked with bright red on outer margin from behind the eyes to the base of anal segments, with a broad dorsal stripe commencing behind the pronotum, and merging into the side stripes at apex; transverse rows of spots on dorsal surface of thoracic and abdominal segments, and two apical tubular segments black.

Larva: third stage.—Head much larger, arcuate in front; antennæ long, slender and showing swelling at the apices of 3rd, 4th and 5th segments; eyes projecting. General colour fuscous, with apical portion of thorax and centre of abdomen semitransparent, with red markings showing, but confined to apical portion of abdomen; thorax and base of abdomen elongate-oval, tapering to the tip to a slender cylindrical tail, which consists of two tubular segments nearly as long as the thorax and rest of abdomen combined, fringed with scattered long hairs.

Larva: fourth stage.—Head longer than broad, deeply arcuate in front, with antennæ standing out in front as in the adult insect; eyes projecting. General colour dull white; with head, sides of pronotum, legs, antennæ, spots of dorsal surface and anal segments black. The broad red stripes down the centre and sides of dorsal surface very well defined, anal tubular segments fringed with long hairs at apex of first, but only lightly at tip of last.

Pupa.—Head narrow, broadest at hindmargin, the antennæ standing out on either side of head like short goat's horns; general form of thoracic and abdominal segment elongate-oval, tapering to the tip into a slender bristle-like appendage. Semi-transparent, richly blotched and marked with bright red, only black markings showing on small eyes and anal segments. Second pupal form well defined, like the adult insect, with the antennæ curved round the sides of head and hidden under the sides of prothorax, wing-covers well defined on back. The pupal forms do not appear to feed, but remain resting on the leaves, and move readily when disturbed.

Imago (♂).—Length from $\frac{1}{8}$ to $\frac{1}{2}$ inch in length, excluding antennæ. General colour black except the ochreous marking on antennæ, and red blotches on thorax, legs, and sides of abdominal segments. Wings pale horn-colour, with nervures ochreous and cilia smoky. Head finely transversely striated, long, cylindrical, rounded in front, thrice as long as broad; antennæ very long, slender, clubbed at apices of 3rd-6th segments and tapering at tips; eyes projecting, lateral ocelli large, in centre of inner margin of eye, almost touching; proboscis pointed, not quite reaching to fore margin of mesosternum; upper lip pointed. Prothorax irregularly hexagonal, not half the length of head, deeply arcuate on sides between mesothorax which, swelling out on the sides, is rounded to hindmargin of metathorax; meso- and metathorax combined slightly longer than broad. Legs long; wings, somewhat pointed at the extremities, with the central nervure extending a little beyond middle of wing, very thickly fringed with long cilia. Abdominal segments tapering to 8th segment, 8th forming

a short truncate base, to which is attached the tubular appendage nearly one-third of the length of the whole of abdomen.

Hab. — Sutherland, Kenthurst, Sydney, N.S.W. (W. W. Froggatt) - Gatton, Queensland (Mr. W. B. Gurney)—Hobart, Tasm. (Mr. A. M. Lea)— Melbourne, Vic. (Mr. C. French, Junr.).

The insects, in all stages of growth, are to be found at the end of August, sometimes in great numbers, by beating or shaking the dead foliage of Eucalypt bushes, where the trees have been cut down, and the leaves have remained attached to the twigs, forming a close shelter for them. When the dead leaves rest on the ground and are disturbed, the Thrips run about on the ground with the tip of the abdomen turned up over the back, much after the manner of the Staphylinidæ or Rove Beetles, for which at first sight they might easily be mistaken. Mr. Gurney was fortunate in finding a large number of leaves with the eggs attached to them; and I was thus enabled to watch the larvæ emerging from the eggs, and to note their development in all stages. As yet I have been unable to find how or upon what they feed, as there can be little or no substance (at least for the young larvæ) to devour on the dry Eucalypt leaves; but one larva after hatching remained enclosed under a watch glass for nine days without food. Placed upon flowers and fresh foliage, they at once crawl off and either rest on the sides of the jar or on the ground.

EXPLANATION OF PLATE III.

Idolothrips spectrum.

Fig. 1.—Eggs.
Fig. 2.—First larval form.
Fig. 3.—Second larval form.
Fig. 4.—Third larval form.
Fig. 5.—Perfect larva.
Fig. 6.—First pupal form.
Fig. 7.—Second pupal form.
Fig. 8.—Perfect insect (imago).

NOTES AND EXHIBITS.

Mr. North exhibited skins, nests and eggs of *Acanthiza ewingi*, Gould, and *Acanthornis magna*, Gould, from Tasmania. They were received by the Trustees of the Australian Museum, in March, 1902, the birds being sent in the flesh. The nest of *Acanthiza ewingi* is a neat domed-shaped structure, with a rounded entrance in the side. Externally it is formed of thin strips of bark and bark-fibre, and thickly coated with bright green moss, the inside being lined with the rich brown downy covering of freshly budded fern-fronds and a thick layer of feathers of the yellow-bellied Parrakeet. It measures externally 4½ inches in height, 3 inches in diameter, and across the entrance 1¼ inches. The eggs, three in number, are rounded-ovals in form, pure white, with distinct zones on the larger ends formed of small confluent spots, flecks and streaks of different shades of purplish-red. Length (A) 0·68 × 0·52 inch; (B) 0·67 × 0·52; (C) 0·69 × 0·5. Two eggs in the collection of Mr. Charles French, Junr., taken prior to 1899 by Mr. G. F. Hinsby on Mount Wellington, near Hobart, measure alike, 0·67 × 0·49 inch.

WEDNESDAY, APRIL 27TH, 1904.

A Special General Meeting and the Ordinary Monthly Meeting of the Society were held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, April 27th, 1904.

SPECIAL GENERAL MEETING.

Mr. Thomas Steel, F.L.S., F.C.S., in the Chair.

Business:—To consider the Council's recommendations that the suspension of entrance fees should be given up; and that Rule vi. should be amended so as to provide for the reduction of the entrance fee for Ordinary Members from two guineas to one

guinea, and for the omission of the entrance fee of one guinea for Associate Members.

The recommendations of the Council were adopted by a unanimous vote.

ORDINARY MONTHLY MEETING.

Mr. Thomas Steel, F.L.S., F.C.S., in the Chair.

Messrs. R. J. H. JENKINS, Selwyn Street, Moore Park; R. C. L. PERKINS, B.A., Department of Agriculture, Honolulu, T.H.; F. W. TERRY, Department of Agriculture, Honolulu, T.H.; R. MURDOCH, Wanganui, N.Z.; the REV. ALFRED ROFE, Orange, N.S.W.; and Mr. C. A. SUSSMILCH, Technical College, Sydney, were elected Ordinary Members: and Miss ROTHWELL, Newcastle, N.S.W., an Associate Member of the Society.

The Chairman announced that under the provisions of Rule xxv., the Council had elected Professor David, B.A., F.R.S., F.G.S., Mr. Henry Deane, M.A., F.L.S., &c., Mr. J. H. Maiden, F.L.S., and the Hon. James Norton, LL.D., M.L.C., to be VICE-PRESIDENTS; and Mr. J. R. Garland, M.A. (56 Elizabeth Street), to be HON. TREASURER, for the current year.

Notice of a Special General Meeting was given, to be held on Wednesday, 25th May, 1904, at 8 o'clock, to take precedence of the Ordinary Monthly Meeting on the same date. *Business:* to confirm the alteration of Rule vi., providing for the reduction of the entrance fee for Ordinary Members from two guineas to one guinea, and for the omission of the entrance fee of one guinea for Associate Members, as passed at the Special General Meeting on April 27th.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 1 Vol., 47 Parts or Nos., 1 Bulletin, 2 Reports, 2 Pamphlets, and 2 Miscellanea, received from 33 Societies, &c., and 1 Individual, were laid upon the table.

DESCRIPTIONS OF NEW SPECIES OF AUSTRALIAN COLEOPTERA.

By Arthur M. Lea.

Part VII.

(Plate iv.)

In the present paper I record three additional blind species from Tasmania. Of these, one—*Anommatus 12-striatus*, Müll.—has presumably been introduced from England; a second—*Phycochus graniceps*, Broun, appears to be indigenous in Tasmania, but occurs also in New Zealand: whilst the third—*P. sulcipennis*, n.sp.—so far is known only from Tasmania. The number of blind species of Coleoptera now recorded from Australia and Tasmania is eight, as follows:—

Carabidæ.

Steganomma porcatum, Macl. Queensland.*
Illaphanus Stephensi, Macl. New South Wales.

Colydiidæ.

Anommatus 12-striatus, Müll. Tasmania.

Scarabæidæ.

Phycochus graniceps, Broun. Tasmania.
P. sulcipennis, n.sp. Tasmania.

Curculionidæ.

Halorhynchus caecus, Woll. West Australia.
H. geniculatus, Lea. West Australia.
Tasmanica myrmecophila, Lea. Tasmania.

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* Although its "eyes" are mentioned, this species is really without them. I do not comment further on the species, as I believe Mr. Sloane is about to do so.

It is remarkable that so far no blind Coleoptera have been taken in limestone caves in Australia. I have myself carefully searched for them in such caves in Western Australia, New South Wales, and Tasmania without obtaining a single specimen of any species. In the Jenolan Caves I have taken a spider in places that are (except for artificial light) always in total darkness, but have taken the same spider in the open under old rotten logs; in bats' dung at the same caves I obtained many dipterous larvæ, some of which developed into flies belonging to the *Muscidæ;* from the same dung I obtained many fragments of the common and introduced *Ptinus fur;* even, however, if these fragments were from beetles that existed for a time in total darkness and were not from the bats' droppings, it would be of little interest, as the species occurs in many out of the way places, such as cellars, cupboards, &c. In the Mole Creek Caves in Tasmania I have taken a small blind crustacean and a slimy phosphorescent dipterous larva; a very similar larva (I have not been able to rear either), if not the same, occurs under logs on Mount Wellington, and in other parts of Tasmania. In the twilight portions of caves I have taken a number of beetles, but these appear to have been accidental intruders; several spiders, however, appear to be confined to such places both in New South Wales and Tasmania, and at the Mole Creek and Chudleigh Caves a pallid, wingless, long-legged cricket with exceedingly long antennæ is very common.

STAPHYLINIDÆ.

Œdichirus tricolor, n.sp.

(Plate iv., fig. 1.)

Cylindrical and shining. Red; abdomen (two apical segments excepted) black; legs flavous, apex of femora and base of tibiæ (but not the knees) blackish; antennæ flavous, but the joints usually slightly infuscate towards the base. Clothed with rather sparse straggling yellowish pubescence.

Head with large scattered punctures, extreme base supplied with a feeble carina extending from near each eye to the neck.

Antennæ slender, extending almost to apex of elytra. *Prothorax* cordate, slightly longer than wide, the greatest width slightly more than that of head across eyes; with large punctures arranged in four irregular rows. *Elytra* scarcely more than one-half the length of prothorax and at its widest part considerably narrower, sides strongly rounded, apex conjointly semicircularly emarginate; punctures smaller than on prothorax and more evenly (although still irregularly) distributed. *Abdomen* slightly narrower at base than in middle; densely and coarsely punctate, the punctures becoming smaller posteriorly; four basal segments finely transversely corrugated at apex, the apical segment with a strong acute spine on each side. Posterior *tibiæ* with a comb-like series of setæ at the outer apex; joints of the front tarsi greatly inflated. Length $7\frac{1}{3}$, to apex of elytra 3 mm.

Hab.—Emerald, Vic. (Lea); Tasmania (A. Simson).

An apterous species, in build somewhat resembling *Œ. Andersoni*, but (apart from colour) stouter, the head considerably larger, prothorax wider, with larger, sparser and more irregular punctures, apex of posterior tibiæ wider and with a more pronounced comb. The prothoracic punctures are large and of almost uniform size, although very irregularly distributed.

Œdichirus terminalis, n.sp.

Cylindrical and moderately shining. Testaceous-red, appendages flavous, 5th and 6th abdominal segments (except apex of each) black. Clothed with rather sparse, straggling, yellowish pubescence.

Head with large scattered punctures, sparser on vertex than elsewhere. Antennæ rather slender, slightly passing base of prothorax. *Prothorax* elongate-cordate, noticeably wider than head across eyes; with moderately dense and large punctures. *Elytra* scarcely more than one-half the length of prothorax but almost as wide, sides strongly rounded, apex conjointly moderately emarginate; punctures smaller, denser and more regular than on prothorax. *Abdomen* very slightly narrower at base than in middle; densely and coarsely punctate, the punctures smaller on

the posterior segments; four basal segments finely transversely corrugated at apex; apical segment with a strong acute spine on each side. Posterior *tibiæ* with a comb-like series of setæ at the outer apex; joints of the front tarsi greatly inflated. Length $4\frac{2}{3}$, to apex of elytra $1\frac{3}{4}$ mm.

Hab.—Upper Ord River, N.W.A. (R. Helms).

A small apterous species in build resembling *Œ. Andersoni*, but the head narrower, prothorax with rather larger and more regular punctures, and the abdomen differently coloured. The punctures at the base of the four basal segments of the abdomen (on both surfaces) and less noticeably on the 5th, become more or less confluent, so that these segments appear to be supplied with numerous short regular longitudinal ridges. A somewhat similar appearance (but less pronounced) is to be seen in *Œ. Andersoni*. The prothoracic punctures show scarcely any trace of a seriate arrangement, except on each side of a scarcely traceable median space.

ŒDICHIRUS ANDERSONI, Blackb.

Two specimens from the Swan River, W.A., agree with the description of this species, except that they are somewhat smaller (7 mm. only).

ŒDICHIRUS PÆDEROIDES, Macl.

This species has ample wings; a character not noted in the original description. I have taken specimens on the Clarence River, N.S.W.

PÆDERUS SPARSUS, Fvl. *Hab.*— Kiama, N.S.W.

P. ANGULICOLLIS, Macl. *Hab.*—Clarence River, N.S.W.

P. ANGULATUS, Macl.* *Hab.*—Tasmania, New South Wales.

P. SIMSONI, Blackb. *Hab.*—Tasmania (widely distributed).

P. TWEEDENSIS, Blackb. *Hab.*—Tweed, Clarence and Hawkesbury Rivers, Sydney, N.S.W.

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* I prefer to regard this species as a good one, rather than as a variety of *cruenticollis*.

P. MEYRICKI, Blackb. *Hab.*—Geraldton, W.A.

P. CRUENTICOLLIS, Germ. *Hab.*—South West Australia (widely distributed).

P. AUSTRALIS, Guér. *Hab.*—Tasmania.

CAFIUS VELUTINUS, Fvl.

I have an unique specimen from Hobart that I cannot satisfy myself is distinct from this species; it differs, however, from the normal form in having the head moderately shining, and with its punctures much more sharply defined.

C. OCCIDENTALIS, Blackb. *Hab.*—Swan River, W.A.

C. SERICEUS, Holme. *Hab.*—Tasmania; West Australia.

C. AREOLATUS, Fvl. *Hab.*—Tasmania; New South Wales.

HESPERUS HÆMORRHOIDALIS, Macl. *Hab.*—Sydney, N.S.W.

H. AUSTRALIS, Macl. *Hab.*—Tweed River, Windsor, N.S.W.

H. SEMIRUFUS, Fvl. *Hab.*—Queensland.

PHILONTHUS SUBCINGULATUS, Macl.

This species is widely distributed in Australia. The Rev. T. Blackburn records it from Central Australia. I have specimens from Geraldton and Beverley, W.A.; Upper Ord River, N.W.A.; and Tamworth, Albury, Bathurst and Cootamundra, N.S.W. The types were from Gayndah in Queensland.

M. Fauvel has recorded it from Adelaide, New South Wales, Victoria, and the Paroo River, describing it, however, as a new species (*P. sanguinicollis*).

P. ANTIPODUM, Fvl. *Hab.*—New South Wales; West Australia.

P. LONGICORNIS, Steph. *Hab.*—New South Wales; West Australia; Tasmania.

P. SORDIDUS, Grav. *Hab.*—New South Wales; West Australia; Tasmania.

P. ÆNEUS, Rossi. *Hab.*—Forest Reefs, Sydney, N.S.W.

P. DISCOIDEUS, Grav. *Hab.*—West Australia; Tasmania.

P. XANTHOLINOIDES, Macl. Co-type.

P. NIGRITULUS, Grav. *Hab.*—West Australia; New South Wales; Tasmania.

QUEDIUS LURIDIPENNIS, Macl.

Specimens compared and agreeing with the types of this species agree with the description of *Q. semiviolaceus*, and also with a specimen sent to me under the latter name by the Rev. T. Blackburn. I have specimens from New South Wales and Western Australia.

Q. FEROX, Blackb. *Hab.*—Tasmania.

Q. ANDERSONI, Blackb. *Hab.*—Swan River, W.A.

Q. CUPRINUS, Fvl. *Hab.*—New South Wales; Tasmania.

Q. SIDNEENSIS, Fvl. *Hab.*—New South Wales; Tasmania.

Q. SULCICOLLIS, Fvl. *Hab.*—New South Wales; West Australia.

Q. RUBRICOLLIS, Fvl. *Hab.*—Clarence River, N.S.W.

Q. PICEOLUS, Fvl. *Hab.*—Forest Reefs, N.S.W.

Q. DIVERSIPENNIS, Fvl. *Hab.*—West Australia (widely distributed).

Q. HYBRIDUS, Er. *Hab.*—West Australia; New South Wales; Tasmania.

Q. RUFICOLLIS, Grav. *Hab.*—Tasmania; New South Wales.

Q. ANALIS, Macl. *Hab.*—Queanbeyan, Windsor, N.S.W.

XANTHOLINUS OLLIFFI, Lea.

The Rev. T. Blackburn* states that this name is probably a synonym of *X. phœnicopterus*, Er.; but in this he is mistaken. I have numerous specimens from various parts of Australia and Tasmania, which agree well with both Erichson's and Fauvel's descriptions, and also with specimens identified as *X. phœnicopterus* by the late Mr. A. S. Olliff. Erichson's species has elytra

* Trans. R. Soc. S. Aust., 1902, Vol. xxvi., Part 1, p. 20.

of a semitransparent red, but with a beautiful violet or purple gloss. He says:—"*Elytris rubris, purpureo nitentibus.*" And again:—"*Rubra, nitore purpureo resplendentia.*" M. Fauvel says in his tabulation of the genus:—"*Elytres d'un beau rouge violace.*" The elytra of *X. Olliffi* are not at all red and transparent; they might be described as "black, washed with metallic-purple"; other differences are that in *X. Olliffi* the head is decidedly larger in both sexes, the antennæ shorter and stouter, and the elytral punctures much more strongly impressed. The only specimens of *X. Olliffi* I have ever seen were taken in a flood on the Peel River; whilst *X. phœnicopterus* is a very widely distributed species, ranging beyond Australia.

XANTHOLINUS PHŒNICOPTERUS, Er.

A specimen from East Kimberley, N.W.A., appears to represent a variety of this species. It differs from the typical form in having all the tarsi, the anterior coxæ, and the four anterior femora red, and no part of the legs is quite black; the eight terminal joints of the antennæ are also decidedly reddish.

X. LORQUINI, Fvl. *Hab.*—Sydney, N.S.W.

X. ERYTHROPTERUS, Er. *Hab.*—New South Wales.

X. CHALCOPTERUS, Er. *Hab.*—New South Wales; Victoria; Tasmania.

X. HOLOMELAS, Perr. *Hab.*—Sydney, N.S.W.

SCOPÆUS DIGITALIS, Fvl.

I have two specimens from West Australia (Swan and Vasse Rivers) that agree with the description (such as it is) of this species. The type was from Victoria.

S. OBSCURIPENNIS, Blackb. *Hab.*—Victoria; New South Wales; West Australia.

S. LATEBRICOLA, Blackb. *Hab.*—New South Wales (widely distributed).

S. DUBIUS, Blackb. *Hab.*—Tweed and Clarence Rivers, N.S.W.

S. OVICOLLIS, Macl. *Hab.*—Clarence River, N.S.W.

LEPTACINUS NOVÆ-HOLLANDIÆ, Fvl.

This appears to be a synonym of *L. luridipennis*, Macl.

L. LURIDIPENNIS, Macl. *Hab.*—New South Wales (common and widely distributed).

L. SOCIUS, Fvl. *Hab.*—Tasmania; West Australia; New South Wales.

L. FILUM, Blackb. *Hab.*—New South Wales; West Australia.

SUNIOPSIS POLITUS, n.sp.

(Plate iv., fig. 2.)

♀. Highly polished and somewhat depressed. Clear yellow, elytra and antennæ slightly paler than head and prothorax, palpi and legs still paler, mandibles reddish. Head with a few long hairs at base and sides, and two on each side in front and immediately in a line with antennæ; two long hairs and a few short indistinct ones on each side of prothorax; base of elytra with a long hair on each side. Abdomen with moderately short yellowish pubescence, becoming longer on sides and moderately dense at apex.

Head subquadrate; with a few small scattered punctures, but with much smaller and denser punctures invisible from most directions. Antennæ slender, slightly passing base of prothorax, 3rd joint longer than 2nd but shorter than 1st, the others slightly decreasing in length, 11th slightly longer than 10th. *Prothorax* oblong, angles rounded, apex very slightly wider than base, slightly longer and slightly narrower than head; with scattered and very minute punctures and with a series of small punctures on each side of middle and a few small ones (almost seriate in arrangement) on the sides. *Scutellum* small, semicircular; impunctate. *Elytra* little more than one-half the length of prothorax but at widest quite as wide, shoulders strongly rounded; each separately rounded at apex; the surface rendered slightly irregular by punctures, but these shallow and indistinct. *Abdomen* slightly increasing in width from base to beyond middle, 7th segment

suddenly much narrower than 6th; punctures small and setose, much denser on the basal than on the apical segments. Length 6, to apex of elytra $2\frac{1}{2}$ mm.

Hab.—Donnybrook, W.A.

As the eyes are entirely on the upper surface of the head, the front tarsi simple and the body apterous, I have no doubt but that I have correctly placed this species in *Suniopsis*. From the description of *S. singularis* it differs in being smaller, and with the entire upper surface shining; there appear also to be slight differences in colour. In the unique specimen described there are five punctures on one side and seven on the other in the median prothoracic series.

SUNIUS APICIFLAVUS, n.sp.

Long and thin. Upper surface moderately (the head rather feebly) shining. Black; apex of elytra, apex of each of the four basal abdominal segments and all the appendages flavous. Clothed with short yellowish pubescence, the sides with sparse and rather long blackish hairs.

Head oblong, base rounded on each side; eyes projecting; sides suddenly narrowed in front of them and straight to apex; under-surface densely and regularly punctate throughout. Antennæ long and thin, the 1st joint as long as the 2nd and 3rd combined. *Prothorax* depressed, ovate, longer than wide, narrower than head but exactly the same length. *Elytra* slightly narrower and shorter than prothorax, shoulders rounded, posterior angles rounded, apex inwardly oblique to suture; densely, rather strongly and almost equally punctate throughout. *Abdomen* long, thin and parallel-sided to near apex; densely punctate; lower surface of apical segment deeply triangularly excised in male. Length $4\frac{1}{4}$, to apex of elytra 2 mm.

Hab.—Tweed and Clarence Rivers, N.S.W.

Rather more than one-third of the elytra is flavous, the two colours being sharply defined and parallel with the apex, though not with the base; in consequence the line of demarcation approaches the suture obliquely. In an occasional specimen the

shoulders are feebly diluted with red. In appearance the species is moderately close to *cylindricus*, but is larger, the prothorax entirely black, the shoulders without epaulettes and more of the abdomen black. *S. cylindricus* is said to be a variable species, but of the (four) specimens that I possess the largest is considerably smaller than the smallest of the (nineteen) specimens that I have of the above species; moreover, I have never seen a specimen of *cylindricus* having the prothorax entirely dark. Sir Wm. Macleay says of it :—"This species seems to vary a good deal in colouring. The thorax and abdomen have brown marks in one of the specimens before me which are not to be traced in the other." In my own specimens the brown markings on the prothorax consist of a patch on each margin sometimes dilated towards the middle but never encroaching on the base or apex; on the elytra the pale basal markings in three specimens consist of rather large epaulettes, in the other the base is entirely pale, as in the type.

The head and prothorax in this and the two following species (as they are also in *guttula*, *cylindricus*, and *æqualis*) are closely covered with comparatively large shallow punctures of even depth, each being supplied with a small central pit. These segments, in fact, appear to be closely reticulated or honeycomb-like in consequence of the walls of the larger punctures being perfectly uniform in height and disposition. I do not remember having seen similar punctures in any other genus of Coleoptera.

Sunius trilineatus, n.sp.

Long and thin. Upper surface shining, the head and prothorax much less than the elytra and abdomen. Black; apex of each of the four basal segments of abdomen and all the appendages flavous; elytra flavous, the suture and a stripe on each side black with a bluish gloss, extreme margins infuscate. Clothed with short yellowish pubescence, the sides with sparse and long blackish hairs. Length $4\frac{1}{2}$, to apex of elytra $2\frac{1}{6}$ mm.

Hab.—Clarence River, N.S.W.

The build is much the same as that of the preceding species, except that the whole insect is slightly more robust. The punctures of the lower surface of the head, however, are considerably larger, deeper and more distinct, the prothorax is comparatively narrower and slightly longer than the head, and the elytra are slightly wider, with much sparser and larger punctures.

The lateral stripes on the elytra are wider than the sutural one and do not extend to the apex or base, whilst the sutural one is continuous from the scutellum (itself black) to the extreme apex; as it approaches the apex, however, it diminishes in intensity of colour. These markings are sufficient to distinguish it from all previously described Australian species.

Sunius brevicollis, n.sp.

(Plate iv., fig. 13.)

Comparatively wide, feebly shining. Black; the extreme apex of the abdominal segments and all the appendages flavous; elytra obscure flavous with a brown stripe extending from each shoulder obliquely downwards, then curved round and increasing in width to suture, which it does not reach except at the middle (to which place from the base the suture itself is dark). Clothed with short yellowish pubescence, much more noticeable on elytra and abdomen than elsewhere, the sides with long and moderately sparse brownish hairs.

Head as in *S. apiciflavus* except that it is rather shorter and more convex, and that the antennæ are shorter and stouter, with the basal joint almost as long as the three following combined. Under surface with a distinct median line; punctures rather small but deep and clearly defined. *Prothorax* depressed, briefly ovate or subcordate, very slightly wider than long, the width of or but slightly narrower than head. *Elytra* scarcely, if at all, longer than wide, wider than head, sides somewhat rounded, shoulders and posterior angles rounded, apex inwardly oblique to suture; densely and rather strongly punctate. *Abdomen* comparatively wide and short, parallel-sided to about middle, thence

noticeably diminishing in width to apex; punctures smaller and sparser than in the two preceding species; under surface of apical segment deeply excised in male. Length 4, to apex of elytra $2\frac{1}{6}$ mm.

Hab.—Richmond River, Dalmorton, N.S.W.

In general appearance this species approaches to a number of species of *Lithocharis*, but the remarkable punctures of the head and prothorax are even more clearly defined than in either of the preceding species. The elytral markings are somewhat vaguely defined in places, but in appearance are somewhat like a W or a reversed M with the corners crushed inwards. A female specimen differs in having the head, prothorax and abdomen of an obscure testaceous colour, with the elytral markings absent on the entire basal half.

Owing in places to irregularity of the punctures, there appear to be a number of small subtubercular elevations on the elytra; in one specimen there are four of these in a straight line down the middle of each elytron, with two others close to the suture, and several near the apex; these small spaces are polished, and from certain directions very conspicuous, but they appear to be solely due to absence of punctures. Similar subtubercular spaces can be traced in most of the other species.

S. GUTTULA, Fvl. *Hab.*—New South Wales; Tasmania.

S. ÆQUALIS, Blackb. *Hab.*—New South Wales; West Australia.

S. CYLINDRICUS, Macl. *Hab.*—Clarence River, N.S.W.

CRYPTOBIUM MYRMECOCEPHALUM, n.sp.

(Plate iv., fig. 3.)

Narrow and opaque, but with certain parts shining. Piceous-black; abdomen piceous-brown, legs testaceous, knees and tibiæ darker, antennæ testaceous-brown, the terminal joints and the basal half of the 1st paler. Clothed with moderately long brownish pubescence, sparse on head, and still sparser on prothorax and elytra.

Head considerably longer than wide, widest across eyes (which are at about the basal third); with a deep median line from near base (where it is enlarged and almost pyriform) to clypeus, on each side of which it somewhat indistinctly diverges. Antennæ long and thin, extending to apex of elytra; 1st joint as long as the six following combined; 2nd slightly longer than the 3rd; 3rd slightly longer than the 4th, but shorter than the 5th; 7th-9th subglobular; 10th transverse; 11th obovate. Palpi long and apparently (only) two-jointed, the terminal joint being unusually small, and scarcely distinguishable from the true second joint. *Prothorax* considerably longer than wide, at widest almost equal to head across eyes, greatest width at about apical third, thence obliquely and strongly decreasing in width to apex, which is rounded; sides less rapidly (and with a slight inward curve) decreasing to base; very densely and finely punctate throughout; each side moderately close to middle, with a fine shining carina (vanishing at about the middle) curved round and joined at apex and base, and from the middle of base continued for a slight distance along the median line. *Elytra* distinctly longer and wider than prothorax, each side of base with a triangular emargination, apex conjointly widely emarginate, very densely and finely (more coarsely than the prothorax) punctate throughout. *Abdomen* subparallel to beyond the middle, the four basal segments densely and rather coarsely punctate, the 5th with smaller but moderately dense punctures; in ♂ under surface of 5th very feebly emarginate at apex, the 6th deeply and triangularly excised. Meso- and metasternum densely and rather strongly punctate. *Legs* rather long and thin. Length 5½, to apex of elytra 3; variation in length 5-6 mm.

Hab.—Clarence River, N.S.W.

A highly remarkable species, with head and antennæ strongly resembling those parts of many ants; the antennæ are also carried much as they are by ants. It may eventually be considered necessary to place it in a new genus on account of the position of the eyes, and the peculiar palpi, prothorax and elytra.

CRYPTOBIUM MASTERSI, Macl. (?)

I have two specimens from the Upper Ord River which I cannot structurally distinguish from this species, but which differ in having the antennæ and legs of a dull red, the basal half of the femora paler but still of a reddish colour. One of these specimens is a male, and has the 5th abdominal segment slightly emarginate at its apex, and with the 6th deeply and triangularly excised. Sir William did not describe the sexual characters of the types, and my three typically coloured specimens (from New South Wales and North West Australia) are females.

C. APICALE, Macl. *Hab.*—Behn and Upper Ord Rivers, N.W.A.

C. FRACTUM, Fvl. *Hab.*—Vasse, Swan River, Albany, W.A.

C. VARICORNE, Blackb. (cotype).

DICAX VENTRALIS, n.sp.

(Plate iv., fig. 12.)

♂. Long, thin and shining. Black; legs and mouth-parts red; the mandibles somewhat darker, antennæ piceous, the base of nearly all the joints red. Clothed with rather sparse straggling brownish pubescence, denser (but still comparatively sparse) on abdomen than elsewhere; apex of elytra fringed with short golden hairs.

Head longer than wide; sides with large and moderately dense punctures, absent on median line and on clypeus, with numerous small scattered punctures more noticeable on clypeus than elsewhere; antennary tubercles large. Clypeus rather strongly depressed on each side. Mandibles fully as long as the head, the apices considerably projecting beyond each other when at rest. Antennæ moderately slender, not extending to base of prothorax, 1st joint as long as 2nd-3rd combined, 3rd-10th gradually decreasing in length, 11th slightly longer than 10th. *Prothorax* subcylindrical, narrower than head, apex truncate, posterior angles rounded; each side along middle with a somewhat irregular, but very distinct series of punctures of somewhat smaller size than

the large ones on the head, the sides (especially on apical half) with punctures of similar size, but irregularly distributed; elsewhere with a few indistinct scattered punctures. *Elytra* about once and one-third longer, and once and one-fourth wider than prothorax; sides very feebly inflated to middle; apex conjointly feebly emarginate, and with a very narrow raised rim, with rather large punctures in distinct series on the disc (about five series on each), but irregular on sides, the sutural row in a narrow depression with the punctures sometimes quite concealed. *Abdomen* parallel-sided to near apex; moderately densely punctate, the punctures rather denser on the margins than elsewhere; lower surface of 5th segment trisinuate, the median sinus rather wider than the others, and simple, the outer ones each with a comb-like fringe of short dark setæ; 6th segment almost semicircularly excised. Length (excluding mandibles) 11, to apex of elytra 6; variation in length 8-12 mm.

♀. Differs in having a smaller head, with shorter mandibles, and with the abdomen simple.

Hab.—Beverley, Donnybrook, Newcastle, Swan River, W.A.

A very common species under logs and stones in the vicinity of water. It appears to be allied to *D. longiceps* and *D. cephalotes*, but has the legs of a decided red. The neck is normally concealed, but when exposed is seen to be closely covered with moderately large punctures; on its under surface they are larger but shallower than on its upper. The sculpture and clothing of the lower surface of the 5th abdominal segment in the male is most remarkable.

Dicax ruficollis, n.sp.

♂. Long, thin and shining. Black; the entire sterna (including the pronotum), the two apical segments of abdomen, the mouth-parts, coxæ, trochanters and tarsi red; antennæ piceous, the bases of the joints and the antennary tubercles and knees more or less diluted with red. Clothed with rather sparse, straggling, yellowish pubescence, becoming dense on abdomen.

Head longer than wide; with moderately large punctures, and with numerous smaller ones scattered about; antennary tubercles

rather small. Clypeus scarcely depressed on each side. Lower surface densely and rather coarsely punctate, except in the vicinity of the gular suture. Antennæ extending to base of prothorax, 1st joint almost as long as 2nd and 3rd combined, 2nd slightly shorter than 3rd, the others gradually decreasing in length. *Prothorax* suboblong, somewhat depressed, very slightly narrower than the head; punctures as in the preceding species. *Elytra* slightly longer and slightly wider than prothorax, apex conjointly feebly emarginate, and with a very narrow raised rim; with series of moderately large punctures on the disc, but irregular at the side. *Abdomen* parallel-sided to near apex, densely punctate (both surfaces); lower surface of 6th segment feebly emarginate. Length 8, to apex of elytra 4½ mm.

♀. Differs in having a smaller head and simple abdomen.

Hab.—New South Wales.

The colour of this insect is sufficient to distinguish it from all previously described species. The punctures on the clypeus are no sparser than elsewhere on the head. About six rows of punctures can be seen on the disc of each elytron; of these, however, the second row consists of but few punctures, which are usually placed beyond the middle, so that the first row appears to be separated from the 2nd (but really the 3rd) row by a considerable space; the true 4th row, though quite regular, contains considerably smaller punctures than the 3rd or 5th.

I have taken specimens of this species and its variety (described below) from flood débris of the Tweed, Clarence, Hawkesbury and Peel Rivers, but unfortunately I confused the localities, so that I cannot now say where each comes from; they are, however, all from New South Wales.

Var. NIGRIVENTRIS, n.var.

Differs only in being slightly smaller (7 mm.), and by having the abdomen entirely black.

MYRMEDONIA CLAVIGERA, Fvl.

M. Fauvel describes the abdomen of this species as blackish-piceous. One specimen under examination has the abdomen

entirely dark except that the apex of the 1st, 2nd and 3rd segments are reddish, but in three others (from New South Wales and Tasmania) the three basal segments are entirely of a rather bright red.

Falagria pallipes, Oll. *Hab.*—New South Wales; Victoria; Tasmania.

F. Fauveli, Sol. *Hab.*—New South Wales; Victoria; Tasmania; West Australia.

Aleochara speculifera, Er. *Hab.*—New South Wales.

A. actæ, Oll. *Hab.*—Sydney.

A. brachialis, Jek. *Hab.*—Sydney, Tamworth, N.S.W.

A. hæmorrhoidalis, Guér. *Hab.*—New South Wales; Tasmania.

A. semirubra, Fvl. *Hab.*—Whitton, N.S.W.

A. puberula, Kl. *Hab.*—New South Wales; West Australia.

A. insignis, Blackb. *Hab.*—Bridgetown, W.A.

Correa oxytelina, Fvl. *Hab.*—South Australia.

Tachynoderus australis, Fvl. *Hab.*—Wide Bay, Q.

T. hæmorrhous, Fvl. *Hab.*—Sydney.

Cryptommatus Jansoni, Matth. *Hab.*—Tasmania.

Heterothops picipennis, Fvl. *Hab.*—Tasmania; New South Wales.

H. laticeps, Fvl. *Hab.*—Sydney.

Antimerus smaragdinus, Fvl. *Hab.*—Gosford, N.S.W.

Creophilus erythrocephalus, Fab. *Hab.*—Common in all the Australian States.

Mysolius chalcopterus, Oll. *Hab.*—Cairns, Q.

Actinus Macleayi, Oll. *Hab.*—Cairns, Q.

Lathrobium bipartitum, Fvl. *Hab.*—New South Wales; North West Australia.

L. australicum, Sol. *Hab.*—Clarence River, Windsor, N.S.W.

Scymbalium australe, Fvl. *Hab.*—Whitton, Windsor, N.S.W.

S. SIMPLARIUM, Fvl. *Hab.*—New South Wales; Tasmania.

S. MICROCEPHALUM, Fvl. *Hab.*—Clarence River, N.S.W.

S. ARCUATUM, Fvl. *Hab.*—Tamworth, N.S.W.

DOMENE TORRENSENSIS, Blackb. *Hab.*—Windsor, N.S.W.

PALAMINUS AUSTRALIÆ, Fvl. *Hab.*—Sydney, Dalmorton, N S.W.

LEPTOCHIRUS SAMOENSIS, Blanch. *Hab.*—Barron Falls, Q.

AMPHICHROUM AUSTRALE, Fvl.

This species may be obtained in abundance from many species of *Banksia** about Sydney. My specimens vary in length from 3 to 6½ mm.

AMPHICHROUM SPINIPES, Fvl.

A very variable species as regards both colour and size. It is widely distributed in West Australia.

AMPHICHROUM ADELAIDÆ, Blackb.

I have five male and two female specimens from Tasmania which agree very well with the description of this species. In none of them is the breast dark, a character in itself sufficient to distinguish the species from the males of M. Fauvel's three species. In all of them the elytra are semitransparent, so that from certain directions the folded wings can be easily distinguished.

ELEUSIS PLANICOLLIS, Macl.

Specimens from the Tweed River, compared and agreeing with the types of this species, agree exactly with the description of *E. australis*, Fvl.

E. PARVA, Blackb. *Hab.*—Tweed and Richmond Rivers, N.S.W.

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* The three species with which I am acquainted were all obtained from species of *Banksia*

COLYDIIDÆ.

Illestus Grouvellei, Reitter.

Herr Reitter (Verh. K. K. Zool. Bot. Gesell. in Wien, 1879, p. 508) states that this is a synonym of *Sparactus interruptus*, Er. This correction has been overlooked in the Supplementary Catalogue.

Anommatus 12-striatus, Müll.

At the roots of grass in my garden in Hobart I obtained numerous specimens (there are 19 before me now) of a small, blind, apterous Clavicorn. These were shown to Mr. J. J. Walker, who said they reminded him very much of *Anommatus 12-striatus*, one of the four blind British beetles. Subsequently Mr. G. C. Champion kindly sent me a specimen of this species from Kent, and on comparison I find the Tasmanian specimens identical with it. It is probable that the species was brought to Tasmania in earth with pot plants.

RHYSODIDÆ.

Hitherto but one species of this remarkable family has been recorded from Australia. I have now to add five others, all of which are very distinct. Together with the previously described *R. lignarius*, they may be tabulated as follows :—

Prothorax without lateral sulci ..... *planatus*, n.sp.
Prothorax trisulcate.
  Elytra acutely carinate. .... *mirabilis*, n.sp.
  Elytra seriate-punctate.
    Median prothoracic ridges shorter than lateral ones..... ..... *abbreviatus*, n.sp.
    Median ridges no shorter than lateral ones.
      Median lobe of head continuous to base. *lignarius*, Oll.
      Median lobe terminating considerably before base.
        Lateral lobes of head transverse.... *trichosternus*, n.sp.
        Lateral lobes longitudinal ..... *ichthyocephalus*, n.sp.

RHYSODES ICHTHYOCEPHALUS, n.sp.

Black, shining; legs diluted with red.

Head deeply bisulcate; median lobe terminated considerably before base and impunctate; lateral lobes punctate, basal portion subreniform and feebly separated from the apical portion. Antennæ with the 1st joint cylindrical and longer than wide, 2nd-10th transverse, 11th very little longer than wide. *Prothorax* deeply trisulcate; the ridges lightly punctate, of equal length and all swollen in middle, the two middle ones slightly converging towards each other at apex; lateral impressions narrow and running out at apex. *Elytra* not much wider than prothorax; seriate-punctate, punctures partially effaced towards suture; interstices rounded, fifth slightly raised, posteriorly becoming subcarinate, waved and joined to the sutural interstice. *Under surface* with scattered punctures of moderate size, but large and rather dense on apical segment; each of the other abdominal segments with a transverse series of punctures, small in middle, larger and denser at sides. Length 6, width 2 mm.

Hab.—Cairns, Q. (Macleay Museum).

In general appearance not unlike *lignarius*, but the median lobe (which has an outline somewhat similar to that of a fish) of the head of different shape and terminated considerably before the base.

RHYSODES ABBREVIATUS, n.sp.

Black, shining; legs diluted with red.

Head irregularly impressed and divided into six lobes; the median lobe largest, suboblong, slightly produced in front (the apex just before middle) and continuous to base, near base impressed on each side; basal lateral lobes rather large and subreniform, and not very distinctly separated from eyes; apical lateral lobes long, narrow and feebly transversely impressed; apical median lobe small. Basal joint of antennæ scarcely longer than wide, 2nd-10th transverse, 11th slightly longer than wide. *Prothorax* deeply trisulcate; the ridges impunctate and all swollen in middle, the median ones noticeably shorter than the

lateral; marginal impressions deep, continuous, and not very narrow. *Elytra* not much (but rather suddenly) wider than prothorax; seriate-punctate, each puncture with a central pit; interstices narrow (the sutural rather wide) and each slightly encroached upon by punctures, the interspaces opaque. *Mentum* shining and lightly transversely wrinkled; rest of under surface of head and apex of prosternum opaque; mesosternum triareolate in middle; metasternum with a few coarse punctures on flanks; suture between 1st and 2nd abdominal segments deep in middle, 2nd and 3rd rather lightly transversely impressed near apex, 4th more deeply impressed, 5th coarsely and irregularly punctate. Length 6, width 2 mm.

Hab.—Cairns, Q. (Macleay Museum).

This species is also somewhat after the style of *R. lignarius*, but may be at once distinguished by the very different punctures and interstices of the elytra, and the short median prothoracic ridges. The marginal impressions of the prothorax might very fairly be regarded as sulci.

Rhysodes mirabilis, n.sp.

(Plate iv., fig. 7.)

Black, shining; legs obscure piceous-red.

Head deeply bisulcate; median lobe very narrow posteriorly, and terminated considerably before base; lateral lobes large, feebly transversely and longitudinally impressed. Antennæ stout, all the joints transverse except the 11th. *Prothorax* decidedly elongate; deeply trisulcate; the ridges impunctate, the median raised towards the middle, noticeably wider than the lateral, and conjoined at apex; marginal impressions scarcely visible from above. *Elytra* scarcely wider than the widest part of prothorax, and very little longer than head and prothorax combined; base emarginate; suture depressed at base and apex, but perfectly flat in middle; each with three acute costæ: the outer commencing on each shoulder and conjoined at apex, the median one slightly shorter and thickened at apex, the inner one still

shorter, abruptly terminated, and nowhere thickened. *Under surface* impunctate; mentum transversely and longitudinally impressed; abdomen strongly convex, each of its segments deeply sulcate laterally, the sulci not traceable across middle. *Legs* much stouter than usual. Length 7, width 1½ mm.

Hab.—Cairns, Q. (Macleay Museum).

A remarkably distinct species.

RHYSODES TRICHOSTERNUS, n.sp.

Piceous-black and shining; legs and outer margins of elytra diluted with red.

Head deeply bisulcate; basal lobes large; median lobe of irregular shape, and terminated considerably before the base, a feeble lobe on each side of its middle. Antennæ rather long, 1st joint almost as long as 2nd and 3rd combined, 2nd transverse, 3rd longer than wide, 4th as long as wide, 5th-10th transverse, 11th once and one-half the length of 10th. *Prothorax* considerably narrowed in front; deeply trisulcate, ridges impunctate, the median slightly narrower than the lateral, and almost conjoined at apex; marginal impressions deep and narrow. *Elytra* considerably wider than prothorax; seriate-punctate, punctures rather large, interstices rounded and feebly raised, the 8th thickened and conjoined at apex. *Mentum* strongly punctate; apex of prosternum opaque and pubescent, flanks coarsely punctate; middle and sides of metasternum punctate; each of the abdominal segments with a transverse series of punctures and lightly impressed, apical segment densely punctate. Length 8½, width 2½ mm.

Hab.—Victoria (C. French).*

A comparatively large species with wide elytra. In appearance it resembles *R. ichthyocephalus*, but the antennæ are considerably stouter, and the 8th (instead of the 5th) elytral interstice raised posteriorly.

* Mr. J. J. Walker has recently shown me a specimen of this species which he obtained in an old rotten log near Hobart.

RHYSODES PLANATUS, n.sp.

Reddish-brown, shining.

Head deeply but comparatively narrowly bisulcate, lateral lobes large, feebly impressed on each side, and each side narrowly continued to in front of antennæ; median lobe large, of irregular shape, produced behind, but terminated considerably before base. Antennæ moderately long, 1st joint slightly, the 3rd and 11th distinctly longer than wide. *Prothorax* wide and flat, almost impunctate; with a deep and narrow median line not quite continuous to apex; each side of base with a large subtriangular punctate impression, from the middle of which a feebly impressed line is traceable almost to the middle of the disc; marginal impressions narrow and continuous. *Elytra* wider than prothorax; seriate-punctate, punctures of moderate size, interstices rounded and slightly raised, both punctures and interstices irregular near apex. *Mentum*, middle of prosternum and of metasternum with rather large and moderately dense punctures; abdominal segments not transversely impressed, but with rather numerous shallow punctures (except at base and apex of each). Length $8\frac{1}{4}$, width $2\frac{1}{3}$ mm.

Hab.—Victoria (C. French).

A large flat species, which may be easily recognised by the absence of lateral prothoracic sulci. The median lobe of the head in the unique specimen under examination is impressed with two rather large punctures.

R. LIGNARIUS, Oll. *Hab.*—Richmond River, N.S.W.

LÆMOPHLÆUS SUBOPACUS, n.sp.

Moderately densely clothed with short yellowish pubescence; subopaque. Testaceous.

Head transverse, moderately densely punctate, median line very feeble. Antennæ extending to posterior coxæ, 1st joint stout, not quite as long as 2nd-3rd combined, 2nd stouter, and very little longer than 3rd, 5th-11th very feebly increasing in length. *Prothorax* transverse, anterior angles dentiform; densely

and moderately distinctly punctate; with two fine carinæ on each side. *Elytra* with three (almost geminate) striæ on each side; moderately densely punctate at base and sides. Length $2\frac{1}{3}$ mm.

Hab.—Newcastle, W.A.

In general appearance (except as to its clothing) this species resembles *L. rigidus*. From some directions the sides of the elytra (rearwards from the shoulders) appear to be feebly raised.

LÆMOPHLÆUS UBIQUITOSUS, n.sp. or var.

♂. Glabrous, highly polished. Pale reddish-testaceous.

Head transverse, distinctly and moderately densely punctured; a semicircular impression in front, behind eyes a deep transverse impression, median line scarcely traceable. Antennæ extending almost to apex of elytra, 1st joint stout, as long as 2nd and 3rd combined, 3rd slightly shorter than 2nd or 4th, 4th-10th subequal in length, 11th slightly longer. *Prothorax* transverse, sides feebly rounded, anterior angles dentiform, posterior briefly obliquely truncated; striæ deep and distinct and with a foveate expansion in the middle of each, punctures distinct but small and rather sparse. *Elytra* feebly longitudinally concave on each side; punctures distinct on each side, but feeble along middle; sutural stria obsolete on basal third, the lateral near apex. Length $1\frac{1}{4}$-$2\frac{1}{2}$ mm.

♀. Differs in having the antennæ considerably shorter, with the joints (except the 1st) proportionately stouter.

Hab.—Bruni Island, Huon River, Ulverstone, Frankford, &c., Tasm.

In general appearance close to *L. rigidus*, but differs in being smaller and comparatively narrower. I am doubtful, however, as to whether it should not be regarded as a variety of that species, as the only tangible distinction I can find is that in the Tasmanian specimens the sutural stria terminates at about one-third from the base, whilst in those from West Australia this stria can be traced to the base itself; but even in this character there are intermediate stages. Of *L. rigidus* I have never seen

specimens less than $2\frac{1}{2}$ mm. in length (the smallest size recorded by Olliff), whilst $2\frac{1}{2}$ mm. appears to be the maximum size attained by *L. ubiquitosus*. It is of common occurrence under the bark of several species of Eucalyptus, and may be beaten plentifully into the umbrella from drying leaves. In his original description of *L. Australasiæ*, Blackburn says: "*elytris ante apicem fascia lata infuscata ornatis*," and again, "the wide blackish fascia occupying nearly all the apical half of the elytra." In a recent paper he says, "I have seen specimens in which the subapical infuscation is only slightly developed." In all the numerous specimens of *L. ubiquitosus* I have seen, the elytra are entirely of uniform colour. *L. rigidus* appears to be unknown to Mr. Blackburn, and is tabulated by him as having "Sublateral stria of pronotum very much deepened on its hind half;" it should, however, have been placed in the same division "F F F" as *Australasiæ*.

LÆMOPHLÆUS PILOSUS, n.sp.

♂ (?). Clothed with short yellowish pubescence, moderately shining. Testaceous, head and prothorax slightly darker.

Head strongly transverse; punctures partially concealed; median line scarcely traceable. Antennæ extending beyond posterior coxæ, 1st joint stout, not much longer than 2nd, 2nd stouter and slightly longer than 3rd, 4th-10th feebly increasing in length, 11th about once and one-half the length of 10th. *Prothorax* transverse, sides rounded, apex considerably wider than base; punctures dense and moderately large, but more or less concealed, lateral striæ partially concealed. *Elytra* densely punctate, each with four distinct striæ and with traces of others. Length $1\frac{1}{2}$ mm.

Hab.—Swan River, W.A.

From *L. subopacus* (also pilose and from W. Australia) this species may be distinguished by its less depressed form, but in particular by the anterior angles of the prothorax being rounded instead of dentiform.

LÆMOPHLÆUS TESTACEO-RUFUS, n.sp.

♂ (?). Scarcely visibly pubescent, shining. Uniformly testaceous-red except for a blackish cloud about the scutellum.

Head transverse, distinctly punctate; basal impression rather feeble, median line not traceable. Antennæ just passing base of prothorax, 1st joint moderately stout, not much longer than 2nd, 3rd-10th subequal in length and feebly or not at all transverse, 11th ovate, not much longer than 10th. *Prothorax* transverse, apex much wider than base, with or without a feeble longitudinal impression on each side of middle; densely and distinctly punctate, a single stria on each side. *Elytra* rather strongly punctured at sides, but feebly along middle, each with four distinct striæ and with traces of others. Length $1\frac{3}{4}$ mm.

Hab.—Geraldton, Mount Barker, W.A.

A specimen which appears to be a female differs in having a smaller head and shorter antennæ, with the sides of the prothorax more rounded. In general appearance the species is close to *L. rigidus*, but the striation of the prothorax is very different.

LÆMOPHLÆUS EUCALYPTI, n.sp.

♂. Scarcely visibly pubescent, shining. Pale reddish-testaceous and with or without a slight blackish cloud about scutellum.

Head moderately large; punctures moderately distinct, median line not traceable. Antennæ terminated before base of prothorax, 1st joint stout, subglobular, not quite the length of 2nd-3rd combined, 2nd stouter and longer than 3rd, 3rd-8th subequal in length and feebly transverse, 9th-10th slightly larger, 11th briefly ovate, but about once and one-half the length of 10th. *Prothorax* feebly transverse, apex considerably wider than base, densely and regularly punctate; each side with a single stria. *Elytra* each with four distinct striæ and traces of others, the sides of the striæ feebly rugulose from punctures, interspaces very feebly punctate. Length $1\frac{1}{4}$-$1\frac{3}{4}$ mm.

♀. Differs in having a smaller head and shorter antennæ, and the prothorax slightly longer than wide.

Hab.—New Norfolk, Tasm.

A small narrow species which was taken rather plentifully between the layers of woolly-bark (*Eucalyptus obliqua*) in company with a species of mealy-bug (*Dactylopius*) in July. It differs from the description of *L. Tasmanicus* in being smaller, narrower, and the elytra of different shape and sculpture.

LÆMOPHLÆUS PALLIDUS, n.sp.

♂. Almost glabrous, shining. Pale testaceous, feebly (or not at all) infuscate about scutellum.

Head scarcely visibly punctate, median line absent, a feeble impression on each side in front. Antennæ extending to posterior coxæ, 1st joint almost as long as 2nd-3rd combined, 3rd feebly transverse, 4th-10th subequal in length, 11th slightly longer. *Prothorax* feebly transverse, anterior angles subdentiform, apex noticeably wider than base; distinctly punctate, sides unistriate. *Elytra* not very distinctly punctate, each with three distinct striæ and with traces of others. Length 1(vix)-1¼ mm.

♀. Differs in having a narrower head, with the 2nd-10th joints of the antennæ proportionally smaller and with the prothorax not at all transverse.

Hab.—Newcastle, W.A.

Of the *L. testaceus* type, but differs from that species in its smaller size and by the striation of both prothorax and elytra.

L. AMABILIS, Oll. *Hab.*—Clarence River, N.S.W.

L. ARTICEPS, Oll. *Hab.*—Inverell, N.S.W.

L. RIGIDUS, Oll. *Hab.*—West Australia (widely distributed).

L. TESTACEUS, Fab. *Hab.*—West Australia; New South Wales; Tasmania.

L. BISTRIATUS, Grouv. *Hab.*—Dalmorton, Richmond River, Forest Reefs, N.S.W.

L. DIFFICILIS, Blackb. (cotype).

I had descriptions of the two following species prepared for publication when a recent paper by the Rev. T. Blackburn (in which they were described) appeared.

Læmophlæus Diemenensis, Blackb.

(Plate iv., fig. 14.)

The female (apparently unknown to Blackburn) differs from the male in having the head somewhat longer, with the eyes more distinct; the 1st joint of the antennæ stout, simple, and as long as the three following combined, the 2nd slightly longer and stouter than the 3rd, the 3rd-10th of almost equal length and width, the 11th slightly longer and thinner than the 10th; the prothorax is transverse with stronger punctures, and is nowhere wider than the greatest width of the elytra.

Hab.—Scamander River and Mount Wellington, Tasm. (between layers of bark of the Stringy-bark, *Eucalyptus obliqua*).

Læmophlæus Frenchi, Blackb.

(Plate iv., fig. 4.)

The 1st joint of the antennæ of this remarkable species is variable in the male; in the specimen described by Mr. Blackburn it was strongly curved but simple, in one of the specimens before me there is a small but distinct and acute projection at its apical third; in two others it is much less strongly curved at apex, thickened, simple and approaching the normal length.

Hab.—Hobart, Huon River, and Mole Creek, Tasm.

Dryocora Walkeri, n.sp.

(Plate iv., fig. 5.)

Flat, highly polished, glabrous. Uniformly testaceous, front of prothorax narrowly infuscate or not.

Head strongly transverse, basal lobes large, their hinder margin level or almost level with front of prothorax, neck strongly constricted and below the general level; clypeus very little wider than long; with small scattered punctures—larger and denser on neck than elsewhere. Antennæ very little longer than width of head, basal joint stout, almost as long as the two following combined, 9th and 10th strongly transverse. *Prothorax* longer than

wide, apex much narrower than base, base obtusely rounded, sides subparallel on basal half; with small scattered punctures rather sparser than on head. *Scutellum* transverse, apex truncate; without or with but few small punctures. *Elytra* slightly wider than prothorax, a distinct and continuous stria on each side of suture, elsewhere with very feeble traces of striation and with small punctures in feeble series. *Undersurface* with small punctures, the sides very finely aciculate, jugular region and prosternum finely transversely corrugated. Length $4\frac{1}{2}$, width $1\frac{1}{3}$; variation in length $4\text{-}5\frac{1}{4}$ mm.

Hab.—Mount Wellington (J. J. Walker, H. H. D. Griffith, and Lea), Huon River, Hobart, Tasm. (Lea).

This species seems to be not uncommon in old rotting logs, where it may sometimes be taken in company with *Prostomis Atkinsoni*, Waterh. From *Prostomis*, to which the genus is undoubtedly closely allied, the basal lobes and simple undersurface of head will readily distinguish it. From the New Zealand *D. Howitti*,* Pasc., it may be distinguished by its much smaller size, much paler colour, sparser and smaller punctures, much less transverse clypeus, and by the 2nd-6th joints of antennæ not at all transverse. Seen from the sides, the disc of the elytra appears to be margined by a narrow continuous carina, but this is invisible from above. The elytral punctures, although as a rule larger than those on the prothorax, are very shallow and never sharply defined. With the head removed, the body resembles many of the *Cossonides*, especially of the genus *Cossonus*.

PLATISUS INTEGRICOLLIS, Reitter.

(Plate iv., fig. 6.)

The larva of this species is an extraordinary creature, especially as regards its tail segments; it may sometimes be taken in abundance under bark, often in company with the adults; when full grown it measures about one-half inch in length. The larva

* Mr. J. J. Walker has kindly given me a specimen of this species.

of *Ipsaphes bicolor*, Oll., is somewhat similar, but the tail segments are still more peculiar; I have not drawn it, however, as the only specimen I now have (and which is about one inch in length) has long been dried.

SCARABÆIDÆ.

Panelus Arthuri, Blackb.

This name is a synonym of *Panelus* (*Temnoplectron*) *pygmæus*, Macl. Both descriptions were drawn up from specimens taken at King's Sound by Mr. W. W. Froggatt.

Liparetrus tuberculatus, Lea.

This species was referred to Macleay's Sec. i., Subsec. 3, *c*. In again examining the type, however, I see that it should have been referred to Subsec. 2, "Clypeus with the apex more or less tridentate," the clypeus being certainly tridentate, although rather feebly so. In general appearance it is close to *L. asper* of that Subsection, but the subapical tubercle renders it very distinct from that, and in fact from any other described species.

Phycochus sulcipennis, n.sp.

(Plate iv., fig. 10.)

Dark reddish-brown, front margins of prothorax and legs somewhat paler, antennæ flavous. Undersurface and legs and outer margins of elytra with long straggling pale hairs.

Head rather densely granulate but smooth posteriorly, front margin incurved, sides suddenly narrowed beyond middle. *Prothorax* widely transverse, base and sides rounded, apex indistinctly emarginate, with coarse irregular punctures, in places conjoined so as to form irregular transverse depressions. *Scutellum* minute, semicircular, impunctate. *Elytra* at base not much wider than prothorax, but considerably wider about middle, each with ten deep and distinct striæ, in which are moderately long narrow punctures; interstices wide, smooth and impunctate. *Legs* stout; front tibiæ with three large outer teeth, of which the

median is the largest, and with a long free apical spine; middle tibiæ with serrated sides, the apex very wide and with a long free spine, also with a fixed spur about half the length of the spine; hind tibiæ widest of all, the sides deeply sculptured, apex with a long free spine and a fairly long spur; tarsi pentamerous, the front pair linear and (when placed along it) not passing tip of the outer tibial tooth; middle tarsi stouter and longer, the 1st joint fairly wide, the 5th very thin; joints of the posterior (except the 5th) shorter and wider than those of the middle tarsi. Length $3\frac{1}{2}$, width $1\frac{3}{4}$; variation in length 3-4 mm.

Hab.—Hobart, Tasm. (At roots of plants growing in white sand close to Sandy Bay beach).

From the two described New Zealand species, the strong elytral sculpture will readily distinguish this species. Two of the specimens before me are so dark that they might fairly be called black, others are almost castaneous. On only one specimen can I see a few punctures on some of the elytral interstices; on all the others these are quite impunctate. The free spines of the tibiæ are not much shorter than the tarsi, those of the middle pair being the longest and of the hind the stoutest. The 5th tarsal joint under a Coddington lens appears to be without ungues; under a compound power it appears to be terminated by one or two setæ and these appear to be true setæ, so that there are probably no true ungues. Although there are eleven perfect specimens before me, I have not been able to see the antennæ sufficiently clearly to draw them or even to describe them.

Phycochus graniceps, Broun.*

I have taken numerous specimens (with one exception, however, all dead and more or less broken and faded) of this species at the dead roots of plants (usually of the bracken fern) in sand hillocks near Sandy Bay.† These specimens agree with two from

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* Broun, Man. N.Z. Col. Part iii., pp. 770 and 771.

† From the same place (close to Hobart), Mr. Walker, however, has taken several living specimens.

New Zealand given to me by Mr. J. J. Walker. Capt. Broun appeared to regard the genus as not having truly pentamerous tarsi,* but in one of my New Zealand specimens there are certainly five joints to the right middle tarsus, although the rest have the tarsi either broken off or with but three of the joints remaining; the apical joint, however, is thin—not much thicker than a stout seta—and apparently clawless.

MALACODERMIDÆ.

Balanophorus Macleayi, Lea.

(Plate iv., fig. 8.)

A figure of this fine species is given, as no species of the genus (which appears to be fairly numerous in, and confined to, Australia) has hitherto been figured.

Neocarphurus impunctatus, Lea.

(Plate iv., fig. 9.)

Figured for the same reason as the preceding species.

BOSTRYCHIDÆ.

Mons. P. Lesne having recently monographed the above family, and altered the generic names of all the previously described Australian species, a catalogue of the Australian and Tasmanian species may be acceptable. In this catalogue are given the localities so far as known, with references to Mons. Lesne's descriptions and figures. It has not been considered necessary to give here full references, as these have been given by Mons. Lesne.

Dinoderus, Stephens; Lesne, Ann. Soc. Ent. Fr., 1897, 321.

Australiensis, Lesne, Notes Leyden Mus., xix., 184; Ann Soc. Ent. Fr., 1897, 328—Northern Territory.

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* It is true that in describing the genus he says, "Tarsi seemingly normal, all mutilated, three joints only intact;" but in describing a second species—*P. lobatus* (Man. Part v., p. 1114)—he says, "The tarsi are only triarticulate and are without claws."

BOSTRYCHOPSIS, Lesne, Ann. Soc. Ent. Fr., 1898, 524.

JESUITA, Fabr. (*Bostrychus*, Fabr.), Lesne, *l.c.*, p. 524, fig. 137; p. 539, figs. 155, 156, 157 : *B. Canarii*, Nordlinger—Australia (all States except Tasmania).

XYLODELEIS, Lesne, Ann. Soc. Ent. Fr., 1901, 524.

OBSIPA, Germar (*Apate*, Germar), Lesne, *l.c.*, p. 525; p. 526, figs. 320, 321, 322, 323 : *X. rufescens*, Murray; *X. serratus*, Lea (*Apate*, Lea), Lesne, *l.c.*, 1898, p. 440, fig. 40; *X. subcostatus*, Lea (*Apate*, Lea); *X. retusus*, Lea (*Apate*, Lea)—Australia (all States) and Tasmania.

XYLODECTES, Lesne, Ann. Soc. Ent. Fr., 1901, 536.

VENUSTUS, Lesne, *l.c.*, p. 540—Queensland.

XYLOTILLUS, Lesne, Ann. Soc. Ent. Fr., 1901, 540.

LINDI, Blackb. (*Apate*, Blackb.), Lesne, *l.c.*, p. 541, figs. 340, 341—Northern Territory, South Australia, New South Wales.

XYLION, Lesne, Ann. Soc. Ent. Fr., 1901, 542.

CYLINDRICUS, Macl. (*Bostrychus*, Macl.), Lesne, *l.c.*, p. 557, figs. 371, 372, 373, 374, 375, 376—Queensland, New South Wales, Victoria, Tasmania, South Australia.

COLLARIS, Er. (*Apate*, Er.), Lesne, *l.c.*, p 543, fig. 343; p. 559, figs. 377, 378, 379, 380, 381 : *X. excavatus*, Lea (*Apate*, Lea); *X. bicolor*, Lea (*Apate*, Lea)—New South Wales, Victoria, Tasmania, South Australia.

PERARMATUS, Lesne, *l.c.*, p. 562, figs. 384, 385, 386, 387, 388—New South Wales.

XYLOBOSCA, Lesne, Ann. Soc. Ent. Fr., 1901, 564.

BISPINOSA, Macl. (*Bostrychus*, Macl.), Lesne, *l.c.*, p. 564, fig. 390; p. 567, figs. 393, 394 : *X. Macleayi*, Blackb. (*Apatodes*, Blackb.), P.L.S.N.S.W., 1888, 1429*; *X. canina*, Blackb. (*Xylopertha*, Blackb.)—Australia (all States) and Tasmania.

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* This name has apparently been overlooked by Mons. Lesne. It is undoubtedly a synonym of *bispinosa;* as, however, a genus (*Apatodes*) was erected to receive it by Mr. Blackburn, it would appear that *Apatodes* (1888) should replace *Xylobosca* (1901).

ELONGATULA, Macl. (*Rhizopertha*, Macl.), Lesne, *l.c.*, p. 568, figs. 395, 396, 397—West Australia, Queensland, New South Wales.

GEMINA, Lesne, *l.c*, p. 569, fig. 398—Queensland.

LEAI, Lesne, *l.c.*, p. 564, figs. 391-392; p. 570, figs. 399, 400, 401, 402, 403—Tasmania.

HIRTICOLLIS, Blackb. (*Xylopertha*, Blackb.), Lesne, *l.c.*, p. 572, figs. 400, 405, 406—West Australia.

MYSTICA, Blackb. (*Xylopertha*, Blackb.), Lesne, *l.c.*, p. 574—South Australia.

XYLOTHRIPS, Lesne, Ann. Soc. Ent. Fr., 1901, 620.

RELIGIOSUS, Boisd. (*Bostrychus*, Boisd.), Lesne, *l.c.*, p. 620, fig. 473; p. 624, figs. 476-477—Queensland.*

XYLOPSOCUS, Lesne, Ann. Soc. Ent. Fr., 1901, 627.

RUBIDUS, Lesne, *l.c.*, p 629, fig. 480—West Australia.

CASTANOPTERA, Fairm., Lesne, *l.c.*, p. 635: *X. affinis*, Brancsik—Australia (without exact locality).

GIBBICOLLIS, Macl. (*Rhizopertha*, Macl.), Lesne, *l.c.*, p. 627, fig. 479; p. 638, fig. 488: *X. viduus*, Blackb. (*Xylopertha*, Blackb.)—Australia (all States) and Tasmania.

CISTELIDÆ.

SYNATRACTUS VARIABILIS, Macl.

As Sir William Macleay has stated, the colour of this species is very variable. The under surface varies from a dingy testaceous-red to a dull brown; the legs are occasionally entirely dark, but usually the base of the femora is paler; sometimes the tibiæ and apex of femora are but little more than lightly infuscate; the antennæ vary from a rather light brown to almost black; usually the 2nd joint and apex of the 1st are paler than the rest; sometimes the three basal joints are quite pale. One specimen under examination has the entire upper surface dark, another has the

* This species was unknown to Mons. Lesne from Australia; but I have received specimens from the Macleay Museum as coming from Queensland. Subsequently I received specimens from Cairns, Q.

head and elytra dark, another the elytra only, another has the head and sides of elytra dark, another the head and apex of elytra, and another has the entire upper surface pale, except for a cloud on the basal half of the elytra.

HOMOTRYSIS RUFICORNIS, Macl.

I have a specimen from Somerset, Q, which agrees in all structural details exactly with the type of this species, but its antennæ (except at the sutures of the basal joints) and legs are entirely dark.

PYTHIDÆ.

LISSODEMA HYBRIDUM, Er.

I have this species from New South Wales, Victoria, and Tasmania. In the last-named State it is exceedingly common, being frequently found under bark, in moss and on fence tops at dusk. In size it varies from $1\frac{1}{2}$ to $2\frac{3}{4}$ mm. The male has a considerably longer prothorax than the female, and has it supplied with a median excavation, which is very distinct when viewed from behind; in the female this is scarcely more than traceable; the male also has the prothorax much narrower posteriorly. I have taken many pairs in copula.

MELANDRYIDÆ.

MYSTES PLANATUS, Champ.

A specimen (taken whilst struggling in a spider's web just after sundown) from Forest Reefs, N.S.W., either belongs to or is closely related to this species. It differs from Mr. Champion's description in having the eyes very slightly notched behind the antennæ, and by having four terminal joints of the front, three of the middle and two of the hind tarsi suddenly much paler than the others; the colour of the antennæ also diminishes in intensity from base to apex.*

* This note was sent to Mr. Champion, who wrote me as follows:—"I can hardly say that the eyes are notched in front, though they appear so when the insect is viewed in certain lights. There seems to be a slight depression for the reception of the base of the antennæ. As to the colour of the antennæ and tarsi, I do not see what you describe, but if present I should not attach any importance to it."

ANTHICIDÆ.

FORMICOMUS ELEGANS, Lea.

This species is an *Anthicus;* it was referred to *Formicomus* on account of its resemblance to the Rev. R. L. King's *Formicomus australis*, since referred by Mr. G. C. Champion to *Anthicus*. *Formicomus obliquifasciatus*, King, and *F. posticalis*, Lea, also appear to be referable to *Anthicus*.

MORDELLIDÆ.

MORDELLA COMMUNIS, Waterh.

M. TRIVIALIS, Waterh.

M. FUGITIVA, Lea.

M. ÆMULA, Lea.

M. RAYMONDI, Lea.

It may be possible that all or more than one of these names may be retained as distinct, but having a very large series of specimens before me from New South Wales (including many from Mount Kosciusko) and Tasmania, I have doubts as to whether they represent more than one species.

M. trivialis is supposed to be distinct principally on account of the pubescence of the head and prothorax, but I have specimens having this pubescence uniformly yellowish (as in the type), some having it mixed with grey or black pubescence and others having the prothoracic pubescence entirely dark.

In describing *M. fugitiva*, *M. Raymondi*, and *M. æmula*, I relied partly on size, but principally on the shape and length of the aculeus, but this organ (in some species at least)appears to be variable sexually; moreover, its shape is altered in appearance by the portion of the abdomen by which it is clasped at the base. The tibial spurs vary in colour from entirely dark to the apical half (or fourth) more or less diluted with red. The anterior legs are sexually variable in colour. The median zigzag fascia of the elytra appears to be exceedingly variable, but this variability is caused solely by the greater or less abundance of silvery (or

yellowish) pubescence and not to its shape; the apical spots are also variable; *M. communis* (I have a specimen from Mr. Champion which was compared with the type) is the form in which the fascia is frequently broken up. (I have specimens under examination which I believe to be this species and in which the median fascia is entirely wanting.)

Possibly it would be best to regard the species as one having many varieties, including the following :—

M. communis, Waterh. (type).—Size comparatively small (4½ to 6 mm.), median zigzag fascia seldom complete and usually broken up into small spots and oblique stripes.

Var. *trivialis*, Waterh.—Size variable (5 to 8 mm.); prothorax with dense and uniform yellowish (or greyish-yellow) pubescence; median zigzag fascia always complete, but more or less variable at suture.

Var. *fugitiva*, Lea.—Similar to the preceding, but with the prothoracic pubescence yellowish only at base and apex; the apical spot on each elytron concave on the side facing the base. Size from 7 to 8½ mm.

Var. *æmula*, Lea.—Size comparatively large (7 to 8 mm.); pubescence much as in *fugitiva*, but the apical spot on each elytron nowhere concave.

Var. *Raymondi*, Lea.—Size comparatively small (5 to 6 mm.); the median zigzag fascia complete on the inner but entirely absent on the outer half of the elytra; aculeus and tibial spurs short.

RHIPIDOPHORIDÆ.

Emenadia.

Mr. Blackburn (Trans. Roy. Soc. S.A. 1899, p. 56) remarks on the species of this genus : —"I have not seen (even in some fairly long series) any variation in the colour of the head in any species." I have a female specimen of *E. difficilis* in which there is a very distinct red fascia near the upper part of the head; on a very careful comparison with typical females, I can find no other differences, even in colour. In another species (possibly

E. tricolor), of six undoubtedly conspecific females, four have the head entirely red and two have it red and black, the colours being as sharply limited as in *E. capito*, but reversely placed.

EMENADIA PICTIPENNIS, n.sp.

♂. Dark reddish-brown, abdomen and all the appendages paler; elytra reddish-brown along base, suture and margins, the sides each with three black patches: one basal, one subapical and the largest antemedian, the interspaces testaceous. Undersurface (and less noticeably the legs) clothed with fine sericeous pubescence.

Head shining; strongly punctate throughout, but punctures denser near mandibles than near summit, the hinder slope very coarsely punctate; middle strongly raised and somewhat rounded. *Prothorax* very densely punctate, the punctures more elongate and confluent posteriorly than in front; base about twice the width of apex; posterior angles acute and projecting; sides lightly but distinctly sinuous; scutellar lobe shining and slightly raised. *Elytra* divided from before the middle, each impressed along middle; with dense and more or less elongate punctures. *Sterna*, especially the mesosternum, densely punctate. Length 9, width $3\frac{2}{3}$ mm.

Hab.—Cairns (Macleay Museum) and Mackay, Q. (C. French).

The elytra appear to be supplied with six black and four pale maculæ. In both this and the following species the head is almost triangularly raised in the middle (this character alone is sufficient to distinguish them from all previously described Australian species), and the scutellar lobe presents an appearance as of having been supplied with a tubercle or spine that, being broken off, leaves a polished scar to mark its position.

EMENADIA SEMIPUNCTATA, n.sp.

♀. Black; abdomen, antennæ (in whole or in part), palpi, spurs and claws red; elytra pale stramineous, but each with three black patches: the first rather narrowly margining the base, the second (subtriangular) just before the middle and touching the side but

not the suture, and the third occupying slightly more than the apical third; suture and margins brownish. Part of posterior coxæ and of metasternal episterna stramineous. Undersurface and legs almost glabrous.

Head almost triangularly raised in the middle; punctures as in the preceding species, but rather coarser. *Prothorax* densely punctate, punctures larger but scarcely more elongate posteriorly; base less than half the width of apex; posterior angles feebly acute; scutellar lobe raised, sloping and polished behind; sides scarcely sinuous. *Elytra* divided almost from the extreme base, each strongly impressed along middle; the black portions with strong, moderately long and rather dense punctures, the paler portions polished and impunctate, except at sides and in the vicinity of the spots, where a few are scattered about. *Sterna*, especially the mesosternum, densely punctate. Length $5\frac{1}{4}$, width 2 mm.

Hab.—N.W. Australia (Macleay Museum).

In shape and pattern of markings resembling the preceding species, but the punctures (especially of the elytra) very different in character. Of two specimens under examination, one has the whole of the antennæ whilst the other has only the basal joints pallid.

EVANIOCERA PERTHENSIS, Blackb.

This remarkable species is common in West Australia; I have it from Darling Ranges, Swan River, Pinjarrah and Geraldton. One of my specimens was taken whilst struggling in the embraces of a species of *Drosera*.

EVANIOCERA GERSTAECKERI, Macl. (*Ptilophorus*, Macl.),

I have two specimens of this species (obtained in copula at Tamworth, N.S.W., on the flowers of lucerne) that were compared with the types, and agree with them. The species supposed by Mr. Champion (Trans. Ent. Soc. Lond. 1895, p. 273) to be *E. Gerstäckeri* is very different, and is formally described below. Mr. Champion says of it :—"The pubescence has the appearance

of being rubbed off in places, but it does not form definite markings, either on the thorax or elytra." He evidently thought it probable that Sir Wm. Macleay's description was founded on partially abraded specimens, but this was not the case. Macleay says:—"Elytra having a patchy appearance from the cinereous pubescence not covering equally the whole surface." This patchy appearance is natural, and much more pronounced in the female than in the male; on the prothorax the pubescence forms vague stripes. Each antenna is supplied with nine rami, the first being little more than half the length of the second, and placed at the extreme base of its supporting joint, so that a considerable space intervenes between it and the 2nd, the space being considerably greater than in *E. Meyricki*.

EVANIOCERA PALLIDIPENNIS, n.sp.

♂. Head (but not its appendages), prothorax, scutellum, and sterna black; elsewhere pale testaceous-brown. Uniformly clothed with fine whitish pubescence that appears to be much paler on the darker parts than elsewhere, and is nowhere linear in arrangement.

Eyes semicircular, very narrow, but not divided in middle, not widely separated in front. Each antenna with nine very long rami, the first close to and scarcely shorter than the second. *Prothorax* much narrower at apex than at base; posterior angles very acute, sides distinctly sinuous. *Elytra* with very feebly raised interstices. Length 6, width $2\frac{1}{2}$; variation in length 4-6 mm.

Hab.—N.W. Australia.

Of the three specimens under examination, one was sent to me by Mr. Champion as "*Evaniocera Gerstäckeri*, Macl (?)" and was taken at Roebuck Bay by Mr. Walker; the others are from the Macleay Museum. They are all males; of the other sex, Mr. Champion says:—"The females have the elytra more elongate and darker in colour than in the males, and the antennæ testaceous."

ŒDEMERIDÆ.

Danerces.*

No species of this genus has hitherto been recorded from Australia. It is remarkable for the biflagellate 4th joint of the maxillary palpi in the male. Westwood described thirteen species from New Guinea and the Malay Archipelago,† and I have now to record one from Queensland.

Danerces bicolor, n.sp.

(Plate iv., fig. 11.)

♂. Narrow, moderately shining, densely and finely pubescent all over. Black (claw-joints paler); prothorax and elytra reddish-testaceous, the former with three black spots—a small angular one in middle, and a still smaller rounded one on each side; clypeus obscure testaceous.

Head with dense but shallow and indistinct punctures. Antennæ extending to abdomen, 1st joint slightly longer than 3rd, 2nd less than half the length of 3rd, 4th slightly longer than 3rd or 5th, the others feebly decreasing in length; 3rd-7th somewhat compressed, 8th-11th almost cylindrical. *Prothorax* longer than wide, shorter and wider than head, base and apex feebly incurved to middle, sides swollen in front, all the angles rounded, disc uneven; punctures as on head. *Scutellum* subquadrate. *Elytra* much wider than prothorax, and more than twice as long as head and prothorax combined, shoulders rounded, sides parallel to near apex, where each is separately rounded; densely and finely granulate; each with three raised and punctate longitudinal costæ, of which the outer one is shorter and less distinct than the others; sides and suture thickened. *Mesosternum* long, with a rather wide and continuous median ridge.

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* Westwood, Trans. Ent. Soc. Lond. 1875, p. 228, pl. 7, fig. 3.

† By a curious oversight the hind tarsi of *D. bipartita*, Westw., are figured as pentamerous.

Legs long and thin; tibiæ with two minute spines at apex. Length 10, width $2\frac{1}{2}$ mm.

♀. Unknown.

Hab.—Mackay, Q. (C. French).

The elytra are densely, finely and uniformly granulate throughout, although at first the granules appear to be nothing but (fairly large) punctures. I cannot satisfy myself that there are any punctures on the head and prothorax other than those from which the pubescence arises. In the type specimen the greater portion of the prosternum is pallid; in another it is entirely dark.

CURCULIONIDÆ.

Chrysolophus foveatus, n.sp.

Deep glossy black; club, palpi and claws of a more or less obscure red. Sparsely clothed with elongate whitish setæ; on the scutellum (where they are densest), base of prothorax and elytra becoming elongate, narrow scales.

Head densely and irregularly punctate and foveate, punctures smaller on vertex than elsewhere and behind eyes obliquely confluent; a deep impression from between eyes to prothorax. Rostrum coarsely and irregularly punctate, punctures smaller between antennæ than elsewhere. *Prothorax* strongly convex, sides strongly rounded, with large, irregular foveæ. *Scutellum* very small. *Elytra* much wider than prothorax, widest across shoulders, thence distinctly and regularly diminishing in width to near apex, posterior declivity abrupt; seriate-foveate, the foveæ usually much longer than wide, interstices irregular, the third near base raised into an elongate but not very distinct tubercle. *Undersurface* feebly or not at all punctate, except at sides. *Femora* dentate, the hind pair very obtusely so. Length $14\frac{1}{2}$, width $5\frac{1}{4}$; variation in length 12-$14\frac{1}{2}$ mm.

Hab.—Kurrajong (G. Masters) and Sydney, N.S.W. (W. W. Froggatt).

There are far too many differences in the shape, sculpture and clothing of this species for it to be regarded even as an extreme

variety of *C. spectabilis*, variable as is that species. Seen from above, the head of *C. foveatus* appears to be in two distinct lobes, whilst that of *C. spectabilis* is regularly convex; the apex of the rostrum is always narrower; the punctures and foveæ are very much larger, those on the prothorax and elytra being fully twice as large as in *C. spectabilis:* on the elytra of the latter species the foveæ are usually subquadrate, whilst in *C. foveatus* they seldom are; the elytra are much less parallel-sided (they might fairly be called wedge-shaped) than in *C. spectabilis*, and the posterior declivity is much more abrupt (fully 15° nearer to the perpendicular); the scutellum is only about half the size of that of *C. spectabilis*, the prothorax is much more convex, and the punctures of the under surface are very different. The body in *C. foveatus* at the hind coxæ is deeper than wide, whilst in *C. spectabilis* it is there distinctly wider than deep. The clothing (apart from colour) is essentially different as on the under surface, legs and head it is never squamose, whilst such scales as are present on the elytra are always elongate (in *C. spectabilis* the paler scales are more or less oval) and are never (in the three specimens before me) in spots; on all three, however, they form a feeble and obscure fascia at the apical third. There are also no black scales such as are usually present (and rather dense) in the elytral punctures or foveæ of *C. spectabilis*.

CHRYSOLOPHUS SPECTABILIS, Dej.

This species occurs in Queensland, New South Wales, Victoria, and South Australia. The clothing (which is of a peculiarly soft lustrous nature and has caused the species to be named the "Australian diamond-beetle") varies from a pale yellowish-green to deep blue, but in the majority of specimens is of a decided green. In addition to the green scales, however, there are some deep black ones, but these are smaller and not visible to the naked eye. The size varies from 10 to 28 mm.

The green scales are sometimes almost confined to the punctures, at other times they almost entirely conceal the derm. Mr. J. G. O. Tepper has given me some specimens from Kangaroo

Island in which the greenish scales have entirely disappeared, leaving only a feeble line of white scales on the prothorax and elytral suture.

SCOLYTIDÆ.

Hylesinus fici, n.sp.

(Plate iv., fig. 15.)

♂. Oblong-elliptic, opaque. Dark reddish (or purplish) brown, sterna black, antennæ (club excepted), parts of legs and abdomen reddish. Densely and finely punctate all over. Densely clothed with short greyish pubescence, the elytra with exceedingly short and dense pubescence, but in addition each interstice with two or three very irregular rows of short, whitish, decumbent setæ.

Head concave in front. Eyes about three times as wide as long. Scape about as long as club; club with its first two joints transverse and much wider at apex (each side of which is produced) than at base, the third obpyriform. *Prothorax* moderately transverse, sides rounded, apex much narrower than base and feebly or not at all incurved to middle, base bisinuate; with or without traces of a feeble median elevation; apical third with small granules in irregular transverse series. *Elytra* wider than prothorax and not twice as long, each raised and rather strongly separately rounded at base; punctate-striate, the punctures comparatively small; interstices wide and feebly separately convex; base and suture near base with small granules. *Tibiæ* wide, the four hind ones with a serrated (or dentate) outer ridge, the front ones deeply notched for the tarsi and with two large teeth at and near apex, the apical one largest; between these and base about six small teeth; claw-joint not much longer than the rest (which are rather wide) combined. Length $3\frac{3}{4}$, width 2 mm.

♀. Differs in being somewhat larger, with the head flat or gently convex, and having shorter pubescence, and with the anterior tarsi narrower.

Hab.—Sydney, Narrabeen, National Park, N.S.W.

The legs are somewhat variable in colour; usually, however, the front femora and tibiæ, and the middle femora are darker than

the rest. The prothorax is usually darker than the elytra, but its base and sides are frequently diluted with red. From some directions each side of the prothorax at the base usually appears to have a patch of silvery pubescence. Even when the elytra are intentionally abraded, their seriate punctures are seen to be rather small and at most only about one-third the width of the interstices, whilst with the clothing present they appear much smaller; in fact, on many specimens they cannot even be traced. Seen from in front or behind the base of the elytra appears to be serrated with a rather deep notch at the position of the scutellum. In both sexes the head is occasionally feebly longitudinally ridged in front, but this ridge is never distinct. In the male the excavated portion is horseshoe-shaped and has longer clothing than elsewhere.

This species attacks various species of *Ficus*, both wild and cultivated; the terminal shoots are drilled so as to be destroyed, but the bark and wood, especially of the Port Jackson Fig, are also attacked. It is probably the species mentioned by Mr. Tryon* as attacking the terminal shoots of fig, and as being probably allied to *Phlœotribus*. Mr. Froggatt† has figured and described it as *Hylesinus porcatus*, Chp. It cannot, however, be that species, which is described as being much smaller ($2\frac{1}{3}$ mm.) with the prothorax almost twice as wide as long and granulate at the sides (not in front as in *H. fici*), but in particular by the elytra being deeply crenate-striate, with the striæ and interstices subequal in width.

PLATYPUS OMNIVORUS, n.sp.

♂. Cylindrical, shining. Reddish-brown, apical third of elytra and the abdomen darker, rest of under surface and the appendages paler. Apical portion of elytra with short, dense, setose, seriate pubescence; head, front margins of prothorax, under surface and legs rather sparsely pubescent.

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* Trans. Nat. Hist. Soc. Queensland, Vol. i., 1894.

† Agric. Gaz. N.S. Wales, Vol. x., p. 268, and plate facing p. 268.

Head densely and shallowly punctate; face feebly concave. Scape more than twice the length of funicle, and about one-fourth shorter than club, the latter large and briefly oval. *Prothorax* distinctly longer than wide, sides incurved to middle, with small sparse punctures becoming denser and larger at base and apex. *Elytra* almost twice the length of prothorax, sides feebly inflated about middle, and suddenly diminishing near apex, each at apex with two conical projections, of which the largest is at apex itself and almost perpendicular, the other is just above it and projects slightly outwards; there is also a minute inner projection; feebly seriate-punctate, the interstices very feebly punctate, the series of punctures in scarcely defined striæ on basal half, but beyond the middle the striæ become deep and very distinct, with the interstices blackish and opaque. *Under surface* sparsely punctate, the apical segment, however, densely punctate. *Legs* stout; tibiæ obliquely ridged; tarsi long and thin. Length $4\frac{3}{4}$ mm.

♀. Differs in having the head more distinctly punctate, the vertex with a narrow shining carina (scarcely traceable in the male), the elytra rounded posteriorly and without conical projections, the summit of the posterior declivity densely granulate, and the sides (except at apex) perfectly parallel.

Hab.—Tasmania, widely distributed.

This species attacks practically all the native trees and many cultivated ones, including the apple, plum and apricot. Trees of *Acacia decurrens* and *A. dealbata* that have been stripped of bark, and Eucalypts that have been ring-barked, are soon riddled by it; even long dead wood is sometimes attacked. Perfectly healthy fruit trees are sometimes attacked and rather seriously injured by them, especially when in the vicinity of new clearings.

Although so common in Tasmania, I have seen it from nowhere else. From the previously described species the apical third of the elytra renders it abundantly distinct.

Platypus australis, Chp.

The female of this species, as such, was unknown to Chapuis. I have taken numerous specimens of both sexes (some in copula) on the Tweed and Richmond Rivers, and it appears to me that the

description of *P. crenatus*, Chp. (of which the male, as such, was unknown to Chapuis) was founded on its female.

XYLOPERTHA (?) COMPRESSA, Lea; X. (?) HIRSUTA, Lea; X. (?) PARVA, Lea.

These appear to belong to the genus *Xyleborus*. I informed Mons. P. Lesne of this fact some years ago, and he wrote me that he had made the necessary correction; but if his note has been published, I have not seen it.

AMASA THORACICA, Lea.

This is Erichson's *Tomicus truncatus*. It belongs to the same genus as Eichhoff's *Xyleborus solidus;* the latter species has been figured by Mr. French in his 'Handbook of the Destructive Insects of Victoria' (Part i., Pl. iv.) as *Apate collaris*, Er.

CHRYSOMELIDÆ.

CHALCOLAMPRA RUFINODA, n.sp.

Deep glossy black; prothorax with two, each elytron with about twelve, red tubercles. Antennæ tarsi and inner apex of tibiæ pubescent.

Head with a few irregular punctures; clypeus subcircular, from its posterior suture three impressed lines extending backwards, of which the median one becomes subfoveate near the vertex. Antennæ moderately stout, passing intermediate coxæ, 1st joint subglobular, as long as the 5th. *Prothorax* moderately transverse, anterior angles produced, posterior obtuse, sides rounded but incurved at middle; each side with two large rounded tubercles, of which the largest is red, and occupies the apical two-fifths; the second is just behind the middle, black, and not half the size of the front one; surface elsewhere uneven, and with large irregularly distributed punctures. *Scutellum* feebly transverse, smooth, impunctate. *Elytra* considerably wider than prothorax, widest beyond middle, with large punctures in very irregular series; each with two rows of large red tubercles. *Legs* stout, tarsi with basal joint inflated. Length 8, width $3\frac{3}{4}$ mm.

Hab.—Summit of Mount Wellington, Tasm.

I have seen but two perfect specimens of this species, both of which were taken (in January, 1902) by Mr. J. J. Walker, who kindly presented one of them to me. Both Mr. H. H. D. Griffith and myself, however, have seen numerous fragments of it under stones, but only on the plateau at the summit. The species is certainly the finest of the genus; it is allied to *C. pustulata*, Baly, but differs in its entirely black colour except for the red tubercles; these also are larger, of different number, shape and position, and all are true rounded tubercles, whilst some of those of *C. pustulata* appear as thickened portions of interstices; the antennæ and legs are stouter, the punctures more numerous, larger and more irregular, and the outline of the prothorax is very different. The reddish tubercles are much the same colour as sealing wax; they vary both on different individuals, and on the right and left side; the largest one on the elytra is always on the shoulder, and is not much smaller than the larger ones on prothorax; they appear in two irregular rows on each elytron, except at the apex, where a single one only is to be seen; the average is six in each row, but the number on each elytron varies from eleven to fifteen; they are always circular, except where two are more or less conjoined.

EXPLANATION OF PLATE.

Fig. 1.—*Œdichirus tricolor*, Lea.
Fig. 2.—*Suniopsis politus*, Lea.
Fig. 3.—*Cryptobium myrmecocephalum*, Lea.
Fig. 4.—*Læmophlœus Frenchi*, Blackb.
Fig. 5.—*Dryocora Walkeri*, Lea.
Fig. 6.—*Platisus integricollis*, Reitter; larva.
Fig. 7.—*Rhysodes mirabilis*, Lea.
Fig. 8.—*Balanophorus Macleayi*, Lea.
Fig. 9.—*Neocarphurus impunctatus*, Lea.
Fig. 10.—*Phycochus sulcipennis*, Lea.
Fig. 11.—*Danerces bicolor*, Lea.
Fig. 12.—*Dicax ventralis*, Lea; apex of 5th ventral segment.
Fig. 13.—*Sunius brevicollis*, Lea; punctures of head.
Fig. 14.—*Læmophlœus Diemenensis*, Blackb.; antenna.
Fig. 15.—*Hylesinus fici*, Lea; antenna.

CONTRIBUTIONS TO A KNOWLEDGE OF AUSTRALIAN ENTOZOA.

No. iii.—On some species of *Holostomidæ* from Australian Birds.

By S. J. Johnston, B.A., B.Sc., Economic Zoologist, Technological Museum, Sydney.

(Plates v.-vii.)

In the present paper, five species of *Holostomidæ*, all parasites of Australian birds, are described as new. Two of them are referred to the genus *Hemistomum*, and three to the genus *Holostomum*. They were all collected by Dr. J. P. Hill, Demonstrator of Biology at the University of Sydney, and formed part of a collection of Trematodes and Cestodes given by him to me for investigation. In addition to the collection of worms, I am indebted to Dr. Hill for some valuable preparations of some of the specimens and notes as to their location in their hosts, &c.

Dr. Brandes' 'Monograph on the Holostomidæ,' published in the Zoologischer Jahrbücher, Band v., has been of especial use to me in the preparation of this paper. The lengths given are measured along ventral body wall.

Hemistomum triangulare, sp. n.

(Plate v., figs. 1-6.)

Length 2·3 mm.; the anterior region shorter than the posterior, about one-third of the total length. The flattened anterior body-region is triangular in shape, the mouth opening situated at the apex of the triangle; the lateral edges strongly curved round (Pl. v., fig. 5).

The clinging plug is situated near the junction with the posterior body-region, and its base of attachment is short, not

extending as far forwards as the position of the ventral sucker. It is roughly cubical in shape and is partly overhung by a lip or narrow hood formed by the flexed lateral flaps, which are fused together for a short distance at their posterior ends. It is split in the middle (Pl. v., fig. 2).

Oral sucker well formed, orbicular, larger than the pharynx, about equal in size to the ventral sucker. Oral sucker 0·06 mm. in diameter, pharynx 0·05 mm., ventral sucker 0·062 mm.

On either side of the oral sucker is the conspicuous opening of a group of unicellular glands. The ventral sucker is surrounded by a group of unicellular glands, each cell opening on the surface by a separate duct (Pl. v., fig. 4).

The alimentary canal divides into two immediately on leaving the pharynx, and the two well-developed arms are continued to the posterior end of the body.

The ovary is large, rounded and situated far forwards in the posterior body-region, near its junction with the anterior body-region. The testes are large, situated one behind the other, and behind the ovary. The uterus occupies a considerable part of the space in the posterior body-region; eggs large.

The vitelline glands are very numerous, extending from one end of the body to the other and into the clinging plug.

Found in the duodenum and small intestine of the Laughing Jackass, *Dacelo gigas*, Bodd. Collected at Jervis Bay, N.S.W.

Hemistomum intermedium, sp.n.

(Plate v., figs. 7-10.)

Length 3·6 mm.; length of anterior body-region 0·67 mm., length of posterior region 2·93 mm.

The anterior body-region is well marked off from the posterior and is strongly bent back on the posterior in a dorsal direction, giving the body a ∪-shaped form (Pl. v., figs. 6 and 7).

The foldings of the lateral body-edges ventralwards very marked; these folds are fused for some distance in their posterior part, so that the cup-shaped anterior body-part of the genus *Holostomum* is approached. In its clinging apparatus, too, this

species approaches the characters of that genus. Instead of being the simple, almost solid plug characteristic of *Hemistomum*, the clinging plug in this species consists of two parallel plates folded in a scroll-like manner towards one another (Pl. v., fig. 7).

The oral sucker is of moderate size (0·17 mm.) and the pharynx smaller; the ventral sucker (0·25 mm.) is very large and stalked, being raised up from the body-surface on a thick projection or stalk, about equal in length to the diameter of the sucker. On each side of the oral sucker is a group of very large unicellular glands, which open into a crescentic depression from the ventral body-surface.

The bursa copulatrix, which, together with the genital papilla, is fairly well developed, is turned to open dorsally. The ovary is situated far forwards in the cylindrical body-region, near its junction with the anterior body-region. Behind it are placed, one behind the other, two large testes. The uterus in its hinder part has its walls raised up into a number of transverse folds or ridges.

The vitelline glands, which are very numerous, occur along the whole length of the ventral aspect of the posterior body-part.

Found in the duodenum of the Black Swan, *Cygnus atratus*, Lath. Collected at Duckmaloi River, N.S.W.

Holostomum Hillii, sp.n.

(Plate vi., figs. 1-8.)

Length 6·9-8·2 mm. Anterior body-region well marked off from the posterior region, one-seventh of the entire length.

The clinging apparatus or plug, which lies in the cavity of the cup-like anterior body-part, consists of two parts: a cushion-like mass, with a long base of attachment to the ventral body-wall, situated on the dorsal side of the cup and forming the dorsal mass of plug, and a ventral part consisting of a lamellous sheet, which may be described as H-shaped. It arises posteriorly from the ventral wall of the cup as two lateral flaps which, at about the middle of their length, become fused together for a short space

(Pl. vi., figs. 1-5). The cushion-like part of the plug is grooved in the mesial line by the deep longitudinal incision characteristic of this part in many species of the genus, which almost divides it into two, and does completely divide it in its anterior aspect, and each of these divisions, projecting for some distance beyond the rim of the cup, ends in a knobby club-shaped head.

The oral and ventral suckers are about the same size (0·13 mm.); the pharynx is a little smaller (0·08 mm.). A short œsophagus follows on the pharynx; the two limbs of the intestine, lined by a single layer of large deeply-staining cells, are continued to the extreme posterior end of the body (Pl. vi., fig 8). The excretory system of vessels is well developed.

The ovary is a rounded, solid body, situated dorsally about the middle of the posterior body-region. The uterus runs forward almost to the junction of the anterior and posterior body-regions, and, in those specimens in which it is filled with eggs, occupies the greater part of the body-space. The testes are oval, solid organs, lying one behind the other just behind the ovary.

The vitelline glands do not extend into the anterior body-region, but extend throughout the whole length of the posterior body-region, surrounding the other organs.

The vesicula seminalis is large and coiled, and leads into a duct which opens into the female duct just before that duct opens on the extremity of the genital papilla.

The bursa copulatrix is very large, larger than the anterior body-region. A strong sphincter muscle surrounds the orifice of the bursa; and less strong sphincter muscles are present in the base of the bursa near its junction with the rest of the body, and also at the base of the genital papilla. A well marked circular muscle is present throughout the length of the genital papilla, and strong longitudinal fibres are seen in both the papilla and walls of the bursa.

Found in the duodenum of the Australian Gull, *Larus novæ-hollandiæ*, Stephens. There is just the bare possibility of doubt about the specific identity of this host. Collected at Jervis Bay.

Holostomum simplex, sp.n.

(Plate vii., figs. 1-3.)

Length 3·5 mm.; the cylindrical posterior region narrower than the anterior and gradually tapering backwards; anterior region 0·68 mm. long, posterior 2·8 mm.

The clinging plug is very simple in form, being in the form of a flat lamella folded along its median, ventral, longitudinal line into two folds (Pl. vii., fig. 3), which project a little way beyond the cup. The oral and ventral suckers are large and equal in size (0·18 mm. diameter); the pharynx is much smaller.

The ovary is situated about the middle of the posterior body-region, oval or elliptical, with the long axis in a dorsi-ventral direction. The main chambers of the uterus are situated in front of the ovary; it then runs backwards as an uncoiled tube along the ventral body-wall. The vitelline glands extend into the anterior body-region and into the plug, and right back along the ventral wall to the extreme posterior end. Testes large, and divided up into a number of lobes. The male and female ducts join to form a common genital duct which traverses the genital papilla and opens on its extremity.

Found in the intestine of the Blue Crane, *Ardea novæ-hollandiæ*, Lath., at Creel Bay, Broken Bay.

Holostomum musculosum, sp.n.

(Plate vii., figs. 4-9.)

Length 11 mm.; anterior region 1·2 mm., posterior 9·8 mm.

Anterior and posterior body-regions well marked off from one another. The anterior region is much shorter than the posterior region; the hinder part of the dorsal aspect of the anterior body-region presents to view two rounded elevations. The posterior body-region is circular in transverse section and gradually increases in diameter towards the posterior end, the rate of increase becoming greater in the region of the bursa copulatrix.

The clinging apparatus is especially complicated. It consists of a number of processes projecting into the cavity of the cup,

which may be divided into two groups, one group springing from the ventral wall of the cup, the other from the dorsal wall of the cup. The group of processes from the dorsal wall is in the form of the hollow plug characteristic of the genus, with a swollen dorsal ("inner wall" of Brandes) and a ventral lamellar wall. The dorsal cushion-like part is divided by a longitudinal groove into two main masses: its base of attachment to the ventral body-wall of the worm extends along for a considerable distance, but anteriorly each mass ends in a free tongue capable of being bent backwards towards the bottom of the cup. The lamellar wall of this hollow clinging plug is produced in front into a very long process which in the case of all the worms examined (a large number) extends beyond the cup cavity for a considerable distance. The edges of the extruded part are beset with a number of fine digitate processes or papillæ, which contain strong muscular fibres. These processes, and indeed the whole ventral lamellar wall of the plug, are hollowed out into a number of well defined canals, opening mostly at the ends of the processes and extending to the posterior extremity of the ventral wall of the plug, at the bottom of the cup. These canals are mostly filled with birds' red blood corpuscles, some of which are beginning to disintegrate, but precisely what becomes of these birds' corpuscles must be further looked into. The group of processes springing from the ventral wall of the cup consists of a single median lamellar lobe, arising near the anterior edge of the cup and with only a small area of attachment to the wall and a free edge directed backwards (Pl. vii., fig. 4 *pr.*): behind this lies a pair of lamellæ attached at their anterior ends but free along their lateral edges and posterior ends, which ends are also directed backwards towards the bottom of the cup: these two lamellæ are fused together for a short distance about their middle, so that together they are H-shaped. Behind this again, and also springing from the ventral wall of the cup, is another lamellous plate attached along its sides and posterior edge to the cup-wall, but with its anterior edge free and directed forwards towards the opening of the cup.

The oral sucker is of medium size (0·2 mm. diam.); the pharynx is about the same size: both are spherical in shape: the œsophagus is of some length (0·35 mm.). The ventral sucker, though well developed (0·2 mm. long, and 0·14 mm. broad), is completely covered over by the plug of the clinging apparatus, and lies embedded in its tissues and those of the ventral part of the body, communicating with the exterior only by means of a narrow thin-walled canal which opens into the cavity of the hollow plug.

A number of very strong bands of longitudinal muscle occur in the posterior body-region: near its junction with the anterior body-region they are gathered into several well marked bundles (Pl. vii., fig. 8), but towards the posterior end they have spread out and tend to become a complete circular layer of longitudinal fibres. The excretory system is very well developed, and in the front part of the posterior body-region consists of a number of well marked cavities. The vitelline glands do not occur in the anterior body-region nor in the walls of the bursa copulatrix, but in the intervening portion they are numerous and well developed. The testes are large and divided up into a number of lobes (Pl. vii., fig. 6). The genital papilla opens on the exterior by a cleft-like aperture which divides it into two parts (fig. 7).

Found in the duodenum of the Crested Tern, *Sterna bergii*, Licht., at Broken Bay.

Many of the figures were drawn by my wife.

Reference letters.

b.c., bursa copulatrix.—*c.c.*, cavity of cup.—*cav.p.*, cavity of plug.—*c.p.*, clinging plug.—*d.w.*, dorsal wall of plug.—*eg.*, eggs.—*ex.*, excretory vessel.—*f.d.*, female duct.—*gl.*, glands.—*g.p.*, genital papilla.—*int.*, intestine.—*l.m.*, longitudinal muscle.—*l.t.*, lobes of testes.—*m.d.*, mouths of ducts.—*œs.*, œsophagus.—*o.s.*, oral sucker.—*ov.*, ovary.—*ovid.*, oviduct.—*ph.*, pharynx; pr_1. and pr_2., processes arising from the ventral wall of the cup.—*rf.p.*, reflexed process of plug.—*s.m.*, sphincter muscle.—t_1. and t_2., testes.—*u.f.*, united posterior parts of the lateral folds.—*ut.*, uterus.—*v.d.*, vas deferens.—*v.g.*, vitelline glands.—*vit.d.*, vitelline duct.—*v.s.*, ventral sucker.—*v.sem.*, vesicula seminalis.—*v.w.*, ventral wall of plug.

EXPLANATION OF PLATES.

Plate v.

Hemistomum triangulare (figs. 1-6).

Fig. 1.—Whole view of mounted animal (× 50).

Fig. 2.—Longitudinal section, about the middle line in most of its length, but posteriorly to one side of the middle line through a slight lateral flexure in the body (× 70).

Fig. 3.—Section through posterior end showing bursa and genital papilla, &c. (× 70).

Fig. 4.—Longitudinal section showing group of unicellular glands surrounding ventral sucker (× 420).

Fig. 5.—Transverse section through anterior body-region showing flexed lateral edges of body.

Fig. 6.—Sketch of an unmounted specimen; side view (× 20).

Hemistomum intermedium (figs. 7-10).

Fig. 7.—Longitudinal section a little to one side of the middle line, showing stalked ventral sucker and characters of clinging plug and uterine wall (× 37).

Fig. 8.—View of whole animal, mounted (× 20).

Fig. 9.—Longitudinal section through the posterior end (× 37).

Fig. 10.—Slanting section through the two anterior groups of glands (× 37).

Plate vi.

Holostomum Hillii (figs. 1-8).

Fig. 1.—Drawing of whole animal, mounted (× 20). The amount of dorsal flexure shown is about the usual amount shown in this species.

Fig. 2.—Longitudinal section through the anterior body-region, showing the separate dorsal and ventral walls of the clinging plug (× 50).

Fig. 3.—Transverse section through the anterior body-region, showing the commencing separation of the ventral wall of plug (× 50).

Fig. 4.—Transverse section further forward than fig. 3, showing the separation of the ventral wall still further advanced (× 50).

Fig. 5.—Transverse section still further forward, and showing the ventral wall of plug completely separated from the wall of the cup; this section passes through the fused part of the two lateral portions of this ventral wall (× 50).

Fig. 6.—Transverse section through posterior body-region (× 50).

Fig. 7.—Longitudinal section through posterior body-region and bursa copulatrix (× 35).

Fig. 8.—Transverse section through bursa and genital papilla in front of the junction of the two genital ducts (× 37).

Plate vii.

Holostomum simplex (figs. 1-3).

Fig. 1.—Longitudinal section; not passing through the mouth of the cup (× 50).

Fig. 2.—Drawing of the whole worm, mounted (× 28).

Fig. 3.—Transverse section through anterior body-region showing the simple folded clinging apparatus (× 50).

Holostomum musculosum (figs. 4-9).

Fig. 4.—Transverse section through anterior end of cup (× 37).

Fig. 5.—Transverse section through cup, further back than fig. 4 (× 37).

Fig. 6.—Transverse section through posterior body-region showing bands of longitudinal muscle (× 20).

Fig. 7.—Transverse section through bursa and split genital papilla (× 20).

Fig. 8.—Transverse section through posterior body-region, much farther forward than that of fig. 6, showing excretory vessels and muscular bands (× 20).

Fig. 9.—Sketch of an unmounted specimen of *Holostomum musculosum*: 1, opening of cup; 2, projecting part of clinging plug; 3, digitate processes of clinging plug (× 12).

AUSTRALIAN FUNGI, NEW OR UNRECORDED. DECADES VII.-VIII.

By D. McAlpine.

Of the twenty species recorded in this paper, seventeen are new, and belong to thirteen different genera. At least two of these genera are worthy of special mention. *Myriangium*, which was formerly classed among the lichens, is represented by two species, one of which is a very injurious parasite. The asci are produced in the outside tissue of the so-called thallus, and as fresh asci are formed beneath this, the outer layer breaks away as the new tissue is pushed forward. There is still some doubt as to its exact systematic position. The other genus is new, and named *Amphichæta*, on account of its possessing spores with a hair or seta at either end. In *Monochætia*, Sacc., to which it is closely allied, the spore possesses only a single hair as the name denotes.

From New South Wales there are four species, represented by as many genera—*Alternaria*, on Carnation; *Barlœa*, on clayey soil; *Hexagonia*, on dead wood; and *Humaria*, on gritty soil. It may be noted that in the genus Hexagonia, this is the first occasion on which the spores have been described, presumably on account of the freshness of the specimens, and their being collected at the proper season.

The common Horehound, which is spreading so extensively in New South Wales and Victoria, is attacked by a Phyllosticta, which causes spotting of the leaves and withering particularly towards the tips.

61. Alternaria longispora, n.sp.

Forming dark olive tufts on withered portions of leaves. Conidiophores olivaceous, erect or ascending, simple, stout, septate,

slightly or not at all constricted at septa, straight or bent, 40-70 × 7-8μ. Conidia obclavate, olivaceous to pale fuliginous, transverse septa up to 19-20, deeply constricted, with long pale-coloured septate beak and body of sporidium muriformly divided, 100-160 × 16-25μ.

Sydney, N.S.W.; on Carnation; August, 1903 (R. T. Baker).

The exceedingly long spore of this species is very characteristic, deeply constricted at the septa, and may either be comparatively slender or bulging considerably. *Septoria dianthi* also occurred on the leaves. This species is after the type of *A. solani* (E. & M.), Jones & Grout, in which the spore may be more than twice as long, but the transverse septa are fewer and less constricted, and the longitudinal septa are few or lacking.

Amphichæta, n.g.

Acervuli beneath the epidermis, often erumpent, disc- or cushion-shaped, black. Sporules elongated, with two or more transverse septa, at least partially coloured, and with one seta at each end; basidia hyaline, filiform.

The genus *Pestalozzia* was originally divided into the three subgenera, *Eu-Pestalozzia* with sporules partly coloured and two or more apical setæ; *Monochætia* with only one apical seta, and *Pestalozzina* with the sporules entirely hyaline. The two latter are now raised to the rank of genera, and *Monochætia*, Sacc., corresponds to this new genus, only there is no basal seta to the spore. In *Cryptostictis*, Fckl., the spores are similar to those of *Amphichæta*, but they are enclosed in a perithecium.

62. Amphichæta daviesiæ, n.sp.

Pustules black, erumpent, subgregarious, sometimes confluent, on both surfaces of leaves and on stems. Sporules fusoid, 4-septate, hardly constricted at septum, 3 median cells coloured, 2 terminal hyaline, crested with one hair up to 20μ long, with another usually shorter hair springing obliquely from basal cell near to junction with stalk, 20-26 × 7-8μ; basidia hyaline, filiform.

Box Hill and Ringwood, Vic.; on *Daviesia latifolia*, R.Br.; October, 1903 (C. French, Jr.).

This fungus is very destructive, causing large discoloured patches on the greater portion of the green leaves, and also invading the stem.

63. Amphichæta kennedyæ, n.sp.

Pustules small, black, erumpent, scattered. Sporules fusoid, sometimes slightly curved, 5-6-septate, median cells coloured, two terminal hyaline, may be slightly constricted at median septum, crested with one hair averaging 6-10μ long, but rarely up to 17μ long, and another springing obliquely from basal cell, very variable in length, 9-22μ long, but generally longer than apical seta; basidia hyaline, filiform, 10-16μ long.

Ringwood and Cheltenham, Vic.; on dry portions of leaves of *Hardenbergia monophylla*, Benth., and *Kennedya prostrata*, R.Br.; September, 1903 (C. French, Jr.).

64. Ascophyta fœniculina, n.sp.

Perithecia subgregarious, erumpent then superficial, punctiform, clear olivaceous by transmitted light, globose to lenticular, membranaceous, of parenchymatous texture, with apical pore, 100-150μ diam. Sporules olivaceous, cylindrical, straight or slightly curved, not or slightly constricted at septum, occasionally a second septum, with guttule in each cell, variable in size but generally 14-17 × 6-6½μ.

Armadale, Vic.; on fruits of *Fœniculum vulgare*, Mill; June, 1903.

It differs from *A. ferulæ*, Pal., which occurs on white spots on dead stems, in the smaller perithecia and spores which are not hyaline but greenish.

65. Ascochyta violicola, n.sp.

Spots whitish or pale yellow, orbicular or oval, determinate, average 3-5 mm. Perithecia scattered or subgregarious, black, punctiform, erumpent, membranaceous, of parenchymatous texture,

pale olivaceous by transmitted light, globose, averaging 200μ diam., with small round apical pore about 20μ diam. Sporules hyaline, elliptical to sausage-shaped, at length 1-septate, not constricted at septum, 7-8 × 2½μ, expelled in dilute pink tendrils.

Armadale, near Melbourne, Vic.; on *Viola odorata*; March, 1903.

The size of the spores at once distinguishes this from *A. violæ*, Sacc. & Speg., in which they are more than twice the size, 15-18 × 3½-4μ.

66. Barlæa persoonii (Crouan), Sacc.

Syn. *Barlæa violascens* (Cooke), Mass.

Ascophore 6-7 mm. across, gregarious, sessile, fleshy, hemispherical, then expanding, glabrous; margin incurved, entire; disc purplish, externally dark purplish; excipulum parenchymatous, cells rather large, tinged with violet. Asci cylindrical, elongated, base attenuated, apex at first rounded, ultimately truncate, 8-spored. Spores uni-seriate, globose, smooth, 1-guttulate, at first hyaline, ultimately violet, 9-10μ diam. Paraphyses filiform, about 2μ thick, often slightly recurved at apex.

Boppy Mount, Cobar District, N.S.W.; on clayey soil among moss; May, 1903 (R. T. Baker).

This is the first record of the species for Australia. It is described as of a dingy violet colour by Massee, and in Cooke's 'Mycographia' (fig. 83), it is shown of a very decided violet, but these specimens were more purplish. However, the colour has changed a little since the specimens were gathered. The collector notes that the colour, when fresh, was violet, but under certain angles of light it appeared somewhat purplish. Whether purple or violet, however, the colour was not dingy.

This species has been variously named, but if we trace the different names according to their chronological order, it will be found that the one used above is according to the recognised system of naming.

1. *Ascobolus persoonii*, Crouan, Flor. Finist. 56 (1867).
2. *Aleura violascens*, Gillet, Champ. 49 (1879).

3. *Peziza violascens*, Cooke, Mycogr. 46 (1879).
4. *Barlæa persoonii*, Saccardo, Syll. viii., p. 116 (1889).
5. *Barlæa violascens*, Massee, Brit. Fung. Flor. iv., 398 (1895).

67. CONIOTHYRIUM BURCHARDIÆ, n.sp.

Spots greyish, usually marginal, elongated, with broad dark brown margin. Perithecia scattered, minute, black, punctiform, at first covered, then erumpent, globose, membranaceous, of parenchymatous texture, with apical pore, 100-140μ diam. Sporules numerous, clear brown, ellipsoid, 8-9 × 4-5μ.

Ringwood, Vic.; on green leaves of *Burchardia umbellata*, R.Br.; October, 1903 (C. French, Jr.).

The perithecia were dark brown by transmitted light owing to the contained spores, but when empty they were olivaceous.

68. CONIOTHYRIUM PYCNANTHÆ, n.sp.

Spots rounded or irregular, somewhat indefinite, ruddy, often confluent and forming small or large patches. Perithecia scattered, erumpent, surrounded by ruptured epidermis, depressed-globose, membranaceous, yellowish-brown by transmitted light, with apical pore, 120-150μ diam. Sporules yellowish-brown, oval to elliptical, or somewhat irregular and often unsymmetrical, with single guttule, 6-8 × 2½-3μ.

Myrniong, Vic.; on phyllodes of *Acacia pycnantha*, Benth., Golden Wattle; July, 1900 (Brittlebank).

Two species of this genus are recorded on branches of *Acacia* in California, but the spores are entirely different.

C. decipiens, Cooke & Harkn., has spores 4 × 3μ, and in *C. punctum*, Cooke & Harkn., they are 5μ in diam.

69. GLŒOSPORIUM ACACIÆ, n.sp.

Spots on either surface of leaf, ruddy brown, slightly sunken, but with raised margin. Pustules at first covered, then free and bursting through epidermis, black, often arranged as a ring around central pustule. Sporules hyaline, cloudy, elliptical to cylindrical, acute or rounded at the ends, 10-13 × 2½-3μ; sporo-

phores densely fasciculate, pale olivaceous in mass, septate, simple, 50-60μ long by 3-4μ broad, and slightly narrowing towards apex.

Dimboola, Vic.; on *Acacia hakeoides*, A. Cunn.; August, 1896 (Reader).

It differs from *A. sphærelloides*, Sacc., occurring on *Acacia melanoxylon*, in which the sporules are 5-6 μ broad, twice that of the above.

70. Glœosporium eucalypti, n.sp.

Spots rounded or irregular, on both surfaces of leaf, brownish, determinate, often spreading inward from apex or margin, and becoming confluent. Pustules gregarious or scattered, numerous, greyish to blackish, erumpent, averaging $\frac{1}{3}$-$\frac{1}{2}$ mm. Sporules hyaline, ellipsoid, non-guttulate, 8-10 × 3-4μ; sporophores fasciculate, simple, septate, of equal thickness throughout, 50-60 × 5-6μ.

Zoological Gardens, Melbourne, Vic.; on *Eucalyptus corynocalyx*, F.v.M.; June, 1903 (Le Souëf).

It differs from *G. ochrostictum*, Sacc., on languid leaves of *E. rostrata*, in the pustules ultimately being blackish and not ochraceous, and the sporules shorter, narrower and non-guttulate. Also from *G. nigricans*, Cooke & Mass., on *E. pauciflora*, Sieb., in which the spots are indistinct and the ovoid sporules are 12 × 7μ.

71. Heterosporium graminis, n.sp.

Tufts small, distinct, gregarious, dusky olive, on dry parts of leaves and stems. Fertile hyphæ erect, simple, nodulose, rarely septate, slightly flexuous, dark olivaceous, abruptly narrowed at apex, and terminating in minute disc for attachment of conidia, 40-60 × 5-7μ, and when swollen may be 9-10μ broad; disc 2-2$\frac{1}{2}\mu$, sometimes two alongside of each other. Conidia in fragile chains, olivaceous, oblong-ellipsoid, prominently echinulate, continuous to 4-septate, not constricted, 20-30 × 11-14μ.

St. Kilda, Vic.; on *Ammophila arundinacea*, Host., Marram-grass; September, 1903.

It differs from *H. avenæ*, Oud., in which the fertile hyphæ are 3 to 4 times as long, and the conidia are only 1-septate. Also

from *H. cercosporoides*, Speg., in which the hyphæ are septate, and the 1-2 septate conidia are pale rose to fuliginous.

72. HEXAGONIA BICOLOR, n.sp.

Pileus dimidiate, about 3 cm. across, solitary, woody, yellowish to brownish when young, smoky and cracked when old, the two zones—yellow and black, distinct, smooth. Pores rounded to polygonal, shallow towards margin, rather deep further back, decurrent, cream-coloured, rather large, 2-3 mm. across. Spores hyaline, elliptical, apiculate, 12-16 × 7-8μ.

Restdown, N.S.W.; on dead wood of *Eucalyptus woollsiana*; July, 1903 (R. T. Baker).

The two-coloured pileus is very marked, as well as the large, cream-coloured, polygonal pores. It differs from *H. muelleri*, Berk., also found on *Eucalyptus*, which is thin and rigid, and the pores are only $\frac{1}{2}$ mm. diam. It is rather interesting to note that this seems to be the first time in which the spores of this genus have been recorded. Of the 88 species given in Saccardo's 'Sylloge Fungorum,' in not a single instance have the spores been seen or at least recorded.

73. HUMARIA BAKERI, n.sp.

Loosely gregarious, subsessile to distinctly stalked, glabrous, all of one colour, pale fleshy pink, firm and hard; disc globose or elliptic, slightly concave, about 1 mm. across. Asci cylindrical, but tapering slightly towards base, rounded at apex, 8-spored, 85-95 × 7μ; paraphyses numerous, hyaline, septate, often bifurcating at apex. Spores 1-seriate, hyaline, somewhat fusiform, smooth, 13-16 × 3$\frac{1}{2}$-5μ.

Wentworth Falls, N.S.W.; on gritty soil; August, 1903 (R. T. Baker).

This is a very characteristic species with its delicate pinkish tint, minute size, and subsessile to shortly stalked ascophore.

It differs from *H. salmonicolor*, Sacc., in the smaller size of the disc and spores, and from *H. novo-zelandica*, Henn., in which the disc is externally tomentose, the asci about twice the length, and the spores larger.

74. LEPTOSTROMA ACACIÆ, n.sp.

Perithecia clustered on pale indefinite spots, black, elongated or irregularly subcircular, at first covered by the epidermis, then erumpent, opening by longitudinal fissure, sometimes reaching a length of nearly 1 mm. Sporules hyaline, lanceolate, generally straight, often thicker at one end than the other, 22-30 × 5-6μ.

Dimboola, Vic.; on phyllodes and branches of *Acacia salicina*, Lindl.; July, 1896 (Reader).

The black clusters of perithecia stand out prominently from the pale green of the phyllodes, and the species is a characteristic one.

75. MYRIANGIUM ACACIÆ, n.sp.

Stromata in clusters, up to 4 mm. across, tubercular, scattered, superficial, firmly attached to bark by submembranaceous base; each stroma 1-1½ mm. diam., black, disciform, plane or convex above, orbicular or angular from pressure, horny in texture, pseudo-parenchymatous. Ascigerous cells or perithecia numerous, subpolystichous, subglobose, each containing a single ascus. Asci subglobose to obovate, 8-spored, aparaphysate, 40-50 × 32-38 μ. Sporidia conglobate, hyaline, oblong-elliptical, often curved, transversely 7-8 septate and slightly constricted at some of the septa, imperfectly muriform, 30-38 × 11-13μ, occasionally reaching a length of 42μ.

Plenty River, Vic.; on living branches of *Acacia dealbata*, Link; August, 1903 (C. French, Jr.).

This species approaches *M. duriæi*, Mont. & Berk., but the spores are rather larger.

76. MYRIANGIUM PRITZELIANUM, Henn. (Hedw. xl., 353, 1901.)

Stromata densely gregarious, sometimes scattered, on branches, leaves and flowers, erumpent and becoming superficial, pulvinate, rough to warty, or somewhat furrowed, rather fleshy, black to dark cinnamon, 0·2-0·5 mm. diam., ruddy-brown or deep blood-red by transmitted light, pseudo-parenchymatous. Ascigerous cells or perithecia numerous, subpolystichous. Asci ovoid, obovate or

subglobose, at first thickened at apex, 4-8-spored, aparaphysate, 22-35 × 20-28μ. Sporidia conglobate, ellipsoid or subclavate, straight or slightly curved, obtuse at both ends, hyaline or pale yellowish, transversely 3-septate, more or less constricted at septa, imperfectly muriform, 10-18 × 4-6μ.

Kergunyah, Vic.; on *Pomaderris apetala*, Labill.; November, 1902 (Robinson)—Near Mt. Falkiner, Tasm.; September, 1896 (Rodway, 464)—Near Geraldton, W.A.; on *Trymalium wichuræ*, Nees; July, 1901 (Pritzel).

Dr. Hennings kindly forwarded a portion of the original material on which the species was founded, and there is no doubt of the identity of the Victorian and Tasmanian specimens. In these the stromata occur on the young branches, the leaves and the flower-stalks, and in the West Australian specimens they occurred on the calyx-leaves as well. The stromata have their base narrowed and inserted in the matrix, and although the branches are not deformed still it is a very injurious parasite.

The genus *Myriangium*, Mont. & Berk., was formerly classed among the lichens, but the absence of spermogonia and gonidia exclude it. In Hooker's London Journal of Botany (Vol. iv., p. 73, 1845), Berkeley records *M. duriæi* from near Swan River, West Australia, but it was omitted from Cooke's 'Handbook of Australian Fungi,' on account of its lichenoid nature.

77. Phyllosticta marrubii, n.sp.

Perithecia minute, black, punctiform, erumpent, prominent, scattered, depressed-globose, golden to olivaceous by transmitted light, membranaceous, of parenchymatous texture, with round apical pore, 120-130μ diam., on both surfaces of pale brown irregular spots, but mostly on upper. Sporules hyaline, oval, 5½-6 × 2½-3, occasionally reaching a length of 8μ.

Armadale, Vic.; on living leaves of *Marrubium vulgare*, L.; September, 1903.

At first the irregular pale brown spots are isolated, but ultimately they coalesce and form large withered patches, often towards the tip of the leaf. The spots usually occur on leaves

towards the base of the stem and not freely exposed to the light. *Phoma labiatarum*, Cooke, occurs on dead stems.

78. Septoria hypochœridis (Allesch.), McAlp.

Syn. *Rhabdospora hypochœridis*, Allescher (Hedw., xxxv., 163, 1897).

Spots on both surfaces of leaf, dirty grey to brownish, somewhat round, with purplish margin, usually about 5 mm. diam. Perithecia very minute, black, scattered or gregarious, erumpent, olivaceous by transmitted light, depressed-globose to lenticular, membranaceous, of parenchymatous texture, with apical pore, 70-100 μ diam. Sporules hyaline, filiform, very slender, straight, curved or slightly flexuous, guttulate, 22-32μ long.

Armadale, near Melbourne, Vic.; on *Hypochœris radicata*, L.; October, 1903.

This species was associated with *Puccinia hypochœridis*, Oud., which occurred on the same spots. It differs from *S. mougeoti*, Sacc. & Roum., occurring on *Hieracium*, in the nature of the spots, and in the shorter spores.

It was first determined on the dead stems of this cosmopolitan plant in Germany, and assigned to the genus *Rhabdospora* by Allescher, but since it occurs on the leaves as well and forms spots, it is a true *Septoria*.

79. Sphærella rubicola, n.sp.

Perithecia on silvery-grey patches, minute, black, depressed-globose, scarcely erumpent, scattered, dark brown by transmitted light, membranaceous, with relatively large, round, papillate mouth, 140-190μ diam. Asci obclavate, shortly stalked, rounded at apex, without paraphyses, 8-spored, 63-70 × 18-21μ. Sporidia generally biseriate, cylindric-oblong, hyaline, with finely granular contents, 1-septate, not constricted at septum, rounded at both ends, gradually tapering towards lower end, two cells about equal in length, upper cell broader, 21 × 7μ.

Arthur's Creek, Vic.; on still green and brown branches of *Rubus parvifolius*, L.; August, 1902.

The size of the sporidia, which is very constant, at once distinguishes it from *S. fruticum*, Starb., and *S. rubina*, Peck., occurring on the stems of the Raspberry (*Rubus idæus*). This fungus did not occur on the leaves, which, however, were affected with *Phragmidium subcorticium* (Schrank), Winter.

80. TOLYPOSPORIUM LEPIDOBOLI, n.sp.

Produced within the ovaries, black, powdery. Spore-balls composed of very many spores closely united into irregularly shaped solid masses, about 80 to 90μ lengthwise. Spores rounded or polygonal, 12-14 μ diam., or 12-16 × 10-11μ, epispore rough.

Dimboola, Vic.; in ovaries of *Lepidobolus drapetocoleus*, F.v.M. (Reader).

NOTES AND EXHIBITS.

Mr. Froggatt exhibited specimens of, and offered some remarks on, the larvæ of five handsome and characteristic members of the family *Carabidæ*, namely :—

Castelnaudia imperialis, Sloane.—Two different families of this beautiful beetle were obtained under large logs along a forest track on the top of Tambourine Mount, Southern Queensland, in November, 1903. In one of them two eggs were found, each enclosed in a rounded clay cell; and also two larvæ. Larva 1 inch long, light brown to ochreous-yellow in colour, with the dorsal plates chocolate-brown; head broader than long, flattened, with long curved reddish-brown jaws armed with a stout incurved tooth towards the basal half.

Catadromus Lacordairei, Boisd.—Larvæ were taken along the banks of a lagoon at Howlong, and on several occasions were observed to be eating small frogs.

Pamborus viridis, Gory.—Larvæ from under logs on the Tweed River.

Calosoma Schayeri, Erich., is common in fields infested with the army cut-worm (*Leucania unipunctata*, Haw.), the larvæ hiding under clods of earth and devouring the pupæ of the above-mentioned and other cut-worms.

And the larvæ of a species at present undetermined.

Mr. Johnston showed, under the microscope, mounted examples and sections of parasitic Trematodes in illustration of his paper.

Mr. Stead exhibited a specimen of *Octopus pictus* with a batch of newly deposited eggs. Also a portion of a fish preserved in $2\frac{1}{2}$ % of formalin, the slightly exposed surface of which was covered with a luxuriant growth of mould. Dr. R. Greig Smith, Dr. Chapman and the Chairman mentioned still more surprising instances of the growth of fungi in, or upon substances wholly or

partially immersed in, antiseptic solutions, which had come under actual observation.

Mr. Fred. Turner exhibited, and offered some observations upon, the following plants :—

(1) *Trifolium resupinatum*, Linn., a clover indigenous to Southern Europe, Northern Africa, and other countries in the Northern Hemisphere, which has recently become established in the Bombala District, N.S.W., where it is likely to prove a useful addition to the pasture herbage.

(2) *Andropogon saccharoides*, Sw., an American grass which has recently been found growing at Minembah, Upper Hunter, N.S.W. So far as he was aware, not previously recorded for Australia.

(3) *Chloris barbata*, Sw. var. *decora* (Syn. *C. decora*, Nees), a Central Australian grass which has recently established itself at Minembah, Upper Hunter, N.S.W. So far as the exhibitor was aware, this species had not hitherto been recorded from the coastal districts of this continent. Mr. Sylvester Browne speaks highly of its prolificness.

(4) *Hordeum murinum*, Linn. This European grass is very common in many of the inland parts of Australia, but the exhibitor had not hitherto observed the inflorescence in a diseased condition. The specimen exhibited was affected by a parasitic fungus, probably some species of *Ustilago*. Collected near Dubbo, N.S.W.

(5) *Zea mays*, Linn. This largely cultivated cereal is monœcious, but occasionally it produces abnormal inflorescence. The specimens exhibited, which were grown on Seanmoney Station, near Coonamble, N.S.W., and collected by Mr. W N. Thomas, Surveyor, showed remarkable development. Surmounting the rhachis of each male inflorescence was a more or less developed cob without sheaths and surrounded by male flowers, amongst some of which were scattered grains.

Mr. Steel exhibited a specimen of the common Pine Case-moth, *Thyridopteryx Hubneri*, which had two cases firmly woven

together for about one-third of their length, the attachment commencing close to the neck.

Mr. North sent for exhibition a specimen of *Munia flaviprymna*, Gould, from the Australian Museum Reference Collection. The Trustees also possess a living example of this, the rarest of all Australian Finches. It was captured with a flock of *Donacicola castaneothorax*, Gould, in the Northern Territory of South Australia, in December, 1903. A skin was also exhibited of *Poephila atropygialis* (Diggles), Castelnau and Ramsay,* from the Norman River, Gulf of Carpentaria. *Poephila nigrotecta*, Hartert,† is a synonym of this species.

* P.L.S.N.S.W., Vol. i., p. 382 (1877).
† Bull. Brit. Orn. Club, Ibis, 1899, p. 647.

WEDNESDAY, MAY 25TH, 1904.

A Special General Meeting and the Ordinary Monthly Meeting of the Society were held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, May 25th, 1904.

SPECIAL GENERAL MEETING.

Dr. T. Storie Dixson, President, in the Chair.

The amendment of Rule vi., so as to read—

> vi. The Entrance Fee for Ordinary Members shall be one guinea, and the Annual Subscription one guinea; and for Associate Members the Annual Subscription shall be one guinea, without Entrance Fee—

was confirmed by a unanimous vote.

ORDINARY MONTHLY MEETING.

Dr. T. Storie Dixson, President, in the Chair.

Messrs. R. E. TURNER (c/o. Mr. G. A. Waterhouse, Sydney), and W. J. CLUNIES ROSS, B.Sc., F.G.S., Technical College, Sydney, were elected Ordinary Members of the Society.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 19 Vols., 63 Parts or Nos., 20 Bulletins, 6 Pamphlets, and 5 Maps, received from 48 Societies, &c., and 2 Individuals, were laid upon the table.

BOTANY OF SOUTH-WESTERN NEW SOUTH WALES.

By Fred. Turner, F.L.S., F.R.H.S., etc.

Introduction.

In the early history of the settlement of Australia the south-western portion of New South Wales was the theatre of many heroic struggles and trials of intrepid explorers such as Oxley, Evans, Cunningham, Sturt, Mitchell, Hume and Hovell, who discovered for the world that rich and fertile section of country now principally devoted to pastoral and agricultural pursuits. In the published accounts of their travels there are references to some of the most interesting plants growing there. I have always felt I was on classic ground when botanising in country traversed by those early explorers. I have seen the tree, *Eucalyptus rostrata*, Schlecht., under which Hume and Hovell are said to have camped in 1824.

Although it is not a century since that part of the State was a *terra incognita* to the civilised world, millions of sheep and thousands of horses and cattle are now being fattened on the indigenous grasses and herbage where the kangaroo and wallaby were the principal herbivora before the advent of the white man. Hundreds of thousands of acres have been brought under cultivation, and in ordinary seasons millions of bushels of excellent wheat are produced, and many other commercial crops are successfully grown.

This paper refers to the indigenous and acclimatised vegetation found between the parallel 33° South and the Murray or Hume River (the boundary of New South Wales and Victoria) and the meridians 141° to 147° East. The physical features of this region consist of gently undulating country, sand hills, mountain ranges, isolated hills, none of which, however, attain great

altitude, and nearly level plains, the last-named forming by far the greater portion of this area. Some of these plains consist of black soil, others of red loam, while considerable tracts are of a sandy nature. Much of the land bordering the rivers and creeks is rich alluvial deposits. Those are the principal soils of the South-West, but there are many others of an intermediate character. The surface of some of the ranges and hills is partly composed of rock or loose stones, whilst that of others is even and clothed with grass and herbage from base to summit. Some are called "bald hills" because they are bare of trees, but on a number arboreal and shrubby vegetation is growing. There are immense, treeless plains, separated here and there by large belts of timber; and considerable areas of open forest, scrub, pine, and mallee country. On the plains, when the atmospheric conditions were favourable, I have often seen a mirage of beautiful trees and lakes of clear water, and the effect is very remarkable, especially to one standing on sun-baked earth almost destitute of herbage.

Climate.

Temperature at Hay.

Mean temperature	63·4° F.
Mean Summer temperature	75·5°
Mean Winter temperature	50·6°
Highest temperature (shade)	117·3°
Lowest temperature (shade)	21·1°

The temperature will range from a few degrees higher in the extreme west to a few degrees lower in the extreme east, but those mentioned will give a good idea of the climate of South-Western New South Wales.

Rainfall.

The average annual rainfall at Hay is 14½ inches, but it ranges from 12 inches at Wentworth to 19¾ inches in the extreme east.

Water.

The South-West is naturally rather well watered by parts of the following rivers and their tributaries—Darling, Lachlan,

Murrumbidgee, Murray or Hume, Edward and Wakool. There are also several lakes, of which the following are the principal:—Cudgellico and Urana in the east; Pitarpunga, Yanga, Moornanyah, Yartla, Popilta and Victoria in the west. In propitious seasons the deep depressions and billabongs generally contain great quantities of water. Considerable enterprise has been shown by pastoralists, who have made many dams and tanks for the conservation of water. The Government also has done a considerable amount of good work in testing the western portion of this region for artesian supplies of water, and a number of wells have been sunk into the tertiary beds, but those I saw did not yield much water.

The Flora.

In the early part of 1875 I made my first collection of plants in the South-Western portion of New South Wales whilst on my first visit to Albury. But it is only during the last twenty-one years that I have many times traversed this region, systematically collecting the flora and writing more than fifty special reports on the economic value of the vegetation growing over different parts of this area. In addition, I have figured and described, as to their economic value, many of the useful plants of this region under instructions from the Government of New South Wales. In very many respects the flora differs from that found in the Darling country,* though there are a great number of plants common to both these sections. Speaking generally, the vegetation might be described as intermediate in character between that found north of the parallel 33° and that growing in the north-western portion of the adjoining State of Victoria. Near the rivers and most of the water-courses, the arboreal vegetation attains larger dimensions, much of the Mallee grows taller, the shrubby growth and herbaceous plants generally having a less rigid habit and more luxuriant foliage, whilst the flora of the plains generally grows more densely and consists of a greater

* These Proceedings, 1903, p. 406.

number and variety of dwarf plants to a given area than in the Darling country. The Darling country, as defined in my paper on the botany of that portion of the State, has an area of about 96,400 square miles, whilst the south-west, as defined by this paper, has only an area of about 57,360 square miles. The latter is about seven-twelfths the size of the former and is 24·86 per cent. richer in indigenous species. Those circumstances may be attributed to the fact that the average rainfall is slightly more, that there is a fairly good natural water system, that the average temperature is lower, and that there is less aridity than in the country north of the parallel 33°. There is another feature of the south-western flora which I have observed and is worth recording, namely, that on considerable areas of the plains in widely separated districts such *Compositæ* as *Helichrysum apiculatum*, DC., and *Helipterum floribundum*, DC., formed about sixty per cent. of the vegetation, and the same applies to certain *Cruciferæ*, especially species of the genera *Blennodia* and *Lepidium*, also to several *Chenopodiaceæ* as *Atriplex nummularia*, Lindl., *Kochia aphylla*, R.Br., *K. pyramidata*, Benth., and *K. sedifolia*, F.v.M. (the last-named is always an indication of dry country), and to *Anguillaria dioica*, R.Br., amongst *Liliaceæ*, and to *Xerotes leucocephala*, R.Br., amongst *Juncaceæ*. On swampy country and on land subject to periodical inundation such plants as *Glyceria ramigera*, F.v.M., "Cane Grass"; *Leptochloa subdigitata*, Trin., "Cane Grass"; *Mentha australis*, R.Br., "Native Mint"; *Marsilea drummondii*, A.Br., "Nardoo"; and *Muhlenbeckia cunninghamii*, F.v.M., "Lignum Scrub" or "Sturt's Leafless Bramble," often form dense growths almost excluding other vegetation. Such annuals as *Erodium cygnorum*, Nees, "Crow-foot"; *Portulaca oleracea*, Linn., "Purslane"; and *Tetragonia expansa*, Murr., "Warrigal Cabbage," are often the predominant plants on large areas at certain seasons of the year. And a similar remark applies to that South African Composite, *Cryptostemma calendulaceum*, R.Br. Quite a number of introduced species (principally from Europe) have become acclimatised in different districts, but mostly in the eastern portion.

Ranunculaceæ are not largely represented, but the Order includes a few interesting species, such as *Clematis microphylla*, DC., which is found in many parts and in spring time often displays a wealth of white flowers. That widely distributed and curious plant, *Myosurus minimus*, Linn., may be collected on the margins of many of the rivers and lakes. The genus *Ranunculus* furnishes four species—one, *R. muricatus*, Linn., is an introduction and a suspected poison plant. It is fairly common in the extreme eastern portion. The poppy family (*Papaveraceæ*) has only one indigenous species, *Papaver horridum*, DC., but four exotics have become established in various localities. *Cruciferæ* are common over a great part of this region, and on some of the plains are a conspicuous feature in early spring. Although the prevailing hue of the flowers is yellow, it varies in intensity of colouring, and there are several species which have white, purple, pink and lilac blooms. The genus *Capparis* includes two species only and neither of these is common, but that curious, leafless, allied plant, *Apophyllum anomalum*, F.v.M., occurs frequently on some of the scrubby country in the western portion. One of the Australian Violets, *Viola betonicæfolia*, Sm., is found on some of the shady river banks. Its rather large, violet-coloured flowers are produced in great profusion in early summer, but they have no perfume. This species produces many apetalous or imperfect flowers usually arranged on very short scapes. Two species of *Ionidium* grow in many districts, but nowhere very plentifully. Their singular, mostly blue, flowers, of which the lowest petal is more largely developed than the others, often attract attention. There is a white-flowering variety of *I. floribundum*, Walp., but it is a rare plant. *Pittosporeæ* comprise four genera and the same number of species. With the exception of *Pittosporum phillyræoides*, DC., they are found mostly in the eastern portion. *Cheiranthera linearis*, A. Cunn., is the most beautiful flowering plant of this Order, but it may be considered rare in this part of the State. It is a low-growing undershrub, with showy blue flowers, which are from one inch to nearly two inches in diameter. The Australian species of *Polygaleæ*, or milk-wort family, are

neither numerous nor important, and of the three genera only one, *Comesperma*, is endemic. In the South-West there are three species of this genus, of which *C. scoparium*, Steetz, is the most singular. It is a dwarf, broom-like, leafless shrub, and on its smaller branches blue flowers appear usually in spring, but sometimes in autumn. It is generally found in sandy country or on stony rises. The Order *Frankeniaceæ* consists of only one genus, *Frankenia*, and of the seven species found in Western Australia only one, *F. pauciflora*, DC., extends to New South Wales. It is an interesting plant to the botanist from the fact that it is allied to *Dianthus* and cognate genera. *Malvaceæ* are fairly well distributed, and at certain seasons of the year produce a profusion of flowers of various colours. Some species of the genera *Howittia*, *Abutilon*, and *Hibiscus* are well worth the attention of horticulturists, and so is *Gossypium sturtii*, F.v.M., the "native cotton" or, as it is sometimes called, "Sturt's desert rose." Several exotic species, principally of the genus *Malva*, have become acclimatised and now are apparently wild.

Linum marginale, A. Cunn., is the only indigenous species of the flax family (*Lineæ*). It is a slender-growing plant, attaining under favourable conditions, a height of four feet. It produces a loose corymb of charming blue flowers, and the seeds are mucilaginous, but are rarely used for any purpose. From its stems the Aborigines make a fibre which is of considerable strength, and is employed for several purposes. The introduced species, *Linum gallicum*, Linn., has small, yellow flowers. The Order *Zygophylleæ*, or "bean caper," is represented by several species, but, with one exception, they are dwarf or prostrate-growing plants, having opposite leaves and yellow or white flowers. Certain of them are considered vermifuges. In propitious seasons the "caltrops," *Tribulus terrestris*, Linn., spreads rapidly, and its prickly fruits often prove troublesome to stock. Amongst the prettiest flowering *Rutaceous* plants are *Eriostemon myoporoides*, DC., and *E. difformis*, A. Cunn., which occur in various districts, but principally near water-courses. The soft, acid fruits of the "native cumquat" (*Atalantia glauca*, Hook.), are made

into preserves. *Sapindaceæ* include some interesting trees and shrubs. The genus *Dodonæa* has eight species which have polygamous or unisexual, often diœcious flowers and capsules, mostly furnished with dorsal wings. The ripe fruits are red, brown or green, and are called "hops" by the settlers in the interior. A shrub in fruit is an ornamental object. Many of the species are fairly common on sand-hills and on country of a light loamy nature.

Leguminosæ are numerous as regards species and fairly well distributed over this region; they include trees, shrubs, herbaceous and annual plants, many of which are of a highly ornamental character. Some, when in bloom, are amongst the most charming plants of the interior. Many of the arboreal species furnish timber for industrial purposes, and the leaves of certain of them provide feed for stock during adverse seasons. *Acacia* is more largely represented by species than any other genus of this Order. No less than forty-two distinct species, besides varieties, are found in varying proportions over this area. Some of the shrubby kinds grow very densely and often form great thickets, which are difficult to penetrate either on foot or on horseback. The genera that rank next to *Acacia* in regard to the number of species are *Swainsona*, *Cassia*, and *Pultenæa*. The first has eleven, the second nine, and the third eight species. The suspected poison plants of this order belong to the following genera:—*Isotropis*, *Goodia*, *Crotalaria*, *Lotus*, *Indigofera*, and *Swainsona*. Many exotic *Leguminous* plants have become established, and now are apparently wild in different districts. Those species of *Medicago* which have prickly legumes are often troublesome to the sheep-owner, as the fruits get matted in the wool and, to a certain extent, cause a depreciation in the value of that staple product. Although many species of the Order *Haloragee* are of little interest to any but the botanist, there are a few exceptions. On some of the sandy and gravelly places two species of *Loudonia*, with golden-yellow flowers, arranged in terminal corymbose panicles, often arrest attention, and species of *Myriophyllum* and *Ceratophyllum* well repay examination and study. These two

genera are aquatic plants and fairly common in some of the sluggish water-courses. The *Myrtaceæ* comprise both arboreal and shrubby growth, occurring in more or less profusion over nearly the whole of this region. The pretty, white-flowering shrub, *Calythrix tetragona*, Labill., is often seen, generally in sandy country. The lobes of the calyx are produced into fine awns, about one-quarter of an inch long, hence it is sometimes called "spider-bush." Several species of *Leptospermum* and *Melaleuca* grow near some of the water-courses, and when in bloom are a pretty sight amongst the surrounding, somewhat sombre vegetation. The genus *Angophora* is represented by one species, *A. intermedia*, DC., which grows into a fair-sized tree in some situations, but the principal arboreal vegetation is the *Eucalyptus*, of which the noblest member is *E. rostrata*, Schlecht. This tree grows abundantly on the banks of rivers, billabongs, and creeks, and on land subject to periodical inundation. All the water-courses can easily be defined miles away by this beautiful tree. The timber of this species and of some other western Eucalypts is of great economic value, being used for a variety of purposes where strength and durability are required. The principal Eucalypti forming the Mallee scrub are *E. gracilis*, F.v.M., *E. uncinata*, Turcz., *E. dumosa*, A. Cunn., *E. incrassata*, Labill., and *E. oleosa*, F.v.M., and to a less extent *E. paniculata*, Sm. From the thick roots of a few of these species (when cut into short lengths and placed in a vertical position) moderate quantities of fair drinking water can be obtained in the driest of seasons. The most graceful species of *Eucalyptus* in the interior is *E. pendula*, A. Cunn. It has a drooping habit, with rather long, narrow leaves and sometimes crimson-coloured flowers. The inflorescence of *E. behriana*, F.v.M., is often of the same colour, whilst that of *E. leucoxylon*, F.v.M., is frequently red. When in bloom these Eucalypti often make an effective display, forming a pleasing contrast to those species which produce white or cream-coloured flowers. *Umbelliferæ* are represented by six genera and thirteen species, which are fairly well distributed. Two species of *Trachymene*—*T. australis*, Benth., and *T. incisa*, Rudge,

popularly known as "Wild Parsnip"—are suspected of poisoning stock; whilst the species of *Apium* and *Daucus*, when partaken of by milch cows, are regarded as giving a "taint" to milk.

Loranthaceæ consist of seven species of *Loranthus*, found on different kinds of trees and shrubs, and these parasitical plants appear to be increasing to the injury of certain kinds of vegetation.* I have seen trees and shrubs absolutely killed by *Loranthus pendulus*, Sieb., one of the most vigorous-growing species of this genus. There is no doubt that the mistletoe bird, *Dicæum hirundinaceum*, Shaw, is largely responsible for the spread of these parasites. That bird eats the ripe fruits and voids or otherwise leaves the seeds on the branches of the trees, where they germinate and in due course develop into plants. At one time the Aborigines used to eat the ripe fruit of several species of *Loranthus*, and thus prevented many of the seeds being disseminated by birds and other agencies. *Compositæ* are abundant over the great part of this region, particularly from Mt. Elliott to considerably west of Oxley, and from Hillston to Pooncarie, where much of the plain country, in the early summer months and sometimes in autumn after rainfall, is often literally carpeted with many species of this family. When these plants are in bloom the effect is positively bewildering to the eye, and even a brief reference to the different species would occupy more pages of the Society's Proceedings than I should presume to ask for. I might refer, however, to one or two circumstances by way of illustrating the useful character of certain of these plants. On one very large pastoral holding in the Mossgiel district *Helipterum floribundum*, DC., was the principal feed of the sheep for four years, and the manager informed me that the animals thrived well on this plant. On the Murray the leaves and succulent stems of *Senecio magnificus*, F.v.M., are sometimes cooked and eaten as a vegetable. I have eaten the palatable fleshy roots of the "native Scorzonera," *Microseris forsteri*, Hook. f. Quite a number of exotic *Compositæ*, some of an undesirable character, have become

* These Proceedings, 1894, p. 557.

acclimatised and now are apparently wild in many districts. *Goodenoviece* are represented by four genera and sixteen species, many of them being most interesting plants when in flower. The Australian "blue bell," *Wahlenbergia gracilis*, DC., of the *Campanulaceæ*, is a most variable plant, common in many parts, and in a few districts an albino and a semi-double flowered variety have been observed. There is also one species of *Isotoma*, *I. axillaris*, Lindl., of this family, of which there is a white variety, but it is rare. The south-western *Apocyneæ* and *Asclepiadeæ* are mostly climbers and twiners, but the species are neither numerous nor abundant. *Alstonia constricta*, R.Br., a small tree of the former family, yields a bark which has febrifuge properties. An infusion of the bark of this is often taken by those suffering from feverish symptoms, &c, and it is, therefore, known to the settlers in the interior as the "bitter" or "fever bark tree." It is widely distributed, but nowhere plentifully. *Gentianeæ* consist of only two genera and two species, which, however, are common in many districts. They are *Sebæa ovata*, R.Br., and *Erythræa australis*, R.Br., the former having yellow and the latter pink flowers. A bitter principle pervades all parts of these small, annual plants, and they are employed medicinally as rustic remedies in stomachic complaints, &c. *Boragineæ* include many interesting species, and they are widely distributed. A few are found near water, some on the plains, and others on higher land. One of the most charming plants of this Order is *Halgania strigosa*, Schlecht. Its intensely blue flowers, which are often borne in great profusion, are admired by every one who sees them. Certain species of *Scrophularineæ* are held in repute for their medicinal properties, but the greater number are pretty flowering plants included in the following genera:—*Mimulus*, *Morgania*, *Veronica*, and *Euphrasia*. Persons prospecting for gold regard the occurrence of *Veronica perfoliata*, R.Br., as an indication of auriferous country. The only member of the *Bignoniaceæ* is *Tecoma australis*, R.Br. This climbing plant is widely distributed, but nowhere plentiful. In some seasons it flowers very profusely, and then is a conspicuous object. *Myoporineæ*, either in a

shrubby or subarboreal state, occur mostly in the western portion, many of the species being admired for their singularly beautiful flowers. I have grown several of them in the eastern portion of the continent, and they succeeded admirably when planted in dry situations. I have also seen a few species successfully cultivated in some of the plant houses in Europe. Several species of the *Labiate* family are strongly scented, and some of them are widely distributed both on high and low land. *Prostanthera* is more largely represented by species than any other genus of the Order, and when these shrubs are in bloom they make a charming floral display, especially *P. nivea*, A. Cunn., whose flowers are rather large and mostly white. Notwithstanding the fact that the leaves of these plants are studded with resinous glands, sheep and rabbits eat them as well as those of the two species of *Teucrium*. Several exotic *Labiates* have established themselves, and some species now are apparently wild, especially in the eastern portion.

Codonocarpus cotinifolius, F.v.M., of the *Phytolaccaceæ*, is one of the most remarkable trees in the interior, and is known locally as the "horse-radish tree." Its curious flowers and fruits render it a very interesting object to the botanist. It is figured and described in my work on the indigenous "Forage Plants of Australia" (non grasses). *Gyrostemon cyclotheca*, Benth., is an allied species of shrubby habit with diœcious flowers. Both these species are usually found on low sand hills or on sandy country, but not plentifully. Amongst the most useful plants, from a pastoralist's point of view, are the numerous species of the saltbush family (*Chenopodiaceæ*), and they are widely distributed, but not nearly as plentifully as in former years. This Order comprises no less than twelve genera and sixty-one species, all the most important of which I have figured and described, as to their economic value, under the authority of the Government of New South Wales. Although the greater number of the plants of this Order are of a high economic value from a stock-owner's point of view, there are a few species, especially when in fruit, of an undesirable character. Stockmen call the ripe fruits

of the various species of *Anisacantha* "Bindyhies," and they are often a terror to those who camp out in the western country. Once these fruits with their adherent spines get into a blanket they can rarely be removed again, and should stock eat too freely of these plants when the fruits are near maturity, trouble is often caused to their salivary glands. *Anisacantha muricata*, Moq., when dry, makes the troublesome "roley poleys" on some of the plains. *Amarantaceæ* and *Polygonaceæ* are represented by a number of interesting plants, particularly the former Order. In the early summer months some places on the plains are quite gay with the curious flowers of several species of *Trichinium*. *Proteaceæ* consist of six genera and nineteen species, most of which are widely distributed. They are found on various soils, principally in sandy country, though a few species grow on the stronger classes of soil and on stony rises. The South-Western *Thymeleæ* consist of only one genus, *Pimelea*, but there are eleven species and one variety, and some of them are fairly plentiful. Several have a bad reputation amongst pastoralists, who regard them as stock-poisoners. *Euphorbiaceæ* occur in many districts, and consist principally of shrubs and herbs. Speaking generally, they may be recognised by the milky juice which pervades all parts of the plant, their unisexual flowers and tricoccous fruit. Many of the species have long been suspected of poisoning stock. Four species of *Casuarina* are found over a large area, and although they grow fairly plentifully in some places they do not form forests as do many other kinds of trees. *Santalaceæ* include several trees and shrubs of economic importance. Some of the species are popularly known in the interior as "Sandalwood," "Quandong," "Native Currant," and "Native Cherry." The young, leafless branches of *Choretrum glomeratum*, R.Br., possess an agreeable acidity, and they are sometimes chewed by stockmen and travellers desirous of assuaging their thirst.

Monocotyledoneæ are well represented both by genera and species. They consist of aquatic, epiphytal and terrestrial plants, the last, of course, largely predominating. *Hydrocharideæ* include three interesting species, of which *Ottelia ovalifolia*, J. C.

Rich., is the most showy flowering plant. It has submerged, tufted, radical leaves, ovate or oblong floating ones and rather large whitish flowers. It is fairly common in many of the fresh water lakes and lagoons. Two other allied plants, *Vallisneria spiralis*, Linn., and *Hydrilla verticillata*, Casp., are found in many of the water-courses.

With the exception of one epiphytal species, *Cymbidium canaliculatum*, R.Br., all the south-western *Orchideæ* are terrestrial plants which are fairly numerous, especially in the eastern portion. The most widely distributed species of this Order is *Pterostylis rufa*, R.Br. In one or other of its several forms it is found from the extreme east to the farthest settlement west, but nowhere plentifully. The tallest growing members of this family are the two species of *Prasophyllum*, but those kinds which produce the most showy flowers belong to the genera *Thelymitra, Diuris* and *Caladenia*. In September and October groups of these plants may often be seen in bloom, and although the flowers are small in comparison with those of the tropical exotic species, still they are a charming sight when growing amongst the vivid green spring herbage. The colour of the flowers ranges through all shades of blue, purple, yellow, pink, and white. There is considerable variation in regard to the height of the plants, and colour and size of the blooms of certain species of *Caladenia*. When bruised the leaves of *Glossodia major*, R.Br., emit a sweet perfume. I have found no indigenous *Irideæ*, but four exotic species of this Order have become acclimatised in a few districts. The two South African species of *Homeria* (*H. collina*, Sweet, and *H. aurantiaca*, Sweet) with orange-coloured flowers and commonly known as "Cape tulip," are suspected poison plants. *Amaryllideæ* have a few beautiful flowering species, usually found on sandy country. Several species of the lily family (*Liliaceæ*) occur in greater or less profusion almost all over this region. They include plants popularly known as "fringed violets" (*Thysanotus* spp.), "native onion" or "leek" (*Bulbine* spp.), "blind poison plant" (*Stypandra glauca*, R.Br.), and "Cockatoo plant" (*Anguillaria dioica*, R.Br.).

The last-named is an exceedingly variable and most interesting plant, generally dicœcious but often polygamous, with white flowers and prominently three-angled capsules containing small, globular seeds. *Juncaceæ* consist of three genera and ten species, and some of them are widely distributed. The dicœcious flowers of some species of *Xerotes* are sweetly scented and often perfume the air for a considerable distance. *Cyperaceæ* are found almost all over this section of the State, occurring on high and low land and in marshy situations. Several species are very ornamental when in flower, especially those of the genera *Cyperus* and *Fimbristylis*. A few species of this Order are eaten by stock, but, speaking generally, the feeding value of these plants is not considered to be very high, though they are of great importance in the economy of nature.

The indigenous *Gramineæ* are represented by forty-seven genera and one hundred and fifteen species besides varieties, of which all the more important ones have been figured and described, as to their economic value, by me under instructions from the Government of New South Wales. Many exotic species, some of which have become acclimatised, are found in more or less abundance over nearly the whole of this region. From a pastoralist's point of view, the indigenous grasses are the most important part of the vegetation of the South-West.

Acotyledoneæ, as far as vascular *Cryptogams* are concerned, and this Census does not take into account cellular *Cryptogams*, are not a conspicuous feature of the flora of the South-West, though they are more numerous, both in genera and species, than in the Darling country. On many of the still waters the two species of *Azolla* are very common, particularly *A. rubra*, R.Br. This floating plant completely covers some lagoons, and it goes by the name of "red jacket," on account of its prevailing colour. I have frequently taken water for drinking purposes from lagoons covered with this plant because it was invariably clear and very much cooler than that exposed to the fierce rays of the sun. There is no doubt that these species of *Azolla* considerably check the evaporation of water in summer time.

Marsilea drummondii, A.Br., grows abundantly on land in the western portion that is subject to periodical inundation, but the involucres are rarely now collected by the Blacks as an article of food. Of the fern family (Filices) *Cheilanthes tenuifolia*, Swartz, has the widest range, being found on high and low land, on various classes of soil and on stony rises. In some districts the "bracken" fern, *Pteris aquilina*, Linn., var. *esculenta*, is common, and I have been informed that the Aborigines, before they tasted the sweets of civilisation, used to cook and eat the underground stems of this fern. The other members of this family enumerated in the following pages are mostly found in the eastern portion and in some places fairly plentifully, with the exception of *Ophioglossum vulgatum*, Linn., which appears to be rare.

This is the first Census of the *Phanerogamia* and vascular *Cryptogamia* of South-Western New South Wales, and I hope it will be found useful to those who desire to study the flora of that portion of the State. Many plants not hitherto recorded from that region will be found in the following pages.

All the indigenous plants included in this Census that I did not know at sight I have worked out by the diagnosis given in Bentham's 'Flora Australiensis,' and I have followed the same classification and nomenclature as have been adopted in that valuable reference work.

The plants marked with an asterisk are exotic, but some of them have become acclimatised in the South-West.

The plants marked with a dagger have been figured and described, as to their economic value, by me.

In addition to those intrepid explorers already mentioned, several others, including Frazer, Eyre, Dallachy, Mueller and Beckler, have collected plants in the South-West, and their names will always be inseparably associated with the flora of New South Wales.

My thanks are due to a number of pastoralists and stockmen for forwarding me botanical specimens for identification during the last nineteen years.

The accompanying table shows the percentage of the indigenous *Phanerogamia* and the vascular *Cryptogamia* of the South-West compared with the similar flora of New South Wales.

New South Wales.		South-Western New South Wales.		Percentage.	
Dicotyledoneæ.		*Dicotyledoneæ.*			
Genera ...	662	Genera ...	282	Genera ...	42·59
Species ...	2393	Species ...	727	Species ...	30·38
Monocotyledoneæ.		*Monocotyledoneæ.*			
Genera ...	212	Genera ...	89	Genera ...	41·98
Species ...	668	Species ...	212	Species ...	31·73
Acotyledoneæ.		*Acotyledoneæ.*			
Genera ...	40	Genera ...	8	Genera ...	20·00
Species ...	145	Species ...	10	Species ...	6·89
Total Genera	914	Total Genera	379	Genera ...	41·46
Total Species	3206	Total Species	949	Species ...	29·60

Class I. DICOTYLEDONS, Ray.

Subclass I. POLYPETALÆ.

Series I. Thalamiflorae.

Ranunculaceæ, B. de Juss.

Clematis microphylla, DC.

Myosurus minimus, Linn.

Ranunculus lappaceus, Sm.

rivularis, Banks et Sol.

parviflorus, Linn.

muricatus, Linn.*

Adonis autumnalis, Linn.*

Dilleniaceæ, Salis.

Hibbertia sericea, Benth.

stricta, R.Br., var. *canescens.*

Papaveraceæ, Juss.

Papaver horridum, DC.

hybridum, Linn.*

PAPAVERACEÆ.

Papaver argemone, Linn.*
rhœas, Linn.*
Argemone mexicana, Linn.†*

CRUCIFERÆ, B. de Juss.

Nasturtium palustre, DC.
Cardamine laciniata, F.v.M.
tenuifolia, Hook.
hirsuta, Linn.
Alyssum linifolium, Steph.
Sisymbrium officinale, Scop.*
Blennodia filifolia, Benth.†
trisecta, Benth.†
nasturtioides, Benth.†
eremigera, Benth.
cardaminoides, F.v.M.
curvipes, F.v.M.
brevipes, F.v.M.
lasiocarpa, F.v.M.†
canescens, R.Br.
cunninghamii, Benth.
Stenopetalum velutinum, F.v.M.
lineare, R.Br.
sphœrocarpum, F.v.M.
Menkea australis, Lehm.
Capsella procumbens, Fries.
bursa-pastoris, Mœnch.†*
Senebiera didyma, Pers.*
Lepidium leptopetalum, F.v.M.
phlebopetalum, F.v.M.
monoplocoides, F.v.M.
papillosum, F.v.M.
ruderale, Linn.
Thlaspi cochlearinum, F.v.M.†
ochranthum, F.v.M.

FUMARIACEÆ, De Cand.
Fumaria officinalis, Linn.*
parviflora, Linn.*

RESEDACEÆ, DC.
Reseda luteola, Linn.*

CAPPARIDEÆ, Juss.
Capparis mitchelli, Lindl.
loranthifolia, Lindl.
Apophyllum anomalum, F.v.M.

VIOLARIEÆ, De Cand.
Viola betonicæfolia, Sm.
Ionidium floribundum, Walp., et var. *alba*.
filiforme, F.v.M.

PITTOSPOREÆ, R.Br.
Pittosporum phillyræoides, DC.†
Bursaria spinosa, Cav.
Billardiera scandens, Sm.
Cheiranthera linearis, A. Cunn.

POLYGALEÆ, Juss.
Comesperma scoparium, Steetz.
volubile, Labill., et var. *alba*.
ericinum, DC.

FRANKENIACEÆ, St. Hil.
Frankenia pauciflora, DC.

CARYOPHYLLEÆ, Labill.
Gypsophila tubulosa, Boiss.
perfoliata, Linn.*
Dianthus prolifer, Linn.*
Saponaria vaccaria, Linn.*
Silene gallica, Linn.*
Lychnis githago, Lam.*
cæli-rosa, Dur.*
Cerastium vulgatum, Linn.*
Stellaria pungens, Brongn.
glauca, With.

CARYOPHYLLEÆ.

Stellaria flaccida, Hook.
media, Linn.*
Spergularia rubra, Pers.
Polycarpon tetraphyllum, Linn. f.

PORTULACEÆ, Juss.

Portulaca oleracea, Linn.†
Calandrinia polyandra, Benth.
pusilla, Lindl.
volubilis, Benth.

ELATINEÆ, Cam.

Bergia ammannioides, Roth.

HYPERICINEÆ, St. Hil.

Hypericum gramineum, Forst.
japonicum, Thunb.
perforatum, Linn.†*

MALVACEÆ, Juss.

Lavatera plebeia, Sims.†
Malva rotundifolia, Linn.*
parviflora, Linn.*
sylvestris, Linn.*
verticillata, Linn.*
Modiola multifida, Mœnch.*
Malvastrum spicatum, A. Gray.†
Plagianthus spicatus, Benth.
microphyllus, F.v.M.
Sida corrugata, Lindl.
intricata, F.v.M.
petrophila, F.v.M.
rhombifolia, Linn.
Howittia trilocularis, F.v.M.
Abutilon otocarpum, F.v.M.
avicennæ, Gærtn.
oxycarpum, F.v.M.
fraseri, Hook.

MALVACEÆ.

Hibiscus trionum, Linn.
brachysiphonius, F.v.M.
krichauffianus, F.v.M.
sturtii, Hook.
Gossypium sturtii, F.v.M.†

STERCULIACEÆ, Vent.

Sterculia diversifolia, G. Don.†
Rulingia rugosa, Steetz.
Lasiopetalum behrii, F.v.M.
baueri, Steetz.

Series II. DISCIFLORÆ.

LINEÆ, DC.

Linum marginale, A. Cunn.
gallicum, Linn.*

ZYGOPHYLLEÆ, R.Br.

Tribulus terrestris, Linn.†
Nitraria schoberi, Linn.
Zygophyllum apiculatum, F.v.M.†
glaucescens, F.v.M.†
iodocarpum, F.v.M.†
billardieri, DC.
fruticulosum, DC.

GERANIACEÆ, Juss.

Geranium dissectum, Linn.†
Erodium cygnorum, Nees.†
cicutarium, L'Hér.*
moschatum, Willd.*
Pelargonium australe, Willd.
rodneyanum, Lindl.
Oxalis corniculata, Linn.

RUTACEÆ, Juss.

Zieria furfuracea, R.Br.
Boronia cœrulescens, F.v.M.
inornata, Turcz.

RUTACEÆ.

Eriostemon myoporoides, DC.
difformis, A. Cunn.
Phebalium pungens, Benth.
glandulosum, Hook.
Geijera parviflora, Lindl.†
Atalantia glauca, Hook.

MELIACEÆ, Juss.

Owenia acidula, F.v.M.
Flindersia maculosa, F.v.M.†

CELASTRINEÆ, R.Br.

Celastrus cunninghamii, F.v.M.

STACKHOUSIEÆ, R.Br.

Stackhousia monogyna, Labill.
muricata, Lindl.

RHAMNEÆ, Juss.

Ventilago viminalis, Hook.
Pomaderris racemosa, Hook.
Spyridium subochreatum, Reissek.
eriocephalum, Fenzl.
Stenanthemum leucophractum, Reissek.
Cryptandra amara, Sm.
tomentosa, Lindl.
propinqua, A. Cunn.

SAPINDACEÆ, Juss.

Atalaya hemiglauca, F.v.M.†
Heterodendron oleæfolium, Desf.†
Dodonæa viscosa, Linn.
attenuata, A. Cunn.†
cuneata, Rudge.
lobulata, F.v.M.†
bursarifolia, Behr.
baueri, Endl.
boroniæfolia, G. Don.
stenozyga, F.v.M.

Series III. CALYCIFLORÆ.

LEGUMINOSÆ, Juss.

Suborder I. PAPILIONACEÆ.

Isotropis wheeleri, F.v.M.
Pultenæa daphnoides, Wendl.
microphylla, Sieb.
pedunculata, Hook.
styphelioides, A. Cunn.
humilis, Benth.
foliolosa, A. Cunn.
densifolia, F.v.M.
prostrata, Benth.
Eutaxia empetrifolia, Schlecht.
Bossiæa riparia, A. Cunn.
ensata, Sieb.
walkeri, F.v.M.
Templetonia egena, Benth.
sulcata, Benth.
Hovea longifolia, R.Br.
Goodia lotifolia, Salisb.
Crotalaria cunninghamii, R.Br.
dissitiflora, Benth.
Medicago sativa, Linn.*
lupulina, Linn.*
denticulata, Willd.*
maculata, Willd.*
minima, Willd.*
tribuloides, Willd.*
intertexta, Willd.*
Melilotus parviflora, Desf.*
Trifolium repens, Linn.*
subterraneum, Linn.*
arvense, Linn.*
glomeratum, Linn.*
fragiferum, Willd.*

PAPILIONACEÆ.

Trifolium resupinatum, Linn.*
procumbens, Linn.*
Trigonella suavissima, Lindl.†
Lotus corniculatus, Linn.
australis, Andr.
Psoralea eriantha, Benth.
patens, Lindl.
cinerea, Lindl.
tenax, Lindl.
Indigofera enneaphylla, Linn.
trita, Linn. f.
australis, Willd.
brevidens, Benth.
Sesbania aculeata, Pers.
Clianthus dampieri, A. Cunn.†
Swainsona greyana, Lindl.
galegifolia, R.Br.†
phacoides, Benth.†
burkittii, F.v.M.
oligophylla, F.v.M.
procumbens, F.v.M.†
phacifolia, F.v.M.
oroboides, F.v.M.†
lessertiifolia, DC.
microphylla, A. Gray.
laxa, R.Br.
Glycyrrhiza psoraleoides, Benth.
Desmodium varians, Endl.
Vicia sativa, Linn.*
villosa, Linn.*
Hedysarum coronarium, Linn.*
Glycine falcata, Benth.
sericea, Benth.
tomentosa, Benth.
Galactia tenuiflora, Willd.

PAPILIONACEÆ.

Vigna lanceolata, Benth.
Rhynchosia minima, DC.
Onobrychis sativa, Lamarck.*

Suborder II. CÆSALPINIEÆ.

Cassia sophera, Linn., var. *schinifolia*.
pleurocarpa, F.v.M.
pruinosa, F.v.M.†
circinata, Benth.†
phyllodinea, R.Br.†
eremophila, A. Cunn.†
artemisioides, Gaud.†
sturtii, R.Br.†
desolata, F.v.M.
Petalostyles labicheoides, R.Br.
Bauhinia carronii, F.v.M.

Suborder III. MIMOSEÆ.

Neptunia gracilis, Benth.
Acacia continua, Benth.
spinescens, Benth.
lanigera, A. Cunn.
colletioides, A. Cunn.
tetragonophylla, F.v.M.
diffusa, Lindl.
rigens, A. Cunn.
juncifolia, Benth.
calamifolia, Sweet.
aspera, Lindl.
armata, R.Br.
obliqua, A. Cunn.
acinacea, Lindl.
lineata, A. Cunn.
undulifolia, A. Cunn.
flexifolia, A. Cunn.

MIMOSEÆ.

Acacia microcarpa, F.v.M.
montana, Benth.
verniciflua, A. Cunn.
sentis, F.v.M.†
pycnantha, Benth.
notabilis, F.v.M.
amœna, Wendl.
hakeoides, A. Cunn.
salicina, Lindl.
brachybotrya, Benth.
amblygona, A. Cunn.
trineura, F.v.M.
homalophylla, A. Cunn.†
pendula, A. Cunn.†
oswaldi, F.v.M.
stenophylla, A. Cunn.
sclerophylla, Lindl.
farinosa, Lindl.
viscidula, A. Cunn.
excelsa, Benth.
aneura, F.v.M.†
doratoxylon, A. Cunn.
spectabilis, A. Cunn.
decurrens, Willd.†
dealbata, Link.
farnesiana, Willd.

ROSACEÆ, Juss.

Rubus fruticosus, Linn.*
Rosa rubiginosa, Linn.*
Acœna ovina, A. Cunn.†
sanguisorbæ, Vahl.
Poterium sanguisorba, Linn.*

CRASSULACEÆ, De Cand.

Tillæa verticillaris, DC.

CRASSULACEÆ.

Tillæa purpurata, Hook.
recurva, Hook.

DROSERACEÆ, Salis.

Drosera indica, Linn.
glanduligera, Lehm.

HALORAGEÆ, R.Br.

Loudonia aurea, Lindl.
behrii, Schlecht.
Haloragis ceratophylla, Endl.
odontocarpa, F.v.M.
tetragyna, Hook.
Myriophyllum variæfolium, Hook.
verrucosum, Lindl.
integrifolium, Hook.
Ceratophyllum demersum, Linn.

MYRTACEÆ, Juss.

Calythrix tetragona, Labill.
Micromyrtus microphylla, Benth.
Bœckea crassifolia, Lindl.
behrii, F.v.M.
Leptospermum lævigatum, F.v.M.
flavescens, Sm.
lanigerum, Sm.
myrtifolium, Sieb.
Callistemon brachyandrus, Lindl.
Melaleuca acuminata, F.v.M.
uncinata, R.Br.
hakeoides, F.v.M.
pustulata, Hook.
Angophora intermedia, DC.
Eucalyptus obliqua, L'Hér.
leucoxylon, F.v.M.
melliodora, A. Cunn.
gracilis, F.v.M.

MYRTACEÆ.

Eucalyptus paniculata, Sm.
populifolia, Hook.
behriana, F.v.M.
pendula, A. Cunn.
uncinata, Turcz.
albens, Miq.
microtheca, F.v.M.
dumosa, A. Cunn.
incrassata, Labill.
dealbata, A. Cunn.
viminalis, Labill.
rostrata, Schlecht.
oleosa, F.v.M.
Syncarpia leptopetala, F.v.M.

LYTHRARIEÆ, Juss.

Ammannia multiflora, Roxb.
Lythrum salicaria, Linn.
hyssopifolium, Linn.

ONAGRARIEÆ, Juss.

Œnothera biennis, Linn.*
Epilobium junceum, Forst.
Jussiæa repens, Linn.

CUCURBITACEÆ, Juss.

Cucumis trigonus, Roxb.
myriocarpus, Naud.*
Melothria muelleri, Benth.

FICOIDEÆ, Dill.

Mesembryanthemum æquilaterale, Haw.
pomeridianum, Linn.*
Tetragonia expansa, Murr.†
Aizoon quadrifidum, F.v.M.
Trianthema decandra, Linn.
Mullugo glinus, A. Rich.

FICOIDEÆ.

Mullugo orygioides, F.v.M.
cerviana, Ser.

UMBELLIFERÆ, Juss.

Hydrocotyle hirta, R.Br.
callicarpa, Bunge.
trachycarpa, F.v.M.
Trachymene pilosa, Sm.
cyanopetala, Benth.
australis, Benth.
glaucifolia, Benth.
incisa, Rudge.
Xanthosia dissecta, Hook. f.
Eryngium rostratum, Cav.
Apium australe, Thou.
leptophyllum, F.v.M.
Daucus brachiatus, Sieb.†

Subclass II. MONOPETALÆ.

LORANTHACEÆ, Juss.

Loranthus longiflorus, Desr.
linearifolius, Hook.
exocarpi, Behr.
linophyllus, Fenzl.
pendulus, Sieb.
quandang, Lindl.
grandibracteus, F.v.M.

CAPRIFOLIACEÆ, Rich.

Sambucus xanthocarpa, F.v.M.
gaudichaudiana, DC.

RUBIACEÆ, Juss.

Hedyotis tillæacea, F.v.M.
Canthium latifolium, F.v.M
oleifolium, Hook.
Pomax umbellata, Soland.

RUBIACEÆ.

Asperula scoparia, Hook. f.
conferta, Hook. f.
Galium geminifolium, F.v.M.
gaudichaudi, DC.
aparine, Linn.

COMPOSITÆ, Vaill.

Leuzea australis, Gaud.
Centaurea solstitialis, Linn.†*
melitensis, Linn.*
calcitrapa, Linn.†*
Carthamus tinctorius, Linn.*
Onopordon acanthium, Linn.*
Carduus marianus, Linn.*
Arctium lappa, Linn.*
Cirsium lanceolatum, Scop.*
palustre, Scop.*
arvense, Scop.†*
Olearia myrsinoides, F.v.M.
viscidula, Benth.
lepidophylla, Benth.
subspicata, Benth.
pimeleoides, Benth.
conocephala, F.v.M.
magniflora, F.v.M.
muelleri, Benth.
decurrens, Benth.
teretifolia, F.v.M.
tenuifolia, Benth.
rudis, F.v.M.
ciliata, F.v.M.
Vittadinia australis, A. Rich.
Podocoma cuneifolia, R.Br.
Madia sativa, Mol.*
Erigeron linifolius, Willd.

COMPOSITÆ.

Minuria leptophylla, DC.
cunninghamii, Benth.
integerrima, Benth.
denticulata, Benth.
Calotis cuneifolia, R.Br.
cymbacantha, F.v.M.
erinacea, Steetz.
scabiosifolia, Sond.
scapigera, Hook.
lappulacea, Benth.
microcephala, Benth.
plumulifera, F.v.M.
hispidula, F.v.M.
Brachycome melanocarpa, Sond.
goniocarpa, Sond.
pachyptera, Turcz.
basaltica, F.v.M.
trachycarpa, F.v.M.
exilis, Sond.
ptychocarpa, F.v.M.
scapiformis, DC.
heterodonta, DC.
ciliaris, Less.
calocarpa, F.v.M.
Monenteles sphacelatus, Labill.
Pluchea eyrea, F.v.M.
Epaltes cunninghamii, Benth.
australis, Less.
Xanthium spinosum, Linn.*
Siegesbeckia orientalis, Linn.
Eclipta platyglossa, F.v.M.
Galinsoga parviflora, Cav.†*
Glossogyne tenuifolia, Cass.
Anthemis cotula, Linn.*
Chrysanthemum segetum, Linn.*

COMPOSITÆ.

Cotula australis, Hook. f.
Myriogyne minuta, Less.
Elachanthus pusillus, F.v.M.
Isoetopsis graminifolia, Turcz.
Myriocephalus rhizocephalus, Benth.
stuartii, Benth.
Angianthus tomentosus, Wendl.
brachypappus, F.v.M.
pusillus, Benth.
strictus, Benth.
Gnephosis skirrophora, Benth.
cyathopappa, Benth.
Calocephalus sonderi, F.v.M.
citreus, Less.
platycephalus, Benth.
Gnaphalodes uliginosum, A. Gray.
Craspedia richea, Cass.
pleiocephala, F.v.M.
chrysantha, Benth.
globosa, Benth.
Chthonocephalus pseudoevax, Steetz.
Cassinia lævis, R.Br.
quinquefaria, R.Br.
arcuata, R.Br.
Eriochlamys behrii, Sond. et Muell.
Rutidosis helichrysoides, DC.
Millotia tenuifolia, Cass.
greevesii, F.v.M.
Ixiolæna leptolepis, Benth.
tomentosa, Sond. et Muell.
Athrixia tenella, Benth.
Podolepis rutidochlamys, F.v.M.
acuminata, R.Br.
canescens, A. Cunn.
rugata, Labill.

COMPOSITÆ.

Podolepis lessoni, Benth.
siemssenia, F.v.M.
Leptorhynchus panætioides, Benth.
ambiguus, Benth.
pulchellus, F.v.M.
waitzia, Sond.
Helichrysum semifertile, F.v.M.
bracteatum, Willd.
podolepideum, F.v.M.
apiculatum, DC.
semipapposum, DC.
dockerii, F.v.M.
diosmifolium, Less.
adnatum, Benth.
cunninghamii, Benth.
Waitzia corymbosa, Wendl.
Helipterum polygalifolium, DC.
floribundum, DC.
incanum, DC.
cotula, DC.
hyalospermum, F.v.M.
strictum, Benth.
corymbiflorum, Schlecht.
pygmæum, Benth.
moschatum, Benth.
dimorpholepis, Benth.
Gnaphalium luteo-album, Linn.
japonicum, Thunb.
indicum, Linn.
Erechthites quadridentata, DC.
hispidula, DC.
Senecio gregorii, F.v.M.
magnificus, F.v.M.
lautus, Forst.
behrianus, Sond. et Muell.

COMPOSITÆ.

Senecio brachyglossus, F.v.M.
cunninghamii, DC.
vulgaris, Linn.*
Cryptostemma calendulaceum, R.Br.†*
Calendula arvensis, Linn.*
Microseris forsteri, Hook. f.
Hypochœris glabra, Linn.
radiata, Linn.*
Picris hieracioides, Linn.
Sonchus oleraceus, Linn.
Cichorium intybus, Linn.*
Tragopogon porrifolius, Linn.†*
Lactuca saligna, Linn.*
Taraxacum dens-leonis, Desf.*

STYLIDIEÆ, R.Br.

Stylidium graminifolium, Swartz.

GOODENOVIEÆ, R.Br.

Velleia connata, F.v.M.
paradoxa, R.Br.
Goodenia geniculata, R.Br.
hederacea, Sm.
calcarata, F.v.M.
cycloptera, R.Br.
pinnatifida, Schlecht.
heteromera, F.v.M.
glauca, F.v.M.
gracilis, R.Br.
Scævola spinescens, R.Br.
ovalifolia, R.Br.
æmula, R.Br.
Dampiera lanceolata, A. Cunn.
marifolia, Benth.
rosmarinifolia, Schlecht.

CAMPANULACEÆ, Juss.

Pratia erecta, Gaud.

CAMPANULACEÆ.

Isotoma axillaris, Lindl.
petræa, F.v.M.
fluviatilis, F.v.M.
Wahlenbergia gracilis, DC.

EPACRIDEÆ, R.Br.

Styphelia adscendens, R.Br.
Melichrus urceolatus, R.Br.
Brachyloma ericoides, Sond.
Leucopogon attenuatus, A. Cunn.
ericoides, R.Br.
cordifolius, Lindl.

PRIMULACEÆ, Vent.

Anagallis arvensis, Linn.*

JASMINEÆ, Juss.

Jasminum lineare, R.Br.†

APOCYNEÆ, Juss.

Alstonia constricta, F.v.M.
Parsonsia lanceolata, R.Br.
Lyonsia eucalyptifolia, F.v.M.

ASCLEPIADEÆ, R.Br.

Sarcostemma australe, R.Br.†
Pentatropis quinquepartita, Benth.
Marsdenia leichhardtiana, F.v.M.†

LOGANIACEÆ, R.Br.

Logania linifolia, Schlecht.
nuda, F.v.M.

GENTIANEÆ, Juss.

Sebæa ovata, R.Br.
Erythræa australis, R.Br.†

HYDROPHYLLACEÆ, Von Martius.

Phacelia tanacetifolia, Benth.*

BORAGINEÆ, Juss.

Heliotropium curassavicum, Linn.

BORAGINEÆ.

Heliotropium europæum, Linn.
ovalifolium, Forsk.
Halgania strigosa, Schlecht.
lavandulacea, Endl.
Trichodesma zeylanicum, R.Br.
Echium violaceum, Linn.*
Lithospermum arvense, Linn.*
Echinospermum concavum, F.v.M.
Rochelia maccoya, F.v.M.
Cynoglossum suaveolens, R.Br.

CONVOLVULACEÆ, Juss.

Ipomœa sepiaria, Koen.
Convolvulus erubescens, Sims.
Polymeria longifolia, Lindl.
Breweria media, R.Br.
Cressa cretica, Linn.
Evolvulus alsinoides, Linn.
Wilsonia rotundifolia, Hook.
backhousii, Hook. f.
Cuscuta australis, R.Br.

SOLANEÆ, Juss.

Solanum nigrum, Linn.†
simile, F.v.M.
ferocissimum, Lindl.
esuriale, Lindl.
chenopodinum, F.v.M.
sturtianum, F.v.M.
sodomæum, Linn.*
lacunarium, F.v.M.
ellipticum, R.Br.
Lycium australe, F.v.M.
Datura stramonium, Linn.†*
tatula, Linn.*
Nicotiana suaveolens, Lehm.
glauca, Grah.†*

SCROPHULARINEÆ, Mirb.
Duboisia hopwoodii, F.v.M.
Verbascum virgatum, With.*
Celsia cretica, Linn.*
Linaria elatine, Mill.*
Mimulus gracilis, R.Br.
repens, R.Br.
prostratus, Benth.
Morgania floribunda, Benth.
glabra, R.Br.
Gratiola pedunculata, R.Br.
peruviana, Linn.
Peplidium humifusum, Delile.
Glossostigma elatinoides, Benth.
Veronica perfoliata, R.Br.
arenaria, A. Cunn.
peregrina, Linn.
Euphrasia collina, R.Br.
scabra, R.Br.
Bartsia viscosa, Linn.†*

OROBANCHACEÆ, Lindl.
Orobanche cernua, Lœfl.

BIGNONIACEÆ, R.Br.
Tecoma australis, R.Br.

ACANTHACEÆ, R.Br.
Ruellia australis, R.Br.
Justicia procumbens, Linn.

MYOPORINEÆ, R.Br.
Myoporum acuminatum, R.Br.
serratum, R.Br.
deserti, A. Cunn.†
parvifolium, R.Br.
platycarpum, R.Br.
Pholidia scoparia, R.Br.
divaricata, F.v.M.

MYOPORINEÆ.

Eremophila bowmanni, F.v.M.
oppositifolia, R.Br.†
sturtii, R.Br.
mitchelli, Benth.
latrobei, F.v.M.
longifolia, F.v.M.†
polyclada, F.v.M.
bignoniæflora, F.v.M.†
goodwinii, F.v.M.
brownii, F.v.M.
duttoni, F.v.M.
maculata, F.v.M.†
latifolia, F.v.M.
alternifolia, R.Br.

VERBENACEÆ, Juss.

Verbena officinalis, Linn.
bonariensis, Linn.*

LABIATÆ, Juss.

Origanum vulgare, Linn.*
Melissa officinalis, Linn.*
Nepeta cataria, Linn.*
Marrubium vulgare, Linn.*
Stachys arvensis, Linn.†*
Moluccella lævis, Linn.*
Mentha australis, R.Br.
satureioides, R.Br.
Salvia verbenacea, Linn,*
pratensis, Linn.*
Prostanthera ovalifolia, R.Br.
nivea, A. Cunn.
striatiflora, F.v.M.
microphylla, A. Cunn.
aspalathoides, A. Cunn.
Westringia rigida, R.Br.
eremicola, A. Cunn.

LABIATÆ.

Teucrium racemosum, R.Br.
sessiliflorum, Benth.
Ajuga australis, R.Br.

PLANTAGINEÆ, Juss.

Plantago varia, R.Br.†
lanceolata, Linn.*
major, Linn.*

Subclass III. MONOCHLAMYDEÆ.

PHYTOLACCACEÆ, Endl.

Gyrostemon cyclotheca, Benth.
Codonocarpus cotinifolius, F.v.M.†

CHENOPODIACEÆ, Meisn.

Rhagodia parabolica, R.Br.†
gaudichaudiana, Moq.
crassifolia, R.Br.
spinescens, R.Br.
hastata, R.Br.†
nutans, R.Br.†
linifolia, R.Br.
Chenopodium nitrariaceum, F.v.M.†
auricomum, Lindl.†
album, Linn.*
microphyllum, F.v.M.
carinatum, R.Br.†
cristatum, F.v.M.
atriplicinum, F.v.M.†
Atriplex stipitata, Benth.†
quinnii, F.v.M.
nummularia, Lindl.†
rhagodioides, F.v.M.†
vesicaria, Hew.†
velutinella, F.v.M.†
angulata, Benth.†
semibaccata, R.Br.†

CHENOPODIACEÆ.

Atriplex muelleri, Benth.†
microcarpa, Benth.
campanulata, Benth.†
leptocarpa, F.v.M.†
limbata, Benth.†
halimoides, Lindl.†
holocarpa, F.v.M.†
spongiosa, F.v.M.
Enchylæna microphylla, Moq.
tomentosa, R.Br.†
Kochia lobiflora, F.v.M.
lanosa, Lindl.†
triptera, Benth.
brevifolia, R.Br.†
pyramidata, Benth.†
eriantha, F.v.M.†
villosa, Lindl.†
planifolia, F.v.M.†
sedifolia, F.v.M.†
appressa, Benth.†
aphylla, R.Br.†
ciliata, F.v.M.†
brachyptera, F.v.M.†
stelligera, F.v.M.†
Chenolea dallachyana, Benth.†
tricornis, Benth.
sclerolænoides, F.v.M.
Babbagia dipterocarpa, F.v.M.
Sclerolæna diacantha, Benth.†
lanicuspis, F.v.M.
bicornis, Lindl.
biflora, R.Br.
paradoxa, R.Br.†
Threlkeldia salsuginosa, F.v.M.
Anisacantha muricata, Moq.

CHENOPODIACEÆ.

Anisacantha divaricata, R.Br.
echinopsila, F.v.M.
Salicornia robusta, F.v.M.
tenuis, Benth.
Salsola kali, Linn.

AMARANTACEÆ, Juss.

Amarantus mitchellii, Benth.
macrocarpus, Benth.
tenuis, Benth.
enervis, F.v.M.
Trichinium obovatum, Gaud.†
parviflorum, Lindl.
alopecuroideum, Lindl.
nobile, Lindl.†
macrocephalum, R.Br.
exaltatum, Benth.
erubescens, Moq.†
spathulatum, R.Br.
Alternanthera nodiflora, R.Br.

POLYGONACEÆ, Juss.

Rumex brownii, Campd.
dumosus, A. Cunn.
halophilus, F.v.M.
acetosella, Linn.*
Polygonum aviculare, Linn.*
plebeium, R.Br.
prostratum, R.Br.
minus, Huds.
lapathifolium, Linn.
attenuatum, R.Br.
Muhlenbeckia polygonoides, F.v.M.
cunninghamii, F.v.M.

NYCTAGINEÆ, Juss.

Boerhaavia diffusa, Lindl.†

PROTEACEÆ, Juss.

Isopogon petiolaris, A. Cunn.
Conospermum patens, Schlecht.
Persoonia sericea, A. Cunn.
fastigiata, R.Br.
rigida, R.Br.
juniperina, Labill.
Grevillea pterosperma, F.v.M.
arenaria, R.Br.
lanigera, A. Cunn.
ericifolia, R.Br.
divaricata, R.Br.
lavandulacea, Schlecht.
huegellii, Meisn.
striata, R.Br.
triternata, R.Br.
Hakea purpurea, Hook.
leucoptera, R.Br.†
flexilis, F.v.M.
Banksia ornata, F.v.M.

THYMELEÆ, Juss.

Pimelea glauca, R.Br.
colorans, A. Cunn.
collina, R.Br.
sericostachya, F.v.M.
trichostachya, Lindl.
microcephala, R.Br.
pauciflora, R Br.
serpyllifolia, R.Br.
flava, R.Br.
curviflora, R.Br., et var. *micrantha*.
octophylla, R.Br.

EUPHORBIACEÆ, Juss.

Euphorbia australis, Boiss.
drummondii, Boiss.
eremophila, A. Cunn.

EUPHORBIACEÆ.

Beyeria viscosa, Miq.
opaca, F.v.M.
Ricinocarpus bowmanni, F.v.M.
Bertya cunninghamii, Planch.
mitchelli, Muell.
Phyllanthus thesioides, Benth.
ramosissimus, Muell.
fuernrohrii, F.v.M.
lacunarius, F v.M.
Adriana acerifolia, Hook.
hookeri, Muell.
Ricinus communis, Willd.†*

URTICEÆ, Vent.

Urtica incisa, Poir.
urens, Linn.*

CASUARINEÆ, Mirb.

Casuarina stricta, Ait.
glauca, Sieb.†
cunninghamiana, Miq.
distyla, Vent.

SANTALACEÆ, R.Br.

Santalum lanceolatum, R.Br., var. *angustifolium*.
Fusanus acuminatus, R.Br.†
persicarius, F.v.M.
Choretrum glomeratum, R.Br.
spicatum, F.v.M.
lateriflorum, R.Br.
Leptomeria aphylla, R.Br.
Exocarpus spartea, R.Br.
aphylla, R.Br.
stricta, R.Br.

Subclass IV. GYMNOSPERMÆ.

CONIFERÆ, Juss.

Frenela robusta, A. Cunn.
endlicheri, Parlat.

Class II. MONOCOTYLEDONS, Ray.

HYDROCHARIDEÆ, Lam.

Ottelia ovalifolia, L. C. Rich.
Vallisneria spiralis, Linn.
Hydrilla verticillata, Casp.

ORCHIDEÆ, R.Br.

Cymbidium canaliculatum, R.Br.
Spiranthes australis, Lindl.
Thelymitra ixioides, Sw.
longifolia, Forst.
antennifera, Hook. f.
Diuris punctata, Sm.
palustris, Lindl.
maculata, Sm.
pedunculata, R.Br.
sulphurea, R.Br.
Prasophyllum patens, R.Br.
fuscum, R.Br.
Microtis porrifolia, Spreng.
Corysanthes fimbriata, R.Br.
Pterostylis nutans, R.Br.
barbata, Lindl.
mutica, R.Br.
rufa, R.Br.
Eriochilus autumnalis, R.Br.
Caladenia filamentosa, R.Br.
patersoni, R.Br., var. *typica*.
clavigera, A. Cunn.
carnea, R.Br.
congesta, R.Br.
cærulea, R.Br.
deformis, R.Br.
Glossodia major, R.Br.

IRIDEÆ, R.Br.

Sisyrinchium bermudiana, Linn.*

IRIDEÆ.

Sisyrinchium micranthum, Cav.*
Homeria collina, Sweet.*
aurantiaca, Sweet.*

AMARYLLIDEÆ, St. Hil.

Hypoxis hygrometrica, Labill.
Crinum flaccidum, Herb.
Calostemma purpureum, R.Br.
luteum, Sims.

LILIACEÆ, De Cand.

Anguillaria dioica, R.Br.
Bulbine bulbosa, Haw.
semibarbata, Haw.
Thysanotus tuberosus, R.Br.
baueri, R.Br.
Cæsia vittata, R.Br.
Corynotheca lateriflora, F.v.M.
Tricoryne elatior, R.Br.
Stypandra glauca, R.Br.
cæspitosa, R.Br.
Allium fragrans, Vent.*

PHILYDRACEÆ, R.Br.

Philydrum lanuginosum, Banks.

COMMELYNACEÆ, Endl.

Commelyna ensifolia, R.Br.

JUNCACEÆ, Agardh.

Xerotes longifolia, R.Br.
effusa, Lindl.
elongata, Benth.
leucocephala, R.Br.
Luzula campestris, DC.
Juncus planifolius, R.Br.
bufonius, Linn.
homalocaulis, F.v.M.

JUNCACEÆ.

Juncus communis, E. Mey.
pauciflorus, R.Br.

TYPHACEÆ, De Cand.

Typha angustifolia, Linn.

LEMNACEÆ, De Cand.

Lemna trisulca, Linn.
minor, Linn.
oligorrhiza, Kurz.

NAIADEÆ, Agardh.

Triglochin centrocarpa, Hook.
procera, R.Br.
Potamogeton natans, Linn.
crispus, Linn.
obtusifolius, Mert. et Koch.
acutifolius, Link.
Naias tenuifolia, R.Br.

ALISMACEÆ, R.Br.

Alisma plantago, Linn.
Damasonium australe, Salisb.

RESTIACEÆ, R.Br.

Hypolæna lateriflora, Benth.

CYPERACEÆ, R.Br.

Cyperus pygmæus, Rottb.
gracilis, R.Br.
squarrosus, Linn.
difformis, Linn.
concinnus, R.Br.
vaginatus, R.Br.
gilesii, Benth.
fulvus, R.Br.
iria, Linn.
diphyllus, Retz.
rotundus, Linn.†
subulatus, R.Br.

CYPERACEÆ.

Cyperus gunnii, Hook. f.
exaltatus, Retz.
Heleocharis acuta, R.Br.
Fimbristylis velata, R.Br.
æstivalis, Vahl.
neilsoni, F.v.M.
barbata, Benth.
Scirpus riparius, Spreng.
cartilagineus, Spreng.
Carex inversa, R.Br.
chlorantha, R.Br.
paniculata, Linn.
vulgaris, Fries, var. *gaudichaudiana*.
gunniana, Boott.
pseudocyperus, Linn.

GRAMINEÆ, R.Br.

Paspalum distichum, Linn.†
Eriochloa punctata, Hamilt.†
annulata, Kunth.†
Panicum cœnicolum, F.v.M.†
divaricatissimum, R.Br., et vars.†
macractinium, Benth.†
sanguinale, Linn.†
leucophæum, H.B. et K.†
flavidum, Retz., et var.†
gracile, R.Br.†
helopus, Trin.
gilesii, Benth.
distachyum, Linn.†
reversum, F.v.M.
colonum, Linn.
crus-galli, Linn.†
adspersum, Trin.
miliaceum, Linn.*
repens, Linn.

GRAMINEÆ.

Panicum effusum, R.Br., et var.†
mitchelli, Benth.
decompositum, R.Br.†
trachyrhachis, Benth.
prolutum, F.v.M.†
Setaria glauca, Beauv.†
verticillata, Beauv.*
viridis, Beauv.*
Plagiosetum refractum, Benth.
Chamæraphis spinescens, Poir.
Spinifex paradoxus, Benth.
Lappago racemosa, Willd.
Neurachne alopecuroides, R.Br.
mitchelliana, Nees.†
munroi, F.v.M.
Perotis rara, R.Br.
Hemarthria compressa, R.Br.†
Pollinia fulva, Benth.†
Andropogon erianthoides, F.v.M.†
sericeus, R.Br.†
pertusus, Willd.†
bombycinus, R.Br.†
refractus, R.Br.†
Imperata arundinacea, Cyr.†
Chrysopogon gryllus, Trin.
parviflorus, Benth.
Sorghum halepense, Pers.
Anthistiria ciliata, Linn.†
avenacea, F.v.M.†
membranacea, Lindl.†
Polypogon monspeliensis, Desf.*
Ehrharta longiflora, Sm.*
Alopecurus geniculatus, Linn.†
Phalaris canariensis, Linn.*
Aristida stipoides, R.Br.

GRAMINEÆ.

Aristida arenaria, Gaud.
behriana, F.v.M.
leptopoda, Benth.
ramosa, R.Br.
calycina, R.Br.
Stipa elegantissima, Labill.
tuckeri, F.v.M.
setacea, R.Br.
aristiglumis, F.v.M.
scabra, Lindl.
Dichelachne crinita, Hook. f.†
sciurea, Hook. f.†
Deyeuxia forsteri, Kunth.†
quadriseta, Benth.†
scabra, Benth.
Aira caryophyllea, Linn.
præcox, Linn.*
Holcus lanatus, Linn.*
Avena fatua, Linn.*
Amphibromus neesii, Steud.†
Danthonia bipartita, F.v.M.†
pallida, R.Br.†
pilosa, R.Br.
semiannularis, R.Br.†
Amphipogon strictus, R.Br.†
Pappophorum nigricans, R.Br.†
avenaceum, Lindl.†
Astrebla pectinata, F.v.M.†
triticoides, F.v.M., var. *lappacea*.†
elymoides, F.v.M.†
Triraphis mollis, R.Br., et var. *humilis*.†
Triodia pungens, R.Br.
irritans, R.Br.
Cynodon dactylon, Pers.†
Chloris acicularis, Lindl.†

GRAMINEÆ.

Chloris truncata, R.Br.,† et var.
ventricosa, R.Br., et var.
Eleusine ægyptiaca, Pers.†
Leptochloa subdigitata, Trin.
Diplachne loliiformis, F.v.M.
fusca, Beauv.†
Sporobolus virginicus, Kunth, var. *pallida*.†
indicus, R.Br.†
pulchellus, R.Br.
lindleyi, Benth.†
actinocladus, F.v.M.
Eriachne aristidea, F.v.M.
obtusa, R.Br.†
Ectrosia leporina, R.Br.
Lamarckia aurea, Mœnch.*
Phragmites communis, Trin.
Elytrophorus articulatus, Beauv.
Kœleria cristata, Pers.*
phleoides, Pers.*
Dactylis glomerata, Linn.*
Eragrostis tenella, Beauv.
pilosa, Beauv.†
kennedyæ, Tur.
brownii, Nees.
laniflora, Benth.
eriopoda, Benth.
chætophylla, Steud.
lacunaria, F.v.M.†
falcata, Gaud.
Poa cæspitosa, Forst..† et vars.
nodosa, Nees.
annua, Linn.*
lepida, F.v.M.
Glyceria fordeana, F.v.M.†
ramigera, F.v.M.†

GRAMINEÆ.

Briza minor, Linn.*
maxima, Linn.*
Bromus mollis, Linn.*
arenarius, Labill., var. *macrostachya*.†
sterilis, Linn.*
Ceratochloa unioloides, DC.*
Festuca bromoides, Linn.
duriuscula, Linn.
Agropyrum scabrum, Beauv.
Lolium perenne, Linn.*
temulentum, Linn.*
Lepturus cylindricus, Trin.
Hordeum murinum, Linn.*
nodosum, Linn.*

Class III. ACOTYLEDONS, Juss.

LYCOPODIACEÆ, Swartz.

Azolla pinnata, R.Br.
rubra, R.Br.

MARSILEACEÆ, R.Br.

Marsilea drummondii, A.Br.†

FILICES, Linn.

Ophioglossum vulgatum, Linn.
Lindsæa linearis, Swartz.
Cheilanthes tenuifolia, Swartz.
Pteris aquilina, Linn., var. *esculenta*.
Notholæna vellea, R.Br.
distans, R.Br.
Grammitis rutæfolia, R.Br.

STUDIES ON AUSTRALIAN MOLLUSCA.

Part VIII. By C. Hedley, F.L.S.

With a Note on *Terebra Hedleyi*, Tate.

By Edgar A. Smith, Assistant Keeper of Zoology, Natural History Museum, London.

(Plates viii.-x.)

(Continued from Vol. xxvii., p. 619.)

Flammulina mathinnæ, Petterd.

Helix mathinnæ, Petterd, Mon. Land Shells of Tasmania, 1879, p. 26.

(Plate viii., figs. 4-6.)

This species has not yet been figured. I am indebted to Mr. Alex. Morton for an opportunity of filling the gap. The drawings now presented are based on a type specimen, the dimensions of which are maj. diam. 5 mm.; min. diam. 4·15 mm.; height 2·65 mm.; now in the collection of the Tasmanian Museum.

Endodonta hookeriana, Johnston.

Helix hookeriana, Johnston in Petterd, Mon. Land Shells of Tasmania, 1879, p. 38.

(Plate viii., figs. 1-3.)

I am also indebted to Mr. Morton for the opportunity of drawing this species from the type in the Tasmanian Museum. Its dimensions are, maj. diam. 1·75 mm.; min. diam. 1·5 mm.; height 0·8 mm.

Coxiella badgerensis, Johnston.

The genus *Coxiella* was founded by Smith* on *Truncatella striatula*, Menke, a native of West Australia. In Dr. Cox's 'Monograph of Australian Land Shells,' two species of this genus were distinguished, but the *striatula* of Menke was redescribed as a new species, *Blanfordia pyrrhostoma*, while Menke's name was attached to the eastern species. This reversal of nomenclature confused Smith, who, in establishing his genus, recognised but one species.

Later I invited† Mr. Smith to reconsider his decision. He accordingly re-examined the subject‡ and separated, as suggested, three species, the western *C. striatula*, Menke, the central *C. gilesi*, Angas, and the eastern form for which he coined a new name, *C. confusa*, Smith.

It unfortunately escaped his notice that a name for the eastern species already existed, viz., *Potamiopsis badgerensis*, described as fossil from Badger Island, Bass Straits, by R. M. Johnston.§ This name its author was afterwards inclined to discard|| as superfluous. Tate & May recognise¶ Johnston's fossil as identical with *C. confusa*, Smith. I have also the assurance of Mr. W. F. Petterd, who is better acquainted with the species than myself, that *C. badgerensis* cannot be specifically distinguished from the recent shell. It follows, therefore, that the earlier name of Johnston must replace the doubly appropriate *Coxiella confusa*, Smith.

Heterocyclus petterdi, Smith.

(Plate viii., fig. 7.)

The accompanying figure is drawn from one of the original specimens of *Bythinia richmondiana*, Petterd,** which the author

* Proc. Mal. Soc. i. 1894, p. 98.
† Proc. Mal. Soc. i. 1895, p. 260.
‡ Proc. Mal. Soc. iii. 1898, p. 76.
§ Proc. Roy. Soc. Tas. 1878, p. 26.
|| Geol. Tas. 1888, p. 329.
¶ These Proceedings, xxvi. p. 449.
** Journ. of Conch. iv. 1884, p. 159.

of the species kindly placed at my disposal. This name has to yield to the prior *Hydrobia petterdi*, Smith.* To the same species is referred *Pupa anodonta* of Musson and myself,† later transferred to *Heterocyclus*.‡ It has, with the following species, been traced by Dr. T. May as far north as Bundaberg.

PETTERDIANA BRAZIERI, Smith.

Mr. W. F. Petterd has also kindly communicated examples of his *Amnicola positura*,§ which prove to be synonymous with the earlier *Hydrobia brazieri*, Smith.‖ The species ought, I think, to be included in the genus *Petterdiana*, of which it is the only representative in this State.

BITTIUM FURVUM, Watson.

Watson, Chall. Rep. Zool. xv., 1886, p. 556, pl. xxxviii., f. 5.

This reference has always been a trouble to Australian students. I have at last identified the shell as the young of *Cerithium icarus*, Bayle = *C. tenue*, Sowb. not Desh. = *B. varieyatum*, Braz.

RISSOA AGNEWI, Tenison Woods.

Ten. Woods, Proc. Roy. Soc. Tas. 1876, [1877] p. 152.

I submitted specimens dredged in 100 fathoms 16 miles east of Wollongong to Mr. W. L. May, who writes (12:ii.:1904) that he thinks they are a variety of that species, from the type of which they differ by having apparently one whorl less, and by a blunter apex; but with which they agree in sculpture and general form. Mr. May now considers that the illustration¶ given as of this species really represents *R. layardi*, Petterd, a different species. In the forthcoming issue of the Proceedings of the

* Journ. Linn. Soc. Zool. xvi. 1882, p. 270, pl. vii., f. 23.
† These Proceedings (2) vi. 1892, p. 558.
‡ These Proceedings (2) vii. 1893, p. 373.
§ Journ. of Conch. iv. 1884, p. 159.
‖ Journ. Linn. Soc. Zool. xvi. 1882, p. 270, pl. vii., f. 21.
¶ These Proceedings, xxvi., pl. xxvi., f. 70.

Royal Society of Tasmania he will give a figure of the type of *R. agnewi*. This species is an addition to the known fauna of this State.

RISSOA INTEGELLA, n.sp.

(Plate ix., fig. 20.)

Shell tall, slender, subcylindrical, imperforate, thin, translucent. Colour uniform white. Whorls nine, including the globose, spirally grooved protoconch of one whorl, rounded, constricted at the sutures. Sculpture: sharp, spiral keels which multiply from three on the first to eight on the last whorl. The interstices are latticed with faint lines, and under a high magnification are further seen to be ornamented by fine, dense, spiral scratches. Aperture subcircular, outer lip bearing a rather strong varix, inner lip reflected over an umbilical furrow. Length 4·85 mm.; breadth 1·35 mm.

Hab.—Sixteen miles east of Wollongong in 100 fathoms; a few specimens dredged by Mr. G. H. Halligan and self.

Type.—To be presented to the Australian Museum.

EPIGRUS PROTRACTUS, n.sp.

(Plate viii., figs. 8-11.)

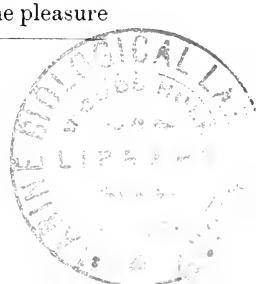
Shell minute, cylindrical, thin, translucent, glossy, with the last whorl uncoiled. Colour pale ochre, with a more ruddy tint on the peristome. Whorls four and a half. First whorl and a half globose, tilted; second and third rounded, deeply contracted at the suture, which is margined; last half-whorl free and stretched out in the direction of the shell's axis. Aperture circular, very oblique; peristome broad, expanded. Length 1·3 mm.; breadth 0·36 mm.

Hab.—Chinaman's Beach, Middle Harbour; several specimens, taken by my friend Miss L. Parkes.

Type.—To be presented to the Australian Museum.

To the information given on this genus in the Report on the Thetis Gasteropoda* I can now add that I lately had the pleasure

* Hedley, Mem. Aust. Mus. iv. 1903, pp. 355, 356.



of showing *E. ischnus* to Mr. W. L. May, and that he recognised it as *E. simsoni*, Tate & May. Of the united names *Epigrus ischnus*, Tate, takes precedence

Planaxis brasilianus, Lamarck.

Several names have been proposed for this species.* Commencing with Angas,† writers on Australian Mollusca have unanimously selected *Planaxis mollis* for employment. Pritchard & Gatliff‡ alone do so definitely on the ground of priority. But this involves chronological error. *Buccinum brasilianum*, Lamarck,§ appeared in August, 1822. *Planaxis mollis*, Sowerby,‖ was undated on the title page of Part or Volume.

We learn, however, from Newton¶ that *Planaxis* was included in Part xii. of Sowerby's "Genera," and we further ascertain from Sherborn** that Part xii. was issued February 3rd, 1823. This, then, is the date to be assigned to *Planaxis mollis*.

Those who, like Brazier,†† might prefer *P. mollis* to *P. brasilianus*, because the latter is a misnomer, are reminded of the rule of zoological nomenclature adopted by the Fifth International Congress of Zoology: "A name once published cannot be rejected, even by its author, because of inapplicability."

Sowerby went as far astray in the habitat as Lamarck did, for he considered *P. mollis* to be a British species. I have already shown‡‡ that the type of *P. brasilianus* was apparently collected by a Sydney resident. Suter enlarges the known range of the species by reporting it from New Zealand.§§

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* Smith, Ann. Mag. Nat. Hist. (4) ix. 1872, p. 46.
† Proc. Zool. Soc. 1867, p. 210.
‡ Proc. Roy. Soc. Vic. n.s. xiv. 1902, p. 87.
§ Anim. s. Vert. vii. p. 272.
‖ Genera of Shells ii., Explanation to Pl. 209.
¶ Brit. Mus. Cat. Edwards Coll. 1891, p. 321.
** Ann. Mag. Nat. Hist. (6), xiii. 1894, p. 371.
†† These Proceedings, (2) ii. 1888, p. 999.
‡‡ These Proceedings, xxvii. p. 24, footnote.
§§ Index Faunæ Novæ Zealandiæ, 1904, p. 76.

LEUCOTINA MICRA, Pritchard & Gatliff.

Turbonilla (Ondina) micra, Pritchard & Gatliff, Proc. Roy. Soc. Vic. n.s. xiii., Aug., 1900, p. 134, pl. xxi., f. 1.

This species extends north to New South Wales. The single haul of the dredge made by Mr. G. H. Halligan and self in 100 fathoms, 16 miles east of Wollongong, yielded a few examples. Under the name of *Syrnola micra*, it has been catalogued by Tate & May* from Tasmania. I prefer to regard it as a *Leucotina*, for the punctured grooving is a feature foreign to either *Turbonilla* or *Syrnola*.

DAPHNELLA CASSANDRA, n.sp.

(Plate viii., fig. 17.)

Shell small, slender, tall, moderately solid. Colour white (? bleached). Whorls seven, including a two-whorled exsert protoconch; angled at the suture. Sculpture: small, sharp, spiral threads, on the earlier whorls three, on the last about ten; above these threads are widely spaced, but on the base crowded. Their interstices are latticed by growth-lines. Aperture narrow, oblong, canal short. Length 5·15 mm.; breadth 1·6 mm.

Hab.—Balmoral Beach, Sydney (Mrs. C. H. Starkey; type); Frederick Henry Bay, Tasmania (W. L. May).

Type.—To be presented to the Australian Museum.

Shortly before his death, I sent this species to the late Prof. Tate, suggesting that it might be the unrecognised *Cingulina brazieri*. Prof. Tate penned a brief note, almost his last scientific work, adopting my suggestion and proposing the new name *Terebra hedleyi* for *Cingulina brazieri*.† The untimely decease of my friend, and the loss of a drawing I had prepared, complicated matters. Since then Dr. Pilsbry has named a Japanese shell *Terebra hedleyi*‡ Mr. E. A. Smith writes that *C. brazieri* is not the species before us, and I therefore formally propose the

* These Proceedings, xxvi., p. 382, pl. xxv. f. 54.

† These Proceedings, xxvi. 1901, p. 214.

‡ Pilsbry, Proc. Acad. Nat. Soc. Philad. 1904, p. 3, pl. i., f. 1.

latter as a new species. For critical remarks on *Cingulina brazieri*, the reader is referred to an appendix to this paper, kindly contributed by Mr. E. A. Smith (*postea*, p. 211).

Strombus urceus, Linn.

Strombus urceus, Linn., Syst. Nat. x. 1758, p. 745.

It has been pointed out by Hanley* that this Linnean name has been always misapplied. He stated that Linné's type (well represented by Thes. Conch. i. pl. vii., f. 45) is identical with *Strombus floridus*, Lamarck. But the species commonly known as *S. urceus*, Linn., is rightly *S. ustulatus*, Schumacher.

This information is not new; but as every writer on Australian Mollusca, from Angas in 1867 to Pritchard and Gatliff in 1900, has gone astray in the matter, it seems well to here restate the facts.

Acmæa octoradiata, Hutton.

Patella octoradiata, Hutt., Cat. Marine Moll. N.Z. 1873, p. 44.

Acmæa saccharina, Linn., var. *perplexa*, Pilsbry, Man. Conch. xiii. 1891, p. 50, pl. xxxvi., figs. 69, 70, 71.

Pilsbry cites Hutton's name with doubt as belonging to his variety. Following this suggestion, I sent a series of this shell from Maroubra Bay to Prof. Hutton, who kindly replied (2 : iv. : '04), "The *Acmæa* is truly my *Patella octoradiata*. I withdrew it from my second edition because I doubted the correctness of the locality. But since then it has been again found in New Zealand."

I agree with Taylor† and with Pritchard & Gatliff‡ in regarding the form under notice as a valid species. In reviving Hutton's prior name, another species is added to those common to Australia and New Zealand.

Since writing this note, I have received from Captain Hutton his 'Index Faunæ Novæ Zealandiæ,' in which (p. 85) the above synonymy is for the first time recognised.

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* Ips. Linn. Conch. 1855, p. 275.
† Nautilus vi. 1892, p. 89.
‡ Proc. Roy. Soc. Vict. xv. n.s. 1903, p. 194.

Acmæa alticostata, Angas.

From Port Lincoln, S.A., Angas described* *Patella alticostata*. He afterwards noted and briefly described † the same shell as *Patella costata*, Sowerby, from Coogee and Wollongong, N.S. Wales. But he failed to explain whether he had withdrawn or only forgotten his own name. Boog Watson notes the species‡ as *P. alticostata*, Angas, from Port Jackson, without allusion to *A. costata*. Subsequent authors have united the names and confounded the two species. The reference to Sowerby given by Angas is incorrect, but it indicates "*Lottia ? costata*," Sowerby,§ from "? Coasts of Pacific Ocean."

It does not seem to be generally known that there are two species of *Acmæa* somewhat alike, the one inhabiting the Central and South-Eastern Pacific, the other temperate Australia. The Australian is larger, more solid, more elevated, with about eighteen subequal ribs, the black border of the inside edge usually continuous. From the Gambier Islands I have seen examples agreeing with Sowerby's figure, in which the black border is interrupted by the cords of the ribs; between the larger ribs smaller ones are intercalated, and between the latter still smaller ones. *Patella stellæformis*, Reeve, seems to me a variety of *A. costata*, Sowerby.

To clinch the argument that *A. costata* and *A. alticostata* are different species, the former Pacific, the latter Australian, I would remark that Capt. Beechey does not appear to have touched during the voyage of the "Blossom" at places where the latter species was procurable, but during his survey of the Gambier Islands he would have had the opportunity of gathering the former.

Streblocerας cygnicollis, n.sp.

(Plate viii., figs. 12-14.)

Shell minute, glassy, translucent. The apex lateral, of two whorls in one plane; remainder describing half a revolution of a

* Proc. Zool. Soc. 1865, p. 56, pl.ii., fig.1.
† Proc. Zool. Soc. 1867, p. 221.
‡ Chall. Rep. xv. 1886, p. 26.
§ Zool. Beechey's Voy. 1839, p. 147, pl.xxxix., f.1.

long-drawn spiral in a plane oblique to the first. At one-fifth of the length a stout projecting ring-varix occurs. Sculpture: delicate growth-rings, which latterly become broader and stronger. Aperture simple, circular, oblique to the plane of growth, nearly at right angles to the plane of apex. Length (straight line between most distant points) 3·35 mm; diameter of aperture 0·45 mm; diameter of apex 0·1 mm.

Hab.—Bottle and Glass Rocks and Long Bay, near Sydney; three specimens (Miss L. Parkes).

Type.—To be presented to the Australian Museum.

This species adds to the Australian fauna a genus which was founded by Carpenter* for the reception of a Tertiary fossil. The first recent species was discovered near Honolulu by the Challenger Expedition. From it, this, the second, is easily distinguished by more slender form and conspicuous ring-varix. The latter character strikingly recalls *Ctiloceras*.

Capulus devotus, n.sp.

(Plate viii., figs. 15-16.)

Shell small, rather solid, elevated, irregular, asymmetrical; apparently without epidermis. Colour white. Sculpture: delicate regular concentric hair-lines. Protoconch sharply defined, of a whorl and a half, smooth. Apex projecting far past the base. Adult shell describing a quarter of a whorl, rapidly increasing, wound in a different plane to the embryo. Aperture subcircular, simple, slightly expanded. Specimen drawn, from back to front 4·5 mm.; base to vertex 3·5 mm.; side to side 3·0 mm. Another specimen, 5·5 × 4·0 × 5·1 mm.

Hab.—Sixteen miles east of Wollongong in 100 fathoms; several specimens dredged by Mr. G. H. Halligan and self.

Type.—To be presented to the Australian Museum.

The lack of colour and rotund form easily distinguish this from *C. violaceus*, Angas, the only other member of the genus native to our coast.

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* Proc. Zool. Soc. 1858, p. 440.

ATYS PRANSA, n.sp.

(Plate ix., figs. 21-22.)

Shell ovate, solid, smooth, glossy. Colour pale cream. Sculpture: faint, spaced, incised, spiral lines, more crowded and conspicuous at either end, and obsolete in the centre. Aperture the length of the shell; above pinched in a narrow loop, below rounded; outer lip arcuate, bent and slightly reflected at the upper and lower insertion; inner lip spreading, a callus on the body-whorl. Deeply narrowly perforate above and below. Length 5·0 mm.; breadth 2·55 mm.

Hab.—Sixteen miles east of Wollongong in 100 fathoms; one specimen dredged by Mr. G. H. Halligan and self.

Type.—To be presented to the Australian Museum.

PHOS TABIDUS, n.sp.

(Plate viii., fig. 18.)

Shell tall, slender, thin. Whorls six, slightly angled. Colour grey, obscurely banded with reddish-brown. Sculpture: on last whorl twenty sharp but low radial plications which commence at the sutures and gradually vanish on the base. Both plications and interstices are crossed by regular, evenly spaced, spiral cords, of which the last whorl has twenty, five of which run between the suture and the angle. This sculpture is continued on the earlier whorls, and fades away gradually at the protoconch, which is large, dome-shaped, of two whorls, smooth and glossy. Aperture ovate, outer lip simple; canal short, bent to the left. Columella much arched, overlaid by a callus sheet, its lower extremity furrowed by a deep spiral groove. Length 12 mm.; breadth 5 mm. The specimen here described is immature.

Hab.—Sixteen miles east of Wollongong in 100 fathoms; a few imperfect specimens dredged by Mr. G. H. Halligan and self.

Type.—To be presented to the Australian Museum.

This species is assigned to the genus *Phos*, in accordance with the views of the late Prof. Tate.* I am not satisfied that this

* These Proceedings, xxvi. p. 454.

classification is correct, but adopt it as a temporary expedient pending the receipt of further information. The only known living relation is the Tasmanian *Phos tenuicostatus*, Ten. Woods, from which the northern shell is discriminated by its small and slender form and less development of longitudinal sculpture.

STIVA, n.g.

Allied to *Rissoina*. Shell with the contour of *Scala* rather than *Rissoina;* large, tapering, solid. Operculum peltate, concentric.

Type *S. ferruginea*, Hedley.

The remarkable operculum, the chief foundation of the genus, has a limb resembling that of *Jeffreysia*, as figured by Alder,* which has, however, the nucleus submarginal.

STIVA FERRUGINEA, n.sp.

(Plate ix., figs. 23-25.)

Shell tall and tapering, very solid, smooth and glossy, a little contracted at the sutures, last whorl subangled at periphery; sometimes decollate and plugged. Colour rusty red, yellow on apex and between the ribs, with a faint, narrow, white peripheral band. Whorls ten, counting the dome-shaped protoconch of two and a half whorls. Suture deeply impressed, undulated by the ends of the ribs. Sculpture: apex smooth, ribbing gradually commences on the third whorl, increasing in strength but not in number to the last. Ribs longitudinal, broad, curved, undulating, ten on last whorl, twelve on penultimate, fading away on base. Under the lens appear fine, dense, wavy scratches crossing both ribs and interstices. Aperture fortified externally with a varix; inner lip very thick, forming a free edge; anteriorly the aperture contracts to a short, shallow, oblique spout. Operculum (figs. 24, 25) peltate, elevated, not spiral, apex excentric, from the apex a furrow runs to the farthest margin, from the lower corner of the

* Ann. Mag. Nat. Hist. (2), vii. 1851, p. 194.

underside projects a spoon-shaped limb. Length 18; breadth 7 mm.

Hab.—Sixteen miles east of Wollongong in 100 fathoms; several specimens dredged by Mr. G. H. Halligan and self.

Type.—To be presented to the Australian Museum.

The Eggs of *Lotorium spengleri*.

(Plate viii, fig. 19.)

Numerous specimens of *Lotorium spengleri*, Chemnitz, were discovered (16 : x. :'03) in the act of ovipositing in rocky pools at low-tide mark in Sydney Harbour. The eggs were concealed under the bodies of the parents. From the nest figured I forcibly removed the mollusc. In shape the mass resembled a peach split down the centre, the cavity answering to that occupied by the peach stone. Each mass, pale yellow in colour, firmly adhered by its base to the rock, and was usually torn in removal. The example drawn weighed $2\frac{1}{4}$ ozs., and measured 60 mm. in diameter and 35 mm. in depth. The eggs are packed in a tough, semi-transparent cup-shaped membrane, externally with close imbricating scales; the margin is shortly folded over the eggs in the interior. The capsules are conical, about 10 mm. long, their base attached to the inner wall of the envelope, their apex projecting into the central hemispherical cavity. They are densely packed, tier above tier, and are probably laid in spirals; the top tier held about thirty-five capsules.

Chione despecta, n.sp.

(Plate x., figs. 35-38.)

Shell small, solid, triangularly ovate, equilateral. Colour grey. Sculpture: radials none; concentric, about twenty fine, thin, elevated, upturned, spaced lamellæ, which traverse the whole shell. In their interstices are fine microscopic concentric threads. Lunule faintly impressed, short and narrow. Dorsal area not differentiated. Umbo prominent. Inner ventral margin crenulated. Pallial sinus short and shallow. Hinge: left valve with

two papillate, cardinal teeth enclosing a deep, narrow fossette which received the single well-developed cardinal of the right valve. Length 3·5; height 3·0; diam. of single valve 1·1 mm.

Hab.—Sixteen miles east of Wollongong in 100 fathoms; a few separate valves dredged by Mr. G. H. Halligan and self.

Type.—To be presented to the Australian Museum.

The lack of radial sculpture distinguishes this from related forms; it is besides the smallest of the genus. The observations on the exceptional hinge require to be checked on fresh material.

CHIONE NITIDA, Quoy & Gaimard.

Venus nitida, Quoy & Gaim., Voy. Astrolabe, Zool. iii. 1835, p. 529, pl. lxxxiv., figs. 13, 15 (not 13, 14, as quoted in the text).

Venus fumigata, Sowerby, Thes. Conch. ii. Venus, 1853, p.737, pl. clix., figs. 152-155.

Venus lævigata, Sowerby, *op. cit.*, p. 738, pl. clix., fig. 158.

The original locality for this species is Hobart, Tasmania. It was characterised by its authors as one inch long, smooth, glossy, oval wedge-shaped, inequilateral, the rounded anterior end shortest, the posterior produced and rather abruptly angled, without a lunule, exterior a uniform clear brown, interior bright orange.

The misprint by which "fig. 14" has been exchanged for "fig. 15" has, perhaps, led to confusion. At first sight, fig. 13 of the Astrolabe plate appears to represent a valve concentrically corrugated, but in view of the insistence of the text that the shell is smooth (Venus polie—Venus nitida—Venus...polita—Cette Venus est lisse), the darker spaces should be read as colour bands.

The London conchologists, as usual, made no effort to recognise this species previously named by the French naturalists, and, as usual, renamed it when they met it. So it has practically passed into oblivion. Messrs. Tate & May subordinate it with a query* to *Meretrix planatella*, and Messrs. Pritchard & Gatliff follow their example with doubt †

* Tate & May, Proc. Linn. Soc. N.S.W. xxvi. 1901, p. 428.

† Pritchard & Gatliff, Proc. Roy. Soc. Vic. xvi. (n.s.), 1903, p. 130.

It is here submitted that the orange-tinted interior is a valid recognition-mark whereby we may prove *Venus nitida* to be the species usually known as *Venus lævigata*, Sowerby. The remainder of the characters, the size and habitat conform to this conclusion. I submitted this idea to my friend, Mr. W. L. May, and inquired if the naturalists of the Astrolabe would have been likely to meet with *V. lævigata* on the beaches round Hobart. He replied (18 : ix. :'03) :—"I should think your view is probably right. Prof. Tate thought *nitida* might be a synonym of *C. planatella*, but I now think that is a mistake. I do not think *planatella* is found in the Derwent, whilst *C. lævigata* would be, and the description and figures, as you say, seem to fit the latter well. The numbering of the Astrolabe plate is wrong, the two valves on the left being *nitida*."

The species whose figure and description follow in the Voyage of the Astrolabe that of *V. nitida*, namely, *V. denticulata*, appears to me from its purple interior to be *Chione gallinula*, Lamarck.

Dr. W. H. Dall included *V. fumigata*, Sowb., in his new section *Macridiscus*.*

Cardium bechei, Reeve.

It has escaped the attention of all subsequent writers, even absurd to say, that of Reeve himself, that this species was first described in the Proceedings of the Zoological Society for 1847, p. 25 (April 13, 1847). For it is always referred to as of Adams & Reeve, and quoted as dating from the 'Voyage of the Samarang.' The species has occurred at the Tweed Heads, and so just falls into the category of New South Wales mollusca. Brazier has mentioned it† from several localities in Queensland, and Melvill and Standen‡ note it from Warrior Island. I have drawn attention§ to its possible identity with the fossil *C. antisemigranulatum*, McCoy.

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* Trans. Wagner Inst. iii. 1903, p. 1289.
† These Proceedings, i. 1876, (1877) p. 306.
‡ Journ. Linn. Soc. Zool. xxvii. 1899, p. 192.
§ Mem. Aust. Mus. iv. 1902, p. 288.

PSAMMOBIA LESSONI, Blainville.

So far as I can ascertain, this is the proper name for the Sydney shell reported as *Gari malaccana*, Reeve, by Angas.* The species was figured by Reeve,† who referred in his careless way to Blainville's name as a manuscript one. Blainville, however, fully described the species‡ from specimens collected by Lesson in the Moluccas.

Fischer noted *G. lessoni* from Ile Art, New Caledonia.§ It occurs along the whole coast of Queensland. In our latitude this straggler from the tropics is smaller, and less brightly coloured than northern examples.

DIPLODONTA ZELANDICA, Gray.

Jointly with Messrs. H. Suter and W. L. May, who discussed the matter with me, I can now announce that *D. tasmanica*, Ten. Woods, is an absolute synonym of the above name. The species has not hitherto been recognised from this State. Its northern limit is indicated to me by a gigantic example from Port Stephens measuring 34 mm. in length and 30 mm. in height.

It was first described as *Lucina zelandica* by Gray.‖ His type was afterwards figured in the 'Zoology of the Erebus and Terror' (1874, Moll., pl. iii., f. 8).

Under the name of *Lucina inculta* it was again figured and described by Gould¶ from New Zealand.

Thirdly, it was named *Diplodonta tasmanica* by Tenison Woods.** A Tasmanian specimen was figured in these Proceedings (Vol. xxviii., pl. xxvii., f. 102).

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* Proc. Zool. Soc. 1867, p. 917.

† Conch. Icon. x., Psammobia, 1856, pl. ii., f. 8.

‡ Dict. Sci. Nat. xlii. 1826, p. 480.

§ Journ. de Conch. vii. 1859, p. 336.

‖ Yate, 'Account of New Zealand.' Appendix. 1835, p. 309. Both the first and second editions of this work are dated 1835.

¶ Am. Expl. Exped. Moll. xii. 1852, p. 412, pl. xxxvi., f. 524.

** Proc. Roy. Soc. Tas. 1876, p. 158.

Thraciopsis arenosa, n.sp.

(Plate ix., figs. 26-27.)

Shell small, oblong, equilateral, anterior dorsal margin concave, posterior dorsal margin convex, tapering more anteriorly than posteriorly. Colour grey, with radiating and concentric lines of pale yellow. Sculpture: the whole shell is densely covered with small but sharp, elevated grains arranged radially. Height 2·9, length 4·55 mm.

Hab.—Sixteen miles east of Wollongong in 100 fathoms; dredged by Mr. G. H. Halligan and self.

Type.—To be presented to the Australian Museum.

This species is represented only by a single left valve. The sculpture, like sand-paper, is a remarkable character, and members of this genus are usually inequilateral. Though more material is requisite for a full description, these peculiarities should ensure recognition.

Cardita dilecta, Smith.

Smith, Chall. Rep. Zool. xiii. 1885, p. 213, pl. xv., f. 4.

This pretty species extends to the waters of this State, for it was included in the rich haul made by Mr. G. H. Halligan and self in 100 fathoms, 16 miles east of Wollongong. It has not been seen since its discovery in Bass Straits by H.M.S. 'Challenger,' thirty years ago.

Zenatia victoriæ, Pritchard & Gatliff.

Pritchard & Gatliff, Proc. Roy. Soc. Vic. n.s. xvi. 1903, p. 92, pl. 15, f. 3.

This species also reaches New South Wales. I saw it frequently on the beach at Boyd Town, Twofold Bay, and have taken a broken valve in Middle Harbour. It is evidently the species which Angas reports* under the erroneous name of *Z. acinacies*, Quoy & Gaimard, from Botany Bay. Mr. O. Thiele informs me that he observed it at Snake Island, Victoria.

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* Proc. Zool. Soc. 1867, p. 917.

CRASSATELLITES PONDEROSUS, Gmelin.

In the opinion of Messrs. E. A. Smith* and J. Brazier,† all the large Australian *Crassatellites*, viz., *C. kingicola*, Lamk.; *C. donacina*, Lamk.; *C. castanea*, Reeve; *C. decipiens*, Reeve; *C. errones*, Reeve; *C. pulchra*, Reeve, and *C. cumingi*, A. Adams, are referable to one species. For the first or for the aggregate, Australian conchologists, misled by European authors, have taken unquestioned the name of *Crasatella kingicola*, Lamarck.

Suspicion that there was a flaw somewhere in the nomenclature was aroused by a statement by Woodward‡ that the type of *Crassatella* is an Australian shell, *C. ponderosa*. This species does not appear in Australian Catalogues, nor is it cited in any monograph of the genus. Search in literature elicited the following information.

The first appearance of our shell in literature§ was by Chemnitz.‖ So far as I can gather, this was in a serial published at Halle in Germany. The first reference that I have seen is by Chemnitz, in the first edition of the Conchylien Cabinet (Vol. vii. 1784, p. 61, pl. lxix., f. A, B, C, D), as *Venus-plumbea-Oceani-australis*, &c.). As Chemnitz did not then use Linnean binomials, his name has, for systematists, only an historical interest. The Chemnitzian figure approximates to that given by Chenu¶ for *C. donacina*, or that given by Reeve** for *C. pulchra*.

Gmelin, upon this account by Chemnitz, founded his species *Venus ponderosa*.†† Gmelin, who only knew the species from the drawing, incorrectly gives "margine crenulato," as a character. His error is obviously based on the fact that the artist used a *dotted line* to represent the inner edge of the valve margin.

* Rep. Zool. Coll. Alert, 1884, p. 108.
† These Proceedings, (2) ix. 1890, p. 749.
‡ Manual, p. 466, Explanation to pl. xxi., f. 4.
§ *Fide* von Martens, Malak. Blatt. xix. 1872, p. 30.
‖ Naturforscher, xix., 1783, p. 185, pl. viii.
¶ Illustr. Conch. Crassatella, 1850, pl. ii.. f. 15.
**Conch. Icon. i. Crassatella, pl. iii. sp. 16, 1843.
†† Syst. Nat. xiii. 1790, p. 191.

The pallial line, which could hardly be "crenulated," is indicated by a similar dotted line.

A French fossil which actually had a crenulated margin occurred to Lamarck, so, misled by Gmelin, he naturally referred it to the Chemnitzian species. To the fossil he gave the name of *C. tumida.** But he had previously bestowed the name *C. gibba*† upon the figures of Chemnitz. On material gathered by Péron, he erected *Crassatella kingicola.*‡

Dillwyn adapted, as his custom was, the name from Chemnitz of *Venus plumbea.*§

I have nothing to add to the range of this species in New South Wales recorded by Brazier, viz., off Merimbula, in 17 fathoms, and the beach at Ballina.

Dacrydium fabale, n.sp.

(Plate x., fig. 39.)

Shell minute, thin, semitransparent white with iridescent reflection. Short, broad and inflated; umbo slightly projecting, dorsal margin arched, ventral sinuate. No radial sculpture, delicate, concentric growth-lines which rise into ridges on the ventral side. Hinge: a deep chondrophore, flanked by two prominent grooved cardinals; the dorsal interior margin carries a long, crenulated band, which is absent on the opposite side. Height 2·8; length 2·0; diameter of single valve 0·8 mm.

Hab.—Sixteen miles east of Wollongong in 100 fathoms; several specimens dredged by Mr. G. H. Halligan and myself.

Type.—To be presented to the Australian Museum.

This species adds a genus to the Australian fauna. The contour and especially the ventral sinuation effectually separate it from other members of the genus.

* An. s. Vert. v. 1818, p. 418.
† Syst. des. An. s. Vert. 1801, p. 119.
‡ Ann. du Mus. vi. 1804, p. 408.
§ Descr. Cat. Rec. Shells, i. 1817, p. 191.

Mytilus erosus, Lamarck.

Lamarck, Anim. s. Vert. vi. 1819, p. 120.

This species, described from "New Holland," and probably from Péron's collection, has been forgotten by modern writers. Gray observed it as occurring in Capt. King's Australian Collection,* and Forbes† reported it definitely as found on Zostera flats at Port Dalrymple in Northern Tasmania.

There can scarcely be a doubt that this is the shell usually known as *Mytilus menkeanus*, Philippi,—a MS. name in the Cumingian Collection put into circulation by Reeve.‡ Probably it is also the species catalogued by Menke§ from various places in West Australia under the name of *Mytilus magellanicus*, Chemnitz.

It has only occurred in New South Wales as a subfossil in raised beaches at Maitland.‖

Lima sydneyensis, nom. mut.

Under the name of *Lima brunnea* I described¶ an Australian shell. I now find that A. H. Cooke previously used** the same name for a Suez species; and accordingly change my name as above.

Contrary to the rules for the proposal of new species, Cooke's *Lima brunnea* was buried in the text, concealed in a tabular list; and has consequently been omitted from the Zoological Record, and from subsequent literature. His scanty diagnosis is probably insufficient for the recognition of the species. Such objectionable work is to be dreaded by systematists, as an uncharted reef is dreaded by mariners. And as such a reef may by the erection of a beacon be made a help instead of a hindrance, so we hope that

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* King's Survey Intertrop. Australia. Append. ii. 1827, p. 477.

† Voy. Rattlesnake, ii. 1832, p. 364.

‡ Conch. Icon. x. Mytilus, 1857, pl. viii., f. 26.

§ Moll. Nov. Holl. Specimen, 1843, p. 37.

‖ David & Etheridge, Rec. Geol. Survey N.S.W., ii. 1890, p. 49.

¶ These Proceedings, xxvi. 1901, p. 21.

** Ann. Mag. Nat. Hist. (5) xvii. 1886, p. 135.

for the guidance of conchologists Cooke's species may be figured and rehabilitated.

Lima bassii, Tenison Woods.

(Plate ix., fig. 28.)

Several odd valves of a Lima were dredged by Mr. G. H. Halligan and self in 100 fathoms, 16 miles east of Wollongong. At first I regarded it as new, but Mr. F. C. Grant, to whom the fossil is familiar, identified it for me. On comparing Tertiary examples determined by Prof. Tate with our shell, the only difference apparent to me is that the Wollongong specimens, which are probably not full grown, are smaller. Another instance is thus added of survivals from the Miocene epoch. My figure is taken from the New South Wales shell.

Tenison Woods described* the species from the Table Cape beds. It was figured by Prof. Tate,† who afterwards‡ enumerated the localities in which it has occurred. Hutton has united it§ with his *L. colorata*, from which Harris‖ separates it.

Lima alata, Hedley.

While on the subject of Lima, I may add *L. alata* to the Australian fauna, on the strength of a single valve which I gathered on the beach of Fitzroy Island, North Queensland, in August, 1901. The species was originally described¶ from Santa Cruz.

Cucullæa concamera, Bruguière.

Some imperfect valves which I collected in November, 1898, on the beach at Cape Byron, enable me to add this species to the fauna of New South Wales. North of this point it extends along the whole Queensland coast to Torres Straits, where it was found

* Proc. Roy. Soc. Tas. 1876, p. 112.
† Trans. Roy. Soc. S.A. vii. 1886, pl.v., f.8, pl.vii., f.1.
‡ *Op. cit.*, xxiii., 1899, p. 273.
§ These Proceedings, i. (2), 1887, p. 482.
‖ Cat. Tert. Moll. Austr. 1892, p. 309.
¶ Rec. Aust. Mus. iii. 1898, p. 84.

by Haddon.* Thence it ranges south down the Gulf of Carpentaria to Mornington Island, where I collected it in June, 1903.

The species is usually and wrongly cited as *C. concamerata*, of Martini, who described it in 1777, but who was preceded by Davila, d'Herbigny, and Favanne. None of these writers were binomial and worthy of citation. The first to apply a binomial name was Bruguière†. In the following year Gmelin renamed it *Arca cucullus.*‡

The fossil from Table Cape recorded as *C. concamerata* by Tenison Woods§ is pronounced by Tate‖ to be really *C. corioensis*, M'Coy. But that which Johnston identified¶ as *C. corioensis* from Flinders Island is said by Tate** to be *C. concamerata.*

ARCA PISTACHIA, Lamarck.

Lamarck, Anim. s. Vert. vi. 1819, p. 41.

This species from King Island, Bass Straits, is described thus by Lamarck :—Shell ovate, decussately striate, outside gray, inside brownish-black, beaks close together, interior striated. Length 21 mm. In the Second Edition (vi. p. 468) Deshayes adds in a footnote that it closely resembles *Arca fusca*, from which it differs by being smaller and by having the interior a rich dark brown.

I submit that the above is an excellent pen portrait of the species afterwards described from Bass Straits by E. A. Smith as *A. radula.*†† Lamarck's "intus fusco-nigricante; natibus proximis" are recognition-marks which distinguish the species from Australian congeners.

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* Melvill & Standen, Journ. Linn. Soc. Zool. xxvii., 1899, p. 188.
† Encyclopédie Méthodique, Vers. i. 1789, p. 102.
‡Linn. Syst. Nat. xiii. p. 3311.
§ Proc. Roy. Soc. Tas. 1875, p. 15.
‖ Proc. Roy. Soc. Tas. 1884, p. 212.
¶Geol. Tas. 1888, p. 331.
** These Proceedings, xxvi. p. 437.
†† Rep. Chall. Zool. xiii. 1885, p. 260, pl. xvii. f. 3.

Tate & May have merged* *A. radula* in *Anomalocardia carpenteri*, Dunker. The crenulated inner margin figured in that species forbids such a union.

Arca pistachia occurred to me in Twofold Bay, N.S.W., and Miss L. Parkes has taken it in Sydney Harbour

ARCA LISCHKEI, Dunker.

(Plate ix., figs. 29-34.)

Arca trapezia, Deshayes; Hanley, Cat. Recent Shells, Append. 1856, p. 374, pl. xviii., f. 40.

Anomalocardia lischkei, Dunker, Novitates Conchologicæ, Moll. Mar. Part xiii., March 1868, p. 115, pl. xxxviii., figs. 14, 15, 16.

Anomalocardia trapezia, Deshayes; Jack & Etheridge, Geol. Queensland, 1892, p. 641, pl. xxxvi., figs. 10, 11, 12.

In studying Australian marine mollusca, I have found most difficulty in naming, not the rarer forms, but the commonest shells, such as *Chione lagopus*, *Pecten medius*, and the present.

Various names have been assigned by London writers to the Sydney Mud-cockle, none of which are satisfactory. The excellent figure and description of an ordinary form of this variable species by Dunker, appears to have hitherto escaped recognition as applying to the Australian shell. Its first appearance in literature is an observation by J. Macgillivray,† who described it as stacked in heaps, several hundred yards in length and more than twenty feet in depth, in aboriginal kitchen-middens at Broken Bay and Brisbane Water, N.S.W. In a footnote Forbes and Hanley identified the species as *Arca trapezia*, Deshayes.‡

But that species, of which *A. lobata*, Reeve, is acknowledged § by its author to be a synonym, is a native of Semblas, Mexico,

* These Proceedings, xxvi. p. 436.

† Ann. Mag. Nat. Hist (2) ii. p. 30, July, 1848.

‡ Revue Zoologique, Soc. Cuv. ii. Dec., 1839, p. 358; and Mag. de Zool. 2nd ser. ii. 1840, Moll. Pl. xxi.

§ Conch. Icon. errata to Arca.

and though approaching in contour is yet distinct from the Australian shell.

Following this determination the species was so recorded from New South Wales by Angas*; from Tasmania by Tenison Woods†; and from South Australia by Tate.‡ Under this name it was added to the fossil fauna of Table Cape by Johnston,§ and expunged by Pritchard.‖

From a confusion of "*trapezia*" with "*trapezina*" it has been catalogued under the latter name from Tasmania by Tate & May.¶ *Arca trapezina*, Lamk., is a tropical species which, by the mixing of Péron's collection, was, with *Arca semitorta* and *Conus pontificalis*, accidentally reported from Tasmania instead of N.W. Australia.

The Challenger Expedition obtained our shell in Sydney Harbour. In the Monograph of the Lamellibranchiata of that Expedition it is classified (p. 266) as *Arca gubernaculum*, Reeve, a Philippine shell. I conjecture that this identification was based on juvenile examples. The discovery of a Philippine species in Sydney Harbour raises a doubt, which Smith appears to allay by throwing suspicion on the habitat originally assigned to *A. gubernaculum*. There is evidence, however, that it was correct. The species was described immediately after Cuming's return from the Philippines. Both the species Smith values as synonyms are also stated to be Philippine. Gray** regards *A. gubernaculum* as a synonym of *A. japonica*, Reeve. Kobelt†† records it from Formosa, and Fischer‡‡ from the Gulf of Siam.

Under these circumstances it is reasonable to ask for further evidence before admitting *A. gubernaculum* as Australian. *Arca*

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* Proc. Zool. Soc. 1867, p. 931.

† Proc. Roy. Soc. Tas. 1877, p. 55.

‡ Trans. Roy. Soc. S.A. ix., 1887, p. 102.

§ Proc. Roy. Soc. Tas. 1879, p. 41.

‖ Proc. Roy. Soc. Vic. viii. n.s. 1896, p. 134.

¶ These Proceedings, xxvi., p. 436.

** Ann. Mag. Nat. Hist. (2) xix. p. 371, May, 1857.

†† Conch. Cab. ii. Arca, 1889, p. 108.

‡‡ Bull. Soc. d'Hist. Nat. d'Autun, iv. 1891, p. 188 of reprint.

lischkei, so abundant on the coast of New South Wales, fails to attain North Queensland, and becomes rare to the point of extinction in South Australia. It is, therefore, unlikely that it should reach the Philippines. Our shell does not agree with Reeve's figure of *A. gubernaculum*. Doubtless this is the species reported as *Arca globata* from Zostera flats at Brisbane by Forbes;* this name is either a MS. one or a misprint.

As subfossil, the species has been noted at Shea's Creek,† at Maitland,‡ at Nudgee,§ and as *A. antiquata* at Deception Bay.‖

From aboriginal middens it has been noted at North Harbour,¶ from the Panbula River,** and from Bondi.††

The reddish colour of its blood has been remarked by Tenison Woods.§§

As bait for fishing it is in great demand round Sydney. Waite has reported it‖‖ as sold for food in the Sydney fish market, under the name of "cockle."

For the further elucidation of the species, I add figures and a description prepared under the impression that I was dealing with an unnamed species.

Shell very solid, equivalve, oblong, trapezoidal from the side, wedge-shaped from back to front, oblique, inflated, inequilateral. Umbo at the anterior third, elevated, incurved, distant one-quarter of the valve-depth from the hinge-margin. Sculpture: twenty-nine elevated, strong, radial ribs, parted by flat interspaces of equal breadth; both are traversed by imbricating growth-lines; anteriorly the ribs on both valves carry regularly spaced knots which gradually disappear towards the middle of the shell, and

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* Voy. Rattlesnake, ii. 1852, p. 364.

†Etheridge, David, and Grimshaw, Proc. Roy. Soc. N.S.W. xxx. 1897, p.16.

‡ David and Etheridge, Rec. Geol. Survey N.S.W. ii. 1890, p. 40.

§ Jack and Etheridge, Geol. Queensland, p. 641.

‖ Jensen, these Proceedings, xxviii. p. 847.

¶ David and Etheridge, Rec. Geol. Survey N.S.W. i. 1889, p. 142.

** Anderson, Rec. Geol. Survey N.S.W. ii. 1890, pp. 55-57.

†† Brazier, these Proceedings, xxi. p. 818.

§§Proc. Roy. Soc. N.S.W. xxii. 1888, p. 123.

‖‖ These Proceedings, (2) ix. p. 562.

which in old age are apt to be worn away. Epidermis dense black, laminate, thinner and usually denuded on the anterior exposure; in youth the epidermis appears as bristles.

Interior porcelain-white, sometimes green under the umbo; the larger ribs imprint within conical crenulations between the pallial line and the posterior ventral margin; pallial sinus very slight. Hinge-line straight and narrow, armed with about twenty-one anterior and twenty-six posterior teeth. In the centre is a sharp break of gauge, the posterior row being considerably smaller, at each end the teeth increase in size and the outermost tumble away from the vertical. Length 52; height 40; depth of separate valve 17 mm.

The species ranges from Bass Straits to Moreton Bay.

Arca lischkei is gregarious and inhabits the soft mud-flats of estuaries. It is sunk up to the umbo obliquely in the mud, and often masked by a tuft of Ulva planted on the anterior end. The swell amidships serves to support the organism from sinking too deeply. Its habits are sedentary.

The asymmetry and wedge-shape appear to have been induced by environment. Parallel development has been carried to an extreme in the case of *Arca tortuosa* and *A. semitorta*, which likewise live sunk nearly upright in the mud. Their sharp posterior ends are planted deep in the mud, and the anterior inflations serve to buoy them up on the surface.

The growth of *Arca lischkei* involves a change in contour, advancing from the symmetry of infancy to asymmetry of youth, and greater degrees of asymmetry in adolescence and senility. A young shell, 3 mm. long, is drawn (fig. 33) to show how the balance of growth is already upset by the preponderance of the posterior side. In another example (fig. 32), 11 mm. long, progress in the same direction is continued. It is interesting to observe that an impressed umbonal ray (perhaps an ancestral feature) like that possessed by *A. antiquata*, Linn., is a prominent feature in the younger shell, is perceptible in the elder, and has disappeared in the adult stage.

The name *Anomalocardia*, of Klein, is barred as pre-Linnean by the rules of nomenclature. Those who prefer to break up "*Arca*" can place this species in Gray's group, *Noëtia*.

PHILOBRYA INORNATA, n.sp.

(Plate x., figs. 40-43.)

Shell very inequilateral, rather inflated, smooth. Colour pale yellow. Sculpture: around the prodissoconch are faint radial wrinkles; beyond, delicate growth-lines are crossed by weak radiating threads, which vanish as the shell ages, leaving the latter part smooth. Hinge-line straight, nearly square with the anterior margin; ventral margin regularly rounded. Prodissoconch subquadrate, flat, with raised margins like a dish. Chondrophore oblique, long and narrow; posterior crenulations faint, anterior in a short bunch of about half a dozen. Inner ventral margin with a few crenulations at the anterior side, feebly denticulate for the remainder of the edge. Height 2·0; length 1·14; depth 0·8 mm.

Hab.—Sixteen miles east of Wollongong in 100 fathoms; several valves were dredged by Mr. G. H. Halligan and myself.

Type.—To be presented to the Australian Museum.

Bernard divided *Philobrya* into two groups—the first smooth, the second radially ribbed. If, as I shall endeavour to show, Tate's *Myrina crenatulifera* should be rejected from this genus because of its two adductors, and want of a prodissoconch cap, then the present is the first smooth Australian *Philobrya*.

Pelseneer transfers this genus to the Arcidæ.*

PHILIPPIELLA RUBRA, n.sp.

(Plate x., figs. 44-47.)

Shell small, solid, mytiliform, with a tendency to spiral growth, rather inflated. Dorsal posterior and ventral margins arched, anterior straight or concave. Umbo terminal, swollen, without

* Expédition Antarctique Belge, Moll. 1903, p. 41.

visible protoconch. Colour uniform red or purple. Externally smooth, coarse irregular concentric sculpture, no radii. Hinge-plate broad, widening posteriorly, projecting into the valve. Chondrophore oblique, long, curved, separating two overlapping crenulated bands, one shorter, subumbonal, with fewer stronger lines; the other longer, posterior, with more numerous but weaker crenulations. No marginal teeth. Margin smooth, except on the posterior side, where it is broken into five prominent, interlocking tubercles. Both posterior and anterior adductor scars are visible; the pallial line is apparently simple. Height 3·8; length 2·9; diameter of single valve 1·2 mm.

Hab.—Tasmania: Eagle Hawk Neck (type, in shell sand collected by Mrs. C. Hedley, 27th May, 1903); Ulverston, among kelp roots (Miss Lodder); Scamander River (Miss Lodder)—New South Wales: Long Bay near Sydney, in shell sand (Miss L. Parkes).

Type.—To be presented to the Australian Museum.

The nearest relation to the species above described is *Myrina crenatulifera*, Tate.* This was apparently shown by Tate to Bernard, who did not recognise it as a *Philobrya*, but continued it† in the original genus,‡ from which Tate afterwards transferred it.§ My reference of that species as occurring in waters of this State‖ is based on *P. rubra*. The two species agree in the absence both of the peculiar protoconch of *Philobrya* and of external radiating sculpture. Tate's species is always brown, mine red; and the mytiliform shape of the novelty further distinguishes it.

The genus *Philippiella* was instituted by Dr. Georg Pfeffer¶ for the reception of two species from South Georgia. I have not

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* Trans. Roy. Soc. S.A. xv. 1892, p. 131, pl. i., figs. 11, 11*a*.

† Journ. de Conch. xlv. 1897, p. 37.

‡ *Adula* should replace the preoccupied *Myrina*. Vide Marshall, Journ. of Malac. viii. 1901, p. 19.

§ Trans. Roy. Soc. S.A. xxii. 1898, p. 87.

‖ These Proceedings, xxvii. p. 17; Mem. Aust. Mus. iv. 1902, p. 300.

¶ Jahrb. wiss. Hamburg, iii. 1886, p. 119.

seen these Antarctic forms, but judge from the account quoted that they closely resemble *Philobrya*, but differ by the presence of two adductor muscles and the absence of the dish-shaped protoconch. Rather than suggest a fresh generic name for our pair of uncapped Australian species, I propose to lodge them for the present in *Philippiella*.

Terebratulina radula, n.sp.

(Plate x., figs. 48-50.)

Shell minute, longer than wide, elongate-ovate, not flexed in front. Colour dull white. Beak produced, distally gouged out to meet a large and incomplete foramen which is margined laterally by small deltidial plates. Ventral valve shallower and much shorter than the dorsal, with auricles somewhat like *Lima bullata*; a juvenile growth-stage is well defined on its apex. Both valves are sculptured by about a dozen bold, radiating granose ribs, which denticulate the ventral margin and are parted by broad, trench-like interstices, the latter roughened by finer grains. On each side these ribs gradually fade away. The auricles of the ventral valve are transversely wrinkled. Loop trapezoidal, complete, with a returning point on the shorter side. Length 2·95; height 3·85; breadth of conjoined valves 2 mm.

Hab.—Sixteen miles east of Wollongong, in 100 fathoms; three specimens taken by Mr. G. H. Halligan and myself.

Type.—To be presented to the Australian Museum.

From the well developed loop, I regard the individual figured as adult, in which case it is probably the smallest of the genus known. It is also easily distinguished from co-generic forms by the bold, radiating sculpture. Young specimens, one-third the size of the type, with undeveloped loop, differ in contour. These are broader in proportion to their length, and have a general resemblance to *Eucalathis murrayi*, Davidson.

The Tertiary fossil *Terebratulina scoulari*, Tate, has a general likeness to our species.

On the dates of Tenison Woods' Tasmanian Shells.

In some cases G. F. Angas and Tenison Woods described the same shell almost at the same time. It is therefore important to ascertain the exact dates of publication of Tenison Woods' Tasmanian shells. While on a visit to Hobart, I called on the printers to the Royal Society of Tasmania, who most courteously furnished me with the following dates of their Proceedings :—

Proc. R.S. Tas. for	1874	issued	May 11, 1875.
,,	1875	,,	March 21, 1876.
,,	1876	,,	Feb. 27, 1877.
,,	1877	,,	June 14, 1879.
,,	1878	,,	Feb. 24, 1879.
,,	1879	,,	July 21, 1880.

The volume for 1877 was held over for a considerable time to complete certain tables. Probably Tenison Woods circulated his reprints privately before the appearance of the Proceedings.

In the author's reprint, but not so far as I am aware in the volume proper, there is inserted in reference to p. 135 of Proc. Roy. Soc. Tas. for 1875, a slip dated 18th May, 1876, withdrawing *Trophon clathratus* in favour of *T. petterdi.*

EXPLANATION OF PLATES.

Plate viii.

Figs. 1, 2, 3.—*Endodonta hookeriana*, Johnston; various aspects.
Figs. 4, 5, 6.—*Flammulina mathinnæ*, Petterd; various aspects.
Fig. 7.—*Heterocyclus petterdi*, Smith.
Figs. 8, 9, 10, 11.—*Epigrus protractus*, Hedley; various aspects, viewed in axial rotation.
Figs. 12, 13, 14.—*Strebloceras cygnicollis*, Hedley; different aspects and magnified tip.
Figs. 15, 16.—*Capulus devotus*, Hedley; from the side and beneath.
Fig. 17.—*Daphnella cassandra*, Hedley.
Fig. 18.—*Phos tabidus*, Hedley.
Fig. 19.—*Lotorium spengleri*, Chemnitz; nest and eggs.

Plate ix.

Fig. 20.—*Rissoa integella*, Hedley.
Figs. 21, 22.—*Atys pransa*, Hedley.

Figs. 23, 24, 25.—*Stiva ferruginea*, Hedley, and its operculum, as seen from each surface.

Figs. 26, 27.—*Thraciopsis arenosa*, Hedley; exterior of valve and hinge.

Fig. 28.—*Lima bassii*, Ten. Woods; from a recent example.

Figs. 29, 30, 31, 32, 33, 34.—*Arca lischkei*, Dunker; adult specimen from the side, within and above; half-grown instance; juvenile specimen and hinge of same.

Plate x.

Figs. 35, 36, 37, 38.—*Chione despecta*, Hedley; exterior, interior, superior aspects and hinge.

Fig. 39.—*Dacrydium fabale*, Hedley, from within.

Figs. 40, 41, 42, 43.—*Philobrya inornata*, Hedley; exterior, interior, superior aspects and hinge.

Figs. 44, 45, 46, 47.—*Philippiella rubra*, Hedley; exterior, interior, superior aspects of one individual and hinge of another.

Figs. 48, 49, 50.—*Terebratulina radula*, Hedley; dorsal, ventral and interior aspects.

Appendix.

Note on *Terebra Hedleyi*, Tate.

By Edgar A. Smith, Assistant Keeper of Zoology, Natural History Museum, London.

In Volume xxvi., p. 214, of these Proceedings, in a note by the late Professor Tate, it is stated that the *Cingulina Brazieri* of Angas does not belong to that genus but to *Terebra*, and because Angas's species-name was already in use in the latter genus, it is changed to *Hedleyi*. The object of the present note is to point out that the shell in question is not a *Terebra*, but was rightly placed by Angas in *Cingulina*, and consequently the alteration in the specific name was altogether unnecessary.

The mistake I imagine has arisen through the artist having drawn the type just as he saw it, and not recognising the fact that the outer lip of the shell had been broken away, thus giving the aperture a somewhat channelled appearance anteriorly, still not so canaliculate as in *Terebra*.

Two specimens of this species were presented to the British Museum by Mr. Angas in 1877, one, the type, being exactly like

the figure,* the other having the normal anteriorly rounded unchannelled aperture of *Cingulina*. It is, however, remarkable that Professor Tate should have selected *Terebra* for the location of this shell with spiral sculpture, a form of ornamentation so uncommon in that genus. If he had suggested *Turritella* one would not have been surprised.

I conclusion, I may add that I very much doubt whether this so-called species is anything more than a variety of *Cingulina circinata* of A. Adams (also known from Port Jackson), in which the spiral ridges are rather flatter, and the intervening grooves narrower than usual.

* Proc. Zool. Soc. London, 1877, pl. v., fig. 5.

THE LOSS OF COLOUR IN RED WINES.

By R. Greig Smith, D.Sc., Macleay Bacteriologist to the Society.

Two samples of red wine were obtained from a correspondent in South Australia, who gave me the following history of them:—

Sample A.—A dry red wine, 1900 vintage. It kept in good condition and order until April, 1903. In the cask it remained without much apparent change of condition. Upon removing a sample from the cask and exposing it to the air, it became perceptibly dull and threw down a copious black powdery deposit, which increased up to a certain limit. The wine then commenced to clear again. The wine contained short rod-like bacteria which, after exposure to the air, as detailed above, became fringed with débris.

Sample B.—A dry red wine, 1901 vintage. This wine appears to have been infected in bulk with the organisms of "*vin tourné.*" It behaved like Sample A, but not to the same extent.

The bacteriological examinations of both samples showed that they contained a few moulds, *Penicillium glaucum*, and a great number of short rod-shaped bacteria, which grew very slowly upon nutrient glucose-gelatine, glucose-yeast-water-gelatine and alcohol (5%)-yeast-water-gelatine. The colonies grew slowly and were always punctiform and microscopically circular and finely granular. In stroke culture upon the various gelatine media they grew slowly as a white narrow line, and did not liquefy the gelatine.

Small experimental flasks of an Australian claret were infected with the bacterium and placed in the incubator at 22°. In five days the wine had lost its brightness, while a slight film and sediment had formed. By the tenth day the wine had become decidedly lighter in colour; the film had become stronger and the

deposit greater. Both film and deposit were coloured with the colouring matter of the wine.

A determination of the loss of colour was made by diluting 5 c.c. of the wine with 45 c.c. of water and comparing the depth of colour of this with similarly diluted wine from a control flask. The colour of the diluted 5 c.c. of infected wine was matched by 50 c.c. of diluted wine, containing 4·2 c.c. of the control wine. The infected wine had, therefore, suffered a loss of 16% of its original colour.

The infected wine had also become more acid. Normally the wine contained 7 milligrams of volatile acid in 10 c.c., while the infected wine at the end of ten days contained 298 milligrams of volatile acid in the same quantity. The acid is expressed as acetic, for it was shown to be such by the appearance and analysis of the silver salt.

The experimentally infected wine had, while losing its colour, deposited a coloured sediment, which consisted of dark-coloured zooglœa masses of bacteria. The phenomenon differed materially from what had been observed in the case of the wine from which the sample had been taken. Upon removal from the cask and exposure to the air, it had become dull and had thrown down a powdery deposit. The two phenomena are, therefore, quite different, but it must be remembered that the wines were under widely different conditions. The experimental wines were small in quantity (20 c.c.) and had been under aërobic conditions for a short time. The natural wine had been contained in casks, where the bulk had been for a long time under practically anaërobic conditions. Probably under the adverse conditions the aërobic bacteria had practically ceased to multiply, but had continued to secrete their oxidases, giving them off to the wine, so that upon exposure to the air the colouring matter was quickly oxidised to an insoluble darker-coloured product which slowly settled as a deposit.

What is generally known as the loss of colour of red wine is recognised as a complex process,* inasmuch as there are certain

* Lafar, Technical Mycology, London (1898), i., 311.

subordinate phenomena associated with the disease while the wine is in the cask. The malady shows itself first by an evolution of gaseous carbon dioxide; then the alcohol is converted to acetic acid, and finally a putrefactive fermentation ensues. Many bacteria have been isolated from such wines by various investigators from Pasteur in 1865 to Galeazzi in 1894; but in all cases the bacteria either had not been purified or experimental evidence as to their infectious nature had not been adduced. In order to produce the various stages, Lafar concludes that a number of organisms are probably necessary. He writes :—"A single bacterial species is insufficient to occasion the complaint, the successive action of a number of species is essential."

If we consider the chief phases of the disease, viz., the loss of colour, we find that there appears to be no reason why it might not be caused by the action of an acetic organism. In an allied disease, the browning of white wine, "*la casse*," the wine when poured from the cask into a glass vessel becomes darker in colour, especially in the upper layers. The colour spreads downwards, the wine becomes turbid, and finally a fine dark powder is deposited. The formation of a deposit is similar to what occurs in "*vin tourné*," and doubtless it was this that caused the loss of colour of red wine to be for a long time classed with the browning of white wine. In the latter disease it is at present accepted that the phenomenon is caused by an enzyme, which plays the part of a carrier of oxygen, that is, an oxidase. The oxygen of the air is absorbed by it and given up to the colouring matter and tannins of the wine, which are converted into insoluble and dark-coloured compounds.

Since it is admitted* that an oxidase causes the formation of a dark powdery deposit in the case of "*vin cassé*," there appears to be no reason why an oxidase should not also be responsible for the similar formation of a dark powdery deposit in the loss-of-colour stage of "*vin tourné*." It is true that in the one case an oxidase has been isolated and not in the other, but that may

* Lafar, *op. cit.*, 400.

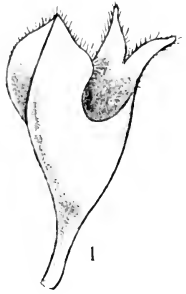
simply be a matter of technique. The acetic bacteria are the oxidising bacteria *par excellence*, and they must do their work by means of oxidases which they produce and possibly excrete. Since acetic bacteria were the only bacteria detected in the wines under investigation, there is every reason to believe that they were responsible for the loss of colour.

The only objection to this claim is that experimentally the sudden formation of a powdery deposit was not obtained. In place of it a slow precipitation occurred concomitantly with the sedimentation of the bacteria. The difference is probably merely one in the time through which the phenomenon extended, and might be explained by the difference between the natural and the experimental conditions.

Attempts were made to produce the sudden precipitation of the colouring matter of the wine by subjecting infected samples of wine to various anaërobic and partly anaërobic conditions during times varying from a week to a month, but without success. When the cultures were again exposed to the air no change occurred. This does not necessarily mean that the bacteria cannot produce the phenomenon, but it means that they cannot do so under laboratory conditions. Under natural conditions, such as the infection of the wine in bulk and storage for a year or more, another result might have been obtained.

The bacterium appears to be a race of *Bact. ascendens*, Henneberg. It forms a delicate film which creeps high up the sides of the culture flasks; it is easily broken and falls to the bottom of the wine as a flocculent precipitate. The cells are not stained by iodine, they are non-motile and are not arranged in threads, but occur singly, in pairs and in masses. The white opalescence upon the medium around the colonies on nutrient glucose-gelatine was not observed, but this is not enough to constitute it as a new species. When contained in wine it is killed by an exposure to 43° C. for ten minutes.

[Printed off August 2nd, 1904.]



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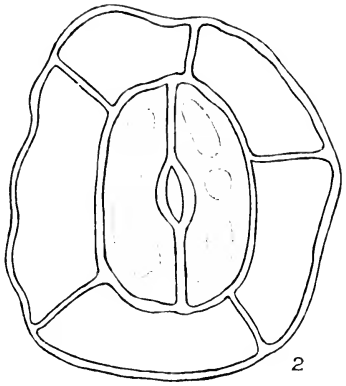

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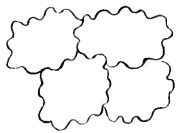

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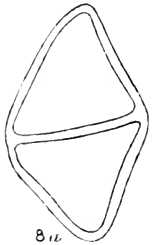

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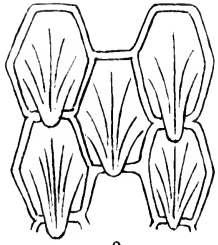

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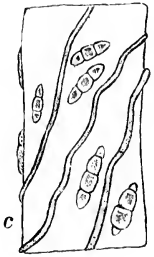

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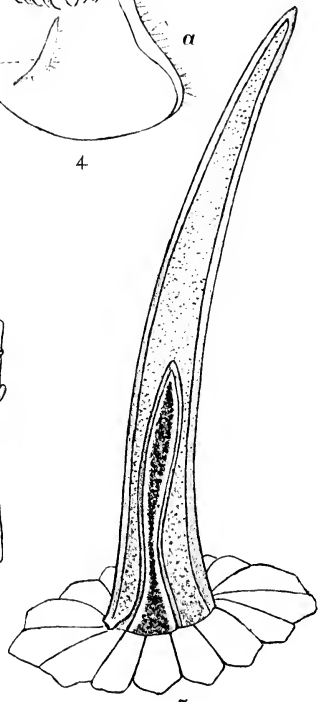

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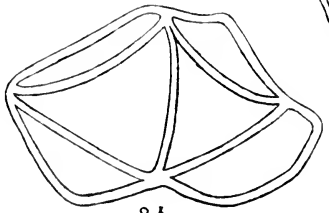

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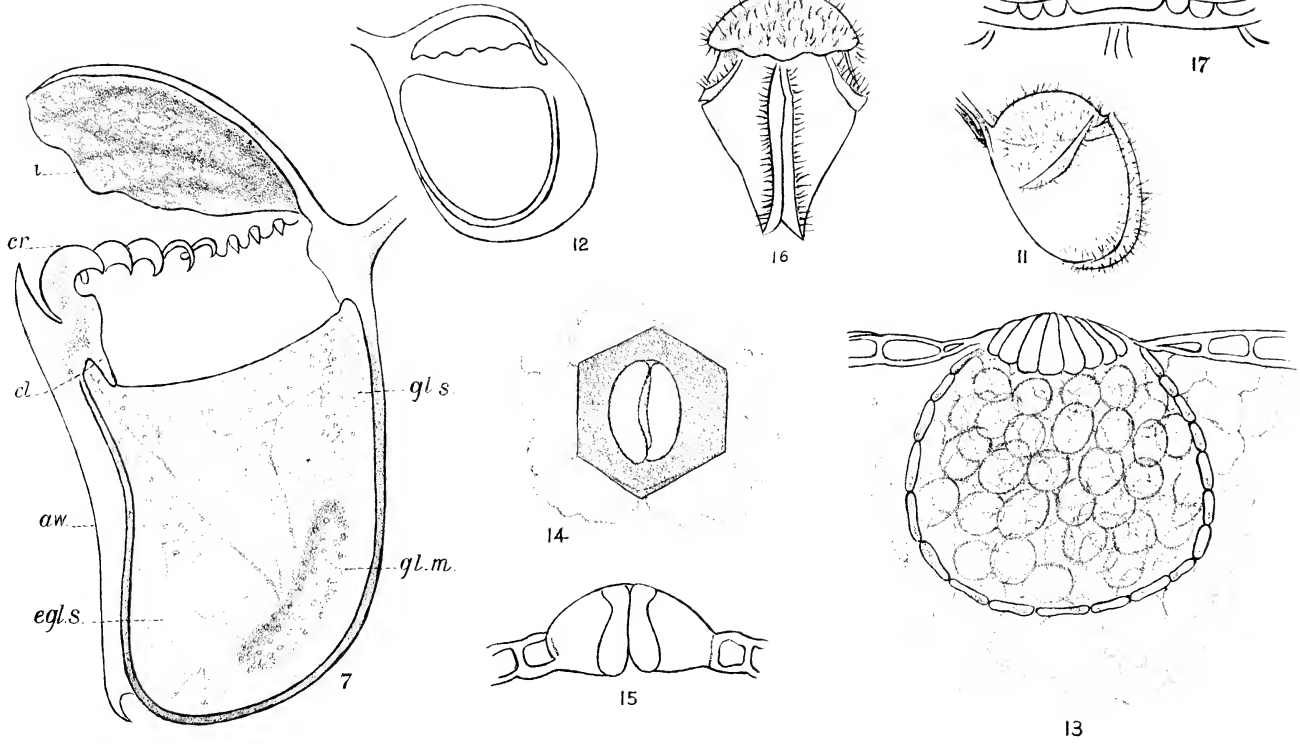


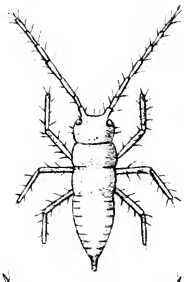
A.G.H. del.

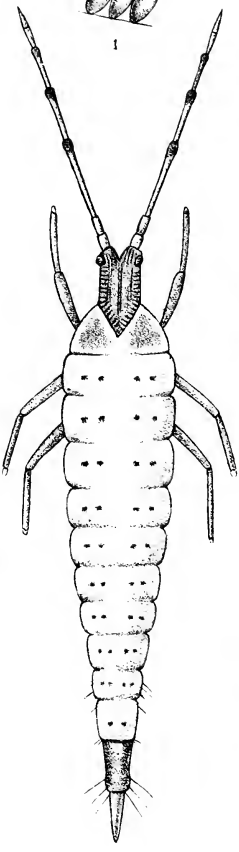
CEPHALOTUS FOLLICULARIS, Labill.

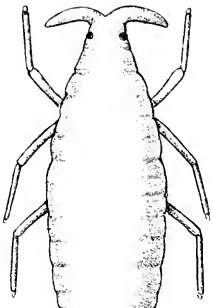
Fig. 18.

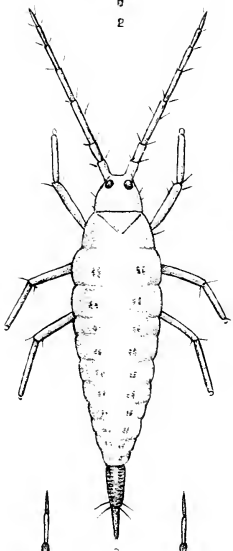
Fig. 19.

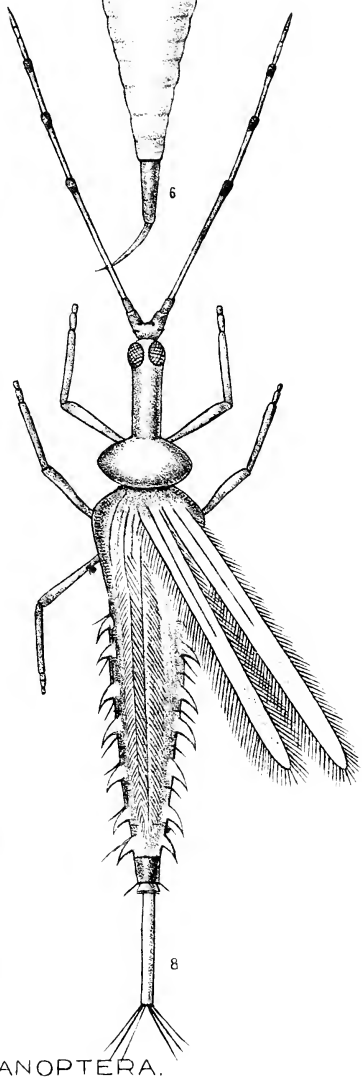
Fig. 20.

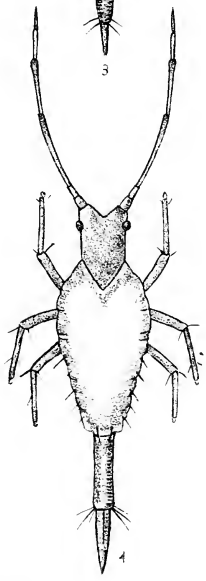


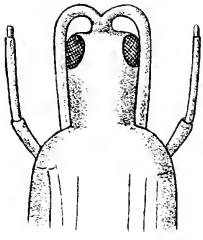












W.W.F. del.

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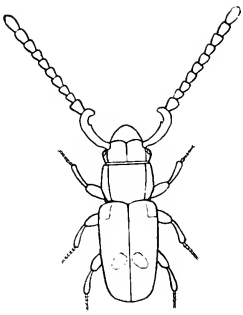

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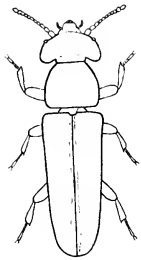

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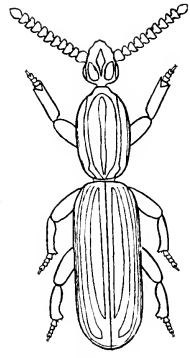

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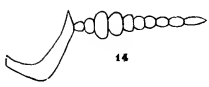

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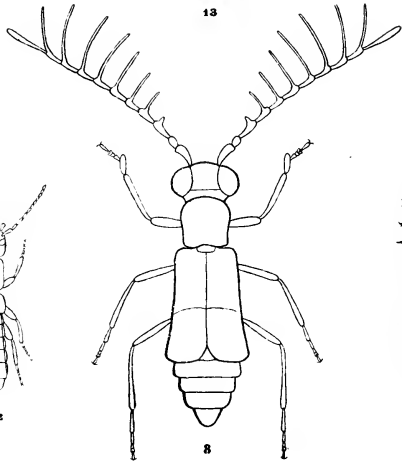

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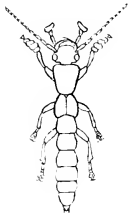

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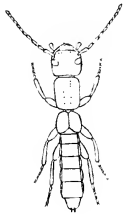

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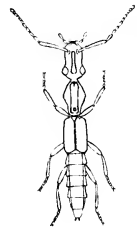

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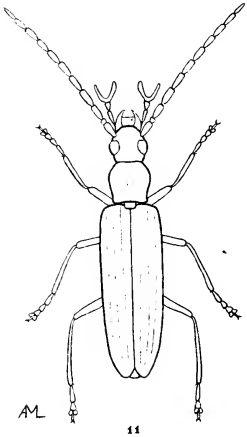

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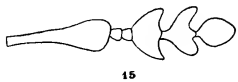

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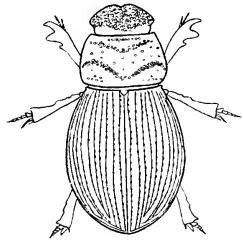

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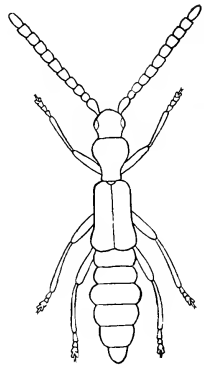

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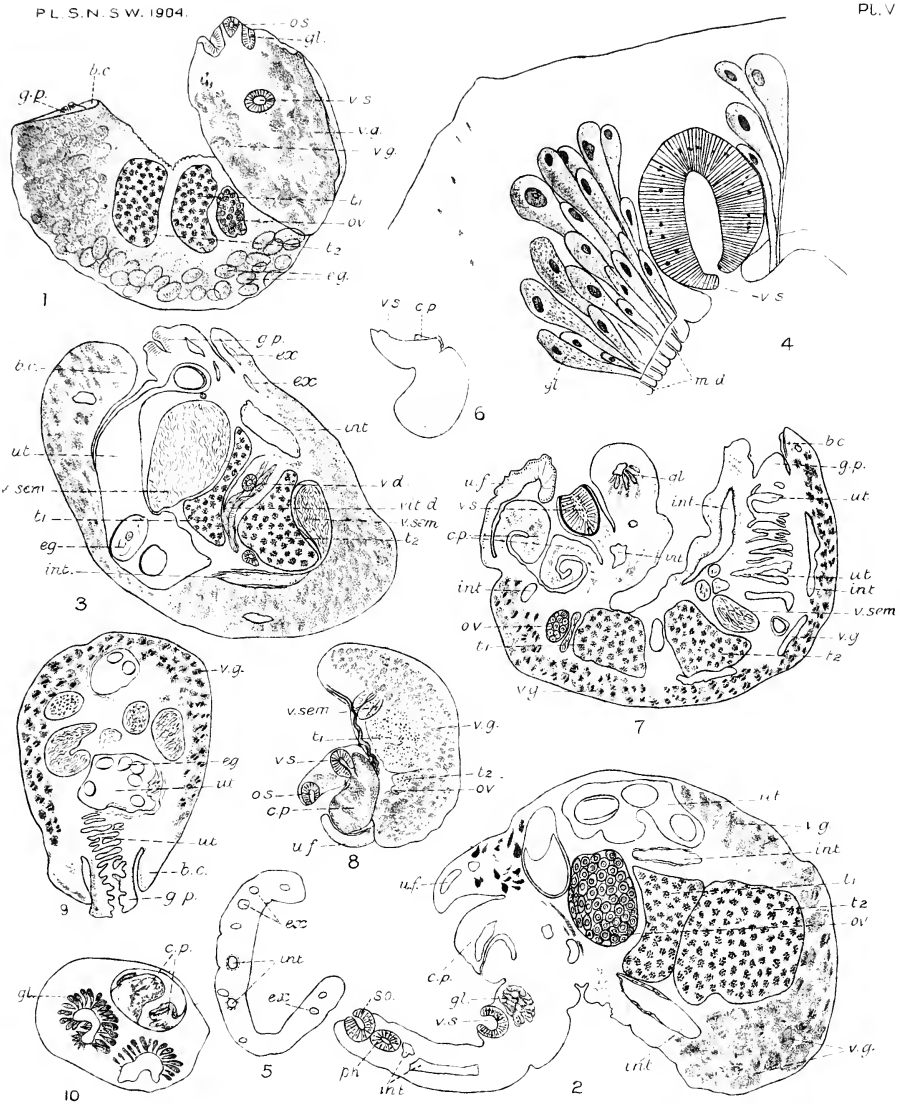
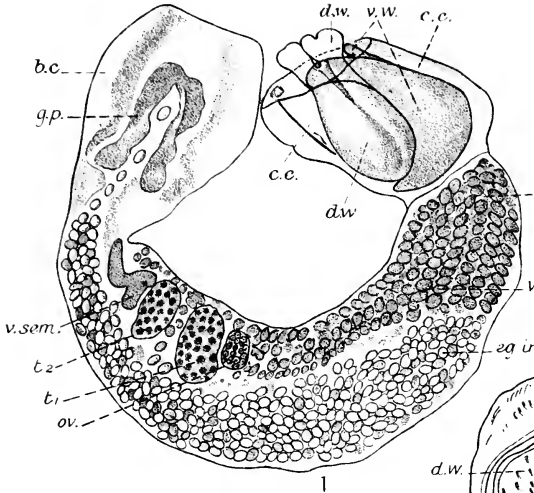


G.J. del.

1-6. HEMISTOMUM TRIANGULARE 7-10. H. INTERMEDIUM



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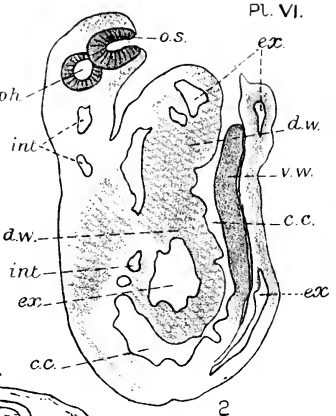

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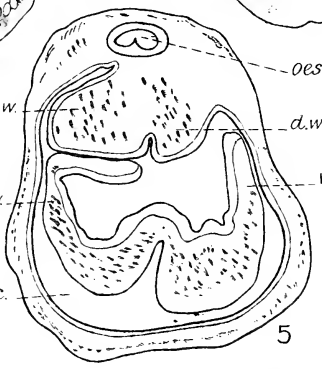

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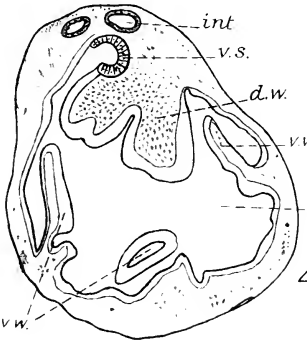

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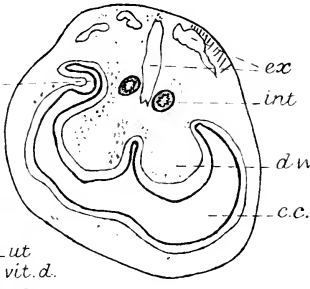

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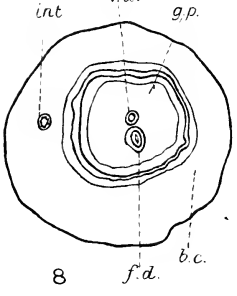

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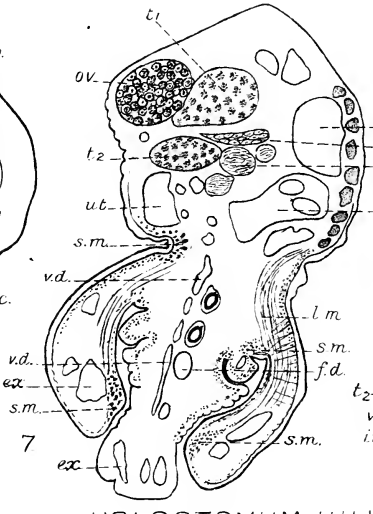

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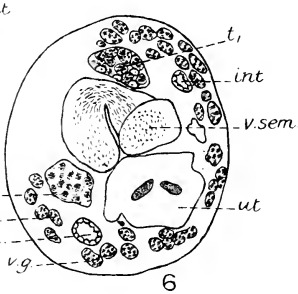

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G.J. del.

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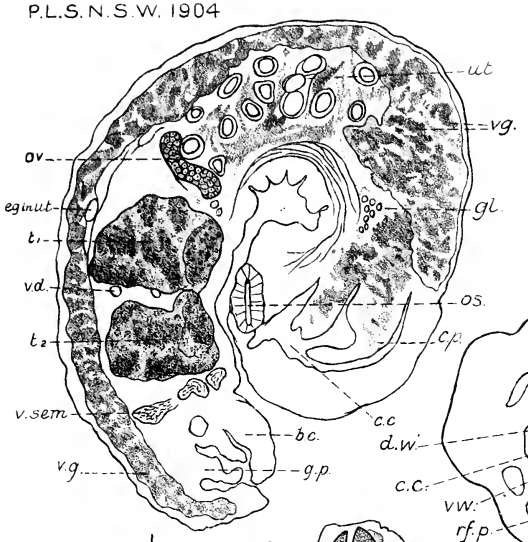

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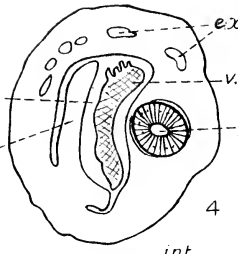

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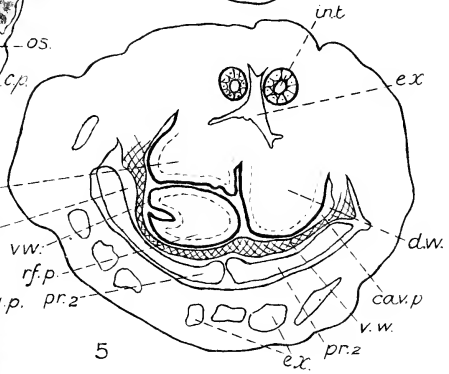

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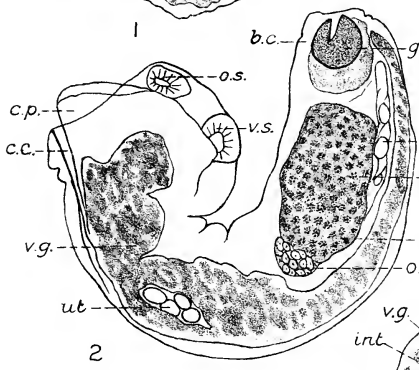

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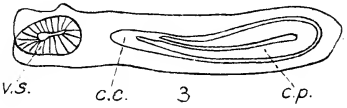

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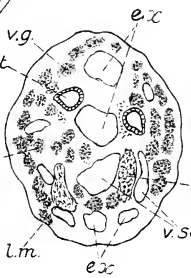

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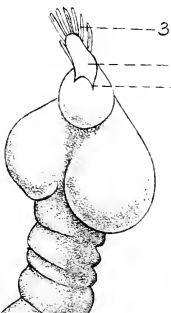

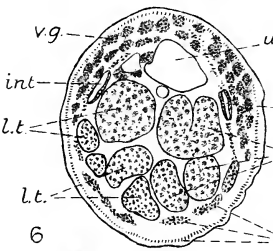

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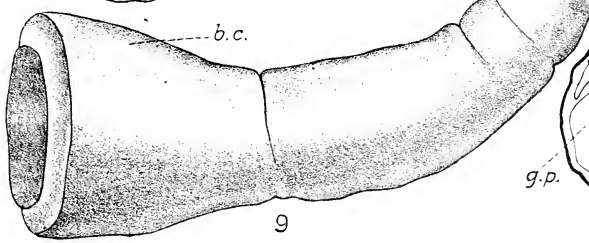

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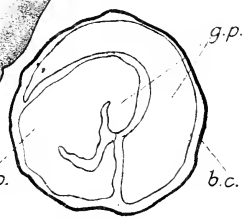

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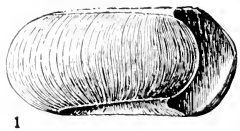
G.J. del.

1-3. HOLOSTOMUM SIMPLEX 4-9. H. MUSCULOSUM



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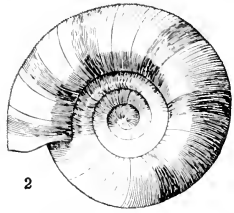

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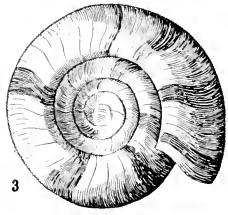

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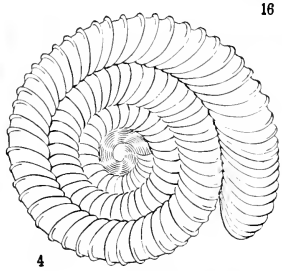

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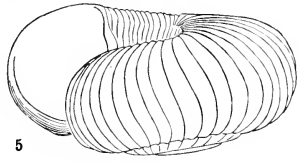

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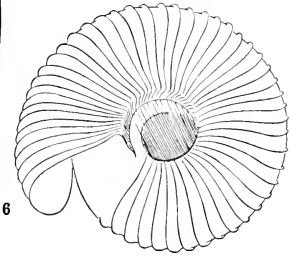

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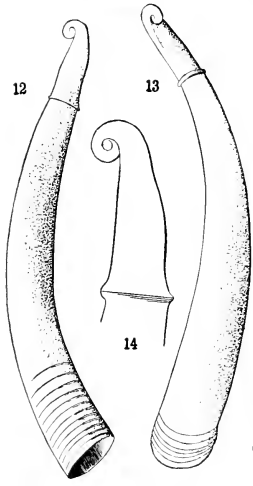

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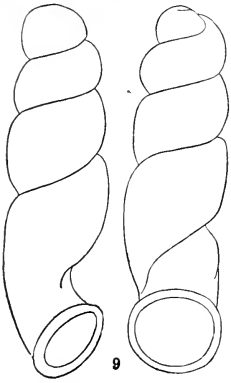

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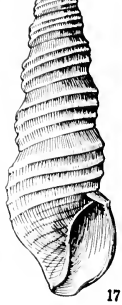

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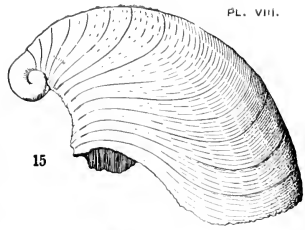

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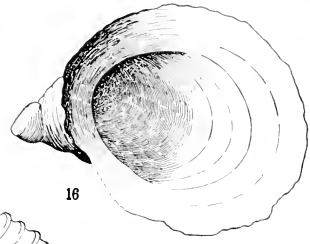

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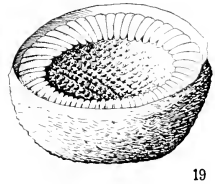

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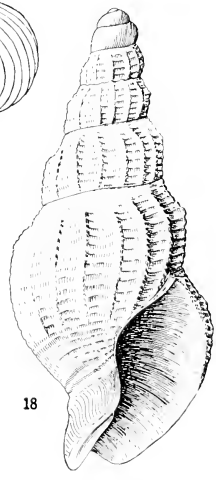

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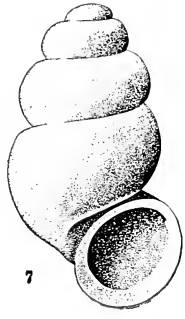

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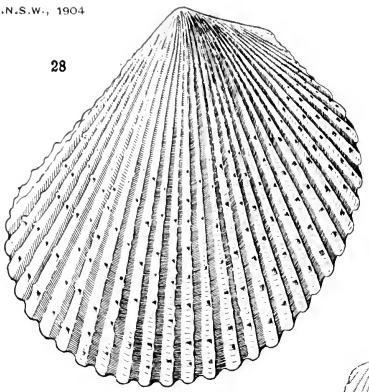
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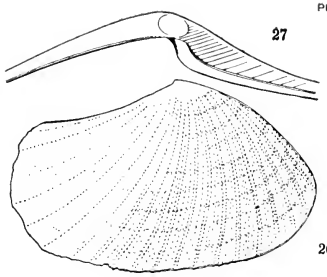
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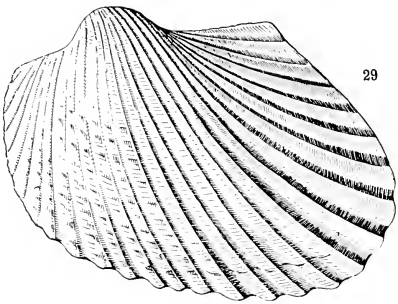
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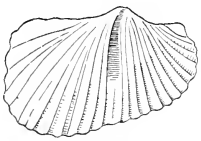
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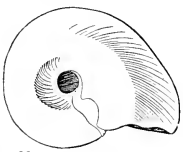
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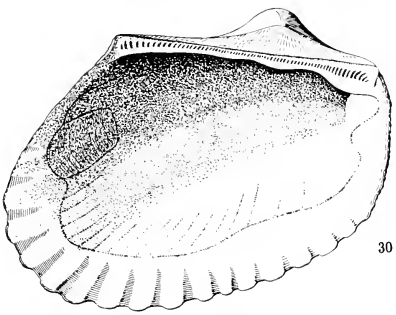
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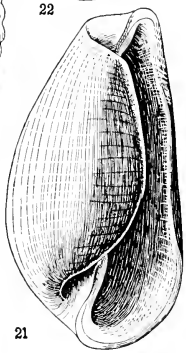
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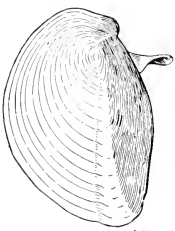
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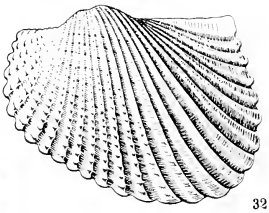
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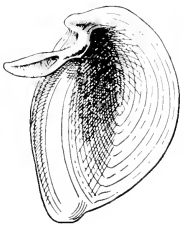
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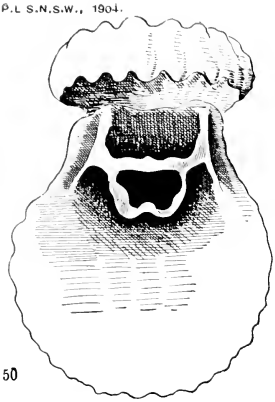
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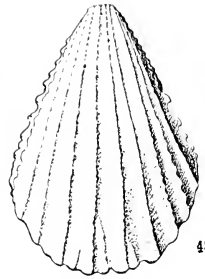
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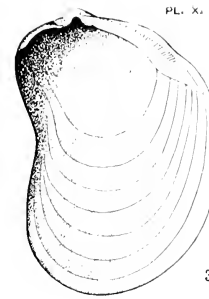
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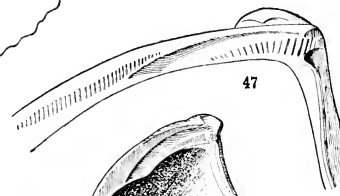
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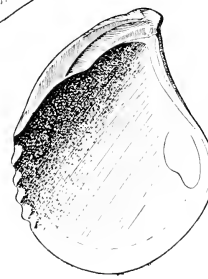
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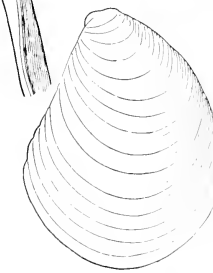
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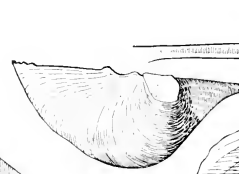
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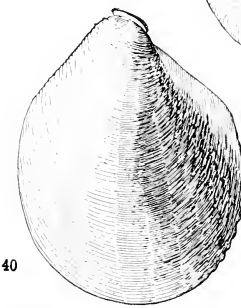
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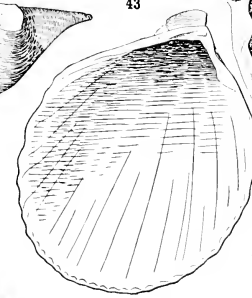
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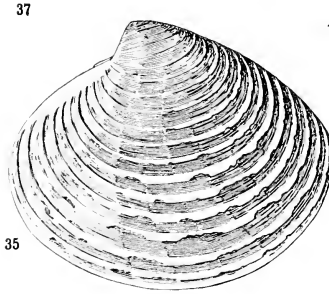
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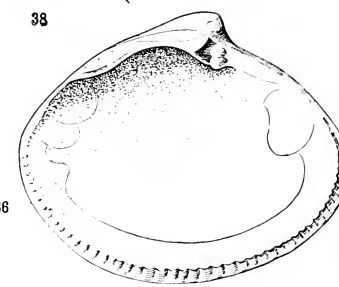
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THE BACTERIAL ORIGIN OF THE GUMS OF THE ARABIN GROUP.

XI.—The Nutrition of *Bacterium acaciæ*.

By R. Greig Smith, D.Sc., Macleay Bacteriologist to the Society.

(Plates xi.-xii.)

In the first two papers of this series it was shown that when *Bact. acaciæ* and *Bact. metarabinum* were sown upon the surfaces of plates of saccharose-potato-tannin agar, they produced luxuriant slimes, and that from the slimes arabin and metarabin could be obtained. Since the medium produced so much slime it was extremely probable that it contained the nutrients which were best adapted to assist the bacteria in producing gum. The medium consisted of saccharose 5%, tannin 0·3%, agar 2%, and potato-juice or extract. The latter is the unknown quantity. It would be necessary to determine the composition of the potato-juice to arrive at a knowledge of the nutrition of the bacteria, and two methods might be adopted for this purpose. Either the juice may be analysed, or one might experiment with various single nutrients in the hope of finding a clue which would lead to the desired end. I chose the latter alternative, chiefly because by doing so there was the probability of increasing the yield of slime by using nutrients which might not be in potato-juice.

Preliminary experiments.—According to Dammar and Rung (Chemisches Handwörterbuch), potato-extract should contain reducing sugars, asparagine, traces of amido-acids, peptone, solanine and gums. The albuminoids would be removed during the preparation of the extract. The chief of these nutrients are the reducing sugars and the asparagine; the other constituents

might be neglected. But since saccharose was found to be useful in the saccharose-potato-tannin medium, the reducing sugars of the extract might also be neglected. There remains then asparagine as being the essential nutrient of the potato-extract. The salts of the extract would also doubtless assist the bacteria.

With this information at my disposal I prepared a saccharose-asparagine-tannin medium and infected plates of it with the bacteria. At the same time a comparative test was made with a medium identical with the other, excepting that it contained no tannin.

	Saccharose-asparagine-agar	
	without tannin.	with tannin.*
Bact. acaciæ (plum) ..	dry growth; no slime	thin non-adherent slime
Bact. acaciæ (almond) ...	scanty growth; no slime	thin non-adherent slime
Bact. metarabinum ...	dry growth; no slime	dry growth; no slime

It is evident that tannin was of considerable importance, not only in causing a production of slime, but also in making the slime non-adherent, an important point in the artificial production of the carbohydrate. The quantity of slime, however, was small compared with what was obtained when potato-extract had been employed. The absence of slime upon the plates infected with *Bact. metarabinum* is peculiar, and shows that the nutrition of this organism may differ from that of *Bact. acaciæ*, and that these bacteria would need to be investigated separately.

Believing that the salts of the last medium had had an influence in lessening the yield of slime, an experiment was made in which the medium in the tubes was treated with varying quantities of potassium chloride, potassium monohydrogen phosphate, and potassium citrate. The last-named salt was suggested by some earlier experiments, which indicated increased slime-yields by

* Saccharose 5, asparagine 0·1, tannin 0·3, KH_2PO_4 0·1, KCl. 0·5, agar 2, water 100 grms. Medium made neutral to litmus before the addition of the tannin.

potassium phosphate, citrate or asparaginate when peptone was used. Furthermore, citric acid is the chief organic acid in potato-juice, a fact which was brought out during the investigation of the acids formed by the bacteria.

Like the previous experiment the slime-production was scanty, but the results showed broadly that no slime was formed in the presence of chloride or phosphate. Slime was produced on the media containing citrate or citrate and chloride. A mixture of citrate and phosphate prevented slime-formation. It was made evident that a good salt to employ in the synthetic medium would be potassium citrate.

After finding that tannin and citrate were useful for a slime-producing medium, the next step which was taken was the influence of different carbohydrates. From 0·5-1 grm. of carbohydrate was dissolved in 20 c.c. portions of a medium containing peptone, citrate and agar; and with these plates were prepared, and the surfaces smeared with *Bact. acaciæ*. At the same time another set was made; these differed in containing asparagine in place of peptone. The results showed that levulose was the chief sugar from which the organism formed its slime, and that asparagine was much better than peptone.

Experimental methods.—Hitherto the quantity of slime produced by a particular combination of nutrients had been roughly estimated. But after making many experiments, it became apparent that some definite method would have to be adopted to distinguish small differences, and the use of the balance suggested itself. Before proceeding to consider the next experiment, perhaps it would be advisable to describe the method employed in obtaining a certain weight of slime. In preparing the medium the agar was first dissolved in about half the required quantity of water. The remainder of the nutrients, etc., were dissolved in rather less than half, which was heated and added to the solution of agar upon its removal from the autoclave. The incomplete medium was then put into wide (6 × 1 inch) numbered test tubes by means of a 200 c.c. burette graduated in cubic centimetres. Each tube contained 20 c.c. of medium. The nutrient under

experiment was weighed and put into the tube, which was shaken until solution had taken place. The tubes were next sterilised by being steamed once for three-quarters of an hour. The tannin medium is not a suitable pabulum for the majority of bacteria, so that one steaming is practically sufficient. Only once or twice have I seen a mould upon the plates, and many hundreds of these have been prepared. After steaming, the tubes were cooled to 50° and poured into 9 cm. Petri dishes. The infecting culture was prepared by growing *Bact. acaciæ* upon the sloped surface of saccharose-potato-agar at 30° for 24-48 hours. This produced a loose aggregation of cells without slime. Some of the culture was picked up with the front of a loop of stout platinum wire and smeared completely over the surface of the agar in the Petri dish. After 24 hours the lid of the dish was raised and the slime uniformly distributed with the same large platinum loop, which had an internal diameter of 4 mm. At the end of three days the slime was scraped by means of a small rubber spade into a counterpoised watch glass and weighed. Two days afterwards the slime which had formed during the interval was similarly removed and weighed. The plates were kept under observation for another two days to be sure that slime-production had ceased. The slimes were weighed upon an open coarse balance to the second decimal place, although the balance was sensitive to 5 milligrams. In the tables that follow, the total weights obtained are multiplied by 5 and expressed as the nearest whole number, thus giving the weight of slime in grams from 100 c.c. of medium. In one or two tables the actual weighings are recorded to show how the bulk of the slime is formed in the first three days.

Several experiments were made during the course of the research, when duplicate plates were used, to see if a larger quantity of infecting material had any tendency to increase the amount of slime. The results showed that the quantity of material had no influence upon the weight of slime. In some cases a little more was obtained, in others a trifle less, in others the weights were the same.

The influence of levulose.—Having found that levulose was a suitable sugar, an experiment was made to determine the most favourable quantity. The figures given are the percentages obtained at the end of the third day. Asparagine was the nitrogenous nutrient in the medium.

THE SLIME FROM VARYING QUANTITIES OF LEVULOSE.

Percentage of levulose.	Grams of slime from 100 c.c. of medium.*
None.	0
1	14
2	17
4	15
6	13
8	10
10	7

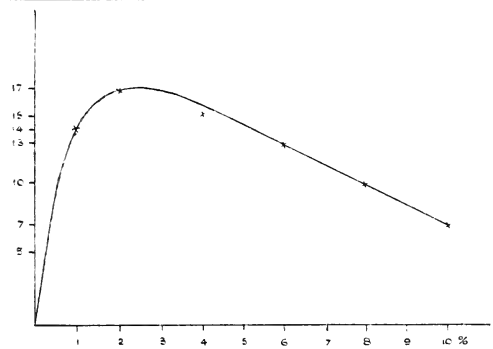


Fig. 1.—THE INFLUENCE OF LEVULOSE.

It is evident that the optimum percentage of levulose lies between 2 and 4 per cent. Upon plotting the numbers it is found that the yield reaches a maximum with about $2\frac{1}{2}$ % of levulose. The depressing effect of larger quantities is clearly shown.

The influence of salts.—The saline constituents of the medium are undoubtedly of considerable importance, and it has been

* Asparagine 0·3, potassium citrate 0·6, tannin 0·3, agar 2, water 100 grms.

already mentioned that citrates favoured, while chlorides and phosphates prevented, slime-formation upon a certain medium. A small quantity, 0·12 grm., of various salts was added to 20 c.c. portions of medium in tubes, so that the salts were present to the extent of 0·6 %. As a rule salts of potash were added, but in some cases the sodium or ammonium salt chanced to be the only compound in the laboratory.

THE INFLUENCE OF VARIOUS SALTS.

Salt.	Grams of slime from 100 c.c. of medium.*
Sodium succinate...	20
Potassium citrate...	18
Sodium potassium tartrate	15
No salt	15
Potassium chloride	14
,, sulphate	12
,, monohyd. phosphate	11
,, oxalate	9
Sodium acetate	0
,, formate	0
Ammonium lactate	0

It is seen from the table that the acid radicles may (1) accelerate, (2) be indifferent, (3) depress or (4) prohibit. Succinate and citrate favour the production of slime, and in the majority of the experiments in this research one or other of these salts has been employed. Tartrates are indifferent, while sulphates, phosphates and oxalates are depressants.

Among the acids which the bacterium forms from saccharose are acetic, lactic and succinic. It is interesting to note that of the three the first two prohibit and the last stimulates the gum-forming faculty of the organism.

Having found that citrate and succinate were stimulants, the next step was to discover the optimum quantities of these salts. Accordingly, tubes of media were prepared and various quantities of salt added.

* Asparagine 0·1, levulose 2, tannin 0·3, agar 2, water 100 grms.

INFLUENCE OF THE QUANTITY OF SALT UPON THE YIELD OF SLIME.

Salt.		Slime in grams from 100 c.c. of medium.*
No salt		25
Sodium succinate	0·1%	25
,, ,,	0·3	22
,, ,,	0·5	21
,, ,,	0·75	21
Potassium citrate	0·1	26
,, ,,	0·3	24
,, ,,	0·5	21
,, ,,	0·75	22

From the numbers as a whole we must conclude that succinates and citrates in anything but small amount, viz. 0·1%, act as depressants. By the reversal of the yields, as compared with the last experiment, the question is still undecided as to whether citrate or succinate is the better; although when the results are expressed in the graphic form the curves show that citrate is rather better than succinate.

The action of tannin.—Previous experience had shown that tannin increased the amount of slime, and at the same time made it of such a nature that it could be removed from the surface of the agar medium with the greatest ease. The very early experiments had indicated that the optimum quantity of tannin lay between 0·2 and 0·4%, and 0·3% was taken in making the saccharose-potato media. That this is the best quantity is open to doubt, and an experiment was arranged to find the weights of slime produced by varying amounts of tannin in a synthetic medium. Tannin is objectionable for two reasons. Firstly, it tends to soften the medium during sterilisation. This it probably does by reason of its acidity. Secondly, it passes into the slime and darkens the gum which is ultimately obtained unless the solutions are made decidedly acid, a condition which somewhat hinders the precipitation of the gum by alcohol. If, therefore, smaller quantities of tannin should be found to be as good as larger for the purpose, a distinct advance would be made.

* Asparagine 0·1, levulose 2, tannin 0·1, agar 2, water 100 grms.

The slimes in the experiment were incubated at 13° and weighed at the end of the third day.

THE SLIME FROM VARYING AMOUNTS OF TANNIN.

Tannin %.	Grams of Slime from 100 cc. of medium.*
None.	10
0·1	16
0·2	16
0·3	16
0·3 (new lot).	11

The influence of the tannin in giving an easily removable slime was again demonstrated, although the difference was not so marked as in the earlier experiments, especially with saccharose-potato-agar. The better nutrition of the bacterium, *e.g.*, with levulose, caused a greater slime-production, with a concomitant greater ease in removal. The consistency of the plate containing 0·1% was firmer and the medium of a lighter colour. Both of these appealed strongly in favour of the use of 0·1%. However, I determined to repeat the experiment, especially as the test with a new lot of tannin gave such a very low yield. In this experiment which follows, the temperature of the laboratory varied from 14° to 17° C. The old and new lots of tannin were powders; the commercial sample consisted of dark-coloured lumps.

THE EFFECT OF DIFFERENT TANNINS.

Tannin.	Slime in 3½ days, grams.	Slime 2 days later, grams.	Total Slime from 100 c.c. of medium† grams.
None	4·48	0·23	24
Old lot 0·1%	4·55	0·15	24
,, 0·3%	4·40	0·16	23
New lot 0·1%	4·14	0·16	22
,, 0·3%	4·08	0·11	21
Commercial lump 0·3% ...	4·61	0·60	26
Gallic acid 0·3%	1·17	0·13	7
Pyrogallol 0·3%	(0·05)	0·00	0

* Asparagine 0·1, levulose 2, potassium citrate 0·6, agar 2, water 100 grms.
† Asparagine 0·1, levulose 2, sodium succinate 0·5, agar 2, water 100 grms.

The most notable result of the experiment is the finding that different tannins produce different results. The smaller quantity, viz., 0·1%, produced more slime than the larger percentage. Plates containing 0·5% were also prepared, but the medium was like starch paste; its gelatinous property had been destroyed by the acid. All the plates containing tannic and gallic acid yielded slimes which were readily removed. The slime in the plate without tannin was not homogeneous and apparently contained zoogloea masses, but still it could be removed without taking away particles of the medium.

The function of the tannin.—One cannot say what the rôle of the tannin in the synthetic medium may be. It is possible that it acts by reason of its acidity, or it may form an unstable compound with the levulose, and thus play the part of a catalyte. Probably it does neither of these, but before discussing its function it would be advisable to record some experiments with organic acids, and with salts and tannin. The acidity of 0·1 % of tannin is approximately equal to 0·02 % of citric or succinic acid, so this quantity was used in order to compare the effect of the free acids.

THE EFFECT OF ACIDITY AND OF TANNIN.

	Grams of Slime in five days from 100 c.c of medium.*	
	Experiment 1.	Experiment 2.
Neither salt nor tannin	16, 16	19
Succinic acid, 0·02%...	18	16
Citric acid, 0·023%	17	17
Tannic acid, 0·1%	17	19
Potassium citrate, 0·1% + tannin 0·1%	17	20
Potassium succinate, 0·1% + tannin 0·1% ...	17	...
,, ,, ,, ,, 0·05 ...	17	...
,, ,, ,, ,, 0·02 ...	16	...

* Asparagine 0·1, levulose 2, agar 2, water 100 grms.

EXPERIMENT 3.

	Slime on					Grms. of Slime from 100 c.c. of medium.*
	3rd day.	5th day.		10th day.	12th day.	
Succinic acid ...0·02%	3·80	0·06	Reinfected.	0·22	0·00	20
Citric acid . 0·02	3·07	0·05		0·47	0·00	18
Commercial tannin 0·1	3·79	0·29		0·00	0·00	20
Comm. tannin, 0·1% + Pot. citrate 0·1% ...	4·30	0·59		0·03	0·00	25
Potassium citrate, 0·1%	3·35	0·02		1·32	0·47	26
Neither acid nor salt ...	3·80	0·02		0·66	0·00	22

The three experiments do not agree in details. The divergences are partly due to the different temperatures of incubation, possibly also to a difference in the vitality of the bacterium at the time of each experiment, for they were not made simultaneously, but following each other. But the third experiment shows that a reinfection of the media was necessary to enable the nutrients in the absence of tannin to be utilised. It is clear that the tannin does not act by reason of its acidity. It seems to act as a stimulant, for the nutrients are quickly utilised, that is to say, the slime is formed quickly. In its absence the gum is very slowly produced, as can be seen by referring to the action of potassium citrate and comparing it with that salt plus tannin. Citric acid alone made the medium brittle, so that the infection of the plate and the removal of the slime had to be done with the greatest care to prevent angular pieces of the agar coming away with the slime. In considering the experiments as a whole, one sees that a pronounced acidity of the medium is not to be recommended. The addition of tannin and citrate is advisable, but in the presence of a suitable proportion of asparagine and levulose the addition could almost be dispensed with. If after adding citrate only the medium is reinfected with bacteria, the maximum yield of slime can be obtained.

With regard to the function of the tannin in the medium, I am of the opinion that it is purely physical and causes the agar jelly to be somewhat contractile. A splitting of the agar is a

* Asparagine 0·1, levulose 2, agar 2, water 100 grms.

common phenomenon when large plates are infected. A contractile jelly would slowly supply the bacteria with fluid containing the nutrients. As the slime contains about 97% of water, from 20 to 24 grams of water are taken from every 100 grams of agar medium. The agar without tannin has probably as great an affinity for this water as has the slime, in which case the slime would not be able to get the necessary amount. But the tannin, by slightly contracting the agar or lessening its affinity for water, enables the bacteria to get the moisture slowly and in quantity sufficient for a maximum formation of slime.

The action of various tannins.—The experiments with different tannins showed that they varied in their effects; some increased while others diminished the yield of slime. With the object of determining the action of known tannins, I obtained samples from Messrs. Harrington Bros., of London and Cork, and subjected these to experiment. The results are expressed in the following table.

THE INFLUENCE OF DIFFERENT TANNINS.

Tannin.	Slime in grams from 100 c.c. of medium in three days.			in six days.		
	Experiment i.*	ii.*	Glycerine†	Experiment. i.	ii.	Glycerine.
1. G. powder	19, 18	15, 15	18, 18	21, 19	17, 17	22, 21
2. G. granular	19, 18	17, 16	18, 17	21, 20	20, 18	23, 21
3. Commercial 6713 ..	19, 17	15, 15	17, 16	20, 18	17, 17	23, 22
4. Commercial	16, 16	15, 15	16, 16	18, 18	17, 16	21, 21
5. No tannin	11, —	10, 10	18, 17	13, —	13, 13	19, 18
6. Granular 6087	9, 8	10, 9	14, —	11, 9	15, 13	20, —
7. Extra cryst.	9, 8	10, 8	16, 14	11, 9	13, 12	22, 21
8. W. B. powder	9, 9	7, 7	12, 11	11, 11	13, 11	19, 18
9. Levissimus	6, 6	10, 9	15, 15	7, 7	12, 10	19, 17
10. Pure	9, 8	8, 7	13, 13	13, 10	12, 11	21, 21

For some reason the duplicate tests did not agree so closely as could have been wished, and as they differed in some cases by 2 or 3 units, I have given the numbers as they were

* Levulose 2, (tannin 0·1), potassium citrate 0·1, asparagine 0·1, agar 2, water 100.

† Levulose 2, glycerine 1, (tannin 0·2), potassium citrate 0·1, asparagine 0·1, agar 2, water 100.

obtained, although it would have perhaps been more striking had only certain numbers been given, as, for example, the higher of two duplicates upon the third day. Experiment No. 1 cannot be compared with No. 2 because the experiments were made at a time when the laboratory temperature differed considerably from day to day; each experiment must be considered by itself.

Considering the experiments broadly, it is clear that certain tannins augment and that others diminish the yield of slime. Purity appears to be a hindrance, from which it would appear that the stimulative or the physical effect, whichever it be, is due to the presence of an impurity. Tannin No. 3 arrived at the laboratory in the same condition as the commercial lot with which the other experiments were made; the passage through the tropics had caused the powder or granules to fuse into hard glistening dark lumps. They were probably the same. Nos. 1, 4 and 8 were fine buff-coloured powders, very similar in appearance; No. 10 was much the same, but coarser. Nos. 2 and 6 were granular and glistening, 2 being dark, 6 being light in colour. No. 4 consisted of dull, light-coloured granules. Messrs. Harrington Bros. informed me that Nos. 1, 2 and 3 were prepared specially for dyers and were manufactured from sumach; Nos. 6, 7 and 8 for printers, and No. 10 (pure) were obtained from gall nuts.

At present I cannot explain the difference between 1, 2, 3 and 6, 7, 8, but it would seem that *Bact. acaciæ* can enable the tannins to be separated into two groups. One group considerably augments the yield of slime and includes the sumach tannins used by dyers. The other group either is inactive or diminishes the yield. It contains the kinds obtained from gall nuts, such as the purer forms and those used by calico printers. Since *Bact. acaciæ* can distinguish between certain of the tannins it is possible that it might form the basis of a biological method for their recognition.

The experiment with glycerine shows that this substance assists the tannin, so that by their combined use any depressing effect of one is annulled if sufficient time be allowed for the complete growth of the slime.

The solids of the slime.—Believing that the amount of solid matter in the slimes might vary considerably and thus account for some of the discrepancies in the experiments, I determined the percentage of water in the slimes obtained from a temperature experiment.

THE WATER CONTENT OF THE SLIME.

Incubation temperature.	Total Slime from 20 c.c. of medium, grams.	Water in Slime %.
14-15°	4·2	96·8
22°	3·6	97·2
22° (duplicate)	3·6	97·2
30°	1·0	96·4

These figures show that the percentage of water in the slime is very constant, and that a smaller yield of slime does not necessarily involve a higher percentage of dry matter.

The influence of asparagine.—Early in the research the effect of varying percentages of different nitrogenous nutrients was tested in a saccharose medium, but as this was contained in tubes only general conclusions could be drawn from the growths upon the sloped agar surfaces. Asparagine and urea produced a fair amount, peptone gave only traces, while the bacterium did not form slime in the presence of ammonium and potassium nitrates.

At a later period the influence of asparagine was quantitatively determined with the following results :—

THE INFLUENCE OF ASPARAGINE.

Asparagine %.	Grams of Slime from 100 c.c. of medium.*
None	0·5
0·005	2
0·015	4·5
0·025	8
0·05	16
0·10	24
0·15	23
0·20	22
0·25	23
0·3	24
0·4	23
0·5	24

* Levulose 2, comm. tannin 0·1, potassium citrate 0·1, agar 2, water 100 grms.

A similar experiment, in which some of the stages were destroyed, corroborated these results. It is seen that the bacterium

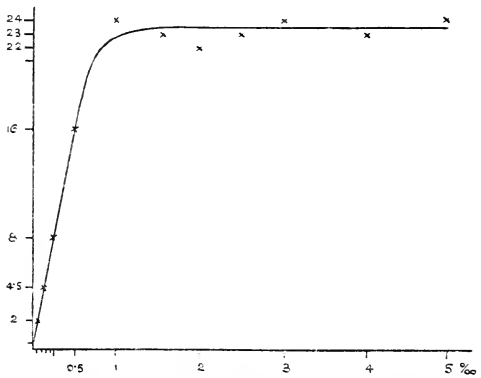


Fig. 2—The Influence of Asparagine.

responds quickly to the asparagine, and that the quantity suggested by the qualitative test, viz., 0·1%, is an optimum percentage.

The prohibitive action of dextrose upon levulose.—In a preliminary experiment made with the object of testing the action of asparagine against peptone with various sugars, it was noted that the plates containing invert sugar produced no slime. The experiment is duplicated elsewhere and need not be given, but the curious behaviour of the sugar warranted investigation. The following experiment was made :—

The Influence of Dextrose in Checking Slime-Formation.

	Grams of Slime in 3 days from 100 c.c. of medium.*
No sugar	0
Dextrose 1%	2
,, 2	2
Levulose 1	10
,, 2	14
Invert sugar 1%	2
,, ,, 2	1
Levulose 1% + dextrose 1%	3
,, ,, ...	3
,, ,, 2%	3

* Asparagine 0·1, potassium citrate 0·6, tannin 0·3, agar 2, water 100.

It is evident that the bacterium practically cannot form gum from dextrose, and also that this sugar is not inert in its action; it prevents the utilisation of levulose and consequent production of slime. The next step in connection with the action of dextrose was to see the effect of adding varying quantities of the aldose, dextrose, to the ketose, levulose.

THE DEPRESSING ACTION OF DEXTROSE UPON LEVULOSE.

	Grams of Slime from 100 c.c. of medium.*
No sugar	0
Levulose 2%	22
,, ,, +dextrose 0·25%	22
,, ,, ,, 0·5	21
,, ,, ,, 1·0	16
,, ,, ,, 1·5	11
,, ,, ,, 2·0	5

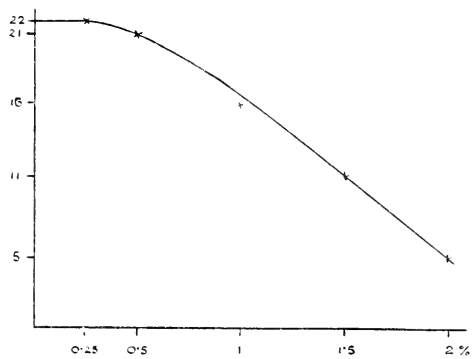


Fig. 3.—THE PROHIBITIVE ACTION OF LEVULOSE.

The depressing influence of dextrose upon levulose is again clearly shown. With a proportion of dextrose to levulose as 1 to 8, the dextrose has no depressing action, but as the ratio

* Asparagine 0·1, sodium succinate 0·5, tannin 0·1, agar 2, water 100.

becomes narrower the depression becomes more and more conspicuous.

The use of other sugars, etc.—The influence of other commonly occurring sugars and nutritive alcohols upon slime-formation is shown in the table which follows. The experiment was made at a time when the laboratory temperature was rather high (20°-22°), and this accounts for the poor yield with levulose as compared with the yields in other experiments.

THE INFLUENCE OF VARIOUS SUGARS, ETC., UPON SLIME-FORMATION.

	Slime in grams from 100 c.c. of medium.*
Saccharose	20
Levulose	19
Dextrose	0
Glycerine	21
Mannite	15
Maltose	11
Raffinose	0
Lactose	0
Galactose	0

The substances that aid slime-formation are seen to be levulose, saccharose, maltose, mannite and glycerine; and of these it is interesting to note the part played by glycerine. It is curious that maltose, which hydrolyses to dextrose, is a nutrient, while dextrose itself is not.

Various sources of carbon and nitrogen compared.—As it appeared possible that the nitrogenous food might influence the effect of these carbonaceous nutrients, an experiment was made in which asparagine, urea and peptone were compared. The incubation temperature was about 17°, the temperature of a refrigerator. The peptone, asparagine and urea were added in quantities containing approximately equal amounts of nitrogen.

* Asparagine 0·1, (sugars, etc., 2·0), tannin 0·1, potassium citrate 0·1, agar 2·0, water 100.

THE INFLUENCE OF DIFFERENT CARBONACEOUS AND NITROGENOUS CONSTITUENTS.

	Slime in grms. from 100 c.c. of medium* containing		
	Peptone.	Asparagine.	Urea.
Levulose	1	28	28
Saccharose	3	24	18
Maltose	4	24	15
Glycerine	4	20	13
Mannite	1	20	12
Dextrose	0	0	0

The most pronounced result is the small yields of the peptone media as compared with the amides, asparagine and urea. Asparagine is the better amide, and it is in all probability the form in which the bacterium obtains its nitrogen under natural conditions. At the same time it must be remembered that the bacteria under experiment had been subcultivated upon potato-extract agar, to the asparagine of which the bacteria must have become accustomed under artificial conditions.

The isolation of a fresh race of the bacterium.—The accustoming to certain nutrients by subcultivation upon certain media must be borne in mind when discussing the nutrition of the bacteria. We have seen that certain carbohydrates are more favourable to slime-formation than others, but the same results might not have been obtained had the organisms been taken directly from their natural habitat and sown upon the experimental medium. This is, of course, impossible, for the bacteria must first be purified, and this process involves the employment of artificial media. But much might be learned by minimising the time during which the bacteria are under the artificial conditions. With this idea portions of the branches of a specimen of *Acacia decurrens* were introduced into flasks containing a saccharose-peptone medium. After some time a gummy mass

* Tannin 0·1, potassium citrate 0·1, (sugars, etc. 2·0), (asparagine 0·1, peptone 0·1, urea 0·033), agar 2·0, water 100.

formed upon the branch in one of the flasks. This was extracted and smeared over the surface of a levulose-asparagine-tannin-agar plate. A slime developed and a portion (large loopful) was used for smearing another plate. The slime that grew was "plated" upon saccharose-potato-agar, and two of the colonies that developed were grown upon the same medium. These growths were smeared over plates of media containing various sugars, and at the same time the cultures were tested upon glucose-gelatine for purity and for their identification. The cultures were pure; one of them was *Bact. metarabinum*, and the other *Bact. acaciæ*. Upon the experimental media the former produced a dry leathery slime that could not be removed from the plates. The indications, however, were that levulose was the best carbohydrate and saccharose the next. *Bact. acaciæ* grew as a slime which was decidedly more viscous or ropy than were the races after much subculture. The weights of slime are given in the following table :—

SLIME-PRODUCTION BY A FRESHLY ISOLATED RACE OF *Bact. acaciæ*.

Incubation temperature 17°.	Slime in grms. from 100 c.c. of medium.*
Levulose	14
Saccharose	7
Dextrose	1 (thin watery fluid)
Maltose	3
Galactose	1 (thin watery fluid)
Mannite	8
Glycerine	9

The yields are not so great as had been obtained with the older bacterium. The new organism was probably a weaker race. It did not grow so strongly upon artificial media and was of a paler colour. The older race was of a deep yellow colour on saccharose-potato-agar; the new race was white, with a buff tinge.

The utilisation of saccharose and maltose.—The experiments with the organism and various sugars have shown that the gum

* Sugars 2, asparagine 0·1, tannin 0·1, potassium citrate 0·1, agar 2, water 100.

is formed from asparagine and levulose. The organism does not secrete invertase, and as it can be made to gain the power of utilising saccharose it is evident that this sugar must be used as such, and not as either or both of the products of hydrolysis. Furthermore, the yield of slime from saccharose when the bacterium is thoroughly accustomed to this sugar is very much greater than what is obtained from a mixture of dextrose and levulose. Maltose must also be utilised as such, for its product of hydrolysis, dextrose, is incapable of assisting gum-formation.

The gum is not derived from cellulose.—The production of the gum from levulose has a direct bearing upon certain hypotheses regarding the origin from cellulose.

Cellulose is a broad term and the statement is on that account sweeping. Under the term may be included substances of such diverse characters and composition as resistant cellulose, the hydrocelluloses, hemicelluloses, the pectins and the oxycelluloses.* The hydrolysed products of these bodies consist of one or more of the following sugars:—dextrose, levulose, mannose, galactose, arabinose, xylose, the furfuroïds of Cross, Bevan and Smith, and possibly others.

The production of gum by the bacterium from any of these celluloses would assume, firstly, that the organism secreted a cellulose-dissolving enzyme, and secondly, that the products of zymolysis were capable of being utilised. In the first place there is no evidence to show that the organism does secrete such an enzyme. The presence in plants of a gum-ferment capable of converting cellulose into gum has been claimed by Weisner, but this has been contradicted by Reinitzer, who regards it as a simple diastase.

In the second place, many of the celluloses give dextrose or galactose only upon hydrolysis, and such would be useless as gum-producers. Levulose is rarely produced, but when yielded by certain hemicelluloses‡ the accompanying dextrose would prevent

* Tollens, Abstract in Journ. Soc. Chem. Ind. 20, 740.
† Oppenheimer, Ferments and their Actions, 189.
‡ Schulze und Castoro, Biochem. Cent. i. 785.

its utilisation. With regard to the sugars, mannose, arabinose, and xylose I cannot speak with certainty, as I did not have them in the laboratory when the experiments were made. In view of the fact, however, that levulose produced so much slime experimentally, and that it is the chief wandering sugar,* there is no reason for supposing that the celluloses contribute to the smallest extent in the nutrition of the organism, even if by some means they should become hydrolysed. Maltose, the other wandering sugar, has been shown to be active in producing gum.

The ideas regarding the cellulose origin of the gum have doubtless arisen in part from the occasional finding of the gum in pockets in the trees. Lutz† found gum-reservoirs in the bark and pericycle of acacia. These consisted of lacunæ caused by the enormous swelling and ultimate deliquescence of the cell walls. It is extremely probable that the solution of the cell walls was caused by micro-organisms other than the gum-forming bacteria. The gum formed in the otherwise healthy vessels would naturally flow into these cavities already formed by moulds, where it might possibly increase in quantity. I have found gum in cavities in the fruits of the almond and the peach, when it had undoubtedly been formed in the stem and branches. It must also be remembered that a semi-soluble gum might increase locally in some of the vessels and rupture the tissues mechanically. This is very commonly observed in Eucalyptus trees, in which the semi-solid gum kino is formed. I have never found soluble wattle-gum in pockets which did not show evidence of grub habitation, and the phenomenon must be rare if it does occur.

The depressing action of galactose and dextrose.—In writing this part of the paper it occurred to me that galactose, one of the most common hydrolytic products of many of the celluloses such as the pectins and hemicelluloses, might not only be useless as a source of gum, but might also hinder or prevent the utilisation of other sugars by the bacterium. Dextrose might also be capable of preventing the formation of gum from maltose. These points

* Brown and Morris, Journ. Chem. Soc. 1893, Trans. 674.
† Reynolds Green, Soluble Ferments, 98.

appeared worthy of experimental enquiry, and accordingly experiments were made with the following results :—

THE INFLUENCE OF GALACTOSE UPON LEVULOSE AND DEXTROSE UPON MALTOSE.

	Slime in grams from 100 c.c. of medium;* 3 days at 19°.
Levulose 1%	22
,, ,, + galactose 2%	0
,, 2%	21
,, ,, + galactose 1%	11
,, ,, + ,, 2%	1
Maltose 1%	8
,, ,, + dextrose 1%	0
,, ,, + ,, 2%	0
,, 2%	17
,, ,, + dextrose 1%	0
,, ,, + ,, 2%	0
Maltose 1% + galactose 1%	4

The results are interesting in showing that galactose behaves like dextrose in prohibiting the slime-formation from levulose. It is rather more pronounced in its action, as can be seen by comparing the experiment with that on page 231. Dextrose prohibits the formation of gum from maltose, and since it acts similarly with levulose, there is the probability that it does so with every sugar. The same may be said of galactose, which, as shown in the single test, depresses the yield from maltose. The experiment serves to confirm what I have already said regarding the improbability of gum being derived even from the most easily attacked celluloses.

The optimum temperature.—An air temperature of about 17° had given the best results when growing slime upon saccharose-potato tannin-agar media. Further trials, however, appeared advisable, so that the weights of slime at different temperatures could be given. Three experiments were made; the first suggested the second, and a third was also made.

* Sugars variable, asparagine 0·1, tannin 0·1, asparagine 0·1, agar 2, water 100.

INFLUENCE OF TEMPERATURE.

	Grams of Slime from 100 c.c. of medium* at				
	13¼°	14°	17°	22°	30°
Experiment 1	...	21	...	18	5
,, 2	...	22	23·5	16·5	...
,, 3	24	...	24	16	...

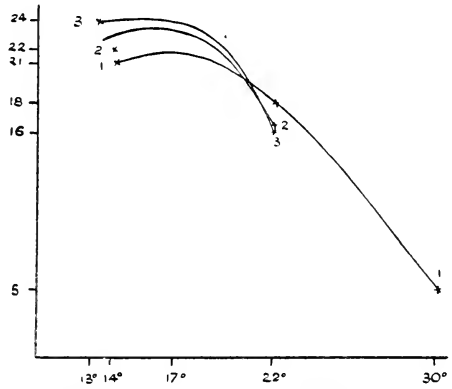


Fig. 4.—THE INFLUENCE OF TEMPERATURE.

In the first experiment the curve of the numbers showed that the optimum temperature was either about 17° or below 14°. The second indicated that the former temperature was the best and that the curve did not fall so rapidly on the lower side of the optimum as it did on the higher. The third experiment corroborated the second generally. The slime was much more rapidly formed at 22° than at 17°, the bulk being produced in 24 hours. At 17°, the slime was chiefly formed between the second and third day.

The best artificial medium.—In reviewing the numerous experiments, it appears that so long as levulose and asparagine are

* Asparagine 0·1, levulose 2·0, tannin 0·1, potassium citrate 0·1, agar 2, water 100 grms. Commercial tannin was used in No. 3.

present in a medium and a suitable temperature maintained, there is little need to have salts or other constituents. The slime may be slightly increased by the addition of traces of a citrate or a succinate, of glycerine and of tannin. The best medium for enabling *Bact. acaciæ* to form its slime in the laboratory should contain the following constituents, and the infected medium should be incubated at 17°.

Levulose..	2·0 grms.
Glycerine	1·0 ,,
Asparagine	0·1 ,,
Tannin	0·1 ,,
Potassium citrate	0·1 ,,
Agar	2·0 ,,
Water	100 c.c.

This medium is something more than a substratum for growing the slime of *Bact. acaciæ*. It is a diagnostic for the slime-forming bacteria. Some organisms, *e.g.*, *Bact. acaciæ*, form a voluminous slime upon it readily; others, *e.g.*, *Bact. metarabinum* in its highest state of development in artificial culture, produce a tough leathery growth; while others, *e.g.*, *Bac. levaniformans*, refuse to grow. Following is a list of the gum bacteria with which I have worked :—

Slime produced.	No slime produced.
Bact. acaciæ.	*Bact. levaniformans.*
Bact. metarabinum (dry, tough).	*Bact. eucalypti.*
Bact. sacchari.	*Bact. vascularum.*
Bact. pararabinum.	*Bact. persicæ.*

Gum Bacteria under investigation and not yet described.

Sunflower ii.	Sunflower iii.
Lime ii.	Lime i.
Quince ii.	Variable galactan bacterium (trace).
Macrozamia *e.*	Macrozamia *b* (trace).
Bact. pseudarabinum, n.sp.	Linseed xi. (trace).

Growth upon saccharose-potato-agar.—It will be remembered that the slime of the arabin bacteria *Bact. acaciæ* and *Bact. metarabinum* was first obtained in quantity upon a medium made with saccharose, tannin and potato-extract. At a later date, when the extract had been obtained from a second lot of potatoes, the bacteria refused to produce the slime. That this was probably not due to a deterioration of the gum-forming faculty of the bacteria was inferred from the formation of a galactan slime of *Bact. sacchari* upon the old potato medium after this organism had been subcultivated in the laboratory for over a year. The potato-extract was apparently at fault, and experiments which were made showed that when a smaller quantity of the extract was used in the agar medium the bacteria again produced their slimes. At a still later date a third lot of potatoes were bought and the extract prepared. Upon media prepared with this extract no slime could be obtained, and it made no difference how much the raw juice was diluted. I was of the opinion that the behaviour of the second lot of potatoes might have been due to the fact that they were new, the first quantity having been obtained in the winter and the second in the spring. But as the third purchase made was in the following winter, and to all appearance was similar to the first, the quality as determined by winter and spring tubers could not explain the difference in the slime-forming effect. In Australia there is no great difference between potatoes, such as there is in the British Isles, for the climate forbids their storage, and they reach the Sydney market during the year from localities at different elevations and in different latitudes.

A number of experiments were made with the third potato-extract medium, such as varying the tannin and the acidity, but to no purpose. However, about this time the influence of dextrose in depressing the slime-forming faculty was discovered, and it appeared to be extremely probable that an excess of dextrose in the extract or juice was the real reason for the non-production of gum by the bacteria.

An experiment was made in which levulose was added in varying amounts to the potato medium, and the following results were obtained :—

THE ADDITION OF LEVULOSE TO POTATO-EXTRACT.

	Slime in grams from 100 c.c. of medium.*
No levulose	None
Levulose 1%	8
,, 2%	15
,, 3%	21
,, 5·3%	23

The production of 21 or 23 grms. of slime shows that the medium contained a sufficiency of asparagine and salts, and the yield of 8 grms. with 1% levulose and 15 grms. with 2% shows a depression such as might be caused by the presence in the medium as prepared of about 1% of dextrose (see p. 231). The depressing constituent of the potato-juice might have been held accountable for the non-production of slime from saccharose had it not been discovered towards the close of this research that the bacteria could again utilise the sugar. The power of forming slime from saccharose was thus a faculty which the organism could gain and lose, and to maintain this power it had to be rapidly subcultivated upon saccharose media, that is, the transfers had to be made every second or third day. Upon referring to my notes I found that, subsequent to the work connected with the first two papers of this series, the bacteria had been subcultivated upon ordinary nutrient agar which contains no saccharose. From the beginning of this research I had grown them upon saccharose-potato-agar, and on this medium the power of using saccharose had been regained.

Slime from molasses.—Bearing in mind the possibility of arabin being in the future manufactured industrially from certain waste

* Potato-juice 10, tannin 0·1, agar 2, water 90 grms.

products such as molasses or the liquor from potato starch, I tried the effect of adding molasses to agar. The sample of molasses contained the following constituents:—cane sugar 38%, fruit sugar 9%, other organic matters 16%, soluble ash 10%, and water 27%. The most favourable yield of slime was about half of what would have been obtained had saccharose and asparagine been employed. Either the dextrose or the excessive saline matter prevented a greater production, but it is also possible that the nitrogen was deficient. Molasses contains from 0·013 to 0·027% of nitrogen, which, being calculated to asparagine, would mean 0·07 to 0·144%; the medium with 5% of molasses would thus contain the equivalent of from 0·0035 to 0·0072% of asparagine, which is undoubtedly too small. Experiments were made with urea on account of its cheapness industrially, and these showed that nothing was to be gained by adding it to the molasses. The addition of potato-juice in varying quantities was also inoperative. The presumable deficiency of nitrogen could not therefore play a part in the lessened yield, and the other constituents of the molasses must be considered as being the active agents. With small quantities of molasses (2% and under) an ordinary infection as by smearing the plates in the manner already described was sufficient, but with larger quantities a mass-infection was absolutely necessary to obtain a yield of slime. This was done by smearing a small loopful of culture (made upon saccharose-potato-agar at 30°) over an area of about a quarter of an inch diameter in the middle of the plate. In 24 hours the slime which had formed was spread over a wider area of about an inch diameter. In another 24 hours the area was increased to 2 inches, and in another day the slime was sufficient to enable the whole plate to be smeared. The slimes were scraped from the plates on the eighth day and weighed. In the following table four experiments are tabulated:—

Molasses as a Source of Gum.

Percentage of tannin in medium.	Slime in grams from 100 c.c. of medium.*			
	i.	ii.	iii.	iv. (17° C.)
				...
0·2	0·0	...	...	...
0·25	...	0.1	...	...
0·4	0·2	...	..	...
0·5	...	0·5	...	...
0·6	1·3	...	...	...
0·8	3·0	...	...	...
1·0	3·7	5·0	...	...
1·2	4·6	...	...	...
1·4	6·9	...	...	...
1·5	...	8·5	5	...
1·6	9·0	...	..	...
2·0	10·1	11	8	...
2·5	...	12	10	...
3·0	...	11	10	15
3·5	...	13	12	15
4·0	...	12	11	16
4·5	...	16	13	18
5·0	...	11	12	16
5·5	...	...	...	16
6·0	...	...	13	15
6·5	...	...	12	16
7·0	...	...	10	15
7·5	...	..	...	16
10·0	...	..	11	...

The experiments show that slime can be obtained from molasses, although there are some constituents (probably dextrose and salts) that are inimical to the full development of the bacteria. These check the growth unless a mass-infection is given and give from one-half to two-thirds the maximum yield of slime. It also appears to be immaterial how much molasses is employed in the medium within certain limits, although 4·5% seems to be an optimum amount.

Precaution in growing slime upon artificial media.—One observation was made in connection with the production of slime in tubes of media. When a certain medium had been recently prepared, slime was readily formed by the bacteria, but after the

* Molasses varying quantity, tannin 0·1, agar 2·0, water to 100.

lapse of about a month not only could no slime be formed, but the cells refused to grow. A few experiments showed that the reason for this was that the surface of the agar had become dry during the interval that passed between the sloping of the tube and its utilisation. The medium must therefore be recently prepared if a production of slime is desired.

The possibility of curing the gum-flux of trees.—In considering the possibility of being able to prevent or check the formation of gum by the bacteria in the tissues of plants, it is evident that we have to deal with organisms that flourish in poor substrata. A small quantity of a suitable sugar ($\frac{1}{4}\%$) and of a nitrogenous substance ($\frac{1}{25}\%$) are enough for the bacteria to produce half the maximum amount of gum. Rich substrata rather tend to prevent gum-formation; this has been seen in the effect of sugars and salts. It has been noted that gum is found upon trees in unhealthy surroundings. Such conditions would reduce the composition of the sap below the normal, and while the growth of the tree was hindered the growth of the bacteria would be accelerated. The influence of temperature is very pronounced, and a reference to the quantity of slime produced at different temperatures is enough to show how the formation of gum is increased by a cold season or by the presence of the tree in a damp, cold hollow. In the latter cases the drainage will have an influence in lessening the vitality of the tree. In all questions of invasion of plant tissues by bacteria it is a rule that a healthy plant will overcome the attacks of the organisms, and it probably does this by itself utilising the products of its own metabolism, thus starving the bacteria, and also by maintaining the acidity of its juices. The success of the plant is also probably influenced by the small numbers of invading bacteria, for a large infection would enable the organisms to get a hold which would lead to the defeat of the plant. A mass of bacteria will secrete more byproducts than a few cells, and these being localised in the host plant may injuriously affect the cells in the locality, and thus enable the bacteria to establish themselves.

In checking the formation of gum on valuable plants, such as fruit trees, the healthiness of the tree should first be considered and means taken to ensure the efficient drainage of the soil and the absence of decaying vegetable matter such as buried stumps. The proper manuring of the tree will next suggest itself so that the plant might be stimulated to a healthier condition. The excision of the part or parts from which the gum is oozing will probably be of little avail, because it is probable that the bacteria are producing the gum in the tissues between the wound and the growing point of the stem or branch. If the gum should exude from a branch only, then the pruning of that branch would probably be beneficial.

Any chemical remedy for the prevention of gum-formation must consist in the application of a salt injurious to the bacteria. The effect of a nitrogenous salt would be indirect. Other salts might act directly, and with regard to these something might be learned from laboratory experiments. We have seen that a trace of a succinate or citrate is beneficial, and that some salts were indifferent, while others were injurious. But in the former tests an optimum medium was not employed, and it, therefore, appeared to be wise to repeat the experiment by adding salts to the optimum medium and noting the depression which they exerted upon the yield of slime. Accordingly tubes of the optimum medium were prepared and salts added to the extent of 0·5%.

THE EFFECT OF SALTS UPON THE OPTIMUM MEDIUM AT 17° C.

Salt added.	Grms. of slime from 100 c.c. of medium.*
No salt	26
Potassium chloride	19
Sodium ,, ...	15
Calcium ,, ...	16
Magnesium sulphate	16
Sodium phosphate	17
Magnesium sulphate ... ... }	17
Calcium chloride ... ... }	
Potassium nitrate	12
,, sulphate	20

* Levulose 2, asparagine 0·1, potassium citrate 0·1, tannin 0·1, agar 2·0 water 100.

From the results it was clear that common salt or potassium nitrate were the most promising for further experiment. Varying amounts of these were therefore added in a subsequent trial. Owing to pressure of other work this was done six weeks afterwards, and during the interval the bacteria had been resting and had partly lost their slime-producing faculty, as will be seen from a comparison of the amounts formed on the control media. During the interval the laboratory temperature had risen to about 22° in Experiment i. and to about 20° in Experiment ii.

THE DEPRESSING INFLUENCE OF SODIUM CHLORIDE AND POTASSIUM NITRATE.

	Slime in grms. from 100 c.c. of media.*	
	i.	ii.
Control—no salt	16	20
Sodium chloride 0·2 %	14	17
,, ,, 0·4 ,, ...	12	12
,, ,, 0·6 ,, ...	—	8
,, ,, 0.8 ,, ...	5	4
,, ,, 1·2 ,, ...	3	1
Potassium nitrate 0·2 ,, ...	9	8
,, ,, 0·4 ,, ...	—	7
,, ,, 0·8 ,, ...	10	8
,, ,, 1·2 ,, ...	11	9

From the experiments it is unlikely that anything would be gained by manuring the trees with salts such as common salt, for the quantity which would affect the bacterium would also injure the plant. But possibly something might be gained by the use of small quantities of potassium nitrate, which would act as a plant stimulant and as a bacterium depressant. Field experiments would alone determine this question.

Infection experiment with peach trees.—It is customary to identify the relation of an organism with a particular disease, whether of plants or of animals, by introducing a pure culture of

* Levulose 2·0, tannin 0·1, asparagine 0·1, potassium citrate 0·1, agar 2·0, water 100.

the organism in question into the tissues of the host. By the reproduction of the symptoms of disease the etiological relationship is established. This method serves very well in the case of animals in which toxic symptoms can be readily observed, and especially as the toxic products of the bacteria cannot as yet be identified chemically. But with plants it is different. The toxic effects are not as a rule decided enough to convince the sceptic, and not unfrequently control plants develop disease as readily as the inoculated.

In my work with plant diseases I have always endeavoured to produce the typical bacterial product in the laboratory and to compare it chemically with the substance formed in the host plant. This is, of course, not always capable of being done, but in the present instance the production of arabin in the laboratory by *Bact. acaciæ* is a much more decided proof that the bacterium produces arabin in the plant than would be the production in the plant after an infection with the bacterium, for the simple reason that we could not be absolutely certain that the tree would not have developed gum independently of the infection, possibly as the result of a previous or a subsequent accidental infection with the same or another organism.

Still I made an infection experiment, but it was done more with the idea of testing whether the bacterium of the wattle could produce gum in the peach, the only susceptible tree which chanced to be in my garden. The trees were about 5 feet high, and were infected at places about $2\frac{1}{2}$ feet from the ground. Three trees were selected. One of them forked at 2 feet, and one fork was infected with *Bact. acaciæ*, the other with *Bact. metarabinum*. A second tree was inoculated with *Bact. acaciæ*, and a third with *Bact. metarabinum*.

Upon returning after the summer vacation the trees were carefully examined and gum was found in two cases. One was the tree infected with both bacteria, the other that which had been inoculated with *Bact. acaciæ*. The third, infected with *Bact. metarabinum* only, had no gum. The forked tree had been inoculated with the two bacteria to see if different gums would be

produced in the different branches, but as the gum upon both trees had exuded at a place about two inches from the ground, the experiment, so far as this question was concerned, was a failure. The gum was protected with thin rubber tissue, but this shortly perished, and the gum was washed away* by the rain.

Several other trees near the experimental ones showed no signs of gum-flux, so that it may be accepted, as shown by this field experiment, that *Bact. acaciæ* can produce gum-flux of the *Rosaceæ* as well as of the *Acaciæ*. It is interesting to note that the gum in this case descended the stem, which would point to the majority of the bacteria travelling in the descending current, probably in the cellular tissue of the bark, the place in which levulose and maltose, the sugars of translocation, would be found. There is, of course, the possibility that the gum exuded low down on the stem in both cases owing to wounds being there, and there only, but as the branches had at an earlier time been freely pruned below and above the site of infection this objection is scarcely tenable.

One year later the fork of the tree which had been infected with *Bact. metarabinum* showed signs of gum in several places, and an oval piece of gum measuring 2 × 1 cm. and 2 mm. thick in the centre was removed. A portion was tested and found to be metarabinum.

The third tree that had been infected with *Bact. metarabinum* only showed a considerable gum-flux at a place where a wire chafed the stem. The gum was of the metarabin variety. It is curious that the branch in one case and the tree in the other, both of which had been infected with the metarabin bacterium, produced this gum a year after inoculation, and that control trees showed no sign of gum.

In January, 1904, one of the check trees of the previous year was infected with a culture of *Bact. acaciæ* which had been growing in the laboratory for over a year, and with which most of the experiments concerning the nutrition of the organism had been

* Metarabin gums swell enormously with water and fall off.

made. Two months afterwards the tree was examined, and small pellets of yellowish gum were found at the infected places. In this case the gum had not migrated down the stem. The granules of gum simply swelled with water and did not dissolve, thus showing it to be metarabin. It is possible, and I think it quite probable, that as the gum issued from the wounds it consisted of a mixture of arabin and metarabin, and that occasional rains had dissolved the former and washed it down the trunk of the tree. Control trees show no appearance of gum, and, therefore, we must conclude that the exudate was caused by the infected bacteria.

Bact. metarabinum, a variety of *Bact. acaciæ*.—When we remember that *Bact. acaciæ* and *Bact. metarabinum* virtually differ in the production of arabin and metarabin respectively,* it is significant that *Bact. acaciæ* should, when infected into the peach, produce a gum-flux of insoluble metarabin instead of the soluble arabin. The gums of the Rosaceæ are practically always metarabin (or cerasin, as it is frequently called), and this experiment shows that the host tree can alter the gum-forming faculty. This it must do either by modifying the gum after its formation by *Bact. acaciæ* or by modifying the bacterium, so that it becomes a metarabin producer, *i.e.*, *Bact. metarabinum*. To gain some information concerning this, I examined the tissues of a branch of the infected tree. The branch sprang from a place between the infected areas of the stem. In the plates of glucose gelatine that were prepared there developed colonies of *Bact. acaciæ*, and upon one of the plates I obtained an impure colony of *Bact. metarabinum* growing upon an imbedded fragment of bark. I have already† discussed the difficulty experienced in isolating *Bact.*

* With the exception of the gum, the bacteria form the same products during the fermentation of saccharose, and they are morphologically very similar. If the gums had an equal solubility all the cultural characters would probably be identical. In short they appear to be races of one organism producing different kinds of gum. But the gums so modify the characters of the cultures that the races appear to be species. Believing this to be the case, I subcultivated both bacteria at 17° and at 30° for four months to see if the characters would approximate, but no change occurred.

† These Proceedings xxvii. (1903), 126.

metarabinum on account of its property of remaining in clumps, while *Bact. acaciæ* diffuses throughout the culture medium. The finding of even one colony of *Bact. metarabinum* was therefore quite sufficient, for there might have been, and probably were, more original bacteria in the one colony of *Bact. metarabinum* than in all the colonies of *Bact. acaciæ*. The impurity in the original colony consisted of *Bact. acaciæ* and a form intermediate between it and *Bact. metarabinum*, that is a transition form between the two. Upon glucose gelatine the colonies of the transition form grew first like *Bact. acaciæ* and then became puckered like *Bact. metarabinum*.

It has by this experiment been shown that the host plant can alter the physiological function of *Bact. acaciæ*, and that so profoundly that the acquired character is practically permanent. In the case of the bacterium from *Acacia penninervis*, the formation of metarabin has been maintained for two years, during which the organism was subcultivated in the laboratory. Since both bacteria were found in the tissues of the tree, it is probable that the exudate really did consist of a mixture of the gums, and that taken from the wounds was really the metarabin residue. The fact that a tree can alter the gum-forming function explains how the gum from different species of trees are so constant in their characters.

The growth of Bact. metarabinum.—Experiments were made with *Bact. metarabinum* to determine the nutrients that favoured the production of slime when the research with *Bact. acaciæ* was nearing completion. Like the preliminary experiments with the latter, the first trials were abortive owing to the lengthened subculture of the organism upon nutrient meat-agar. But after a few rapid transfers upon saccharose-potato-agar* the bacteria rapidly regained the power of forming slime. This was, however, so insoluble that it could not be removed from the agar even when made with 0·3% of tannin. As the gum is not readily

* The saccharose-potato-agar which I now employ consists of potato-extract 250 c.c., 50% solution of saccharose (autoclaved to free it from *Bac. levaniformans*) 40 c.c., agar 20 grams, and water to 1000 c.c.

formed in fluid cultures, the organism did not lend itself to determinative experiments, such as those that had been made with *Bact. acaciæ*. Still so far as they went, the appearances of the agar cultures seemed to show that what favoured the one organism also favoured the other.

The rapid subcultivation upon saccharose-potato-agar produced a growth which indicated that the gum was more insoluble than at the time when the cultural characters of *Bact. metarabinum* were described. At what may be called the height of its development, that is when the gum is most insoluble, the growth on the different media are much drier and more wrinkled than have been described. The colony on glucose gelatine as illustrated is typical of the organism after it has been cultivated for a short time in the laboratory, say from the 5th transfer onwards. Up to the 5th subcultivation the colony has not the regular wrinkled formation, but appears as an irregular moruloid colony. The coarsely granular structure of the glucose-gelatine colonies of *Bact. acaciæ* is apparent, even in the colonies upon the first, *i.e.*, the original plate. A typical colony of *Bact. pararabinum* has been reproduced in order to complete the set of the arabin bacteria. It is by the appearance of the colonies on nutrient glucose gelatine that the bacteria can be most easily diagnosed.

The conclusions that may be drawn from the research are as follows :—

1. *Bacterium acaciæ* can produce gum readily in the presence of suitable nutrients.
2. Levulose and saccharose are the best sources of carbon; maltose, mannite and glycerine come next, whilst dextrose, galactose, lactose and raffinose are of no use.
3. The organism acquires and readily loses the power of utilising saccharose.
4. Dextrose or galactose prevents the gum being formed from levulose or maltose.
5. The bacterium temporarily loses the power of forming gum when subcultivated upon sugar-free media.
6. Molasses can be employed for the production of gum.

7. Amides are the best nitrogenous nutrients; peptone is of little use. A trace of asparagine is sufficient.
8. Salts may accelerate, depress, or prevent slime-formation. Traces of alkaline citrate or succinate were most favourable.
9. Sumach tannin assists the formation of slime upon artificial agar media. Oak tannin hinders the formation, but the retarding effect may be neutralised by the addition of glycerine.
10. The bacterium might be used to distinguish certain tannins.
11. Tannin probably acts physically by making the agar medium more contractile, so that the organisms are slowly supplied with nutrients in solution.
12. The optimum temperature is 17° C.
13. The most suitable medium, as deduced from the experiments, serves as a diagnostic for other slime bacteria.
14. Gum acacia has not a cellulose origin.
15. In the host plant it is formed from the wandering sugars, levulose and maltose.
16. Manuring with saline matter does not promise to be a remedy for the prevention of gum-flux in fruit trees.
17. Peach trees that were inoculated with *Bact. acaciæ* (from *Acacia binervata*) developed gum-flux.
18. The exudate was a metarabin gum.
19. The host plant can convert *Bact. acaciæ* into *Bact. metarabinum*, proving what had been suspected, that the latter is a variety of the former producing an insoluble gum.
20. This explains the uniformity of the gums from certain species of trees.

EXPLANATION OF PLATES XI.-XII.

Colonies of the arabin group bacteria upon nutrient glucose-gelatine.

Plate xi.

Fig. 1.—*Bact. acaciæ* (× 30).

Fig. 2.—The same organism twelve months afterwards (× 30).

Plate xii.

Fig. 3.—*Bact. metarabinum* (× 38).

Fig. 4.—*Bact. pararabinum* (× 22).

NOTES AND EXHIBITS.

Dr. R. Greig Smith exhibited a sample of the so-called "ginger-beer plant," described by Prof. Marshall Ward as consisting of a microbe (*Bacterium vermiforme*) and a yeast (*Saccharomyces pyriformis*); and he explained its use and mode of action.

Mr. Froggatt exhibited a fine collection of undescribed Scale-insects (*Coccidæ*) comprising representatives of about 44 species. These were obtained, for the most part, in the western districts of New South Wales, and upon native shrubs.

Mr. Palmer exhibited a mogo or aboriginal stone axe found at Helidon, near Brisbane, similar to some which he had seen in use among the Blacks of the Clarence River District, both with and without handles.

Mr. Hedley exhibited, on behalf of Miss Parkes, examples of the interesting mollusc, *Strebloceras cygnicollis*, from Port Jackson, described in his paper.

Mr. Fred. Turner exhibited a large collection of plants, including the famous "Pituri" of the aborigines, *Duboisia hopwoodii*, F.v.M., and the bark of the "Quinine Tree," *Alstonia constricta*, F.v.M., from the south-western portion of New South Wales, in illustration of his paper.

WEDNESDAY, JUNE 29TH, 1904.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, June 29th, 1904.

Dr. T. Storie Dixson, President, in the Chair.

Messrs. JAMES M. PETRIE, B.Sc., F.I.C., Sydney University; and R. J. TILLYARD, B.A., Sydney Grammar School, were elected Ordinary Members of the Society.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 10 Vols., 39 Parts or Nos., 5 Reports, 2 Bulletins, 2 Pamphlets, and 2 Miscellanea, received from 43 Societies, &c., and 1 Author, were laid upon the table.

DESCRIPTIONS OF AUSTRALIAN MICRO-LEPIDOPTERA.

By E. Meyrick, B.A., F.R.S., Corresponding Member.

XVIII. GELECHIADÆ.

This family forms a smaller proportion of the *Tineina* in the Australian region than it does in Europe, amounting perhaps to about 12 per cent. of the whole. As, however, the species are often retired in habit, small, inconspicuous, and rather difficult to study, they have been much neglected, and may perhaps prove eventually to be more relatively numerous than they seem at present. Fortunately only seven species were known to Walker, others assigned by him to this family being wrongly attributed. Mr. O. Lower has in late years described some number; he has very kindly transmitted specimens of all these (frequently the actual types) to me for examination, so that I have been able to ascertain positively their identity in all cases; this assistance has been most valuable. Much material in specimens and notes of localities has also been received from him, as well as from Mr. G. Lyell, the late Mr. G. Barnard, and other collectors whose records are duly acknowledged in their place. Altogether 274 species are here recorded, of which 207 are now described as new. Of this total 85 species, or not much less than a third, are included in the endemic genus *Protolechia*, but no other strictly endemic genus attains any large size, though 10 out of the 55 genera are endemic, so far as is known.

The family characters are as follows:—

Head smooth. Tongue developed. Antennæ in ♂ ciliated or more usually simple, basal joint usually without pecten. Labial palpi long, curved, ascending, terminal joint pointed, usually slender and very acute. Maxillary palpi very short, appressed.

Posterior tibiæ usually rough-haired. Forewings: 1b furcate, 2 not widely remote from 3, 7 and 8 stalked (occasionally coincident). Hindwings sometimes over 1, more or less trapezoidal, termen usually sinuate or emarginate, 6 and 7 frequently approximated or stalked, 8 more or less distinctly connected with cell in middle.

Assuming that the *Xyloryctidæ* are maintained as a distinct family (which still appears to me to be convenient, though I think ultimately it must be reduced to a group of the *Gelechiadæ*), I rely for distinction mainly on the character of vein 2 of the forewings, which in that group rises widely remote from 3 (generally disproportionately so); considering this in combination with other characters, I have not hitherto found any species as to which I had the least doubt. From other families the *Gelechiadæ* are most reliably distinguished by the connection of 8 of hindwings with cell by a more or less evident bar; this is not always easy to observe, but the sinuation or emargination of termen is usually perceptible, and where this fails, the greater width of hindwings relatively to forewings, or the approximation of veins 6 and 7 at base are frequent characters which help to distinguish from the *Oecophoridæ*, in which family they never occur.

1.	Vein 7 of forewings to termen or apex	2.
	Vein 7 of forewings to costa	10.
2.	Antennæ over 1	3.
	Antennæ less than 1	5.
3.	Forewings with 9 and 10 stalked	38. Barantola.
	Forewings with 9 and 10 separate	4.
4.	Hindwings with 5 present	42. Macrotona.
	Hindwings with 5 absent	40. Sarisophora.
5.	Hindwings with 5 present	6.
	Hindwings with 5 absent	43. Styloceros.
6.	Terminal joint of palpi as long as second	7.
	Terminal joint of palpi shorter than second	9.
7.	Hindwings with 6 and 7 stalked	44. Croesopola.
	Hindwings with 6 and 7 nearly parallel	8.
8.	Forewings with 9 out of 7	36. Phloeographtis.
	Forewings with 9 separate	55. Thalamarchis.
9.	Forewings with 2 and 3 connate	37. Aulacomima.
	Forewings with 2 and 3 separate	11. Dectobathra.

10.	Antennæ over 1	11.
	Antennæ under 1	12.
11.	Forewings with 2 absent, 3 and 4 stalked	39. CROCANTHES.
	Forewings with 2, 3, 4 present, separate	41. ACHORIA.
12.	Hindwings with 3 and 4 separate	13.
	Hindwings with 3 and 4 connate	24.
13.	Forewings with tufts of scales on surface	14.
	Forewings without tufts of scales	15.
14.	Forewings with 8 out of 6	46. CYMATOMORPHA.
	Forewings with 6 separate	47. LEPTOGENEIA.
15.	Basal joint of antennæ with strong pecten	1. EPIPHTHORA.
	Basal joint of antennæ without pecten	16.
16.	Second joint of palpi tufted beneath	17.
	Second joint of palpi not tufted beneath	21.
17.	Terminal joint of palpi in ♂ concealed	49. ANARSIA (part).
	Terminal joint of palpi in ♂ exposed	18.
18.	Forewings with 7 and 8 out of 6	19.
	Forewings with 6 separate, or 6 and 7 out of 8	20.
19.	Hindwings with 6 and 7 stalked	45. HYODECTIS.
	Hindwings with 6 and 7 separate	3. PALTODORA.
20.	Terminal joint of palpi roughened anteriorly	2. DORYCNOPA.
	Terminal joint of palpi not roughened	4. MEGACRASPEDUS.
21.	Second joint of palpi with rough projecting scales above towards apex	22.
	Second joint of palpi without rough scales above	23.
22.	Second joint of palpi rough-scaled beneath	5. IULOTA.
	Second joint of palpi with appressed scales	48. SYMBOLISTIS.
23.	Hindwings with 6 and 7 stalked	6. SITOTROGA.
	Hindwings with 6 and 7 separate	7. ARISTOTELIA.
24.	Forewings with one or more veins absent	25.
	Forewings with all veins present	37.
25.	Forewings with 9 absent	26.
	Forewings with 9 present	29.
26.	Forewings with 2 and 3 stalked	27.
	Forewings with 2 and 3 separate or coincident	28.
27.	Forewings with 7 and 8 coincident	10. IDIOPHANTIS.
	Forewings with 7 and 8 stalked	34. ANAPTILORA.
28.	Forewings with 3 or 4 absent	9. COLOBODES.
	Forewings with 3 and 4 both present	16. ACANTHOPHILA.
29.	Forewings with 2 and 3 coincident	28. PRODOSIARCHA.
	Forewings with 2 and 3 not coincident	30.
30.	Forewings with 6 absent	23. TRITADELPHA.
	Forewings with 6 present	31.

31. Forewings with 6 and 7 stalked ..... 32.
Forewings with 6 separate ..... 33.
32. Forewings with 4 absent ..... 8. THIOTRICHA.
Forewings with 4 present ..... 26. CRASPEDOTIS.
33. Forewings with 6 to apex ..... 24. EPIBRONTIS.
Forewings with 6 to termen ..... 34.
34. Forewings with 2 and 3 separate ..... 12. CHALINIASTIS.
Forewings with 2 and 3 stalked or connate ..... 35.
35. Terminal joint of palpi as long as second ..... 33. PANCOENIA.
Terminal joint of palpi shorter than second ..... 36.
36. Terminal joint roughened, hindwings over 1 ..... 27. SPHALERACTIS.
Terminal joint not roughened, hindwings 1 ..... 25. EPIMIMASTIS.
37. Forewings with 2 and 3 stalked or connate, or seldom with 2 separate, from angle of cell ..... 38.
Forewings with 2 separate, rising from before angle ..... 43.
38. Second joint of palpi tufted beneath ..... 54. YPSOLOPHUS.
Second joint of palpi not tufted beneath ..... 39.
39. Hindwings with 6 and 7 stalked ..... 40.
Hindwings with 6 and 7 separate ..... 42.
40. Forewings with conspicuous subdorsal scale-tuft ..... 35. ORTHOPTILA.
Forewings without such tuft ..... 41.
41. Second joint of palpi with rough projecting scales above ..... 31. AROTRIA.
Second joint of palpi not rough-scaled above ..... 29. HEMIARCHA.
42. Second joint of palpi rough-scaled above ..... 32. EPHELICTIS.
Second joint of palpi not rough-scaled above ..... 30. PROTOLECHIA.
43. Terminal joint of palpi with scale projection posteriorly ..... 44.
Terminal joint of palpi without scale-projection ..... 45.
44. Second joint of palpi with two projecting tufts beneath ..... 50. DEUTEROPTILA.
Second joint of palpi without projecting tuft ..... 51. ALLOCOTA.
45. Forewings with 3 and 4 stalked or connate ..... 19. STEGASTA.
Forewings with 3 and 4 separate ..... 46.
46. Second joint of palpi with projecting tuft beneath 47.
Second joint of palpi without defined tuft beneath 49.
47. Terminal joint of palpi in ♂ concealed ..... 49. ANARSIA (part).
Terminal joint of palpi in ♂ exposed ..... 48.
48. Hindwings with 6 and 7 stalked ..... 52. NOTHRIS.
Hindwings with 6 and 7 remote, parallel ..... 53. STRENIASTIS.

49. Second joint of palpi with rough projecting scales above towards apex ..... 17. MACRENCHES.
Second joint of palpi without projecting scales above ..... 50.
50. Hindwings in ♂ with hairpencil along costa from base ..... 20. PHTHORIMAEA.
Hindwings in ♂ without costal hairpencil ..... 51.
51. Forewings with 8 out of 6 ..... 52.
Forewings with 8 out of 7 ..... 53.
52. Hindwings with 6 obsolete ..... 13. SMENODOCA.
Hindwings with 6 developed ..... 14 EPITHECTIS.
53. Second joint of palpi rough beneath ..... 54.
Second joint of palpi smooth ..... 15. ANACAMPSIS.
54. Hindwings with 6 and 7 approximated or stalked 18. GELECHIA.
Hindwings with 6 and 7 parallel ..... 55.
55. Second joint of palpi brush-like and furrowed beneath ..... 21. GNORIMOSCHEMA.
Second joint of palpi dilated beneath with rough scales, but not brush-like or furrowed ..... 22. SAROTORNA.

1. EPIPHTHORA, Meyr.

Antennæ $\frac{4}{5}$, in ♂ simple or ciliated, basal joint moderate, with dense strong pecten. Labial palpi rather long, curved, ascending, second joint more or less rough-scaled or expanded with projecting scales beneath towards apex, seldom tufted, terminal joint shorter than second, sometimes very short, rough-scaled anteriorly, not acute. Forewings: 2 and 3 separate, 7 and 8 stalked, 7 to costa. Hindwings under 1, narrow-trapezoidal, apex acutely produced, termen abruptly emarginate, cilia 2-4; 3 and 4 rather approximated, 5 tolerably parallel, 6 and 7 rather approximated towards base.

Type *E. melanombra*, Meyr., from New Zealand. A distinct and peculiar genus, probably a development of *Megacraspedus*, remarkable for the strong basal pecten of antennæ, which is exceptional in this family; the abruptness of the emargination of hindwings (sometimes causing the termen to form a more or less acute prominence beneath it), and the shortness of the terminal joint of palpi are also characteristic. The veins stated to be obsolete in the New Zealand species are, I think, really present,

but indistinct. Besides the following, only the single New Zealand species is known; probably the genus will prove to be of considerable extent in Australia, as the species are inconspicuous and retired in habit, and I have never found one in any numbers. The larva of the New Zealand species mines in leaves. Imago with forewings elongate, pointed. *Stenopherna*, Low., is a generic synonym.

1.	Hindwings with long acute terminal projection beneath emargination	11. *cryolopha.*
	Hindwings with terminal prominence not very acute.	2.
2.	Hindwings whitish	3.
	Hindwings grey	5.
3.	Forewings unicolorous, white	7. *psychrodes.*
	Forewings not unicolorous	4.
4.	Forewings ochreous with white costal and plical streaks	6. *niphaula.*
	Forewings white with dark fuscous streak from disc to apex	4. *thyellias.*
5.	Head clear white	6.
	Head more or less irrorated with fuscous	7.
6.	Forewings with oblique dark bar from middle of dorsum	12. *leucomichla.*
	Forewings without dark bar	10. *autoleuca.*
7.	Antennæ white with dark rings	8.
	Antennæ not dark-ringed	12.
8.	Forewings with dark dorsal spots or bar (sometimes faint)	9.
	Forewings without dark dorsal markings	11.
9.	Cilia of hindwings pale greyish-ochreous	15. *spectrella.*
	Cilia of hindwings whitish	10.
10.	Forewings with dark fuscous subcostal spots at $\frac{1}{6}$ and $\frac{1}{3}$	9. *isonira.*
	Forewings without such spots	19. *chionocephala*
11.	Terminal joint of palpi $\frac{1}{2}$	16. *coniombra.*
	Terminal joint of palpi $\frac{3}{4}$	3. *drosias.*
12.	Forewings with defined white costal streak	5. *lemurella.*
	Forewings without such streak	13.
13.	Forewings with oblique dark bar from middle of dorsum	14.
	Forewings without such bar	16.
14.	Forewings with slender dark fascia at $\frac{1}{3}$	18. *harpastis.*
	Forewings without such fascia	15.

15.	Groundcolour of forewings white, hindwings rather dark grey	14. *achnias*.
	Groundcolour of forewings pale greyish-ochreous, hindwings very pale grey	13. *phantasta*.
16.	Forewings with black subcostal dots anteriorly	8. *miarodes*.
	Forewings without such dots	17.
17.	Hindwings with produced apex $\frac{2}{5}$ of wing	17. *microtima*.
	Hindwings with produced apex $\frac{1}{5}$ of wing	18.
18.	Emargination of hindwings rounded-acute	1. *megalornis*.
	Emargination of hindwings rounded-rectangular	2. *belonodes*.

1. *E. megalornis*, n.sp.

♂♀. 16-20 mm. Head, palpi, and thorax white irrorated with fuscous; palpi with second joint loosely scaled, terminal somewhat over $\frac{1}{2}$. Antennæ and abdomen grey. Legs whitish, irrorated with dark fuscous, hairs of posterior tibiæ white. Forewings acutely long-pointed, termen sinuate; whitish, finely irrorated with rather dark fuscous; costal edge slenderly white from $\frac{1}{4}$ to $\frac{3}{4}$: cilia light greyish-ochreous, sprinkled with dark fuscous points. Hindwings with emargination rounded-acute, produced apex $\frac{1}{5}$; rather dark grey; cilia light fuscous.

Perth, West Australia, in October and November; five specimens.

2. *E. belonodes*, n.sp.

♂♀. 13-14 mm. Head, palpi, and thorax white, irrorated with rather dark fuscous; palpi with scales of second joint expanded above and beneath towards apex, terminal joint somewhat over $\frac{1}{2}$. Antennæ grey. Abdomen grey. Legs dark fuscous irrorated with white, hairs of posterior tibiæ whitish. Forewings acutely very long-pointed, termen sinuate; whitish, densely irrorated with dark fuscous; an undefined white streak along submedian fold: cilia whitish-fuscous, round apex and on costa more whitish and sprinkled with dark fuscous. Hindwings with emargination rounded-rectangular, produced apex $\frac{1}{5}$; grey; cilia pale fuscous.

Geraldton, West Australia, in November; two specimens.

3. *E. drosias*, n.sp.

♂. 10-11 mm. Head and thorax white, sprinkled with dark fuscous. Palpi white, sprinkled with dark fuscous, second joint with short apical scale-projection beneath, terminal joint $\frac{3}{4}$. Antennæ white ringed with fuscous. Abdomen light grey. Legs whitish, anterior and middle tarsi with numerous fine dark fuscous rings. Forewings acutely very long-pointed, termen slightly sinuate; white, sprinkled with dark fuscous: cilia white, with rows of dark fuscous points. Hindwings with emargination obtuse, produced apex $\frac{1}{4}$; light grey; cilia whitish-grey-ochreous.

Port Lincoln, South Australia, in November; two specimens.

4. *E. thyellias*, n.sp.

♀. 13 mm. Head and thorax whitish, sprinkled with fuscous. Palpi white irrorated with fuscous, second joint beneath with rough scales expanded towards apex, almost tufted, terminal joint $\frac{1}{2}$. Antennæ whitish, ringed with dark fuscous. Abdomen ochreous-whitish. Legs ochreous-whitish, posterior tarsi ochreous. Forewings acutely very long-pointed, termen sinuate; white, suffused with whitish-ochreous except towards apex, irregularly sprinkled with dark fuscous; a broad longitudinal streak of dark fuscous irroration from before middle of disc to apex: cilia white, with a few dark fuscous points. Hindwings with emargination rounded-obtuse, produced apex $\frac{1}{4}$; ochreous-whitish; cilia pale whitish-ochreous.

Melbourne, Victoria (Raynor); one specimen.

5. *E. lemurella*, n.sp.

♀. 14 mm. Head white, on crown pale ochreous irrorated with fuscous. Palpi fuscous, second joint, second joint with apex white, scales expanded beneath towards apex, terminal joint $\frac{1}{2}$. Antennæ ochreous-whitish. Thorax ochreous, tips of patagia whitish. Abdomen whitish-ochreous. Legs fuscous, hairs of posterior tibiæ ochreous-whitish. Forewings acutely pointed; ochreous-fuscous, whitish-sprinkled; a moderate snow-white streak along costa from base to $\frac{5}{6}$, narrowed posteriorly; a moderate

suffused white streak along fold from base to tornus; apex mixed with dark fuscous: cilia pale greyish-ochreous, round apex sprinkled with whitish and dark fuscous. Hindwings with emargination rectangular, produced apex $\frac{1}{3}$; light grey; cilia pale greyish-ochreous.

Blackheath (3500 feet), New South Wales, in January; one specimen.

6. *E. niphaula*, n.sp.

♂. 9 mm. Head, palpi, antennæ, and thorax white; second joint of palpi fuscous-tinged except at apex, loosely scaled beneath, terminal joint more than $\frac{1}{2}$. Abdomen light grey. Legs whitish, partially greyish-tinged above. Forewings acutely long-pointed; brownish-ochreous mixed with white; a moderately broad silvery-white costal streak from base to apex; a cloudy undefined white streak along submedian fold from base to tornus: cilia whitish. Hindwings with emargination obtuse, produced apex nearly $\frac{1}{3}$; grey-whitish; cilia whitish.

Launceston, Tasmania, in November; one specimen.

7. *E. psychrodes*, n.sp.

♂. 10$\frac{1}{2}$ mm. Head, palpi, antennæ, thorax, abdomen, and legs white; second joint of palpi loosely scaled beneath, terminal joint $\frac{1}{2}$; a large expansible genital tuft mixed with dark grey. Forewings acutely pointed; ochreous-whitish: cilia ochreous-whitish, with a few dark fuscous points round apex. Hindwings with emargination obtuse, produced apex more than $\frac{1}{4}$; whitish; cilia ochreous-whitish.

Sydney, New South Wales, in September; one specimen.

8. *E. miarodes*, n.sp.

♂. 14 mm. Head and thorax whitish, sprinkled with fuscous. Palpi white, second joint irrorated with fuscous except apex, with considerable projecting apical tuft, terminal joint $\frac{1}{2}$. Antennæ whitish. Abdomen light grey. Legs dark fuscous irrorated with white, hairs of posterior tibiæ whitish. Forewings acutely long-pointed; whitish, thinly sprinkled with fuscous; minute black

dots beneath costa at $\frac{1}{6}$ and $\frac{1}{3}$, and beneath fold at $\frac{1}{5}$ and $\frac{2}{5}$; a row of scattered black scales in disc above middle from beyond middle to $\frac{3}{4}$; apex suffused with rather dark fuscous: cilia whitish, sprinkled with dark fuscous. Hindwings with emargination rectangular, produced apex $\frac{1}{4}$; grey; cilia pale greyish-ochreous.

George's Bay, Tasmania, in January; one specimen.

9. *E. isonira*, n.sp.

♂♀. 9-11 mm. Head and thorax white sprinkled with dark fuscous. Palpi white irrorated with dark fuscous, second joint with scales expanded beneath towards apex, terminal joint more than $\frac{1}{2}$, apex of both clear white. Antennæ white, ringed with dark fuscous. Abdomen ochreous-whitish. Legs dark fuscous irrorated with white, hairs of posterior tibiæ white. Forewings acutely pointed; white, more or less thinly irrorated with dark fuscous; small dark fuscous spots beneath costa at $\frac{1}{6}$ and $\frac{1}{3}$, and in disc at $\frac{1}{6}$; a curved oblique dark fuscous bar from middle of dorsum, reaching half across wing, sometimes interrupted; a dark fuscous spot on tornus; all these markings vary in distinctness: cilia whitish, more or less irrorated with dark fuscous. Hindwings with emargination rather rounded-obtuse, produced apex $\frac{1}{4}$; pale grey; cilia ochreous-whitish.

Blackheath (3500 feet), New South Wales, in January and March; four specimens.

10. *E. autoleuca*, n.sp.

♀. 15 mm. Head, antennæ, and thorax white. Palpi white, second joint sprinkled with fuscous, with rough projecting scales towards apex beneath, hardly tufted, terminal joint $\frac{2}{3}$. Abdomen grey-whitish. Legs whitish, anterior and middle pair finely striated transversely with dark fuscous. Forewings acutely long-pointed; white, with a few minute fuscous speckles posteriorly: cilia white, with some dark fuscous points round apex. Hindwings with emargination rounded-rectangular, produced apex $\frac{1}{4}$; light grey; cilia whitish-grey-ochreous.

Gisborne, Victoria, in January; one specimen received from Mr. G. Lyell.

11. *E. cryolopha*, n.sp.

♂. 14 mm. Head and thorax ochreous-whitish. Antennæ whitish-ochreous. Palpi white, second joint dark fuscous except apex, loosely scaled towards apex beneath, terminal joint $\frac{1}{2}$. Abdomen ochreous, sides whitish. Legs dark fuscous, hairs of posterior tibiæ whitish. Forewings acutely long-pointed; greyish-ochreous, veins broadly suffused with white so as almost to obscure groundcolour; a broad white costal streak, occupying $\frac{2}{3}$ of wing, from base to near apex, narrowed posteriorly, lower edge straight: cilia ochreous-whitish. Hindwings with emargination very deep and narrow, rounded-acute, termen forming a long acute-triangular projection below it, produced apex $\frac{1}{4}$; whitish-grey; cilia whitish-ochreous, more whitish towards tips. Undersurface of forewings with a streak of dark fuscous scales beneath cell. Hindwings with some long costal hairs towards base.

Cooktown, Queensland; one specimen in Mr. O. Lower's collection. This species exhibits the extreme form of hindwings.

12. *E. leucomichla*, n.sp.

♀. 14-15 mm. Head white. Palpi white, second joint sprinkled with fuscous, scales somewhat expanded beneath towards apex, terminal joint somewhat over $\frac{1}{2}$. Antennæ grey-whitish. Thorax white, somewhat sprinkled with fuscous. Abdomen whitish-ochreous. Legs whitish, partially irrorated with dark fuscous. Forewings acutely pointed; shining white, with some scattered fuscous or dark fuscous scales; an outwardly oblique bar from middle of dorsum reaching half across wing, a spot on tornus, a spot on costa at $\frac{3}{4}$, and a terminal suffusion towards apex ochreous-fuscous, or indicated by dark fuscous irroration only: cilia whitish, somewhat sprinkled with dark fuscous. Hindwings with emargination rectangular, produced apex over $\frac{1}{3}$; grey; cilia pale greyish-ochreous.

Sydney, New South Wales; Deloraine, Tasmania; in November and December, two specimens.

13. *E. phantasta*, n.sp.

♂♀. 11-14 mm. Head and thorax whitish, sprinkled with fuscous. Palpi whitish, second joint light fuscous except tip, scales expanded towards apex beneath, terminal joint $\frac{1}{2}$. Antennæ ochreous-whitish. Abdomen pale whitish-ochreous. Legs fuscous, posterior pair ochreous-whitish. Forewings acutely pointed; termen faintly sinuate; pale greyish-ochreous, irrorated with fuscous; an outwardly oblique bar from middle of dorsum to middle of disc, an undefined spot on tornus, and a cloudy dash beyond it towards apex dark fuscous, sometimes nearly obsolete: cilia pale whitish-ochreous, sprinkled with dark fuscous. Hindwings with emargination obtuse, produced apex $\frac{1}{4}$; very pale grey; cilia pale whitish-ochreous.

Sydney, New South Wales, in March; two specimens.

14. *E. achnias*, n.sp.

♂. 11 mm. Head and thorax white irrorated with fuscous. Palpi white, second joint fuscous except apex, with short roughly projecting apical tuft, terminal joint $\frac{2}{3}$. Antennæ whitish. Abdomen grey. Legs dark fuscous, irrorated and ringed with white, hairs of posterior tibiæ whitish. Forewings pointed; white, irrorated with golden-fuscous; an oblique bar from middle of dorsum reaching half across wing, and a spot on tornus golden-fuscous: cilia whitish, sprinkled with dark fuscous. Hindwings with emargination rectangular, produced apex $\frac{1}{4}$; grey; cilia ochreous-grey-whitish.

Picton, New South Wales, in April; one specimen.

15. *E. spectrella*, n.sp.

♂♀. 10-11 mm. Head, palpi, and thorax white irrorated with ochreous or fuscous; palpi with second joint loosely scaled, terminal somewhat over $\frac{1}{2}$. Antennæ whitish, ringed with fuscous. Abdomen whitish-fuscous. Legs dark fuscous, apex of joints and hairs of posterior tibiæ whitish. Forewings acutely pointed; whitish, sometimes much suffused with whitish-ochreous, irrorated with ochreous or fuscous; an outwardly oblique bar from middle

of dorsum reaching half across wing, and a spot on tornus dark fuscous, often partially or almost wholly obsolete: cilia whitish-ochreous, irrorated with dark fuscous. Hindwings with emargination rounded-rectangular, produced apex $\frac{1}{4}$; grey; cilia pale greyish-ochreous.

Lilydale, Victoria; Deloraine, Tasmania; Adelaide, South Australia; in October and November, five specimens.

16. *E. coniombra*, n.sp.

♂. 11 mm. Head and thorax white irrorated with rather dark fuscous. Palpi white irrorated with dark fuscous, second joint with short apical tuft beneath, terminal joint $\frac{1}{2}$. Antennæ whitish ringed with dark fuscous. Abdomen grey. Legs dark fuscous, ringed with whitish, posterior pair whitish. Forewings acutely long-pointed; white, closely irrorated with rather dark fuscous: cilia whitish-fuscous, with rows of dark fuscous points. Hindwings with emargination rounded-rectangular, produced apex $\frac{1}{4}$; fuscous; cilia pale fuscous.

Bathurst (2500 feet), New South Wales, in November; one specimen.

17. *E. microtima*, n.sp.

♀. 7 mm. Head and thorax light fuscous, finely whitish-sprinkled. Palpi fuscous, apex white. Antennæ light fuscous. Abdomen fuscous. Legs dark fuscous, obscurely whitish-ringed. Forewings acutely long-pointed; light greyish-ochreous, irrorated with fuscous and obscurely sprinkled with whitish: cilia light greyish-ochreous, with dark fuscous points. Hindwings with emargination rounded-rectangular, produced apex $\frac{2}{5}$; dark fuscous; cilia fuscous.

Brisbane, Queensland, in September; one specimen. A very inconspicuous insect, but recognisable in the genus by its small size and the unusually long produced apex of hindwings.

18. *E. harpastis*, n.sp.

♂. 10-11 mm. Head and thorax white sprinkled with fuscous. Palpi white irrorated with dark fuscous, second joint with scales

expanded beneath towards apex, almost tufted, terminal joint more than $\frac{1}{2}$, apex of both joints clear white. Antennæ whitish. Abdomen grey. Legs dark fuscous irrorated with white, hairs of posterior tibiæ white. Forewings acutely pointed; whitish, irrorated with dark fuscous; a very indistinct darker slender transverse fascia at $\frac{1}{3}$, slightly oblique; an oblique bar from middle of dorsum, and a spot on tornus darker, very obscure: cilia fuscous-whitish, irrorated with dark fuscous. Hindwings with emargination rounded-rectangular, produced apex $\frac{1}{4}$; light grey; cilia pale greyish-ochreous.

Perth and Albany, West Australia, in October and November; two specimens.

19. *E. chionocephala*, Low.

(*Stenopherna chionocephala*, Low., Trans. Roy. Soc. S. Austr. 1901, 79.)

♀. 11 mm. Head and thorax white, slightly sprinkled with dark fuscous. Palpi white, coarsely irrorated with dark fuscous except at apex of joints, second joint rough-scaled towards apex beneath, terminal joint $\frac{1}{2}$. Antennæ white, ringed with dark fuscous. Abdomen grey. Legs white, irrorated with dark fuscous. Forewings acutely pointed; white, irrorated with dark fuscous; an undefined fascia at $\frac{1}{4}$, cloudy dorsal spots before and beyond middle, and a narrow subapical fascia dilated on costa nearly clear white; undefined spots of dark fuscous suffusion on submedian fold before anterior fascia and between dorsal spots, and before and beyond subapical fascia: cilia white, with rows of dark fuscous points. Hindwings with emargination rectangular, produced apex $\frac{1}{4}$; grey; cilia ochreous-whitish.

Broken Hill, New South Wales, in October and April; one specimen received from Mr. O. Lower.

2. Dorycnopa, Low.

Antennæ $\frac{4}{5}$, in ♂ simple or ciliated, basal joint moderate, without pecten. Labial palpi long, recurved, second joint with short rough apical tuft beneath, terminal joint as long as second, with

rough scales anteriorly throughout. Forewings: 2 and 3 parallel, 6 and 7 out of 8, or 6 separate, 7 to costa. Hindwings 1, elongate-trapezoidal, apex pointed, produced, termen emarginate, cilia $2\frac{1}{2}$-3; 3 and 4 remote, parallel, 5 near 6, 6 and 7 rather approximated.

Type *D. heliochares*, Low. A development of *Megacraspedus*, from which it differs essentially only in the anteriorly roughened terminal joint of palpi. The genus is endemic, and may prove to be characteristic of the interior of the continent. *Bactrolopha*, Low., is a synonym. Imago with forewings elongate, acute.

1. Second discal stigma black, distinct..... 2.
   Second discal stigma absent..... 20. *orthodesma*.
2. Groundcolour of forewings yellowish-brown..... 22. *heliochares*.
   Groundcolour of forewings white..... 21. *marmorea*.

20, *D. orthodesma*, Low.

(*Bactrolopha orthodesma*, Low., Trans. Roy. Soc. S. Austr. 1901, 79.)

♂♀. 10-12 mm. Head white. Palpi white, second and terminal joints with subapical ochreous bands. Antennæ white ringed with dark fuscous. Thorax white, patagia mixed with ochreous. Abdomen in ♂ blackish, in ♀ whitish-ochreous. Legs whitish, tarsi banded with ochreous and fuscous irroration. Forewings pointed; white mixed with pale ochreous; four broad direct yellow-ochreous fasciæ, finely sprinkled with dark fuscous, first almost basal, second before middle, third at $\frac{2}{3}$, fourth less defined, almost apical: cilia whitish, with scattered blackish points. Hindwings in ♂ blackish, in ♀ ochreous-whitish; cilia pale whitish-yellowish.

Broken Hill, New South Wales, in October; I am indebted to Mr. Lower for a ♀, but have not seen the ♂, the peculiar secondary sexual characters of which I have stated from his description.

21. *D. marmorea*, Low.

(*Paltodora marmorea*, Low., Proc. Linn. Soc. N.S.W. 1899, 96.)

♂. 12 mm. Head white. Palpi white, second joint mixed with ochreous and dark fuscous except at apex, terminal joint

with a subapical ochreous ring sprinkled with black. Antennæ white ringed with dark fuscous. Thorax whitish, with a few dark fuscous scales, shoulders with an ochreous spot irrorated with dark fuscous. Abdomen grey, anal tuft whitish. Legs white, with bands of dark fuscous irroration. Forewings long-pointed; white, irregularly sprinkled with yellow-ochreous and dark fuscous; a clear white oblique fascia from before $\frac{1}{4}$ of costa to $\frac{2}{3}$ of dorsum, edged on both sides with yellow-ochreous suffusion, and anteriorly by three spots of blackish irroration; stigmata black, plical obliquely before first discal; a spot of ochreous suffusion above tornus, and a larger ochreous apical patch: cilia whitish, with rows of dark fuscous points. Hindwings pale grey; cilia pale whitish-ochreous.

Broken Hill, New South Wales, in October; one specimen received from Mr. O. Lower.

22. *D. heliochares*, Low.

(*Gelechia heliochares*, Low., Proc. Linn. Soc. N.S.W. 1900, 417; *Dorycnopa acroxantha*, Low., Trans. Roy. Soc. S. Austr. 1901, 78.)

♂. 15 mm. Head ochreous mixed with whitish. Palpi ochreous sprinkled with dark fuscous and whitish, apex of joints whitish. Antennæ white ringed with dark fuscous. Thorax ochreous mixed with dark fuscous and whitish. Abdomen grey, segmental margins whitish-ochreous. Legs dark fuscous, ringed with white. Forewings long-pointed; yellowish-brown, irregularly irrorated with dark fuscous and whitish; two slender whitish or whitish-ochreous transverse fasciæ, first from $\frac{1}{4}$ of costa to $\frac{2}{3}$ of dorsum, straight, edged posteriorly with yellow-ochreous suffusion, second from $\frac{3}{4}$ of costa to tornus, slightly incurved, marked with a black spot in middle (second discal stigma); other stigmata dark fuscous, plical obliquely before first discal, and a short dash in middle of disc, all surrounded with whitish suffusion, sometimes indistinct; a longitudinal streak of dark fuscous suffusion extending from beneath these to second fascia: cilia ochreous-whitish, more white on tornus, with irregular spots and rows of

dark fuscous points, tips brownish. Hindwings grey; cilia whitish-ochreous.

Adelaide, South Australia, in December; two specimens received from Mr. O. Lower.

3. Paltodora, Meyr.

Antennæ $\frac{4}{5}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi long, recurved, second joint with triangular tuft beneath, terminal joint as long as second, acute. Forewings: 2 and 3 tolerably parallel, 7 and 8 out of 6, 7 to costa. Hindwings under 1, elongate-trapezoidal, apex pointed, produced, termen emarginate, cilia $2\frac{1}{2}$-3; 3 and 4 remote, parallel, 5 nearer 6; 6 and 7 rather approximated.

A widely distributed genus, but apparently nowhere of any great extent; it is a closely related development of *Megacraspedus*, only differing from it in that veins 7 and 8 of the forewings rise out of 6, whereas in *Megacraspedus* 6 is separate, or 6 and 7 rise out of 8. The distinction is, however, good and natural. Imago with forewings elongate, acute.

1. Forewings ochreous with white costal streak..... 25. *actias*.
   Forewings not ochreous. ..... 2.
2. Forewings with two blackish dots..... 24. *sciopola*.
   Forewings with six blackish dots..... 23. *stalactis*.

23. *P. stalactis*, n.sp.

♀. 10-12 mm. Head white, slightly sprinkled with fuscous. Palpi white, second joint dark fuscous except apex, tuft very short, terminal joint dark fuscous towards apex. Antennæ fuscous ringed with whitish. Thorax whitish, sprinkled with fuscous. Abdomen whitish-ochreous. Legs dark fuscous, irrorated and ringed with whitish, posterior tibiæ whitish. Forewings long-pointed; whitish, densely irrorated with brown; a cloudy blackish-fuscous dot beneath costa at $\frac{1}{6}$, one on fold beyond this, one towards costa at $\frac{1}{3}$, one on fold hardly beyond this, one in middle of disc, and one in disc at $\frac{2}{3}$: cilia ochreous-whitish, round apex and costa with a blackish interrupted median line. Hindwings pale grey; cilia whitish-ochreous.

George's Bay, Tasmania; Geraldton and Perth, West Australia; in November and December, four specimens. The unusually short tuft of the palpi is in this species liable to be overlooked.

24. *P. sciopola*, n.sp.

♀. 11 mm. Head and thorax grey-whitish. Palpi white, second joint dark fuscous except apex, tuft moderate, apex of terminal joint dark fuscous. Antennæ grey-whitish, ringed with dark fuscous. Abdomen grey. Legs dark fuscous, apex of joints whitish, posterior tibiæ whitish-grey. Forewings pointed; grey, irrorated with dark fuscous; plical and second discal stigmata black: cilia pale fuscous; with basal series of blackish dots along costa and termen. Hindwings light grey; cilia pale fuscous.

Sydney, New South Wales, in October; one specimen.

25. *P. actias*, n.sp.

♂♀. 10-11 mm. Head and thorax white, tinged with greyish-ochreous. Palpi white, second joint blackish except apex, tuft moderate, terminal joint blackish anteriorly towards tip. Antennæ whitish, ringed with greyish-ochreous. Abdomen whitish-grey, in ♂ more whitish. Legs dark fuscous, posterior pair white. Forewings long-pointed; light shining golden-ochreous; a broad white costal streak from base to apex, lower edge posteriorly suffused and more or less mixed with dark fuscous; a white dorsal suffused streak from base to tornus; sometimes some indistinct whitish streaks and dark fuscous scales towards termen: cilia whitish-ochreous. Hindwings pale grey; cilia whitish-ochreous.

Hobart, Tasmania; Adelaide, South Australia; Geraldton, York, and Perth, West Australia; from October to December, ten specimens.

4. Megacraspedus, Zell.

Antennæ $\frac{4}{5}$, in ♂ shortly ciliated, basal joint moderately elongate, without pecten. Labial palpi long, curved, ascending, second joint densely scaled, with projecting apical tuft beneath (sometimes very short), terminal joint as long as second or seldom

longer, acute. Forewings: 2 and 3 separate, tolerably parallel, 7 and 8 stalked, or (in exotic species) sometimes 6 and 7 out of 8, 7 to costa. Hindwings 1, elongate-trapezoidal, apex acute, produced, termen emarginate, cilia $2\frac{1}{2}$-3; 3 and 4 remote, 5 nearer 6, 6 and 7 remote.

This genus, hitherto represented by a few European species, is considerably developed in Australia, and therefore probably occurs also in the Indo-Malayan region; one species, allied to an Australian form, occurs in New Zealand. It is distinguished from *Aristotelia* only by the tuft of the palpi, and as this is very short in some species, care is required; the genus is derivable from *Aristotelia*, and it seems not improbable that Australia is its place of origin. The larvæ are probably often attached to grasses. Imago with forewings elongate, acute.

1.	Forewings with broad sharply defined white costal streak	2.
	Forewings with at most a narrow or illdefined white streak	5.
2.	The white streak leaving costa beyond middle	3.
	The white streak continued along costa to near apex	4.
3.	Forewings with clear white dorsal streak	26. *platyleuca*.
	Forewings without white dorsal streak	27. *astemphella*.
4.	Forewings moderately pointed	29. *oxyphanes*.
	Forewings very acutely long-pointed	28. *centrosema*.
5.	Forewings ochreous-whitish	6.
	Forewings ochreous or grey	9.
6.	An elongate blackish dot below usual place of second discal stigma	42. *sagittifera*.
	No such dot	7.
7.	Hindwings grey	8.
	Hindwings ochreous-whitish	37. *pityritis*.
8.	Discal stigmata obsolete	40. *argonota*.
	Discal stigmata black, conspicuous	36. *niphodes*.
9.	Forewings distinctly ochreous or bronzy	10.
	Forewings grey or fuscous	14.
10.	Stigmata wholly absent	33. *hoplitis*.
	Stigmata more or less present	11.
11.	Plical stigma present	12.
	Plical stigma absent	13.

12.	Head whitish or grey	30. *chalcoscia.*
	Head whitish-ochreous	32. *euxena.*
13.	Forewings golden-ochreous	31. *melitopis.*
	Forewings pale greyish-ochreous	34. *inficeta.*
14.	A distinct white costal streak	15.
	No white costal streak	16.
15.	Costal streak reaching $\frac{1}{2}$	35. *stratimera.*
	Costal streak reaching $\frac{4}{5}$	38. *sclerotricha.*
16.	Stigmata absent	41. *isotis.*
	Stigmata present	17.
17.	Stigmata ochreous, blackish-edged	46. *popularis.*
	Stigmata dark fuscous	18.
18.	Tuft of palpi very short	19.
	Tuft of palpi long	20.
19.	First discal stigma obsolete	44. *ischnota.*
	First discal stigma blackish	43. *coniodes.*
20.	Head white, seldom mixed with grey	39. *aphileta.*
	Head whitish-ochreous	45. *achroa.*

26. *M. platyleuca*, n.sp.

♂♀. 11-12 mm. Head white. Palpi white, second joint rather dark fuscous except base and apex, tuft long, loose, quadrangular, apex of terminal joint dark fuscous. Antennæ grey. Thorax white, patagia tinged with grey. Abdomen grey, in ♂ whitish-suffused. Legs dark fuscous, apex of joints and hairs of posterior tibiæ whitish. Forewings pointed; fuscous, mixed with blackish-fuscous; a broad shining white costal streak from base to beyond middle, thence leaving costa and rather narrowed to $\frac{4}{5}$; an oblique white line from $\frac{3}{4}$ of costa, terminating immediately beyond apex of this; a broad suffused white dorsal streak from base to tornus; stigmata black, plical very obliquely beyond first discal; some white suffusion towards termen: cilia whitish-fuscous, round apex and on costa whiter, with black basal dot at apex, and with two dark fuscous lines round apex. Hindwings light grey; cilia whitish-fuscous.

Sydney, New South Wales; Gisborne, Victoria; Deloraine, Tasmania; Perth, West Australia; in November and December, four specimens.

27. *M. astemphella*, n.sp.

♂♀. 9-11 mm. Head and thorax white. Palpi white, second joint dark fuscous except apex, tuft long, loose, quadrangular, apex of terminal joint dark fuscous. Antennæ grey. Abdomen grey, in ♂ whitish-suffused. Legs dark fuscous, apex of joints and hairs of posterior tibiæ whitish. Forewings long-pointed; fuscous, irrorated with blackish-fuscous; a broad shining white costal streak from base to middle, thence leaving costa and narrowed to $\frac{3}{4}$; stigmata blackish-fuscous, irregular and sometimes dash-like, plical very obliquely beyond first discal; usually some undefined spots of whitish suffusion towards costa posteriorly and termen: cilia whitish-ochreous, round apex and on costa whiter, with black basal dot at apex, and one or two others beneath it, and two indistinct fuscous lines round apex. Hindwings grey; cilia whitish-fuscous.

Port Lincoln, South Australia; Geraldton, West Australia; in October and November, fourteen specimens. Very similar to *M. platyleuca*, but, apart from the absence of the white dorsal streak, certainly distinct by the much more pointed forewings.

28. *M. centrosema*, n.sp.

♂. 11-12 mm. Head and thorax white. Palpi white, second joint dark fuscous except base and apex, tuft long, loose, quadrangular. Antennæ grey. Abdomen whitish-grey. Legs dark grey, apex of joints and hairs of posterior tibiæ whitish. Forewings long-pointed; fuscous; a shining white costal streak from base to apex, narrowed towards extremities, lower edge straight and edged with dark fuscous; an undefined rather broad streak of white suffusion along dorsum and termen: cilia whitish-ochreous, with a dark fuscous apical bar. Hindwings whitish-grey; cilia whitish-ochreous.

Sydney, New South Wales; Adelaide, South Australia; in September and October, three specimens. Differs from *M. oxyphanes* by the much more pointed forewings.

29. *M. oxyphanes*, n.sp.

♂. 12 mm. Head white. Palpi white, second joint dark fuscous except base and apex, tuft moderate, quadrangular. Antennæ grey. Thorax whitish. Abdomen grey. Legs dark grey, apex of joints and hairs of posterior tibiæ whitish. Forewings pointed; fuscous; a rather broad shining white costal streak from base to $\frac{5}{6}$, narrowed to extremities, edged below with slight dark fuscous suffusion; an undefined rather broad streak of white suffusion along dorsum and lower half of termen; plical stigma indistinct, darker fuscous: cilia ochreous-whitish, with fuscous apical bar. Hindwings light grey; cilia ochreous-whitish.

York, West Australia, in October; one specimen.

30. *M. chalcoscia*, n.sp.

♂♀. 12-13 mm. Head white, tinged or sprinkled or sometimes suffused with grey. Palpi white, second joint dark fuscous except base and apex, tuft short, triangular, anterior edge of terminal joint dark fuscous. Antennæ grey, sometimes whitish-mixed. Thorax pale shining brassy-bronze. Abdomen grey. Legs dark grey, hairs of posterior tibiæ whitish. Forewings long-pointed; shining bronze; a slender white costal streak from base to $\frac{2}{3}$; stigmata indistinct, dark fuscous, plical very obliquely beyond first discal: cilia light bronzy-ochreous, on costa becoming whitish anteriorly. Hindwings grey; cilia light bronzy-grey or bronzy-ochreous.

Adelaide, South Australia; Albany, West Australia; in October and December, five specimens. The single Adelaide specimen has a greyer head than the other four from Albany, which I regard as typical.

31. *M. melitopis*, n.sp.

♂. 16 mm. Head light bronzy-grey. Palpi white, second joint ochreous-brown except base and apex, tuft short, triangular, terminal joint dark fuscous anteriorly and towards apex. Antennæ grey. Thorax bronzy-ochreous. Abdomen grey. Legs dark fuscous, hairs of posterior tibiæ grey-whitish. Forewings

pointed; golden-bronzy-ochreous; costal edge shining white from near base to $\frac{2}{3}$; second discal stigma minute, dark fuscous: cilia light bronzy-ochreous. Hindwings grey; cilia light fuscous.

York, West Australia, in October; one specimen.

32. *M. euxena*, n.sp.

♂. 13-16 mm. Head whitish-ochreous. Palpi white, second joint ochreous-brown except base and apex, tuft short, triangular, anterior edge of terminal joint dark fuscous. Antennæ white, ringed with dark fuscous. Thorax yellow-ochreous. Abdomen grey. Legs dark fuscous, hairs of posterior tibiæ whitish. Forewings long-pointed; golden-yellow-ochreous; costa narrowly white from base to $\frac{2}{3}$; stigmata black, plical very obliquely beyond first discal: cilia pale ochreous. Hindwings grey; cilia ochreous-grey.

Albany, West Australia, in December; ten specimens.

33. *M. hoplitis*, n.sp.

♀. 14-15 mm. Head and thorax bronzy-ochreous. Palpi whitish, second joint fuscous except base and apex, tuft short, subtriangular, anterior edge of terminal joint dark fuscous. Antennæ grey. Abdomen ochreous-grey. Legs rather dark fuscous, apex of joints and hairs of posterior tibiæ whitish-ochreous. Forewings long-pointed; bronzy-greyish-ochreous; costa narrowly white from base to $\frac{2}{3}$: cilia light bronzy-ochreous. Hindwings grey; cilia light bronzy-grey.

Perth, West Australia, in November; two specimens.

34. *M. inficeta*, n.sp.

♂. 14-15 mm. Head grey-whitish. Palpi whitish, second joint fuscous except apex, tuft moderately long, subquadrangular, anterior edge of terminal joint fuscous. Antennæ grey, pale-ringed. Thorax whitish-bronzy-ochreous. Abdomen grey. Legs dark grey, hairs of posterior tibiæ grey-whitish. Forewings pointed; pale shining greyish-bronzy-ochreous; costa narrowly suffused with white from base to $\frac{2}{3}$; first and second discal

stigmata small, black: cilia pale ochreous. Hindwings light grey; cilia light greyish-ochreous.

Blackheath (3500 feet), New South Wales; George's Bay, Tasmania; in December and January, five specimens.

35. *M. stratimera*, Low.

(*Eutorna stratimera*, Low., Trans. Roy. Soc. S. Austr. 1897, 58.)

♂. 14 mm. Head, antennæ, thorax, and abdomen grey. Palpi dark fuscous, apex of second joint white, tuft long, quadrangular. Legs dark fuscous (posterior pair broken). Forewings pointed; grey mixed with dark fuscous and posteriorly with whitish; a white costal streak from base to middle, attenuated to extremities; plical and second discal stigmata blackish, obscure: cilia light fuscous, round apex whitish-sprinkled. Hindwings grey; cilia light greyish-ochreous.

Mount Lofty, South Australia, in November. Described from the type-specimen, in Mr. Lower's collection.

36. *M. niphodes*, Low.

(*Eutorna niphodes*, Low., Trans. Roy. Soc. S. Austr. 1897, 58.)

♂♀. 12-13 mm. Head whitish. Palpi white, second joint dark fuscous except base and apex, tuft long, quadrangular, anterior edge of terminal joint dark fuscous. Antennæ ochreous-whitish, ringed with fuscous. Thorax pale whitish-ochreous. Abdomen grey. Legs dark fuscous, apex of joints and hairs of posterior tibiæ ochreous-whitish. Forewings pointed; pale whitish-ochreous; stigmata conspicuous, black, plical very obliquely beyond first discal: cilia pale whitish-ochreous, on costa and termen with basal series of more or less distinct black dots. Hindwings light grey; cilia whitish-ochreous.

Gisborne and Healesville, Victoria; Deloraine, Tasmania; in November, December, and March, four specimens.

37. *M. pityritis*, n.sp.

♂♀. 9-12 mm. Head ochreous-white. Palpi white, second joint dark fuscous except base and apex, tuft long, subquadrangu

lar, anterior edge of terminal joint dark fuscous. Antennæ whitish, ringed with fuscous. Thorax whitish-ochreous. Abdomen pale whitish-ochreous. Legs fuscous, apex of joints and hairs of posterior tibiæ ochreous-whitish. Forewings long-pointed; pale whitish-ochreous, more or less sprinkled with ochreous or fuscous, especially towards apex; stigmata conspicuous, black, plical very obliquely beyond first discal: cilia pale whitish-ochreous, on costa and termen with basal series of more or less ill-defined blackish dots. Hindwings ochreous-grey-whitish; cilia pale whitish-ochreous.

Brisbane, Queensland; Murrurundi, Sydney, and Mittagong, New South Wales; Mount Macedon, Victoria; Launceston and Campbelltown, Tasmania; from September to March, a common species; seventeen specimens. Very like the preceding, but smaller, with the forewings more acutely pointed, and readily separated by the ochreous-whitish hindwings. In the New Zealand *M. calamogona*, which is at first sight extremely similar, the plical stigma is very obliquely before first discal instead of beyond it, so that it is doubtful whether they are really closely related.

38. *M. sclerotricha*, n.sp.

♂♀. 12-15 mm. Head whitish, crown sometimes tinged with ochreous-grey. Palpi whitish, second joint fuscous except base and apex, tuft moderately long, subquadrangular, apex of terminal joint anteriorly fuscous. Antennæ grey. Thorax pale ochreous-grey, sometimes whitish-mixed. Abdomen grey. Legs fuscous, hairs of posterior tibiæ ochreous-whitish. Forewings long-pointed; light fuscous mixed with whitish, sometimes ochreous-tinged; a moderate rather undefined white costal streak from base to $\frac{4}{5}$, narrowed posteriorly; plical and second discal stigmata dark fuscous, sometimes indistinct: cilia light greyish-ochreous mixed with whitish. Hindwings grey or light grey; cilia pale greyish-ochreous.

Blackheath (3500 feet) and Bathurst (2500 feet), New South Wales, in November; nine specimens.

39. *M. aphileta*, n.sp.

♂♀. 10-13 mm. Head white, seldom mixed with grey. Palpi whitish, second joint dark fuscous except base and apex, tuft long, subquadrangular, terminal joint dark fuscous anteriorly towards apex. Antennæ grey. Thorax whitish, somewhat mixed with grey. Abdomen whitish-grey. Legs dark fuscous, apex of joints and hairs of posterior tibiæ whitish. Forewings pointed; light fuscous, somewhat mixed with whitish, with scattered black scales; stigmata dark fuscous or blackish, sometimes rather large, plical very obliquely beyond first discal: cilia pale greyish-ochreous, round apex with two indistinct fuscous lines, on costa and termen with basal series of more or less distinct black dots. Hindwings light grey; cilia pale greyish-ochreous.

Adelaide, Wirrabara, and Port Lincoln, South Australia; York, West Australia; in October and November, eleven specimens.

40. *M. argonota*, Low.

(*Ypsolophus argonota*, Low., Trans. Roy. Soc. S. Austr., 1901, 81.)

♀. 14 mm. Head and thorax white, patagia ochreous-tinged. Palpi white, second joint with a pale ochreous median band. Antennæ whitish. Abdomen ochreous-whitish. Legs whitish, anterior tibiæ infuscated. Forewings long-pointed; ochreous-whitish, thinly sprinkled with fine black and dark fuscous scales; a black dash-like dot on fold at $\frac{1}{3}$: cilia pale whitish-ochreous. Hindwings grey; cilia whitish-ochreous.

Broken Hill, New South Wales, in October. Described from the type-specimen, in Mr. Lower's collection.

41. *M. isotis*, n.sp.

♂. 12 mm. Head grey-whitish. Palpi white, second joint dark fuscous except base and apex, tuft moderately long, triangular, terminal joint dark fuscous towards apex. Antennæ grey. Thorax grey, whitish-sprinkled. (Abdomen broken.) Legs dark fuscous, hairs of posterior tibiæ grey-whitish. Forewings pointed,

termen sinuate; grey, sprinkled with whitish: cilia pale greyish-ochreous. Hindwings grey; cilia light greyish-ochreous.

York, West Australia, in October; one specimen.

42. *M. sagittifera*, Low.

(*Peltodora sagittifera*, Low., Proc. Linn. Soc. N. S. Wales, 1900, 416.)

♂♀. 11 mm. Head and thorax ochreous-whitish, sometimes sprinkled with dark fuscous. Palpi ochreous-whitish, second joint with dark fuscous subapical band, tuft extremely short. Antennæ pale ochreous or whitish. Abdomen whitish, second and third segments yellow-ochreous. Legs ochreous-whitish, more or less irrorated with fuscous. Forewings pointed; whitish-ochreous, mixed with whitish and sprinkled with dark fuscous or blackish; costal edge slenderly white; plical stigma distinct, blackish, and sometimes first discal obliquely beyond it; an elongate blackish dot below usual position of second discal stigma: cilia whitish, sprinkled with blackish. Hindwings pale grey or grey-whitish; cilia pale whitish-ochreous.

Broken Hill, New South Wales, in September and October; two specimens (the original type-specimen, and a second received from Mr. Lower).

43. *M coniodes*, n.sp.

♂. 10-11 mm. Head and thorax whitish-grey-ochreous. Palpi dark fuscous, apex of second joint white, tuft very short, lower half of terminal joint white except base. Antennæ whitish ringed with dark fuscous. Abdomen grey, anal tuft whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings pointed; light greyish-ochreous, sprinkled with dark fuscous; stigmata blackish, plical obliquely beyond first discal; cilia pale greyish-ochreous, with a subbasal row of dots of black irroration. Hindwings light grey; cilia whitish-ochreous.

Quorn and Petersburg, South Australia, in October; two specimens.

44. *M. ischnota*, n.sp.

♂♀. 7-9 mm. Head ochreous-whitish. Palpi dark fuscous, apex of second joint whitish, tuft extremely short, terminal joint whitish, base and a subapical band dark fuscous. Antennæ whitish or whitish-fuscous, ringed with dark fuscous. Thorax ochreous-whitish mixed with fuscous. Abdomen whitish-ochreous, towards middle in ♂ greyish. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings long-pointed; pale ochreous, more or less wholly suffused with fuscous and sprinkled with dark fuscous; an elongate dark fuscous dot on fold at $\frac{1}{4}$; plical and second discal stigmata dark fuscous: cilia whitish-ochreous, round apex with a dark fuscous median line, and basal half indistinctly spotted with fuscous. Hindwings whitish-grey; cilia pale whitish-ochreous.

Carnarvon, West Australia, in October; six specimens.

45. *M. achroa*, Low.

(*Pycnobathra achroa*, Low., Trans. Roy. Soc. S. Austr. 1901, 80.)

♂. 14 mm. Head whitish-ochreous. Palpi white, second joint dark fuscous except base and apex, tuft short, triangular, anterior edge of terminal joint dark fuscous. Antennæ whitish, ringed with fuscous. Thorax whitish-ochreous, mixed with brownish-ochreous. Abdomen grey. Legs fuscous, hairs of posterior tibiæ grey-whitish. Forewings pointed, termen sinuate; whitish-ochreous, rather densely irrorated with fuscous; stigmata rather darker fuscous, indistinct, plical obliquely beyond first discal: cilia pale ochreous. Hindwings light grey; cilia light greyish-ochreous.

Broken Hill, New South Wales, from September to November; two specimens (Lower).

46. *M. popularis*, n.sp.

♂♀. 11-13 mm. Head pale ochreous, more or less infuscated. Palpi ochreous-whitish, second joint dark fuscous except towards apex, tuft very short, subtriangular, terminal joint dark fuscous towards apex, in ♀ longer than second. Antennæ light fuscous,

darker-ringed. Thorax rather dark fuscous. Abdomen grey. Legs dark fuscous, apex of joints and hairs of posterior tibiæ ochreous-whitish. Forewings pointed; rather dark fuscous, slightly purplish-tinged, sprinkled with blackish, and with a few pale scales; stigmata forming round ferruginous-ochreous blackish-edged spots, sometimes very indistinct, plical touching first discal and hardly beyond it: cilia whitish-fuscous, irregularly mixed with dark fuscous. Hindwings grey; cilia greyish-ochreous.

Sydney and Bathurst, New South Wales; Deloraine and Hobart, Tasmania; in December and March, four specimens.

5. Iulota, n.g.

Antennæ $\frac{3}{4}$, in ♂ serrulate, simple, basal joint moderately elongate, without pecten. Labial palpi long, curved, ascending, second joint clothed with dense scales, rough beneath, and roughly projecting above towards apex, terminal joint as long as second or shorter, slender, acute. Forewings: 2 and 3 separate, tolerably parallel, 7 and 8 stalked, 7 to costa. Hindwings 1, elongate-trapezoidal, apex pointed, produced, termen sinuate, cilia $1\frac{1}{2}$-2; 3 and 4 separate, 5 somewhat approximated to 4, 6 and 7 approximated at base.

Type *I. ithyxyla*. An endemic development of *Aristotelia*, distinguished by the peculiar structure of the second joint of palpi. The longitudinally striped species are extremely similar to some in very distinct genera (*Macrenches* and *Gelechia*); the resemblance is probably analogous only. Imago with forewings elongate, acute.

1. Discal stigmata obsolete..... 2.
   Discal stigmata distinct..... 49. *epispila*.
2. Forewings with clear white dorsal streak ..... 47. *ithyxyla*.
   Forewings without white dorsal streak..... 48. *triglossa*.

47. *I. ithyxyla*, n.sp.

♂♀. 11-13 mm. Head white. Palpi white, second joint brown externally except at base and apex, terminal joint blackish except base. Antennæ fuscous. Thorax rather dark purplish-fuscous,

with a white dorsal stripe edged with yellowish. Abdomen grey-whitish, yellowish-tinged. Legs dark fuscous, posterior pair whitish. Forewings long-pointed; bright deep golden-bronze; a broad white costal streak from base almost to apex, faintly purplish-tinged, edged beneath with some dark fuscous scales, anterior half including a light brassy-yellow streak; a suffused white dorsal streak from near base to near tornus: cilia ochreous-whitish, with an apical dark fuscous bar, towards termen with some dark fuscous points, on costa white. Hindwings and cilia pale grey.

Albany, West Australia, in December; seven specimens.

48. *I. triglossa*, n.sp.

♂♀. 14-15 mm. Head grey, sides of crown whitish-pink. Palpi dark fuscous, blackish anteriorly, apex of second joint pinkish-white, terminal joint pinkish-white with median and apical blackish bands. Antennæ dark grey, beneath spotted with white. Thorax fuscous, sides ochreous-yellow, shoulders pinkish-tinged. Abdomen fuscous. Legs dark fuscous, hairs of posterior tibiæ whitish. Forewings long-pointed; golden-ochreous-yellow; a whitish-pink costal streak mixed with fuscous; a narrow blackish median longitudinal streak from base to apex, upper edge sharply defined, straight, indented before $\frac{1}{4}$, margined with a streak of white suffusion, lower edge suffused with golden-brown; dorsal area broadly suffused with pale pink sprinkled with fuscous: cilia pale whitish-ochreous, round apex pale pinkish with dark fuscous points, at apex with a dark fuscous bar. Hindwings light grey; cilia whitish-ochreous.

Deloraine, Tasmania, in November; three specimens.

49. *I. epispila*, Low.

(*Aristotelia epispila*, Low., Trans. Roy. Soc. S.Austr. 1897, 58.)

♂♀. 11-15 mm. Head whitish, sometimes pinkish-tinged, middle of crown more or less fuscous. Palpi fuscous irrorated with black, apex of second joint white, terminal joint white with black median and apical bands. Antennæ whitish-grey ringed

with dark fuscous. Thorax purplish-fuscous mixed with white, sometimes suffused with brassy-yellowish. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings pointed; pinkish-fuscous, sprinkled with dark fuscous, sometimes whitish-mixed or suffused with golden-yellow; an ochreous-yellowish subcostal streak from base to $\frac{2}{3}$, marked with a black dot near base; sometimes a broad pale or white subcostal suffusion from base to apex, its lower edge margined by an undefined streak of blackish scales; stigmata blackish, plical obliquely beyond first discal; when there is a median blackish streak the discal stigmata form projections on its upper edge: cilia whitish-ochreous, pinkish-tinged, irrorated with dark fuscous. Hindwings light grey; cilia pale whitish-ochreous.

Sydney, New South Wales; Gisborne, Victoria; George's Bay and Hobart, Tasmania; Adelaide and Port Lincoln, South Australia; Geraldton, Perth, and Albany, West Australia; from October to March, twenty-seven specimens. This species varies considerably in colouring, especially in the development of white suffusion in costal half of wing, the extreme forms being very different in appearance; I at first thought they might include several species, but finding that all the forms occur together in the same localities, I have become convinced that they are identical.

6. Sitotroga, Hein.

Antennæ $\frac{3}{4}$, in ♂ simple, basal joint long, with pecten. Labial palpi long, recurved, second joint rough-scaled beneath, terminal joint longer than second, acute. Forewings: 2 and 3 separate, parallel, 7 and 8 out of 6. Hindwings under 1, elongate-trapezoidal, apex pointed, produced, termen emarginate, cilia 2; 3, 4, 5 remote and parallel, 6 and 7 stalked.

A genus of a single species, probably indigenous to America, but now introduced into many parts of the world with imported grain. It is a development of *Aristotelia*. Imago with forewings elongate-lanceolate.

50. *S. cerealella*, Ol.

(*Gelechia melanarthra*, Low., Proc. Linn. Soc. N. S. Wales, 1900, 416.)

♂♀. 11-16 mm. Head, palpi, antennæ, thorax, abdomen, and legs whitish-ochreous, anterior legs infuscated. Forewings pale ochreous, more or less sprinkled with brownish; plical and second discal stigmata blackish; often a blackish tornal dot; some black scales at apex: cilia whitish-ochreous, with a row of dark fuscous points, and apical bar of blackish irroration. Hindwings grey; cilia grey, round apex pale ochreous.

Rosewood, Queensland; Sydney and Broken Hill, New South Wales; Carnarvon and York, West Australia; from October to February, and in June, fifteen specimens; common in corn bins, and probably generally distributed in warm districts. Larva feeds in grains of wheat, maize, &c. I have seen Lower's type of *melanarthra;* it is certainly this species.

7. Aristotelia, Hb.

Antennæ $\frac{4}{5}$, in ♂ simple or moderately ciliated (1-1½), basal joint moderate, without pecten. Labial palpi long, recurved, second joint with appressed scales or sometimes rough beneath, terminal joint nearly as long as, or longer than, second, acute. Forewings: 2 and 3 separate, 7 and 8 stalked, sometimes 7 and 8 out of 6, or 6 and 7 out of 8. Hindwings 1 or somewhat under 1, elongate-trapezoidal, apex pointed, produced, termen sinuate or emarginate, cilia 1¼-4; 3, 4, 5 remote, nearly parallel, 6 and 7 remote or somewhat approximated.

A considerable genus, fairly numerous in Europe and probably of wide distribution, but the species are often obscure and retired in habit, and therefore easily overlooked. The Australian species at present known seem in part rather disconnected, but all have their counterparts amongst the European forms. Imago with forewings elongate, more or less acute.

1. Forewings with 7 and 8 out of 6..... 2.
   Forewings with 6 separate..... 7.

2. Forewings with antemedian white costal blotch..... 55. *tetracosma*.
Forewings without such blotch..... 3.
3. Forewings with interrupted white postmedian fascia.... 56. *antipala*.
Forewings without such fascia..... 4.
4. Head ochreous-whitish..... 53. *furtiva*.
Head fuscous on crown..... 5.
5. Face ochreous-white..... 51. *sinistra*.
Face light fuscous..... 6.
6. Forewings with dark fuscous streak from beneath middle of disc to apex..... 52. *macrothecta*.
Forewings without such streak..... 54. *thetica*.
7. Forewings with dark antemedian dorsal blotch..... 60. *peltosema*.
Forewings without such blotch..... 8.
8. Forewings with ochreous-white longitudinal streak..... 59. *centrosema*.
Forewings without such streak..... 9.
9. Forewings with violet-silvery markings..... 58. *epimetalla*.
Forewings without violet-silvery markings..... 57. *pamphaea*.

51. *A. sinistra*, n.sp.

♂♀. 10-12 mm. Head fuscous, face ochreous-white. Palpi ochreous-white, second joint pale ochreous except apex, base of second joint and apical half of terminal joint blackish. Antennæ fuscous. Thorax ashy-fuscous marked with dark fuscous. Abdomen light greyish-ochreous. Legs dark fuscous ringed with whitish, posterior pair ochreous-whitish. Forewings very acutely long-pointed; 7 and 8 out of 6; ashy-fuscous, purplish-tinged, sometimes irrorated with dark fuscous; markings blackish mixed with deep golden-bronzy; an obsolete dorsal spot near base; a subcostal spot at $\frac{1}{6}$, and one on fold slightly beyond it; an outwardly oblique bar from beneath costa at $\frac{1}{3}$ to fold; a spot in middle of disc, and one at $\frac{2}{3}$ (representing stigmata); indistinct opposite costal and tornal whitish spots at $\frac{2}{3}$: cilia pale ochreous, more whitish towards tips, with indistinct median line of dark fuscous irroration, basal half obscurely spotted with alternate whitish and dark fuscous irroration. Hindwings grey; cilia 3, pale brownish-ochreous.

Sydney, New South Wales, in September and March; nine specimens. This and the three following species are nearly allied together and very similar, but the differential characters

appear to be quite constant, and easy of observation when attention is directed to them. *A. sinistra* is distinguished from all the others by the ochreous-white face contrasting with the fuscous crown, and by the pale ochreous second joint of palpi.

52. *A. macrothecta*, n.sp.

♂♀. 14 mm. Head light bronzy-fuscous. Palpi fuscous irrorated with dark fuscous, extreme apex of second joint and lower half of terminal joint whitish. Antennæ fuscous. Thorax bronzy-fuscous. Abdomen light greyish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings very acutely long-pointed; 7 and 8 out of 6; light bronzy-fuscous, irrorated with dark fuscous; a dark fuscous dot on base of costa, two beneath costa at $\frac{1}{6}$ and $\frac{1}{3}$, and three on fold obliquely beyond these respectively; an undefined longitudinal dark fuscous suffusion from between last subcostal and plical dots beneath middle of disc to apex, upper edge with two dark fuscous prominences representing discal stigmata: cilia ochreous-whitish, with a blackish median line. Hindwings pale grey; cilia whitish-grey-ochreous.

Mittagong (3000 feet), New South Wales, in March; two specimens. Larger than the others, with the head wholly fuscous, and differing from all in the suffused dark posterior longitudinal streak.

53. *A. furtiva*, n.sp.

♂. 11-12 mm. Head ochreous-whitish. Palpi dark fuscous, extreme apex of second joint whitish, terminal joint white with extreme base and supramedian band dark fuscous. Antennæ dark fuscous. Thorax rather dark fuscous. Abdomen pale brownish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings very acutely long-pointed; 7 and 8 out of 6; fuscous, slightly purplish-tinged, sprinkled with dark fuscous; a dark fuscous spot on fold at $\frac{1}{4}$, and one beneath costa at $\frac{1}{3}$; stigmata moderate, dark fuscous, plical very obliquely before first discal, which is in middle: cilia pale fuscous, with a dark fuscous median line, basal half sharply

barred with white. Hindwings light grey; cilia 3, pale brownish-ochreous.

Sydney, New South Wales, in September, February, and April; George's Bay, Tasmania, in December; four specimens. Characterised by the wholly ochreous-white head, but with the second joint of palpi dark; the white bars in cilia of forewings are also peculiar; this and the next species have fewer dark spots anteriorly than the other two.

54. *A. thetica*, n.sp.

♂♀. 11-13 mm. Head light bronzy-fuscous. Palpi fuscous sprinkled with dark fuscous, terminal joint whitish, dark fuscous at base and becoming blackish towards tip. Antennæ fuscous. Thorax bronzy-fuscous. Abdomen light greyish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings very acutely long-pointed; 7 and 8 out of 6; light bronzy-fuscous sprinkled with dark fuscous, sometimes with some whitish scales; a dark fuscous spot on fold at $\frac{1}{4}$, and one beneath costa at $\frac{1}{3}$; stigmata moderate, dark fuscous, sometimes more or less surrounded with whitish, plical very obliquely before first discal, which is in middle : cilia pale fuscous, with dark fuscous median line, and two or three rows of dark fuscous points. Hindwings pale grey; cilia 3, pale brownish-ochreous.

Sydney, New South Wales, in March and September; George's Bay and Hobart, Tasmania, in December and January; eight specimens. Nearest to *A. furtiva*, but with the head fuscous; both are apparently double-brooded in New South Wales, single-brooded in Tasmania.

55. *A. tetracosma*, n.sp.

♂. 14 mm. Head, antennæ, and thorax dark fuscous. Palpi dark fuscous, extreme apex of second joint and a subapical ring of terminal joint white. Abdomen grey. Legs dark fuscous, ringed with white. Forewings long-pointed, 7 and 8 out of 6; dark fuscous, with a faint purplish tinge; an ochreous-white subtriangular blotch on costa at $\frac{1}{4}$, reaching more than half across

wing; a similar smaller spot on costa before $\frac{3}{4}$, reaching half across wing: cilia fuscous, basal half somewhat mixed with dark fuscous. Hindwings grey, darker posteriorly; cilia 2, light fuscous.

Perth, West Australia, in October; one specimen.

56. *A. antipala*, n.sp.

♂. 7 mm. Head shining metallic grey. Palpi dark grey. Antennæ dark fuscous, serrate, moderately ciliated. Thorax dark bronzy-fuscous. Abdomen dark fuscous. Legs dark fuscous, ringed with whitish. Forewings elongate-lanceolate; 7 and 8 out of 6; shining dark fuscous, slightly bronzy-tinged; a straight narrow whitish transverse fascia at $\frac{2}{3}$, constricted and just interrupted in middle: cilia dark fuscous. Hindwings dark fuscous; cilia 4, dark fuscous.

Sydney, New South Wales, in September and March; two specimens. I have been able only imperfectly to ascertain the neuration in this small species.

57. *A. pamphaea*, n.sp.

♀. 10 mm. Head and thorax bronzy-fuscous. Palpi dark fuscous, apex of second joint whitish-ochreous, terminal joint suffused with whitish-ochreous towards base. Antennæ and abdomen fuscous. Legs dark fuscous, ringed with ochreous-whitish. Forewings acutely pointed; 6 separate; bronzy-fuscous, irrorated with dark fuscous: cilia bronzy-fuscous, round apex with two dark fuscous lines. Hindwings rather dark fuscous; cilia 2, fuscous.

Sydney, New South Wales, in February; one specimen.

58. *A. epimetalla*, n.sp.

♂♀. 7-8 mm. Head bright leaden-metallic. Palpi brassy whitish-yellowish, terminal joint dark fuscous. Antennæ bronzy-fuscous. Thorax bright golden-bronze, apex of patagia purple. Abdomen bronzy-fuscous, beneath pale golden, anal tuft whitish-ochreous. Legs dark bronze, ringed with brassy-whitish. Fore-

wings elongate-lanceolate; 6 separate; bright shining golden-bronze; markings shining violet-bluish-silvery; a spot on costa at $\frac{1}{5}$, reaching half across wing; a spot on discal fold before middle, one beneath costa beyond middle, and one on tornus; an elongate spot on costa about $\frac{3}{4}$: cilia rather dark fuscous. Hindwings dark fuscous; cilia 4, rather dark fuscous.

Sydney and Blackheath (3500 feet), New South Wales, in September and from February to April; six specimens.

59. *A. centrosema*, Low.

(*Gelechia centrosema*, Low., Trans. Roy. Soc. S.Austr. 1893, 171).

♂♀. 10-14 mm. Head, antennæ, and thorax ochreous-bronzy, face shining whitish-ochreous. Palpi ochreous-whitish. Abdomen shining whitish-ochreous. Legs dark fuscous ringed with ochreous-whitish, posterior pair ochreous-whitish. Forewings elongate-lanceolate; 6 separate; ochreous-bronzy, sometimes golden-tinged, costal half usually more or less pale, dorsal half more or less suffused with fuscous; costal edge ochreous-whitish from about $\frac{1}{4}$ to $\frac{3}{4}$; a rather narrow ochreous-white median longitudinal streak from base to apex: cilia pale fuscous, round apex suffused with ochreous, tips ochreous-whitish. Hindwings grey; cilia 2, light ochreous-fuscous, tips ochreous-whitish.

Glen Innes (3500 feet) and Sydney, New South Wales; Melbourne, Warragul, and Gisborne, Victoria; Launceston and Deloraine, Tasmania; in October, December, January, and March, twenty specimens; a common species in grassy places. I have seen Mr. Lower's type.

60. *A. peltosema*, Low.

(*Xenolechia peltosema*, Low., Proc. Linn. Soc. N.S. Wales, 1900, 50).

♀. 11-12 mm. Head whitish-ochreous, more or less sprinkled with dark fuscous. Palpi whitish, second joint with dark fuscous subbasal and broad subapical band, terminal joint with blackish submedian and apical bands. Antennæ fuscous, ringed with dark fuscous. Thorax whitish-ochreous mixed with yellow-ochreous,

shoulders and a dorsal stripe fuscous. Abdomen greyish-ochreous. Legs dark fuscous ringed with ochreous-whitish. Forewings pointed; 6 separate; whitish-ochreous, irregularly mixed with ochreous and somewhat sprinkled with dark fuscous; costal edge whitish, irregularly spotted with dark fuscous, with larger cloudy spots at $\frac{3}{5}$ and $\frac{4}{5}$; a small dark fuscous spot on dorsum near base, and one on fold at $\frac{1}{5}$; a fuscous dark-edged somewhat reniform blotch on dorsum before middle, reaching $\frac{2}{3}$ across wing, pointed above; second discal stigma dark fuscous: cilia whitish-ochreous, basal half more ochreous. Hindwings grey, lighter towards base; cilia light greyish-ochreous.

Broken Hill, New South Wales; Geraldton, West Australia; in October, three specimens (including Mr. Lower's type).

8. Thiotricha, Meyr.

Antennæ $\frac{4}{5}$, in ♂ strongly ciliated (3-5), basal joint elongate, without pecten. Labial palpi long, recurved, second joint smooth-scaled, terminal joint as long as or longer than second, acute. Forewings: 2 and 3 separate, 4 absent, 7 out of 6, running to costa, 8 absent, 9 out of 6 or approximated. Hindwings under 1, elongate-trapezoidal, apex acute, more or less produced, termen more or less emarginate, cilia 2-6; 3 and 4 connate, 5 rather approximated to 4, 6 and 7 stalked.

Type *T. thorybodes*, Meyr., from New Zealand. This genus, at present known only from Australia and New Zealand, is well characterised by the long antennal ciliations of ♂, and absence of veins 4 and 8 of forewings (I formerly regarded 2 as the lower absent vein, but now think it to be more probably 4); in the narrower-winged species 9 rises from 6, whilst in one New Zealand species (probably the most ancestral form) 6, 7, and 9 are all separate, but I do not consider these differences call for generic subdivision, the species being all evidently allied together. The genus seems to be probably a derivative of the *Dectobathra* group. Imago with forewings elongate, pointed. The only larva known lives in a portable case and mines blotches in leaves, in the manner of *Coleophora*.

1.	Head and thorax yellow	70. *parthenica*.
	Head and thorax not yellow	2.
2.	Palpi wholly white	3.
	Palpi not wholly white	7.
3.	Forewings with dark fuscous antemedian costal spot	66. *arthrodes*.
	Forewings without such spot	4.
4.	Forewings with apical fourth yellow	61. *chrysopa*.
	Forewings with apical fourth not yellow	5.
5.	Forewings pale bronzy-ochreous	62. *oxytheces*.
	Forewings white	6.
6.	Forewings with orange spot in cilia beneath apex	63. *margarodes*.
	Forewings without such spot	64. *leucothona*.
7.	Forewings with dark discal spot at $\frac{1}{4}$	8.
	Forewings without such spot	9.
8.	Forewings with dark fuscous tornal spot	68. *niphastis*.
	Forewings without such spot	69. *anticentra*.
9.	Forewings with large dark median spot	67. *bullata*.
	Forewings without such spot	65. *paraconta*.

61. *T. chrysopa*, n.sp.

♀. 10 mm. Head and palpi shining ochreous-white. Antennæ white, becoming grey on apical half. Thorax shining grey-whitish. Abdomen pale shining bronze. Legs shining whitish, ringed with dark grey, anterior tibiæ and tarsi dark grey. Forewings very narrow, shortly round-pointed; shining pale grey, with brassy and purplish reflections; a pale ochreous-yellow patch occupying apical fourth of wing, upper half suffused with orange, anterior edge convex, enclosing a longitudinal dark grey median dash; a black apical dot, connected with a dark grey mark along upper part of termen: cilia grey, round apex with a dark grey shade, on costal edge of apical patch whitish towards base with two dark grey bars. Hindwings and cilia grey.

Brisbane, Queensland; one specimen.

62. *T. oxytheces*, n.sp.

♂. 9-10 mm. Head and palpi shining white. Antennæ dark grey, basal third white. Thorax and abdomen shining ochreous-whitish. Legs shining whitish, ringed with dark grey, anterior

tibiæ and tarsi dark grey. Forewings very narrow, shortly round-pointed; pale shining bronzy-ochreous, more whitish towards costa anteriorly; costal edge dark fuscous on anterior half; a suffused fuscous mark along dorsum from $\frac{1}{5}$ to middle; a suffused whitish streak along posterior half of dorsum, interrupted by an elongate fuscous mark on submedian fold; an outwardly oblique white fuscous-edged mark above tornus, and a white costal dot above its upper extremity; a black apical dot: cilia pale brownish-ochreous, round apex with a fuscous shade. Hindwings light grey; a minute black apical dot; cilia pale brownish-ochreous, at apex of wing with a whitish bar interrupted in middle with dark fuscous.

Brisbane, Queensland; Sydney, New South Wales; in September and March, two specimens.

63. *T. margarodes*, n.sp.

♀. 9-10 mm. Head, palpi, and thorax shining white. Antennæ whitish. Abdomen shining grey-whitish. Legs whitish, ringed with dark fuscous, anterior tibiæ and tarsi dark fuscous. Forewings very narrow, acutely pointed; shining white, with a faint ochreous tinge; a semioval leaden-grey spot along lower half of termen, edged anteriorly with a dark fuscous line; two outwardly oblique dark fuscous lines from costa towards apex; a black apical dot, preceded by orange: cilia pale bronzy-ochreous, with a faint purplish tinge, at apex with three dark fuscous lines, beneath apex with a suffused orange spot. Hindwings light grey; cilia pale greyish-ochreous.

Rosewood, Queensland, in September; three specimens.

64. *T. leucothona*, n.sp.

♂♀. 9-11 mm. Head, palpi, antennæ, and thorax shining white. Abdomen whitish-ochreous. Legs whitish, more or less banded with dark grey. Forewings narrow, shortly pointed; shining white, with a faint ochreous tinge; costal edge dark fuscous towards base; a crescentic-wedgeshaped fuscous tornal mark reaching half across wing; two rather suffused dark fuscous

oblique streaks from costa towards apex; a black apical dot, preceded by some fuscous suffusion: cilia pale greyish-ochreous, round apex with two fuscous lines, beneath apex with a patch of whitish suffusion. Hindwings light grey; cilia pale greyish-ochreous.

Murrurundi and Sydney, New South Wales, in October; two specimens.

65. *T. paraconta*, n.sp.

♀. 11 mm. Head and thorax shining white. Palpi white, second joint dark fuscous. Antennæ fuscous. Abdomen pale fuscous. Legs dark fuscous, ringed with whitish, hairs of posterior tibiæ whitish-ochreous. Forewings narrow, shortly pointed; shining white, with a faint ochreous tinge; costal edge dark fuscous towards base; a dark fuscous dorsal streak from $\frac{1}{4}$ to before tornus, thence continued very obliquely upwards, reaching half across wing; two rather suffused oblique dark fuscous streaks from costa towards apex; a black apical dot: cilia pale bronzy-ochreous, round apex with two fuscous lines, beneath apex with a spot of white suffusion. Hindwings grey; cilia pale bronzy-ochreous.

Wollongong, New South Wales, in October; one specimen.

66. *T. arthrodes*, n.sp.

♂♀. 10-12 mm. Head and palpi shining white. Antennæ fuscous. Thorax fuscous, posterior third white. Abdomen pale ochreous. Legs ochreous-whitish, anterior pair dark fuscous. Forewings narrow, acutely pointed; shining ochreous-whitish, posteriorly suffused with pale brownish-ochreous; a short dark fuscous costal streak at base; an elongate-triangular dark fuscous costal spot before middle, reaching $\frac{2}{3}$ across wing; an ill-defined dark fuscous fascia beyond middle, narrowed beneath; an ochreous-yellow streak along submedian fold between these; an apical spot of dark fuscous suffusion: cilia pale brownish-ochreous, base on termen, and costa suffusedly whitish-ochreous, at apex with a whitish-ochreous bar. Hindwings grey; cilia pale brownish-ochreous.

Sydney, New South Wales, in November; two specimens.

67. *T. bullata*, n.sp.

♀. 12 mm. Head and thorax whitish, with a few dark grey scales. Palpi dark grey speckled with whitish. Antennæ white ringed with fuscous. Abdomen grey-whitish. Legs dark grey ringed with whitish, hairs of posterior tibiæ whitish. Forewings very narrow, acutely pointed; whitish, thinly sprinkled with dark grey; a large roundish dark grey spot in middle of disc, and a smaller one at $\frac{2}{3}$: cilia whitish. Hindwings whitish-grey; cilia whitish.

Broken Hill, New South Wales, in May; one specimen, in Mr. Lower's collection.

68. *T. niphastis*, n.sp.

♂. 11 mm. Head and thorax shining grey-whitish. Palpi, antennæ, and abdomen grey. Legs dark grey, ringed with whitish, hairs of posterior tibiæ whitish. Forewings narrow, acutely pointed; shining whitish, sprinkled with fuscous; a triangular fuscous spot on base of costa; anterior half of dorsum suffused with pale grey; an irregular fuscous spot in disc at $\frac{1}{4}$, one beneath middle of disc, one on tornus, and one on costa at $\frac{2}{3}$; some irregular fuscous marking towards apex; a blackish apical dot: cilia whitish-ochreous, round apex and on costa whitish broadly barred with fuscous. Hindwings light grey; cilia whitish-ochreous.

York, West Australia, in October; one specimen.

69. *T. anticentra*, n.sp.

♀. 13 mm. Head and thorax grey-whitish mixed with pale grey. Palpi whitish sprinkled with dark grey, second joint dark fuscous except base and apex. Antennæ grey. (Abdomen broken.) Legs dark fuscous ringed with whitish. Forewings very narrow, acutely pointed; whitish, irrorated with fuscous and dark fuscous; a moderate blackish dot on base of costa; a blackish dash beneath fold at $\frac{1}{4}$, and one beneath costa at $\frac{1}{3}$; stigmata blackish, plical dash-like, obliquely before first discal, which is in middle; minute blackish dots along termen and apical

part of costa: cilia whitish-fuscous. Hindwings grey; cilia whitish-fuscous.

Brisbane, Queensland; one specimen.

70. *T. parthenica*, n.sp.

♂♀. 13-14 mm. Head, palpi, and thorax ochreous-yellow. Antennæ ochreous-whitish ringed with dark fuscous. Abdomen ochreous. Legs dark fuscous, posterior pair ochreous-whitish. Forewings narrow, acutely pointed; rather deep ochreous-yellow; costal edge dark fuscous towards base; a minute black dot beneath costa at $\frac{1}{3}$, and stigmata minute, black, plical obliquely before first discal, but all these apparently sometimes absent: cilia ochreous-yellow, becoming paler towards tornus. Hindwings light grey; cilia pale ochreous-yellowish.

Sydney, New South Wales; George's Bay, Tasmania; in October, December, and January, three specimens. Larva case-bearing; case tolerably cylindrical, thick, rather curved, composed of withered fragments of leaf superposed in tiers; feeds on *Grevillea punicea*, boring holes into undersurface and discolouring upper in small blotches, in August.

9. Colobodes, n.g.

Antennæ $\frac{3}{4}$, in ♂ simple, basal joint moderately elongate, without pecten. Labial palpi long, recurved, smooth, cylindrical, terminal joint shorter than second, acute. Forewings: 3 absent (coincident with 2), 7 to costa, 8 absent, 9 absent. Hindwings 1, rounded-trapezoidal, apex acute, produced, termen emarginate, cilia $1\frac{2}{3}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 somewhat approximated.

Contains only the single species; a development of *Idiophantis*, from which it differs mainly by the relatively shorter terminal joint of palpi, and absence of vein 3 of forewings. Imago with forewings elongate, obtuse.

71. *C. insomnis*, n.sp.

♂♀. 7-9 mm. Head shining bronzy-ochreous. Palpi ochreous-whitish, with a longitudinal blackish line on each side. Antennæ

whitish, longitudinally lined with blackish. Thorax light bronzy-ochreous, mixed with dark fuscous. Abdomen shining whitish-ochreous. Legs ochreous-whitish, banded with dark fuscous, anterior pair longitudinally lined with black. Forewings elongate, apex rounded, termen abruptly sinuate-indented beneath apex, little oblique, rounded beneath; light shining bronzy-ochreous, irregularly mixed with dark fuscous suffusion, tending to form irregular blotches, especially towards middle of disc; three fine dark fuscous longitudinal lines beneath costa on anterior half; a silvery-metallic line, edged with dark fuscous, from $\frac{3}{4}$ of costa to tornus, becoming white towards costa, angulated outwards in middle; a silvery-metallic subapical dot; a black terminal dot beneath indentation: cilia fuscous, towards tornus more whitish, at apex with a whitish spot cut by a dark fuscous line, beneath apex with two metallic shades. Hindwings light grey, paler towards base; cilia pale greyish-ochreous.

Sydney, New South Wales, from December to February; eight specimens.

10. IDIOPHANTIS, n.g.

Antennæ $\frac{4}{5}$, basal joint moderate, without pecten. Labial palpi long, recurved, with appressed scales, terminal joint longer than second, acute. Forewings: 2 and 3 long-stalked, 7 to costa, 8 absent, 9 absent. Hindwings over 1, elongate-trapezoidal, termen hardly sinuate, cilia $\frac{2}{3}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 somewhat approximated.

Nearly allied to *Dectobathra*, of which it is a development; only the one species is known. Imago with forewings elongate, obtuse.

72. *I. habrias*, n.sp.

♀. 11 mm. Head and thorax pale ochreous, partially tinged with brown. Palpi whitish, with dark fuscous line on each side of anterior edge. Antennæ whitish, longitudinally lined with blackish. Abdomen whitish-ochreous. Legs white, banded obliquely with blackish-fuscous. Forewings elongate, apex round-pointed, termen concave, little oblique, tornus rounded-prominent;

whitish-ochreous, dorsal half (or more anteriorly) reddish-brown sprinkled with whitish; an elongate-triangular dark fuscous blotch extending along costa from $\frac{1}{4}$ to $\frac{2}{3}$, broadest posteriorly, its posterior edge sinuate and connected by a curved line with dorsal red-brown area; four white longitudinal lines, partially edged with dark fuscous, in disc beyond this; an angulated pale golden-metallic dark-edged transverse line from $\frac{2}{3}$ of costa to tornus, more whitish costally; a pale leaden oblique streak from costa beyond this to apex, margined with light reddish-brown, becoming dark fuscous on costa; two suffused dark fuscous marks on termen: cilia silvery-whitish, with two cloudy dark fuscous lines, sharper and blacker above apex. Hindwings light grey, apex dark grey; cilia pale greyish, round apex whitish ochreous with a dark fuscous line.

Brisbane, Queensland; one specimen in Mr. Lower's collection.

11. Dectobathra, n.g.

Antennæ $\frac{3}{4}$, in ♂ serrulate, simple or ciliated, sometimes with abrupt suprabasal notch, basal joint elongate, without pecten. Labial palpi long, recurved, second joint much thickened with appressed scales, slightly rough beneath, terminal joint shorter, acute. Forewings: 2 and 3 separate, 7 and 8 stalked, 7 to apex. Hindwings 1, trapezoidal, apex obtuse, termen emarginate, cilia $\frac{4}{5}$-$1\frac{1}{3}$; 3 and 4 connate, 5 approximated to 4, 6 and 7 somewhat approximated or stalked.

Type *D. choristis*. The three species here described present some structural variation, but are evidently allied, and it seems unnecessary to separate them generically. This and the two preceding genera form a small endemic group whose affinity with other forms is somewhat obscure; at present I consider them as perhaps derived from a form correlated with *Chaliniastis*. Imago with forewings elongate, apex obtuse.

1. Head and thorax white ..... 75. *insignis*.
   Head and thorax bronzy ..... 2.
2. Second joint of palpi with numerous black bars ..... 73. *choristis*.
   Second joint of palpi wholly whitish-ochreous ..... 74. *amethystina*.

73. *D. choristis*, n.sp.

♂♀. 11-13 mm. Head and thorax bronzy-ochreous. Palpi white, second joint with about ten black transverse bars, terminal joint with anterior edge black. Antennæ dark fuscous, in ♂ with deep abrupt suprabasal notch. Abdomen blackish, with silvery-metallic reflections, apex ochreous-white. Legs ochreous-whitish banded with blackish. Forewings with termen nearly straight, faintly sinuate, little oblique; dark bronzy-fuscous; a rather broad suffused bronzy-ochreous dorsal streak from base to beyond middle; three violet-silvery-metallic transverse lines, white towards costa; first from $\frac{2}{5}$ of costa to beyond middle of dorsum, obtusely angulated in middle, indented beneath this; second from middle of costa to $\frac{2}{3}$ of dorsum, dilated towards costa, somewhat bent in middle; third from $\frac{4}{5}$ of costa to dorsum before tornus, rather irregular; a whitish-ochreous tornal patch, containing two black dashes : cilia bronzy-metallic, at apex with a white patch cut by a black line, on tornus whitish. Hindwings posteriorly dilated, 6 and 7 approximated; grey, becoming dark grey posteriorly; two cloudy white opposite spots beyond middle sometimes distinct, more usually faint or obsolete; cilia dark grey, becoming pale at tips and towards tornus, with a more or less distinct white spot at apex.

Brisbane, Queensland; Bulli, New South Wales; Albany, West Australia; in September and October, nine specimens.

74. *D. amethystina*, n.sp.

♂♀. 8-10 mm. Head and thorax shining bronze. Palpi whitish-ochreous, terminal joint dark fuscous anteriorly. Antennæ dark fuscous, in ♂ simple. Abdomen blackish, with silvery-metallic reflections, apex whitish. Legs whitish, banded with blackish. Forewings with termen somewhat sinuate, little oblique; dark bronzy-fuscous; an oblique white mark from dorsum at $\frac{1}{3}$; a violet-silvery-metallic rather irregularly curved line from $\frac{2}{5}$ of costa to beyond middle of dorsum, white on costa; an irregular-oval spot outlined with violet-silvery-metallic in disc beyond middle, connected with costa by a white mark; a violet-silvery-

metallic irregular line from $\frac{5}{6}$ of costa to tornus; terminal area beyond this more or less suffused with whitish-ochreous, especially towards tornus, and marked with four dark fuscous dashes: cilia fuscous, on termen bronzy-metallic, with a white basal spot at apex, and a white tornal patch towards tips. Hindwings posteriorly dilated, 6 and 7 approximated; dark fuscous, darker posteriorly; a rather broad white fascia beyond middle, sometimes interrupted, seldom obsolete; cilia dark fuscous, with a white apical patch.

Toowoomba, Queensland; Sydney, New South Wales; in September, October, December, and March, twelve specimens.

75. *D. insignis*, n.sp.

♂♀. 11-12 mm. Head, palpi, antennæ, and thorax white; antennæ in ♂ ciliated. Abdomen light greyish-ochreous. Legs dark fuscous ringed with white, posterior pair white. Forewings broader than in the other species, termen sinuate, rather oblique; shining white; a triangular blackish-grey blotch on base of dorsum; a deep golden-ochreous fascia from middle of costa to $\frac{3}{4}$ of dorsum, acutely angulated in middle; three deep golden-ochreous marks on costa beyond this, connected beneath; a series of six longitudinal black lines before termen, two upper surrounded with ochreous suffusion: cilia whitish-ochreous, with two faint darker lines becoming dark fuscous above apex. Hindwings broader anteriorly, 6 and 7 stalked; grey, lighter towards base; cilia pale whitish-yellowish.

Brisbane, Queensland; Sydney, New South Wales; from October to December, three specimens.

12. CHALINIASTIS, n.g.

Antennæ $\frac{3}{4}$, in ♂ serrulate, simple, basal joint moderately elongate, without pecten. Labial palpi long, recurved, second joint with appressed scales, terminal joint longer than second, acute. Forewings: 2 and 3 nearly parallel, 7 to costa, 8 absent. Hindwings considerably over 1, trapezoidal, apex obtuse, termen

not sinuate, cilia $\frac{2}{3}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 rather approximated.

Only one species at present known; it may probably be a derivative of *Gelechia*. Imago with forewings elongate, apex obtuse.

76. *C. astrapaea*, n.sp.

♂. 14 mm. Head bronzy. Palpi pale bronze, with dark fuscous lateral lines limiting whitish anterior edge. Antennæ longitudinally lined with dark fuscous and whitish. Thorax dark bronzy-fuscous, patagia white. Abdomen fuscous, apex whitish. Legs dark fuscous, internally white. Forewings with costa moderately arched, termen hardly rounded, somewhat oblique; bronzy-fuscous, darker on posterior half; an irregular undefined whitish streak along dorsum from base to tornus; a suffused dark fuscous blotch limiting this above from $\frac{1}{4}$ to $\frac{3}{4}$; a moderate triangular white costal spot at $\frac{4}{5}$, whence a fine white slightly curved line proceeds to tornus; an obscure whitish-ochreous suffusion beyond this on lower half: cilia whitish-ochreous, base white, with an indistinct fuscous median line becoming dark fuscous above apex. Hindwings pale fuscous, becoming darker posteriorly; cilia whitish-fuscous.

Brisbane, Queensland; one specimen.

13. Smenodoca, n.g.

Antennæ $\frac{3}{4}$, in ♂ simple, basal joint moderately elongate, without pecten. Labial palpi long, recurved, second joint thickened with scales, slightly rough beneath, terminal joint as long as second, acute. Forewings: 2 and 3 separate, 7 and 8 out of 6, 7 to costa. Hindwings 1, elongate-trapezoidal, apex pointed, termen sinuate, cilia 2; 3 and 4 stalked, 5 becoming obsolete basally, 6 and transverse vein apparently obsolete, 8 anastomosing strongly with margin of cell.

A monotypic genus derivable from *Epithectis*. Imago with forewings elongate, pointed.

77. *S. erebenna*, n.sp.

♂♀. 9-11 mm. Head and thorax whitish, more or less mixed with blackish. Palpi white, basal half and subapical ring of second joint, and base and apical half of terminal joint black. Antennæ whitish, ringed with dark fuscous. Abdomen bronzy-grey. Legs dark fuscous ringed with white, hairs of posterior tibiæ white. Forewings acutely long-pointed; white, coarsely irrorated with dark fuscous; a more or less developed variably interrupted black streak from base of costa through disc to apex, and a less marked also interrupted streak along fold; sometimes a white streak between these, or a white longitudinal mark in disc beyond middle, or white opposite tornal and costal spots; sometimes stigmata traceable as part of black streaks, elongate, plical beyond first discal: cilia fuscous, round apex mixed with whitish, with rows of blackish points. Hindwings fuscous darker posteriorly; cilia fuscous.

Sydney and Blackheath (3500 feet), New South Wales; Gisborne and Healesville, Victoria; Perth and Albany, West Australia; from October to December, fourteen specimens. This species varies much in the development of the markings.

14. Epithectis, Meyr.

Antennæ $\frac{3}{4}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi long, recurved, second joint thickened with scales, somewhat rough beneath, terminal joint as long as second, acute. Forewings: 2 and 3 separate, 7 and 8 out of 6, 7 to costa. Hindwings over 1, trapezoidal, apex pointed, termen sinuate, cilia 1; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 stalked.

A small European and North American genus, to which the following species seems truly referable; it is a conspicuous insect, distinct in appearance from anything else. Imago with forewings elongate, pointed.

78. *E. mesoleuca*, Low.

(*Gelechia mesoleuca*, Low., Proc. Linn. Soc. N.S. Wales, 1900, 48.)

♀. 22 mm. Head ochreous-white. Palpi white, lower half of second joint blackish externally, terminal joint blackish. Antennæ dark fuscous, spotted with whitish. Thorax ochreous-white, patagia and a central stripe blackish. Abdomen whitish. Legs blackish-fuscous, obscurely whitish-ringed, posterior pair whitish. Forewings dark fuscous; a rather broad irregular-edged ochreous-white median streak from base to apex, margined with black suffusion; plical stigma elongate, blackish, inserted in lower edge of median streak, second discal black, placed in streak at $\frac{2}{3}$: cilia fuscous-whitish, towards base with a few blackish scales, above apex with a blackish bar. Hindwings whitish-grey, becoming grey posteriorly; cilia fuscous-whitish.

Gisborne, Victoria, in April; I have described Mr. Lower's type-specimen.

15. Anacampsis, Curt.

Antennæ $\frac{1}{3}$, in ♂ simple, basal joint moderately elongate, without pecten. Labial palpi very long, recurved, second joint smooth-scaled, terminal joint longer than second, acute. Forewings: 2 and 3 parallel, 6 and 7 out of 8, 7 to costa. Hindwings under 1, elongate-trapezoidal, apex acute, produced, termen deeply emarginate, cilia $2\frac{1}{2}$; 3 and 4 connate, 5 rather approximated to 4, 6 and 7 stalked.

A rather small genus, principally European, represented in Australia by one species only. I have retained the generally recognised name of *Anacampsis* (to the use of which exception has been taken by Lord Walsingham), because I consider it still uncertain whether the name is not correctly applicable; but if any entomologist prefers to employ the unfortunately compounded title of *Aproaerema*, Durr., it is open to him to do so. Imago with forewings elongate, pointed. The known European larvæ all feed on *Leguminosæ*.

79. *A. simplicella*, Walk.

(*Gelechia simplicella* (*simplexella*), Walk., Tin. 1024; *Gelechia isoscelixantha*, Low., Proc. Linn. Soc. N.S. Wales, 1897, 272.)

♂♀. 9-12 mm. Head bronzy-ochreous or bronzy, face ochreous-whitish. Palpi ochreous-white, anterior edge of terminal joint dark fuscous. Antennæ bronzy-fuscous. Thorax bronzy. Abdomen fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings acutely long pointed; rather dark bronzy-fuscous; an elongate dark fuscous mark on fold before middle, sometimes interrupted by a ferruginous-ochreous dot, sometimes followed by some whitish scales; sometimes an indistinct dark fuscous discal dot in middle; a small whitish spot on tornus, and larger clear white subtriangular spot on costa opposite, almost meeting: cilia whitish-fuscous, round apex somewhat whitish-mixed and with rows of dark fuscous points. Hindwings grey, darker posteriorly; cilia light grey.

Brisbane and Toowoomba, Queensland; Sydney, Bulli, Bathurst, Blackheath (3500 feet), and Broken Hill, New South Wales; Healesville, Victoria; Deloraine, Tasmania; Adelaide and Mount Gambier, South Australia; from September to December, and in April, a common species; twenty-one specimens. Both types seen.

16. Acanthophila, Hein.

Antennæ $\frac{3}{4}$, in ♂ shortly ciliated, basal joint elongate, without pecten. Labial palpi long, recurved, second joint with appressed scales, somewhat rough beneath, terminal joint as long as second, acute. Forewings: 2 and 3 parallel, 7 and 8 stalked, 7 to costa, 9 absent. Hindwings 1, trapezoidal, apex pointed, termen strongly sinuate, cilia $1\frac{1}{4}$; 3 and 4 connate, 5 parallel, 6 and 7 approximated.

The genus is based on a single European species, with which the following seems to agree in essential structure; probably connecting links may be found in other regions. Imago with forewings elongate, pointed.

80. *A. xanthastis*, Low.

(*Gelechia xanthastis*, Low., Trans. Roy. Soc. S. Austr. 1896, 168.)

♂♀. 10-12 mm. Head and thorax pale yellow, shoulders dark fuscous. Palpi pale yellow, base dark fuscous. Antennæ dark fuscous, ringed with pale yellow. Abdomen dark fuscous, base and apex ochreous-yellowish. Legs dark fuscous, ringed with yellowish, hairs of posterior tibiæ yellowish. Forewings tolerably acute, termen very obliquely rounded; a fine semihyaline streak beneath vein 11; clear pale yellow; three dark purplish-fuscous fasciæ; first basal, enclosing a pale yellow basal dot; second beyond middle, irregular, connected with first by a slender costal streak; third terminal, narrowed to tornus: cilia purplish-fuscous mixed with dark fuscous. Hindwings dark fuscous, lighter anteriorly; cilia rather dark bronzy-fuscous.

Duaringa and Toowoomba, Queensland, in February and March; four specimens.

17. Macrenches, n.g.

Antennæ $\frac{3}{4}$, in ♂ fasciculate-ciliated (2), basal joint moderately elongate, without pecten. Labial palpi long, curved, ascending, second joint with dense scales, beneath rough or angularly projecting at apex, above roughly projecting towards apex, terminal joint somewhat shorter, slender, acute. Forewings: 2 and 3 separate, 7 and 8 stalked, 7 to costa. Hindwings 1, elongate-trapezoidal, apex pointed, termen sinuate, cilia $1\frac{1}{2}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 closely approximated at base.

Type *M. eurybatis*. A development of *Gelechia*; from which it differs in the longer fasciculate ciliations of antennæ, and peculiar scaling of palpi. Imago with forewings elongate, pointed.

Second joint of palpi with more than half white..... 81. *eurybatis*.
Second joint of palpi white at apex only..... 82. *clerica*.

81. *M. eurybatis*, n.sp.

♂. 12 mm. Head ochreous-white. Palpi ochreous-white, base dark fuscous, second joint rough beneath, terminal joint dark fuscous towards apex internally. Antennæ dark fuscous spotted with ochreous-whitish. Thorax dark fuscous, with broad ochreous-white dorsal stripe. Abdomen ochreous-whitish. Legs dark fuscous, ringed with whitish, posterior tibiæ ochreous-whitish. Forewings with apex round-pointed; whitish-ochreous, with purplish-silvery reflections; a broad dark bronzy-fuscous median longitudinal streak throughout, edged above by a shining white streak, beneath rather undefined posteriorly: cilia pale whitish-ochreous, round apex shaded with fuscous, with a dark fuscous median line opposite apex. Hindwings pale grey; cilia whitish-grey-ochreous.

Northampton, West Australia, in November; one specimen. Very similar to the following species, but apart from other differences the character of the palpi proves that it is not merely a geographical form; the second joint is simply rather rough beneath, without any indication of the dilated angular sharply defined apical scale-projection of *clerica*, and is white except towards base, whereas in *clerica* it is dark fuscous except at apex.

82. *M. clerica*, Ros.

(*Gelechia clerica*, Ros., Ann. Mag. Nat. Hist. 1885, 438.)

♂♀. 15-18 mm. Head whitish-ochreous, sides and lower margin of face dark fuscous. Palpi white, second joint triangularly dilated towards apex, projecting angularly beneath, dark fuscous except apex, terminal joint dark fuscous towards apex. Antennæ dark fuscous. Thorax dark fuscous, with broad whitish-ochreous dorsal stripe. Abdomen pale whitish-ochreous, sometimes infuscated. Legs dark fuscous, hairs of posterior tibiæ ochreous-whitish. Forewings with apex round-pointed; dark bronzy-fuscous; a broad ochreous-whitish costal streak from base to near apex, mixed with light fuscous towards costa from middle to near extremity; a similar dorsal streak from near base to

termen near apex, more or less suffused with fuscous posteriorly, sometimes tinged with brassy-yellowish on upper edge anteriorly: cilia ochreous-whitish, somewhat sprinkled with fuscous, sometimes with a postmedian fuscous line, with a dark fuscous apical bar. Hindwings grey or pale grey, paler anteriorly; cilia whitish-ochreous.

Glen Innes (4500 feet), Orange (3000 feet), Blackheath (3500 feet), and Sydney, New South Wales; Melbourne and Healesville, Victoria; Hobart, Tasmania; Mount Lofty, South Australia; from September to April, sixteen specimens; a common species.

18. Gelechia, Zell.

Antennæ $\frac{3}{4}$, in ♂ simple or shortly ciliated, basal joint moderate, without pecten, or with a few fugitive hair-scales. Labial palpi very long, recurved, second joint thickened with more or less rough sometimes expanded and furrowed scales beneath, terminal joint almost or quite as long as or longer than second, acute. Forewings: 2 and 3 parallel, 7 and 8 stalked, 7 to costa. Hindwings 1 or over 1, trapezoidal, apex more or less pointed, termen sinuate, cilia $\frac{2}{3}$-$1\frac{1}{2}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 approximated, connate, or stalked.

A very large and universally distributed genus, but much less prominent in Australia than in other regions, its place being largely taken by *Protolechia*. Imago with forewings elongate, more or less pointed. Larva usually in spun leaves or shoots.

1.	Hindwings over 1	2.
	Hindwings 1 or hardly 1	7.
2.	Forewings with defined dark transverse fasciæ	3.
	Forewings without defined dark fasciæ	4.
3.	Forewings with four dark fasciæ	84. *desmanthes*.
	Forewings with three dark fasciæ	83. *nephelombra*.
4.	Head and thorax ochreous-white	88. *anthochra*.
	Head and thorax not white	5.
5.	Forewings with black subcostal and subdorsal dots near base	86. *bathropis*.
	Forewings without such dots	6.

6. Forewings with costal edge rosy ..... 87. *dictyomorpha.*
   Forewings with costal edge not rosy ..... 85. *pycnoda.*
7. Groundcolour of forewings pale ochreous ..... 89. *epactaea.*
   Groundcolour of forewings white ..... 90. *melanoptila.*

83. *G. nephelombra*, n.sp.

♂♀. 12-14 mm. Head and thorax light bronzy-ochreous, more or less mixed with fuscous. Palpi pale ochreous, more or less mixed with dark fuscous, apex of terminal joint dark fuscous. Antennæ dark fuscous. Abdomen rather dark fuscous, base and apex whitish-ochreous. Legs dark fuscous ringed with whitish-ochreous, hairs of posterior tibiæ whitish-ochreous. Forewings with apex round-pointed, termen very obliquely rounded; light bronzy-ochreous sprinkled with fuscous; markings cloudy, deep fuscous-bronze; a basal fascia, and a broader fascia at $\frac{1}{3}$, connected by a dorsal suffusion; an apical patch covering $\frac{1}{3}$ of wing: cilia bronzy-fuscous. Hindwings over 1, rather dark fuscous; cilia rather dark fuscous.

Duaringa, Queensland, from March to May; two specimens received from Mr. G. Barnard.

84. *G. desmanthes*, Low.

(*Gelechia desmanthes*, Low., Proc. Linn. Soc. N.S. Wales, 1898, 51.)

♂♀. 9-13 mm. Head and thorax pale shining rosy-ochreous, shoulders and a posterior spot dark fuscous. Palpi whitish-ochreous, rosy-tinged, base of second joint, and base and a subapical band of terminal joint dark fuscous. Antennæ pale ochreous, ringed with dark fuscous. Abdomen dark grey, base and apex whitish-ochreous. Legs dark fuscous ringed with whitish. Forewings with apex tolerably acute, termen very obliquely rounded; whitish-ochreous rosy-tinged; four moderate dark bronzy-fuscous fasciæ, first basal, second before middle, third beyond middle, fourth apical, connected in middle with third by a more or less defined bar: cilia fuscous, with a dark fuscous

median shade, terminal half whitish round apex. Hindwings over 1, grey; cilia grey.

Duaringa, Queensland; Broken Hill, New South Wales; in October, March, and April, three specimens (Barnard, Lower).

85. *G. pycnoda*, Low.

(*Gelechia pycnoda*, Low., Proc. Linn. Soc. N.S. Wales, 1899, 97.)

♂. 15 mm. Head and thorax pale bronzy-ochreous mixed with fuscous. Palpi whitish-ochreous, second joint mixed with dark fuscous, base and a subapical band of terminal joint dark fuscous. Antennæ pale ochreous ringed with fuscous. Abdomen grey, more ochreous basally, anal tuft whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with apex tolerably pointed, termen very obliquely rounded; light greyish-ochreous, bronzy-tinged, irrorated with fuscous and dark fuscous; this irroration appears to indicate faint darker fasciæ at base, $\frac{1}{3}$, $\frac{2}{3}$, and apex; discal stigmata obscurely indicated: cilia ochreous-whitish, faintly bronzy-tinged, with a cloudy fuscous median line. Hindwings over 1, whitish-grey; cilia pale whitish-ochreous.

Broken Hill, New South Wales, from June to October; one specimen received from Mr. Lower, who has taken it freely. It is an obscure insect, but I can see no trace of the fine black line (apparently coinciding with the submedian fold) described by Mr. Lower.

86. *G. bathropis*, n.sp.

♀. 16 mm. Head, antennæ, and thorax whitish-fuscous, sprinkled with fuscous or dark fuscous. Palpi whitish, second joint fuscous, with brushlike dilation of blackish scales anteriorly, terminal joint with dark fuscous basal and subapical rings. Abdomen light greyish-ochreous, Legs dark fuscous, obscurely whitish-ringed, hairs of posterior tibiæ whitish. Forewings with apex round-pointed, termen obliquely rounded; whitish-fuscous, faintly rosy-tinged, sprinkled with fuscous and dark fuscous; a black dot beneath or touching costa near base; an irregular black

dot above dorsum near base; stigmata indistinct, dark fuscous, plical obliquely before first discal: cilia pale whitish-fuscous, with two dark fuscous shades interrupted into spots. Hindwings over 1, pale whitish-grey, darker terminally; cilia ochreous-whitish, with two faint greyish lines.

Sydney, New South Wales; Blackwood, South Australia; in August and May, two specimens. Readily known by the two black subbasal dots.

87. *G. dictyomorpha*, Low.

(*Gelechia dictyomorpha*, Low., Proc. Linn. Soc. N. S. Wales, 1900, 49.)

♂. 16 mm. Head and thorax whitish-ochreous sprinkled with brown. Palpi ochreous-whitish, second joint sprinkled with fuscous anteriorly, with a dark fuscous subapical ring, terminal joint with blackish basal and subapical rings. Antennæ ochreous-whitish ringed with dark fuscous. Abdomen whitish-ochreous, sprinkled with fuscous except towards base and apex. Legs dark fuscous ringed with ochreous-whitish. Forewings with apex tolerably pointed, termen very obliquely rounded; pale ochreous, sprinkled with brownish-ochreous and dark fuscous; costal edge suffused with rosy and strigulated with dark fuscous; a transverse mark of blackish irroration from costa near base, reaching half across wing; stigmata formed by dark fuscous irroration, plical obliquely before first discal, these two approximated and surrounded by a cloud of fuscous irroration; traces of a pale angulated transverse shade at $\frac{3}{4}$, enclosed by darker irroration: cilia whitish-ochreous, sprinkled with dark fuscous. Hindwings over 1, grey; cilia pale grey, ochreous-tinged.

Broken Hill, New South Wales, in September and October; one specimen received from Mr. Lower.

88. *G. anthochra*, Low.

(*Gelechia anthochra*, Low., Trans. Roy. Soc. S. Austr. 1896, 168.)

♂♀. 13-15 mm. Head and thorax ochreous-white, shoulders with a dark fuscous dot. Palpi ochreous-white, second and

terminal joints with base and a subapical ring dark fuscous, sometimes partially obsolete. Antennæ fuscous. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with apex tolerably pointed, termen very obliquely rounded; ochreous-whitish, with a few brownish and dark fuscous scales; blackish dots on costa at base, near base, and at $\frac{1}{3}$, and one on fold at $\frac{1}{6}$; stigmata blackish, plical largest, obliquely before first discal (which in one specimen is obsolete); a cloudy dark fuscous praetornal dot; more or less fuscous irroration towards apex, sometimes showing a pale angulated transverse shade at $\frac{3}{4}$; sometimes a terminal series of cloudy dark fuscous dots: cilia ochreous-whitish, round apex sprinkled with fuscous. Hindwings over 1, pale grey; cilia whitish-ochreous.

Duaringa and Rockhampton, Queensland; Sydney, New South Wales; from August to October, four specimens.

89. *G. epactaea*, n.sp.

♀. 17 mm. Head whitish-ochreous sprinkled with dark fuscous. Palpi ochreous-whitish sprinkled with dark fuscous, second and terminal joints each with two undefined blackish bands. Antennæ dark fuscous spotted with whitish-ochreous. Thorax light brownish-ochreous sprinkled with dark fuscous. Abdomen fuscous. Legs dark fuscous, sprinkled and ringed with ochreous-whitish. Forewings with costa moderately arched, apex round-pointed, termen very obliquely rounded; pale brownish-ochreous, irregularly irrorated and partially suffused with dark fuscous, especially towards dorsum and posteriorly; a spot of whitish-ochreous suffusion beneath costa near base; stigmata dark fuscous, very obscure, plical beneath first discal, second discal more distinct, partially surrounded with whitish-ochreous suffusion: cilia fuscous-whitish mixed with dark fuscous. Hindwings 1, fuscous, paler anteriorly; cilia light fuscous.

Adelaide, South Australia, in December; one specimen in Mr. Lower's collection.

90. *G. melanoptila*, Low.

(*Psoricoptera melanoptila*, Low., Proc. Linn. Soc. N. S. Wales, 1897, 272.)

♂♀. 11-12 mm. Head and thorax white, sprinkled with dark fuscous. Palpi white, second joint irrorated with dark fuscous, terminal joint with base and a subapical ring dark fuscous. Antennæ whitish. Abdomen ochreous-whitish, more ochreous towards base. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings acutely pointed; white, irregularly irrorated with fuscous and a few dark fuscous scales; five very undefined costal spots of dark fuscous irroration; a blackish plical dot near base; stigmata blackish, sometimes little marked, plical beneath first discal; a blackish dot above tornus; minute dots of black scales on termen: cilia whitish, irrorated with fuscous. Hindwings hardly 1, pale grey; cilia pale greyish-ochreous.

Broken Hill, New South Wales, in October, March, and April; three specimens received from Mr. Lower. Said to frequent *Solanum esuriale*.

19. Stegasta, n.g.

Antennæ $\frac{3}{4}$, in ♂ simple, basal joint moderately elongate, without pecten. Labial palpi long, curved, ascending, second joint thickened with scales, somewhat rough beneath, terminal joint as long as second, acute. Forewings: 2 separate, tolerably parallel, 3 and 4 stalked or connate, 7 and 8 stalked, 7 to costa; in ♂ beneath with a dense reflexed fold of submetallic scales from anterior half of costa, covering an expansible pencil of long hairs from base. Hindwings 1, elongate-trapezoidal, apex pointed, produced, termen sinuate, cilia $1\frac{1}{2}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 stalked or approximated.

Type *S. variana*. A distinct endemic genus, related generally to *Gelechia*, but differing from all the family in the peculiar costal fold of the forewings. Forewings elongate, tolerably acute.

Head bronze ..... 91. *variana*.
Head whitish-ochreous, sides bronzy-tinged ..... 92. *allactis*.
Head ochreous-white ..... 93. *cosmodes*.

91. *S. variana*, n.sp.

♂♀. 10-12 mm. Head and thorax shining bronze. Palpi whitish, base dark fuscous, second and terminal joints with broad subbasal and subapical dark fuscous bands. Antennæ dark fuscous spotted with whitish. Abdomen grey. Legs dark bronzy-fuscous banded with white. Forewings dark coppery-fuscous; a ferruginous-orange fascia at $\frac{1}{4}$, extended as a thick irregular streak along dorsum to near tornus; four irregular pale golden-metallic fasciæ, costal extremities white, first two margining the orange fascia, third median, enclosing a dot of ground-colour above middle, fourth at $\frac{3}{4}$, terminating above in a large quadrate ochreous-white spot: cilia light greyish-ochreous irrorated with blackish. Hindwings grey; cilia light ochreous-grey.

Duaringa and Brisbane, Queensland; Sydney, New South Wales; from September to February, eight specimens.

92. *S. allactis*, n.sp.

♂. 13-14 mm. Head whitish-ochreous, sides of crown bronzy-tinged. Palpi whitish-ochreous, second and terminal joints with subbasal and subapical dark fuscous bands. Antennæ ochreous-whitish ringed with dark fuscous. Thorax whitish-ochreous tinged with bronzy. Abdomen whitish-ochreous. Legs dark fuscous ringed with ochreous-whitish. Forewings rather dark ferruginous-fuscous, towards dorsum between $\frac{1}{4}$ and tornus ferruginous-ochreous sprinkled with dark fuscous; three ochreous-white fasciæ, becoming silvery-metallic on lower half, first from costa at $\frac{1}{4}$, outwardly oblique, second median, vertical, including a dark fuscous dot above middle, third from $\frac{3}{4}$ of costa, inwardly oblique, interrupted in middle: cilia whitish-ochreous, basal $\frac{2}{3}$ mixed with dark fuscous. Hindwings light grey; cilia whitish-grey-ochreous.

Adelaide, South Australia; Carnarvon, West Australia; in October, three specimens. Possibly a form of the following

93. *S. cosmodes*, Low.

(*Gelechia cosmodes*, Low., Proc. Linn. Soc. N. S. Wales, 1899, 98.)

♂. 13 mm. Head ochreous-white. Palpi white, second and terminal joints with dark fuscous subbasal and subapical bands. Antennæ ochreous-white ringed with dark fuscous. Thorax ochreous-whitish sprinkled with fuscous. Abdomen whitish-ochreous. Legs ochreous-white, banded with dark fuscous. Forewings pale yellow-ochreous, suffusedly mixed with fuscous except towards dorsum between $\frac{1}{4}$ and tornus; three white fasciæ, becoming silvery-metallic on lower half, first from costa at $\frac{1}{4}$, outwardly oblique, partially confluent with a silvery-white patch on fold preceding it, second median, vertical, third from costa at $\frac{3}{4}$, inwardly oblique, interrupted in middle: cilia whitish, partially tinged with ochreous and sprinkled with brown. Hindwings whitish-grey; cilia pale whitish-ochreous.

Broken Hill, New South Wales, from September to November; one specimen received from Mr. Lower.

20. PHTHORIMAEA, Meyr.

Antennæ $\frac{4}{5}$, in ♂ simple, basal joint elongate, without pecten. Labial palpi long, recurved, second joint expanded with rough projecting scales beneath, terminal joint as long as second, acute. Forewings: 2 and 3 parallel, 7 and 8 stalked, 7 to costa. Hindwings 1, trapezoidal, apex produced, acute, termen bisinuate, cilia $1\frac{3}{4}$; in ♂ with long pencil of hairs lying along costa from base beneath forewings; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 remote, nearly parallel.

A North American genus of several species, of which one has been artificially introduced with its foodplant into widely separated regions; it is a derivative of *Gnorimoschema*. Imago with forewings elongate, pointed.

94. *P. operculella*, Zell.

(*Gelechia operculella*, Zell., Zool. Bot. Ver. 1873, 262; *Gelechia terrella* (nom. praeocc.), Walk., Tin. 1024; *Gelechia solanella*, Boisd., Meyr., Trans. N. Zeal. Inst. 1885, 166.)

♂♀. 14-16 mm. Head, palpi, and thorax pale brownish-ochreous, irrorated with grey-whitish; palpi with two dark fuscous bands on second joint, and one above middle on terminal joint. Antennæ, abdomen, and legs pale greyish-ochreous, legs irrorated with dark fuscous. Forewings acute; pale brownish-ochreous, densely irrorated with whitish-grey, and more or less with dark grey or blackish-grey; the dark irroration forms two small spots on costa towards base, and a suffused dorsal streak, connected with three or four small irregular spots about fold: cilia pale greyish-ochreous, towards base strewn with blackish-grey points, forming one or two distinct blackish lines round apex. Hindwings pale grey; cilia pale greyish-ochreous.

Rosewood, Queensland; Sydney, Blackheath (3500 feet), Orange (3000 feet), Shoalhaven, Cooma, and Broken Hill, New South Wales; Melbourne, Victoria; Adelaide, South Australia; from November to May, now generally distributed and common, sometimes abundant in particular localities; native in North America, but occurring also in New Zealand and North Africa. The larva feeds in the tubers of the potato (*Solanum nigrum*), causing them to decay and become worthless; in badly infested fields the whole crop is sometimes destroyed.

21. Gnorimoschema, Busck.

Antennæ $\frac{3}{4}$, in ♂ simple or shortly ciliated, basal joint moderate, without pecten. Labial palpi very long, recurved, second joint thickened with rough expanded and furrowed scales beneath, terminal joint almost or quite as long as or longer than second, usually roughened anteriorly, acute. Forewings: 2 and 3 parallel, 7 and 8 stalked, 7 to costa. Hindwings 1 or over 1, trapezoidal, apex more or less pointed, termen sinuate, cilia $\frac{2}{3}$-$1\frac{1}{2}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 nearly parallel.

A genus of rather considerable extent in North America, and represented in Australia by a group of closely allied species; it is correlated to *Gelechia*, and resembles it in habits. Imago with forewings elongate, more or less pointed.

1. Head sprinkled with dark fuscous ..... 95. *bucolica*.
   Head not sprinkled with dark fuscous ..... 2.
2. Forewings dark slaty-fuscous ..... 103. *perdita*.
   Forewings not dark fuscous ..... 3.
3. Expanse 7-10 mm. ..... 4.
   Expanse 11 mm. or more ..... 6.
4. Thorax white ..... 101. *eschatopis*.
   Thorax not white ..... 5.
5. Forewings irrorated with dark fuscous ..... 97. *pyrrhanthes*.
   Forewings not irrorated with dark fuscous ..... 98. *marina*.
6. Thorax sprinkled with dark fuscous ..... 102. *leucocephala*.
   Thorax sprinkled with ochreous ..... 7.
7. Forewings more or less marked with blackish ..... 8.
   Forewings not blackish-marked ..... 100. *heliopa*.
8. Forewings irrorated with fuscous and blackish ..... 96. *petrinodes*.
   Forewings irrorated with ochreous ..... 99. *xerophylla*.

95. *G. bucolica*, n.sp.

♂♀. 8-11 mm. Head and thorax whitish or whitish-ochreous, more or less irrorated with blackish. Palpi ochreous-whitish, second joint with undefined basal and supramedian blackish bands, terminal joint with basal and subapical blackish rings. Antennæ whitish-fuscous, indistinctly darker-ringed. Abdomen light grey, sometimes suffused with whitish-ochreous towards base. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings acutely long-pointed; pale fuscous, irrorated with blackish; markings blackish, partially surrounded or accompanied with ferruginous; a subbasal median dot, two beneath costa towards base, one on fold between these, one on dorsum at $\frac{1}{4}$, one in disc at $\frac{2}{5}$, one on fold beneath it, one in middle of disc, and one obliquely beyond and below this; the black scales tend to make dots on termen and costa posteriorly: cilia ochreous-grey-whitish, strewn with black points. Hindwings 1, grey, paler in disc and anteriorly; cilia pale greyish-ochreous.

Rosewood, Queensland; Bulli and Broken Hill, New South Wales; Adelaide, Wirrabara, Quorn, Wallaroo, and Port Lincoln, South Australia; Geraldton and Carnarvon, West Australia; from October to December, and in May, thirty specimens. The geographical range is rather curious; although an inconspicuous insect and apparently somewhat local, it generally occurs in great abundance and is not likely to be overlooked; most of the localities are dry regions, but this is not the case with Rosewood and Bulli. It is readily recognised by the fuscous colouring and the ferruginous scales accompanying the dark markings; Broken Hill specimens average distinctly larger than others.

96. *G. petrinodes*, n.sp.

♀. 11-12 mm. Head ochreous-white. Palpi whitish, second joint with basal and supramedian bands of dark fuscous irroration, terminal joint with basal and subapical dark fuscous rings. Antennæ whitish, ringed with dark fuscous. Thorax ochreous-whitish, sprinkled with ochreous. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings acutely pointed; pale whitish-ochreous, irrorated with fuscous and blackish; markings blackish, sometimes mixed with ferruginous; a subbasal median dot, a short oblique mark on costa at $\frac{1}{4}$, three dots on fold from $\frac{1}{4}$ to middle, connected by a streak of whitish suffusion, two in disc before and beyond middle, and one obliquely beyond second of these: cilia ochreous-whitish, with some dark fuscous points. Hindwings 1, whitish-grey; cilia pale whitish-ochreous.

Duaringa, Queensland; Broken Hill, New South Wales; in March, three specimens (Barnard, Lower).

97. *G. pyrrhanthes*, n.sp.

♂♀. 8-9 mm. Head ochreous-whitish, partially tinged with pale ochreous or reddish-ochreous. Palpi whitish-ochreous, second and terminal joints each with two bands of blackish irroration. Antennæ ochreous-whitish, ringed with blackish. Thorax pale

ochreous, irrorated with fuscous. Abdomen grey, segmental margins whitish. Legs whitish, banded with dark fuscous irroration. Forewings pointed; whitish-ochreous, irregularly irrorated with dark fuscous, and somewhat mixed with ferruginous-reddish; two spots of blackish irroration on costa towards base, and two on fold obliquely beyond these; stigmata blackish, surrounded with reddish-ferruginous, plical obliquely before first discal: cilia whitish-grey, sprinkled with black. Hindwings 1, light grey; cilia pale greyish-ochreous.

Carnarvon, West Australia, in October; three specimens.

98. *G. marina*, n.sp.

♂♀. 9-10 mm. Head whitish-ochreous. Palpi whitish-ochreous, second joint with dark fuscous basal and supramedian bands, terminal joint with dark fuscous basal and black subapical rings. Antennæ whitish-ochreous, ringed with dark fuscous. Thorax light yellow-ochreous. Abdomen whitish-ochreous. Legs dark fuscous ringed with ochreous-whitish, hairs of posterior tibiæ ochreous-whitish. Forewings acutely pointed; whitish-ochreous, suffused in disc with deep yellow-ochreous and irrorated with brownish-ochreous; a dark fuscous spot in disc towards base; an oblique sometimes interrupted bar of blackish irroration from costa at $\frac{1}{4}$, reaching $\frac{2}{3}$ across wing; some undefined spots of blackish irroration on costa, at apex, and on termen; discal stigmata undefined, formed of blackish irroration: cilia whitish-ochreous, round apex with a black median line. Hindwings 1, pale whitish-grey; cilia whitish-ochreous.

Kiama, New South Wales; four specimens bred in January. Larva undescribed; mines an irregular crumpled whitish blotch in leaves of *Stackhousia spathulata* (*Stackhousieæ*) in January. This and the next species are closely allied and very similar, being also both variable in development of markings; they are most easily distinguished by the size and colour, this species being much yellower; the difference in larval habit establishes their distinctness.

99. *G. xerophylla*, n.sp.

♂♀. 11-12 mm. Head whitish-ochreous or ochreous-whitish. Palpi whitish-ochreous, second joint with dark fuscous basal and supramedian bands, terminal joint with dark fuscous basal and black subapical rings. Antennæ whitish-ochreous, ringed with dark fuscous. Thorax whitish-ochreous, mixed with brownish-ochreous. Abdomen whitish-ochreous. Legs dark fuscous, ringed with ochreous-whitish, hairs of posterior tibiæ ochreous-whitish. Forewings acutely pointed; whitish-ochreous, irregularly irrorated with brownish-ochreous, with a faint rosy tinge; markings brownish-ochreous, usually more or less irrorated with blackish, varying much in development and intensity; spots on costa and in disc near base; an oblique usually interrupted bar from $\frac{1}{4}$ of costa to fold; stigmata moderate, plical obliquely before first discal; sometimes cloudy spots along costa and termen and at apex: cilia whitish-ochreous, round apex with more or less developed rows of blackish points. Hindwings 1, pale whitish-grey; cilia whitish-ochreous.

Melbourne, Victoria; Broken Hill, New South Wales; twenty-one specimens bred in October. Larva rather stout, grey-whitish or greenish-whitish, dorsal surface sometimes tinged with crimson; spots minute, dark grey; head pale ochreous, 2 whitish-ochreous: feeds amongst spun leaves of *Atriplex nummularia* (*Chenopodiaceæ*), partially mining the leaves in whitish inflated blotches.

100. *G. heliopa*, Low.

(*Gelechia heliopa*, Low., Proc. Linn. Soc. N.S. Wales, 1900, 417.)

♂♀. 12-15 mm. Head whitish-ochreous or ochreous-whitish. Palpi ochreous-whitish, second joint sprinkled with dark fuscous, terminal joint with dark fuscous basal and subapical rings. Antennæ ochreous-whitish ringed with dark fuscous. Thorax whitish-ochreous suffused with yellow-ochreous. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, posterior pair ochreous-whitish. Forewings acutely pointed; pale yellow-ochreous suffusedly irrorated with darker; markings

obscurely darker, tinged with fuscous, hardly defined; traces of faint spots in disc towards base, and along costa; stigmata sometimes tolerably distinct, plical obliquely before first discal; sometimes a fuscous irroration towards apex: cilia whitish-ochreous, faintly fuscous-sprinkled. Hindwings 1, light grey; cilia whitish-ochreous.

Duaringa, Queensland; Broken Hill, New South Wales; Wirrabara, South Australia; from August to October, ten specimens.

101. *G. eschatopis*, n.sp.

♀. 7 mm. Head and thorax white, collar whitish-ochreous. Palpi whitish-ochreous, slightly sprinkled with dark fuscous, apex of second joint white. Antennæ whitish, ringed with ochreous. Abdomen ochreous-whitish. Legs whitish-ochreous, posterior tibiæ whitish. Forewings pointed; silvery-whitish, suffused with pale whitish-ochreous, and sprinkled with pale grey; two or three faint dots of grey irroration towards costa anteriorly; stigmata formed of three or four black speckles, plical obliquely before first discal: cilia whitish. Hindwings 1, grey-whitish; cilia ochreous-whitish.

Carnarvon, West Australia, in October; one specimen.

102. *G. leucocephala*, Low.

(*Gelechia leucocephala*, Low., Trans. Roy. Soc. S. Austr. 1893, 169.)

♀. 15-17 mm. Head ochreous-white. Palpi ochreous-white, second and terminal joints with basal and subapical rings of dark fuscous irroration. Antennæ ochreous-whitish ringed with dark fuscous. Thorax white sprinkled with dark fuscous. Abdomen whitish-fuscous, with broad light ochreous-yellowish antemedian band. Legs whitish, banded with blackish irroration. Forewings acutely pointed; ochreous-whitish, irregularly and suffusedly irrorated with fuscous and dark fuscous; two undefined darker costal spots towards base, and two in disc obliquely beyond these; stigmata dark fuscous, pale-edged, plical obliquely before first discal, placed in an elongate pale mark; a dark fuscous pale-edged

dot obliquely near beyond and beneath second discal; a pale angulated transverse shade at $\frac{3}{4}$ more or less indicated: cilia pale greyish-ochreous sprinkled with fuscous and dark fuscous. Hindwings 1, light grey, darker posteriorly; cilia pale greyish-ochreous.

Broken Hill, New South Wales; Adelaide, South Australia; in October and January; two specimens received from Mr. Lower.

103. *G. perdita*, Low.

(*Gelechia perdita*, Low., Proc. Linn. Soc. N.S. Wales, 1899, 96.)

♂. 16 mm. Head pale ochreous, face ochreous-whitish. Palpi ochreous-white, second and terminal joints with basal and subapical bands of blackish irroration. Antennæ fuscous, darker-ringed. Thorax rather dark fuscous. Abdomen light fuscous, three basal segments light ochreous-yellowish. Legs whitish, banded with dark fuscous irroration. Forewings tolerably acute; rather dark slaty-fuscous, finely whitish-sprinkled; a fine ochreous mark beneath costa at $\frac{1}{5}$; stigmata small, blackish, surrounded with brownish-ochreous, plical rather obliquely before first discal; some brownish-ochreous scales posteriorly: cilia pale greyish-ochreous, shaded with fuscous and sprinkled with dark fuscous. Hindwings 1, pale grey; cilia whitish-ochreous.

Broken Hill, New South Wales, in August and October; one specimen received from Mr. Lower.

22. Sarotorna, n.g.

Antennæ $\frac{3}{4}$, in ♂ — (?), basal joint moderately elongate, without pecten. Labial palpi rather long, curved, ascending, second joint considerably dilated beneath with rough projecting scales, almost tufted, terminal joint as long as second, thickened with rather rough scales anteriorly, acute. Forewings: 2 and 3 parallel, 7 and 8 stalked, 7 to costa. Hindwings 1, trapezoidal, apex produced, round-pointed, termen sinuate, cilia 1; 3 and 4 connate, 5 parallel, 6 and 7 remote, nearly parallel.

The single species is of doubtful affinity, and superficially very distinct; structurally it would appear to be near *Gnorimoschema*,

but the palpi are different, shorter and stouter than usual, with rather peculiar scaling. Imago with forewings elongate.

104. *S. eridora*, n.sp.

♀. 16 mm. Head ochreous-white, back and sides of crown blackish-fuscous. Palpi white, second joint with lower half blackish-fuscous, upper half yellow-ochreous except apex, apex of terminal joint blackish. Antennæ dark fuscous. Thorax ochreous, anterior half of dorsal area blackish-fuscous, shoulders white. Abdomen dark fuscous. Legs dark fuscous ringed with whitish, posterior pair whitish-ochreous. Forewings with costa gently arched, apex obtuse, termen very obliquely rounded; ochreous-white; four moderate dark fuscous fasciæ, first subbasal, second and third confluent on costa in middle, running to middle of dorsum and tornus respectively, fourth from costa before apex to termen: cilia brown mixed with dark fuscous, basal half indistinctly barred with whitish. Hindwings rather dark fuscous, lighter anteriorly; cilia fuscous.

Bathurst, New South Wales, in March; one specimen.

23. Tritadelpha, n.g.

Antennæ $\frac{3}{4}$, in ♂ serrulate, simple, basal joint moderately elongate, without pecten. Labial palpi long, recurved, second joint with scales somewhat rough beneath, terminal joint shorter, acute. Forewings: 2 and 3 separate, 6 absent, 7 and 8 stalked, 7 to costa. Hindwings 1, trapezoidal, apex pointed, termen sinuate, cilia 2; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 approximated.

Although differing in several important points of structure, the two species which form this and the next genus are so similar in other respects that they must be supposed to have near collateral relationship together, their ultimate origin being *Protolechia*. Imago with forewings elongate, tolerably pointed.

105. *T. microptila*, n.sp.

♂♀. 7-8 mm. Head and thorax white. Palpi white, terminal joint dark fuscous on lower half. Antennæ fuscous. Abdomen

grey, apex whitish. Legs whitish, anterior pair suffused with dark fuscous. Forewings white, more or less irrorated with brown or dark fuscous on posterior half; two short very oblique dark fuscous marks from costa before and beyond middle, and a third at $\frac{3}{4}$ stronger and continued to apex; a fuscous blotch, suffused with dark fuscous on fold and towards dorsum, extending along dorsum from base to near tornus, broadest in middle and reaching half across wing, irregularly narrowed to a point posteriorly; some irregular dark fuscous suffusion above tornus: cilia white, sprinkled with dark fuscous, with blackish subbasal and median lines in costal cilia, terminating at apex. Hindwings pale grey, darker posteriorly; cilia pale grey.

Brisbane, Queensland, frequenting *Eucalyptus* in September; ten specimens,

24. EPIBRONTIS, n g.

Antennæ $\frac{3}{4}$, in ♂ serrulate, simple, basal joint moderately elongate, without pecten. Labial palpi long, recurved, second joint with scales somewhat roughened beneath, terminal joint shorter, acute. Forewings: 2 and 3 connate, 6 to apex, 7 and 8 coincident. Hindwings 1, trapezoidal, apex pointed, termen slightly sinuate, cilia $1\frac{1}{4}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 tolerably parallel.

Doubtless a derivative of *Protolechia*. Imago with forewings elongate, tolerably pointed.

106. *E. hemichlaema*, Low.

(*Gelechia hemiclaema*, Low., Trans. Roy. Soc. S. Austr., 1897, 55.)

♂♀. 10-12 mm. Head and thorax white. Palpi white, terminal joint dark fuscous except anterior edge. Antennæ dark fuscous. Abdomen whitish-fuscous, apex whitish. Legs dark fuscous, ringed with whitish, hairs of posterior tibiæ whitish. Forewings white, irrorated with brown on posterior half; two short very oblique dark fuscous marks from costa before and beyond middle, and a third at $\frac{3}{4}$ stronger and continued to apex; a semioval fuscous blotch, mixed with dark fuscous, extending along dorsum

from base to $\frac{3}{4}$, reaching more than half across wing; sometimes a fine dark fuscous longitudinal dash in disc beyond middle; some dark fuscous suffusion towards tornus: cilia fuscous-whitish, partially more fuscous-tinged, with dark fuscous subbasal and median lines in costal cilia, terminating at apex. Hindwings whitish-fuscous, becoming fuscous posteriorly; cilia whitish-ochreous.

Toowoomba, Queensland; Sydney, Bathurst, and Broken Hill, New South Wales; Healesville, Victoria; Hobart, Tasmania; Wirrabara and Mount Gambier, South Australia; from September to January, common and generally distributed; eighteen specimens. Extremely like *Trit. microptila*, but distinguishable superficially by the larger size, more rounded and less posteriorly narrowed dorsal blotch, and terminal joint of palpi not white towards apex.

25. EPIMIMASTIS, n.g.

Antennæ $\frac{3}{4}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi long, recurved, second joint thickened with scales, somewhat rough beneath, terminal joint shorter, acute. Forewings: 2 and 3 connate, 7 and 8 coincident. Hindwings 1, rounded-trapezoidal, apex pointed, termen sinuate, cilia 1; 3 and 4 connate, 5 approximated to 4, 6 and 7 tolerably parallel.

Structurally very similar to the preceding, but not immediately related to it, being probably derived from *Protolechia* by similar modification. Imago with forewings elongate, apex round-pointed, termen very obliquely rounded.

107. *E. porphyroloma*, Low.

(*Gelechia porphyroloma*, Low., Proc. Linn. Soc. N. S. Wales, 1897, 22.)

♂♀. 11-16 mm. Head ochreous-yellow, tinged with fuscous on crown. Palpi light ochreous-yellow, terminal joint blackish. Antennæ ochreous-yellow, basal joint dark fuscous. Thorax orange-yellow. Abdomen grey, apex light yellowish. Legs dark fuscous, ringed with yellow-whitish. Forewings deep orange-

yellow; a rather dark purplish-fuscous apical blotch, anterior edge convex, running from $\frac{3}{4}$ of costa to before tornus, marked with blackish-fuscous on lower $\frac{3}{5}$, suffused into groundcolour towards costa: cilia fuscous, with darker subbasal shade. Hindwings fuscous, darker posteriorly; cilia light fuscous.

Brisbane, Queensland; Sydney, New South Wales; Campbelltown, Tasmania; Woodside and Port Victor, South Australia; from September to February, fourteen specimens. The conspicuous colouring of this species is quite unlike its allies, and closely resembles the normal type of the Oecophorid genus *Coesyra*.

26. Craspedotis, n.g.

Antennæ $\frac{3}{4}$, in ♂ serrulate, simple, basal joint moderate, without pecten. Labial palpi long, recurved, second joint with scales somewhat roughened beneath, terminal joint shorter, acute. Forewings: 2 and 3 connate or stalked, 6 and 7 stalked, 7 to costa, 8 absent. Hindwings 1, rounded-trapezoidal, apex pointed, termen slightly sinuate, cilia 1; 3 and 4 connate, 5 approximated to 4, 6 and 7 approximated or stalked.

Type *C. pragmatica*. A development of *Sphaleractis*, to which it is very similar, differing in neuration. Imago with forewings elongate, apex round-pointed, termen very obliquely rounded.

1. Forewings with costal half wholly suffused with dark fuscous..... 108. *soloeca*.
   Forewings with costal half more or less whitish..... 2.
2. Plical and first discal stigmata distinct..... 109. *pragmatica*.
   Plical and first discal stigmata obsolete..... 110. *thinodes*.

108. *C. soloeca*, n.sp.

♂. 11 mm. Head ochreous-white, sides of crown brownish-tinged. Palpi whitish, second joint sprinkled with dark fuscous, terminal joint blackish externally on lower half. Antennæ whitish-fuscous. Thorax ochreous-whitish, laterally suffused with brownish. Abdomen whitish-ochreous. Legs dark fuscous, ringed with whitish. Forewings pale fuscous, costal half and terminal area suffused with rather dark fuscous; stigmata cloudy, dark

fuscous, plical beneath first discal, these obscured by a prolongation of costal suffusion, second discal distinct: cilia light fuscous, darker-mixed. Hindwings pale grey, thinly scaled, darker grey posteriorly; cilia light grey.

Sydney, New South Wales, in December; one specimen.

109. *C. pragmatica*, n.sp.

♂♀. 10-11 mm. Head whitish, sides of crown more or less infuscated. Palpi whitish, second joint sprinkled with dark fuscous, and with a blackish subapical ring, terminal joint blackish except apex. Antennæ ochreous-whitish, indistinctly ringed with fuscous. Thorax whitish, tinged with ochreous and sprinkled with dark fuscous. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings whitish, irregularly mixed with fuscous and sprinkled with dark fuscous, dorsal half sometimes suffused with light brownish; a bar of dark fuscous suffusion from costa almost at base to beneath fold at $\frac{1}{4}$; stigmata rather large, dark fuscous, plical obliquely beyond first discal, second discal transverse: cilia ochreous-whitish, sprinkled with dark fuscous. Hindwings pale grey, thinly scaled, darker grey posteriorly; cilia pale whitish-ochreous, sometimes fuscous-tinged.

Sydney, New South Wales, in November and March, apparently attached to *Leptospermum;* nine specimens.

110. *C. thinodes*, n.sp.

♂. 10-11 mm. Head ochreous-whitish. Palpi white, second joint and base of terminal more or less suffused with dark fuscous. Antennæ ochreous-whitish, indistinctly ringed with fuscous. Thorax pale ochreous. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings light brownish-ochreous, irrorated with dark fuscous, dorsal area broadly clear from base to near tornus; an ochreous-white costal streak from rather near base to rather near apex, attenuated towards extremities; second discal stigma very indistinct, dark fuscous: cilia whitish-ochreous, irrorated with dark

fuscous round apex. Hindwings pale grey, thinly scaled, darker posteriorly; cilia whitish-ochreous.

Murrurundi, Springwood, and Sydney, New South Wales; Gisborne, Victoria; Woodside, South Australia; from November to January, six specimens.

27. Sphaleractis, n.g.

Antennæ $\frac{3}{4}$, in ♂ serrulate, simple, basal joint moderately elongate, without pecten. Labial palpi long, recurved, second joint thickened with scales, rough beneath, terminal joint shorter, thickened with scales and somewhat roughened anteriorly, acute. Forewings: 2 and 3 stalked, 7 and 8 coincident. Hindwings over 1, rounded-trapezoidal, apex round-pointed, termen sinuate, cilia $\frac{4}{5}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 tolerably parallel.

Type *S. platyleuca*. This and the next two genera are distinct individual developments from *Protolechia*. Imago with forewings elongate, costa gently arched, apex round-pointed.

1. Costal white streak strewn with black specks..... 2.
   Costal white streak with only a black dot near apex..... 111. *parasticta*.
2. Size 13-17 mm., termen of forewings extremely oblique.. 112. *platyleuca*.
   Size 10-12 mm., termen of forewings less oblique..... 113. *eurysema*.

111. *S. parasticta*, n.sp.

♂♀. 9-13 mm. Head whitish-fuscous, face whitish-mixed. Palpi dark fuscous, more or less whitish-mixed towards base and apex. Antennæ whitish-fuscous. Thorax light bronzy-fuscous. Abdomen pale grey, anal tuft grey-whitish. Legs dark fuscous, posterior pair suffused with whitish. Forewings with termen extremely obliquely rounded; light bronzy-fuscous, darker on costal half; a broad white costal streak from base to $\frac{5}{6}$, including a black dot near apex, costal edge sometimes fuscous-tinged beyond middle; plical stigma and a dot towards tornus rather large, blackish; indications of minute black and white dots on termen: cilia whitish-fuscous. Hindwings whitish-grey; cilia ochreous-grey-whitish.

Bathurst and Springwood, New South Wales; Perth and York, West Australia; in November, five specimens. Readily distinguished from the two following by the absence of black specks on the white costal streak, and by the discal stigmata being wholly absent, whilst the plical and supratornal dot are large and conspicuous.

112. *S. platyleuca*, Low.

(*Gelechia platyleuca*, Low., Proc. Linn. Soc. N.S. Wales, 1897, 22.)

♂♀. 13-17 mm. Head pale bronzy-fuscous, face and middle of crown more or less suffused with whitish. Palpi dark fuscous, white anteriorly at base and apex. Antennæ light fuscous. Thorax bronzy-fuscous. Abdomen grey, anal tuft whitish-ochreous. Legs dark fuscous, posterior pair suffused with white. Forewings with termen extremely obliquely rounded; bronzy-fuscous; a broad white costal streak from base to $\frac{5}{6}$, thinly strewn with black specks, costal edge suffusedly fuscous-tinged from middle to $\frac{3}{4}$ (except sometimes in ♀); stigmata small, blackish, often indistinct, plical rather obliquely beyond first discal, sometimes an additional dot midway between second discal and tornus: cilia pale fuscous, with a darker subbasal shade. Hindwings grey; cilia whitish-ochreous-grey.

Sydney, Picton, and Blackheath (3500 feet), New South Wales; George's Bay, Tasmania; from September to January, ten specimens. Type seen.

113. *S. eurysema*, n.sp.

♂♀. 10-12 mm. Head whitish-fuscous, face and middle of crown more or less suffused with whitish. Palpi dark fuscous, base whitish. Antennæ whitish-fuscous. Thorax light bronzy-fuscous. Abdomen whitish-ochreous. Legs fuscous, posterior pair ochreous-whitish. Forewings with termen very obliquely rounded, tornus distinct; light fuscous, darker above middle; a broad white costal streak from base to $\frac{5}{6}$, strewn with black specks, costal edge suffusedly fuscous from middle to $\frac{3}{4}$; stigmata rather large, distinct, blackish, plical rather obliquely beyond first discal, an

additional dot midway between second discal and dorsum: cilia whitish-fuscous, with a darker subbasal shade. Hindwings whitish-grey; cilia ochreous-grey-whitish.

Sydney, Blackheath (3500 feet), and Mittagong (3000 feet), New South Wales; in October, February, and March, six specimens. Very closely allied to *S. platyleuca*, but differs by the smaller size, general lighter colouring and especially paler hindwings, less oblique termen of forewings, larger and more distinct stigmata, and usually more numerous black specks of costal streak.

28. Prodosiarcha, n.g.

Antennæ $\frac{3}{4}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi long, recurved, second joint thickened with scales, somewhat rough beneath, terminal joint shorter, acute. Forewings: 2 and 3 coincident, 7 and 8 stalked, 7 to costa. Hindwings over 1, trapezoidal, apex rounded, termen not sinuate, cilia $\frac{3}{4}$; 3 and 4 connate, 5 parallel, 6 and 7 nearly parallel.

Type *P. loxodesma*. Imago with forewings elongate, apex obtuse, termen obliquely rounded.

Hindwings partly orange ..... 114. *loxodesma*.
Hindwings wholly dark fuscous ..... 115. *thanatodes*.

114. *P. loxodesma*, n.sp.

♂♀. 11-14 mm. Head and thorax fuscous irrorated with dark fuscous and whitish. Palpi whitish irrorated with blackish. Antennæ dark fuscous spotted with whitish. Abdomen fuscous, sides mixed with yellowish. Legs dark fuscous, ringed with whitish, hairs of posterior tibiæ yellowish. Forewings rather dark fuscous, finely irrorated with whitish; a spot on costa at $\frac{1}{4}$, a straight oblique fascia from before middle of costa to before tornus, and an angulated subterminal series of spots very close to posterior portion of costa and termen dark fuscous, undefined and often indistinct: cilia whitish-fuscous with two darker lines, basal half irrorated with dark fuscous. Hindwings orange,

posterior half suffused with dark fuscous; cilia rather dark fuscous.

Adelaide, South Australia, from November to January; eleven specimens (Lower, Guest).

115. *P. thanatodes*, Low.

(*Gelechia thanatodes*, Low., Trans. Roy. Soc. S. Austr. 1893, 170.)

♀. 13 mm. Only differs from the preceding in having abdomen and hindwings wholly dark fuscous.

Adelaide, South Australia; the original type, which I have seen, is still unique. It is doubtful whether this is anything but an exceptional variety of the preceding, but no intermediate forms have occurred, although the typical *P. loxodesma* has been taken in plenty, and I agree with Mr. Lower that it is desirable to treat them as distinct at present. The size given by Mr. Lower is too small.

29. HEMIARCHA, n.g.

Antennæ $\frac{3}{4}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi long, recurved, second joint thickened with scales, somewhat roughened beneath, terminal joint as long as second, acute. Forewings: 2 and 3 stalked, 7 and 8 stalked or sometimes out of 6, 7 to costa. Hindwings over 1, trapezoidal, apex rounded, termen hardly sinuate, cilia $\frac{2}{3}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 stalked.

Type *H. thermochroa*. Imago with forewings elongate, apex obtuse, termen obliquely rounded.

Forewings with fascia from costa at $\frac{1}{3}$; 7 and 8 out of 6 .. 116. *macroplaca*.
Forewings without such fascia; 6 separate..... 117. *thermochroa*.

116. *H. macroplaca*, Low.

(*Gelechia macroplaca*, Low., Trans. Roy. Soc. S. Austr, 1893, 170.)

♂. 15-16 mm. Head and thorax pale ochreous, brownish-tinged, posterior edge of thorax with three dark fuscous dots.

Palpi pale ochreous, with a few blackish points, second and terminal joints with subapical blackish rings. Antennæ whitish-ochreous, spotted with dark fuscous. Abdomen fuscous, apex pale ochreous. Legs whitish-ochreous, banded with blackish irroration. Forewings with 7 and 8 out of 6; pale ochreous, suffusedly irrorated with brownish-ochreous; markings blackish; a dot on base of costa, and seven others along costa; a rather narrow transverse fascia from costa at $\frac{1}{3}$, reaching $\frac{3}{4}$ across wing; a dot in disc at $\frac{3}{5}$: cilia whitish-ochreous, with interrupted ante-median series of blackish points. Hindwings grey, darker posteriorly; cilia light grey.

Gisborne, Victoria, type seen; I possess another Victorian specimen, probably from Melbourne.

117. *H. thermochroa*, Low.

(*Gelechia thermochroa*, Low., Trans. Roy. Soc. S. Austr. 1893, 169.)

♂♀. 14-16 mm. Head, palpi, and thorax ferruginous-ochreous sprinkled with blackish; palpi with subapical blackish rings on second and terminal joints. Antennæ whitish-ochreous ringed with dark fuscous. Abdomen dark fuscous, apex pale ochreous. Legs dark fuscous ringed with pale ochreous. Forewings with 6 separate; light ferruginous-ochreous, with a few scattered dark fuscous scales; markings blackish; a narrow subbasal fascia, more or less produced along dorsum; about eight small spots along costa; a large transverse-oval spot in disc at $\frac{1}{3}$, and a narrower spot at $\frac{2}{3}$, touching a suffused tornal spot; a dot above middle of disc; a suffused terminal fascia: cilia pale bronzy, with dark fuscous subbasal line. Hindwings dark fuscous; cilia fuscous, with darker subbasal line.

Melbourne and Gisborne, Victoria; Mount Gambier and Yale Paddock, South Australia; in March, six specimens.

30. Protolechia, n.g.

Antennæ $\frac{3}{4}$, in ♂ simple, basal joint moderately elongate, without pecten. Labial palpi long, recurved, second joint more

or less thickened with appressed scales, loose or somewhat rough beneath, terminal joint as long as second or shorter, acute. Forewings: 2 and 3 connate or stalked, seldom only approximated and then 2 curved, from angle of cell, 7 and 8 stalked, seldom 6 and 7 out of 8, 7 to costa. Hindwings 1 or over 1, trapezoidal-ovate, apex obtuse or pointed, termen sometimes sinuate, cilia $\frac{3}{5}$-$\frac{4}{5}$; 3 and 4 connate, 5 rather approximated to 4, 6 and 7 nearly parallel or seldom approximated at base, rarely 8 anastomosing shortly with cell.

Type *P. mesochra*, Low. Imago with forewings elongate. A very extensive endemic genus, eighty-five species being here recorded; a large proportion of them are probably attached to various species of *Eucalyptus*, Most of the species are obscurely coloured, and their tabulation is a matter of considerable difficulty; the table here given must be used with caution.

1.	Hindwings tawny	2.
	Hindwings not tawny	4.
2.	Second joint of palpi dark fuscous	123. *caminopis*.
	Second joint of palpi white	3.
3.	Anterior white blotch of forewings reaching base and dorsum	119. *telopis*.
	Anterior white blotch of forewings not reaching base or dorsum	121. *exarista*.
4.	Hindwings whitish or yellowish, posteriorly infuscated	5.
	Hindwings grey, or if whitish, not infuscated posteriorly	10.
5.	Forewings with broad pale yellowish costal streak to $\frac{1}{2}$	171. *tabulata*.
	Forewings without such streak	6.
6.	Forewings with sharply defined broad whitish patch on base of costa	189. *selenia*.
	Forewings without such patch	7.
7.	Head fuscous	124. *temenitis*.
	Head not fuscous	8.
8.	Second joint of palpi white except base and a subapical ring	190. *sodalella*.
	Second joint of palpi wholly irrorated with dark fuscous	9.

9.	Anterior stigmata confluent into a dark blotch	191. *gorgonias.*
	Anterior stigmata distinct	192. *chiradia.*
10.	Termen of forewings oblique or rather oblique	11.
	Termen of forewings very oblique	32.
11.	Head fuscous or grey	12.
	Head white or ochreous	22.
12.	Forewings with clear white patches	122. *acroleuca.*
	Forewings without clear white patches	13.
13.	Anterior stigmata confluent into an irregular blotch.	14.
	Anterior stigmata distinct	16.
14.	Forewings with dark oval discal blotch beyond middle	197. *megalommata.*
	Forewings without such blotch	15.
15.	Second joint of palpi with scales more prominent beneath in middle	195. *eumela.*
	Second joint of palpi normal	196. *loemias.*
16.	Second discal stigma white, conspicuous	202. *subnexella.*
	Second discal stigma not white	17.
17.	Forewings with conspicuous pale ochreous basal dot in middle	148. *nyctias.*
	Forewings without such dot	18.
18.	Plical stigma beneath first discal	198. *banausodes.*
	Plical stigma obliquely beyond first discal	19.
19.	Terminal joint of palpi much shorter than second.	201. *aspetodes.*
	Terminal joint of palpi as long as second	20.
20.	Forewings with dark fuscous costal spots at base and $\frac{1}{5}$	199. *crotalodes.*
	Forewings without such spots	21.
21.	Hindwings with termen sinuate	130. *crypsibatis.*
	Hindwings with termen not sinuate	151. *nephelota.*
22.	Terminal joint of palpi with two defined dark rings.	23.
	Terminal joint of palpi without two defined dark rings	25.
23.	Forewings with fuscous dark-edged basal patch	185. *tridecta.*
	Forewings without dark basal patch	24.
24.	Forewings with pale basal patch	193. *thyrsoptera.*
	Forewings without pale basal patch	184. *haemaspila.*
25.	Thorax wholly dark fuscous	26.
	Thorax not wholly dark fuscous	27.
26.	Stigmata distinct	188. *arganthes.*
	Stigmata obsolete	118. *tetraploa.*
27.	Head white above	125. *voluta.*
	Head ochreous or orange	28.

28. Groundcolour of forewings white ..... 29.
Groundcolour of forewings ochreous ..... 30.
29. Forewings with dark basal fascia straight, entire ... 186. *xanthocephala*.
Forewings with dark basal fascia curved, interrupted 187. *trichalina*.
30. Forewings with all stigmata and two additional discal dots ..... 31.
Forewings with discal stigmata only ..... 182. *scytina*.
31. Termen of forewings and hindwings sinuate ..... 183. *ananeura*.
Termen ef forewings and hindwings not sinuate .... 194. *phasianis*.
32. Termen of hindwings markedly sinuate ..... 33.
Termen of hindwings not or very slightly sinuate .. 45.
33. Forewings with veins 2 and 3 approximated only ... 34.
Forewings with veins 2 and 3 connate or stalked ... 36.
34. Stigmata faint or obsolete ..... 128. *prisca*.
Stigmata well-defined ..... 35.
35. Apex of hindwings acute, considerably produced ... 127. *trachyphanes*.
Apex of hindwings round-pointed, not much produced ..... 126. *pacifica*.
36. Forewings yellow-whitish, with dark brown median fascia ..... 120. *desmatra*.
Forewings without such fascia ..... 37.
37. Forewings with well-defined broad white costal streak ..... 134. *invalida*.
Forewings without such streak ..... 38.
38. Costa of forewings suffused with white ..... 39.
Costa of forewings not suffused with white ..... 40.
39. Thorax white ..... 129. *diplonesa*.
Thorax light fuscous ..... 135. *cladara*.
40. Anterior half of costa spotted with blackish ..... 41.
Anterior half of costa not spotted with blackish ..... 42.
41. Forewings with discal and plical series of black spots ..... 175. *hylias*.
Forewings without such series ..... 166. *plinthactis*.
42. Forewings with additional dot beneath second discal stigma ..... 43.
Forewings without such dot ..... 44.
43. Apex of forewings obtuse ..... 200. *molyntis*.
Apex of forewings pointed ..... 131. *flexilis*.
44. Thorax grey-whitish, stigmata distinct ..... 133. *microdora*.
Thorax fuscous, whitish-sprinkled, stigmata very obscure ..... 132. *frugalis*.
45. Hindwings whitish ..... 46.
Hindwings not whitish ..... 47.

46. Head and thorax whitish-fuscous ..... 138. *aclera.*
Head and thorax whitish sprinkled with dark fuscous ..... 144. *hypoleuca.*
47. Forewings with ochreous-yellow tornal blotch nearly reaching costa ..... 179. *deltodes.*
Forewings without such blotch ..... 48.
48. Head wholly white or whitish-ochreous, without reddish or fuscous tinge ..... 49.
Head not wholly white or whitish-ochreous ..... 60.
49. Forewings with broad white costal streak to $\frac{5}{6}$ ..... 137. *trichosema.*
Forewings without such streak ..... 50.
50. Palpi wholly ochreous-white ..... 170. *catarrhacta.*
Palpi not wholly ochreous-white ..... 51.
51. Forewings with narrow white costal streak from base to beyond middle ..... 155. *sarisias.*
Forewings without such streak ..... 52.
52. Thorax with blackish subdorsal stripes ..... 53.
Thorax without such stripes ..... 54.
53. Abdomen blackish ..... 163. *orthanotis.*
Abdomen whitish-ochreous ..... 157. *aversella.*
54. Thorax dark fuscous ..... 181. *cephalota.*
Thorax not dark fuscous ..... 55.
55. Forewings mixed or tinged with ferruginous ..... 56.
Forewings not tinged with ferruginous ..... 59.
56. Thorax sprinkled with fuscous or dark fuscous ..... 57.
Thorax not so sprinkled, or on shoulders only ..... 58.
57. Forewings white, sprinkled with ferruginous and fuscous ..... 165. *hormodes.*
Forewings fuscous, sprinkled with whitish and dark fuscous ..... 160. *chenias.*
58. Hindwings in ♂ with darker basal patch ..... 159. *sisyraea.*
Hindwings in ♂ without such patch ..... 167. *decaspila.*
59. Thorax fuscous-white ..... 143. *liota.*
Thorax pale bronzy-ochreous ..... 149. *iochlaena.*
60. Head whitish-ochreous, sides of crown dark fuscous 168. *mesochra.*
Head not so coloured ..... 61.
61. Head whitish with pale fuscous central line ..... 151. *obeliscota.*
Head not so coloured ..... 62.
62. Head mostly reddish-ochreous or orange-ochreous .. 63.
Head fuscous or tinged with fuscous ..... 66.
63. Second joint of palpi mixed with blackish or dark fuscous ..... 64.
Second joint of palpi not so mixed ..... 65.

64. Cilia of hindwings pale grey ..... 162. *xuthias*.
Cilia of hindwings whitish-ochreous. . ... 164. *ceramica*.
65. Forewings with broad reddish-ochreous costal streak to $\frac{3}{4}$..... ..... 176. *compsochroa*.
Forewings without such streak..... ..... 145. *cosmotis*.
66. Terminal joint of palpi shorter than second..... 67.
Terminal joint of palpi as long as second... ..... 74.
67. Thorax with blackish subdorsal stripes..... 157. *aversella*.
Thorax without such stripes.. ..... 68.
68. Thorax mixed on sides with ferruginous..... 173. *amblopis*.
Thorax not mixed with ferruginous..... 69.
69. Veins indistinctly streaked with blackish..... 147. *actinota*.
Veins not streaked with blackish..... ..... 70.
70. Stigmata partially edged with white... .... 141. *lithina*.
Stigmata not edged with white... .... 71.
71. Forewings sprinkled with white..... ..... 72.
Forewings not sprinkled with white..... 73.
72. Forewings with several dark spots on fold..... ... 156. *englypta*.
Forewings without several spots on fold..... 136. *sciodes*.
73. Forewings brownish-ochreous towards base..... 150. *xestolitha*.
Forewings not ochreous towards base..... 139. *autopis*.
74. Forewings with pale ferruginous costal streak to $\frac{2}{3}$. 177. *odorifera*.
Forewings without such streak..... ..... 75.
75. Forewings with yellow-ochreous spot above tornus.. 180. *diplanetis*.
Forewings without such spot..... 76.
76. Costa posteriorly dotted with whitish .... 77.
Costa posteriorly not dotted with whitish..... 79.
77. Stigmata white..... ..... 78.
Stigmata dark fuscous..... 146. *psephias*.
78. Cilia of forewings with whitish-ochreous subapical patch .... 178. *micropa*.
Cilia of forewings without such patch ..... 142. *argocentra*.
79. Forewings with pale subcostal stripe.. ..... 80.
Forewings without such stripe..... 81.
80. Head dark fuscous..... 169. *stratifera*.
Head whitish-ochreous, fuscous-tinged ..... 172. *pelogramma*.
81. Veins streaked with blackish-fuscous..... 153. *phloeodes*.
Veins not streaked..... ... . 82.
82. Forewings with three whitish discal patches ..... 174. *aeolopis*.
Forewings without such patches..... 83.
83. Head whitish-ochreous, fuscous-tinged..... 161. *mechanistis*.
Head fuscous, whitish-sprinkled... .. .. 84.

84. Forewings with five oblique series of cloudy dark spots..... 154. *thyridota.*
Forewings without such series..... 85.
85. Stigmata accompanied by white dots..... 152. *anthracina.*
Stigmata not accompanied by white dots..... 140. *elpistis.*

118. *P. tetraploa*, n.sp.

♀. 15 mm. Head ochreous-white, back of crown dark fuscous. Palpi ochreous-white, base dark fuscous. Antennæ ochreous-white, ringed with dark fuscous. Thorax dark fuscous. Abdomen light ochreous-yellowish. Legs dark fuscous, ringed with ochreous-whitish, posterior pair ochreous-whitish. Forewings moderate, suboblong, costa gently arched, more strongly towards base, apex obtuse, termen nearly straight, rather oblique; 2 and 3 connate; dark fuscous; a very broad ochreous-white transverse fascia extending from near base to $\frac{1}{3}$; an ochreous-white costal dot beyond middle; a rather narrow ochreous-white inwards-curved fascia from $\frac{2}{3}$ of costa to before tornus: cilia ochreous-whitish, on costa yellowish, above apex and at tornus with broad rather dark fuscous bars. Hindwings 1, apex rounded, termen hardly sinuate; 6 and 7 approximated; grey, darker towards apex; cilia pale yellowish, at apex with a broad grey bar.

Melbourne, Victoria; one specimen (Raynor).

119. *P. telopis*, n.sp.

♀. 13 mm. Head dark purplish-bronzy, face ochreous-white. Palpi ochreous-white, terminal joint dark fuscous. Antennæ dark fuscous. Thorax dark purplish-fuscous, patagia ochreous-white. Abdomen ochreous-fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 stalked; dark brown, on termen purplish-tinged; a large ochreous-white patch extending along costa from base (except a dark fuscous basal dot) to $\frac{2}{3}$, reaching about $\frac{3}{4}$ across wing and at base to dorsum, lower edge sinuate-indented posteriorly, posterior edge outwardly oblique from costa, somewhat curved; an ochreous-whitish triangular dot on middle of costa; a moderate ochreous-white fascia from $\frac{3}{4}$ of costa towards

tornus, but not quite reaching it, narrowed downwards: cilia pale yellow-ochreous, infuscated towards tornus, with a dark fuscous subbasal line on termen, above apex with a broad dark fuscous bar. Hindwings 1, apex tolerably pointed, termen hardly sinuate; tawny, posteriorly infuscated; cilia tawny.

Sydney, New South Wales, in October; one specimen.

120. *P. desmatra*, Low.

(*Gelechia desmatra*, Low., Trans. Roy. Soc. S. Austr., 1897, 56.)

♂♀. 11-13 mm. Head and thorax yellow-whitish or whitish-yellow, sides of crown round antennæ dark fuscous. Palpi white, terminal joint blackish except anterior edge. Antennæ whitish-ochreous, basal joint dark fuscous, apical half ringed with dark fuscous. Abdomen grey, anal tuft whitish-yellowish. Legs dark grey ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 connate; whitish, more or less wholly suffused with pale ochreous-yellowish; extreme costal edge dark fuscous near base; a moderate dark brown median fascia, extremities strongly angularly produced anteriorly, and slightly posteriorly; a dark brown patch occupying apical fourth of wing, produced anteriorly at extremities to near median fascia, enclosing several oblique white marks on costa and a row of white scales before termen; terminal line dark fuscous: cilia light orange, tips whitish-yellowish, towards tornus brownish, on costa spotted with dark fuscous and whitish. Hindwings over 1, apex pointed, termen sinuate; light fuscous; cilia whitish-fuscous, slightly yellowish-tinged, tips whitish.

Glen Innes, Sydney, Bulli, Bathurst, and Broken Hill, New South Wales; Melbourne, Victoria; Adelaide, Wirrabara, Quorn, and Port Lincoln, South Australia; from October to December, a common species; twenty specimens.

121. *P. exarista*, n.sp.

♂. 12 mm. Head dark fuscous, face ochreous-white. Palpi yellowish-white, terminal joint dark fuscous. Antennæ, thorax,

and abdomen dark fuscous, anal tuft whitish-ochreous. Legs dark fuscous, ringed with ochreous-whitish. Forewings rather narrow, apex round-pointed, termen very obliquely rounded; 2 and 3 connate; dark fuscous, faintly purplish-tinged; a yellowish-white costal blotch near base, reaching $\frac{3}{4}$ across wing, posterior edge outwardly oblique; darker longitudinal marks in disc above middle and on fold; posterior half with scattered undefined dots of white scales, especially indicating a postmedian fascia and terminal series; costal edge yellowish-white for a short distance beyond middle: cilia whitish-grey, with a cloudy dark grey shade. Hindwings over 1, apex round-pointed, termen hardly sinuate; tawny; cilia light tawny.

York, West Australia, in October; one specimen.

122. *P. acroleuca*, n.sp.

♀. 12 mm. Head, antennæ, and thorax dark fuscous. Palpi black mixed with white. Abdomen rather dark fuscous. Legs dark fuscous ringed with whitish. Forewings with costa moderately arched, apex obtuse, termen obliquely rounded (damaged); 2 and 3 connate; dark purplish-fuscous; a moderate irregular-edged oblique ochreous-white fascia from $\frac{2}{3}$ of costa, reaching $\frac{3}{4}$ across wing; a white dot on costa beyond middle; an ochreous-white patch occupying apical fourth of wing, but mixed with dark fuscous scales on margins: cilia fuscous (damaged). Hindwings considerably over 1, apex round-pointed, termen hardly sinuate; fuscous; cilia fuscous.

Bathurst, New South Wales, in November; one specimen.

123. *P. caminopis*, n.sp.

♀. 12 mm. Head and thorax dark ashy-fuscous, face shining bronzy-grey. Palpi and antennæ dark fuscous. Abdomen tawny, basal half fuscous. Legs dark fuscous ringed with whitish. Forewings rather narrow, costa moderately arched, apex round-pointed, termen very obliquely rounded; 2 and 3 connate; dark bronzy, irrorated with blackish; costal edge ochreous-whitish just beyond middle; an irregular-edged elongate whitish-ochreous spot

extending along dorsum from $\frac{2}{5}$ to $\frac{3}{4}$: cilia fuscous, with some black points. Hindwings over 1, apex round-pointed, termen hardly sinuate; tawny, deeper towards apex; cilia fuscous.

Bathurst, New South Wales, in November; one specimen.

124. *P. temenitis*, n.sp.

♂♀. 11-12 mm. Head and thorax whitish-fuscous sprinkled with fuscous. Palpi in ♂ fuscous, in ♀ pale yellowish, fuscous at apex and anterior edge of second joint and on lower half of terminal joint, terminal joint as long as second. Antennæ whitish-fuscous, more or less spotted with dark fuscous. Abdomen light fuscous, more or less whitish-yellowish towards base. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ pale yellow. Forewings with costa moderately arched, apex obtuse, termen rather oblique, rounded beneath; 2 and 3 stalked; in ♂ whitish, in ♀ whitish-ochreous, in both suffusedly irrorated with fuscous, more especially in ♀, where groundcolour is almost wholly obscured; stigmata fuscous, in ♂ distinct, in ♀ very indistinct, plical obliquely beyond first discal, a similar dot close beneath second discal; a broad cloudy fuscous fascia from $\frac{3}{4}$ of costa to tornus, posterior edge in ♂ well-defined; in ♀ a praeterminal series of obscure pale dots: cilia whitish-ochreous, with a faint fuscous shade. Hindwings 1, apex round-pointed, termen slightly sinuate; in ♂ yellow-whitish, in ♀ very pale yellow, terminal half in both suffused with whitish-fuscous; cilia in ♂ yellow-whitish, in ♀ whitish-yellowish, with faint traces of fuscous shade.

Rosewood, Queensland, in September; four specimens (2 ♂, 2 ♀).

125. *P. voluta*, n.sp.

♂. 10-11 mm. Head white, face fuscous, base of antennæ surrounded with dark fuscous. Palpi dark fuscous, terminal joint white, shorter than second. Antennæ fuscous, becoming white towards base. Thorax white, extreme apex of shoulder dark fuscous. Abdomen fuscous, basal third light yellowish, anal tuft whitish-yellowish. Legs whitish-yellowish, anterior and middle pair banded with dark fuscous. Forewings with costa

moderately arched, apex obtuse, termen obliquely rounded; 2 and 3 almost connate; white, somewhat sprinkled with dark fuscous; costal edge ochreous-tinged; slight dark fuscous costal marks at $\frac{1}{5}$ and before middle; a rounded-triangular dark fuscous blotch darker and more sharply defined on upper half, extending along dorsum from $\frac{1}{6}$ to beyond middle, and reaching $\frac{2}{3}$ across wing; a broad rather dark fuscous fascia from $\frac{3}{4}$ of costa to tornus, enclosing two pale ochreous costal dots, anterior edge undefined, concave, posterior edge sharper, straight; a dark fuscous terminal line extended round apex: cilia white, basal half ochreous-tinged, with a fuscous median line on upper part of termen. Hindwings somewhat over 1, apex round-pointed, termen faintly sinuate; whitish-fuscous, terminal half light fuscous; cilia whitish-ochreous, becoming whitish-yellowish towards tornus.

Newcastle and Sydney, New South Wales, from November to January; three specimens.

126. *P. pacifica*, n.sp.

♂♀. 10-12 mm. Head and thorax whitish irrorated with fuscous. Palpi whitish, more or less sprinkled with dark fuscous, terminal joint as long as second. Antennæ dark fuscous, more or less obscurely ringed with whitish. Abdomen whitish-fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa moderately arched, apex round-pointed, termen very obliquely rounded; 2 and 3 approximated only; light greyish-ochreous, irregularly sprinkled with white and dark fuscous; markings cloudy, formed of dark golden-brown irroration mixed with dark fuscous; small spots at base of costa and dorsum; a dorsal suffusion from $\frac{1}{4}$ to near tornus; stigmata rather large, plical somewhat beyond first discal; a small undefined white costal spot before middle; a broad undefined fascia from costa beyond this to tornus: cilia whitish, with fuscous and dark fuscous points forming three or four more or less developed lines. Hindwings 1, apex round-pointed, termen sinuate; whitish-grey; cilia ochreous-grey-whitish.

Sydney, New South Wales; York, West Australia; from September to April, fourteen specimens.

127. *P. trachyphanes*, n.sp.

♀. 9-10 mm. Head ochreous-white, crown more or less sprinkled with fuscous. Palpi whitish, basal joint dark fuscous, terminal joint and apex of second more or less sprinkled with dark fuscous, terminal joint as long as second. Antennæ dark fuscous, obscurely whitish-ringed. Thorax whitish, irrorated with fuscous. Abdomen whitish-ochreous. Legs dark grey ringed with white, hairs of posterior tibiæ whitish. Forewings pointed; 2 and 3 approximated only; light grey, irregularly irrorated with white and dark fuscous; blackish subcostal and dorsal marks near base, and a plical mark beyond these; stigmata rather large, cloudy, dark fuscous, plical rather beyond first discal; posterior half of costa and termen with alternate cloudy spots of white and dark fuscous irroration: cilia whitish with several rows of dark fuscous points, median line marked with blackish dots. Hindwings 1, apex acute, considerably produced, termen sinuate-emarginate; whitish-grey, becoming grey towards apex; cilia ochreous-grey-whitish.

Geraldton, West Australia, in November; three specimens.

128. *P. prisca*, n.sp.

♂♀. 8-11 mm. Head and thorax fuscous finely irrorated with whitish. Palpi fuscous, more or less mixed with white and dark fuscous, terminal joint as long as second. Antennæ fuscous-whitish, ringed with dark fuscous. Abdomen light fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa moderately arched, apex tolerably acute, termen very obliquely rounded; 2 and 3 approximated only; fuscous, very finely irrorated with whitish; stigmata faintly darker or quite obsolete, plical rather beyond first discal: cilia fuscous, finely irrorated with whitish. Hindwings 1, apex pointed, considerably produced, termen sinuate-emarginate; pale grey, somewhat darker posteriorly; cilia ochreous-whitish.

Sydney, New South Wales, in October and February; eight specimens. A very obscure-looking species, but readily separated from the equally obscure *P. frugalis* by the broader forewings.

129. *P. diplonesa*, n.sp.

♂♀. 8-9 mm. Head and thorax silvery-white, sometimes ochreous-tinged. Palpi fuscous, more or less mixed with white, terminal joint as long as second. Antennæ grey. Abdomen grey, segmental margins white. Legs dark grey ringed with white, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 connate; grey densely mixed with white, costa broadly suffused with white from near base to near apex (in one specimen incompletely); discal stigmata large, roundish, dark fuscous, plical little marked or obsolete, somewhat obliquely beyond first discal: cilia whitish, basally tinged with ochreous and sprinkled with grey. Hindwings 1, apex round-pointed, termen sinuate; pale grey, becoming darker posteriorly; cilia ochreous-grey-whitish.

Geraldton, West Australia, in October and November; seven specimens.

130. *P. crypsibatis*, n.sp.

♂♀. 12-14 mm. Head and thorax shining light fuscous, face whitish. Palpi whitish, second joint mixed with fuscous, terminal joint as long as second, mixed with dark fuscous anteriorly and towards base. Antennæ and abdomen light fuscous. Legs fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa slightly arched, apex obtuse, termen oblique, straight, rounded beneath; 2 and 3 stalked; light fuscous irrorated with whitish scales pointed with dark fuscous; stigmata round, dark fuscous, plical rather obliquely beyond first discal, another similar dot below second discal; a dark fuscous marginal line above apex: cilia whitish-fuscous, with a fuscous subbasal shade. Hindwings over 1, apex round-pointed, somewhat produced, termen sinuate; pale grey; cilia grey-whitish.

Mount Kosciusko (4000 feet), New South Wales; Deloraine, Tasmania; Mount Lofty, South Australia; from November to January, three specimens. This species, though apparently most allied to the following group, differs very obviously in the obtuse apex and much less oblique termen of forewings.

131. *P. flexilis*, n.sp.

♂. 12 mm. Head fuscous-whitish, sides and back of crown fuscous. Palpi fuscous, somewhat whitish-sprinkled, terminal joint as long as second, roughened with scales anteriorly. Antennæ light fuscous. Thorax fuscous. Abdomen light grey. Legs dark fuscous, sprinkled and ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex pointed, termen very obliquely rounded; 2 and 3 connate; fuscous, irrorated with dark fuscous and finely sprinkled with whitish; stigmata dark fuscous, plical obliquely beyond first discal, another similar dot beneath second discal: cilia whitish-fuscous, sprinkled with pale points, and towards base with dark fuscous. Hindwings over 1, apex pointed, produced, termen sinuate; pale grey; cilia pale whitish-fuscous.

Sydney, New South Wales, in August; one specimen. Most liable to be confused with *P. frugalis*, from which it differs by its larger size, less oblique termen of forewings, geminated second discal stigma, and relatively broader hindwings.

132. *P. frugalis*, n.sp.

♂♀. 9-11 mm. Head and thorax fuscous, finely sprinkled with whitish, centre of face and sometimes of crown fuscous-whitish. Palpi dark fuscous sprinkled with whitish, terminal joint as long as second. Antennæ grey, sometimes paler-ringed. Abdomen grey. Legs dark fuscous sprinkled and ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex pointed, termen extremely obliquely rounded; 2 and 3 connate; fuscous, irrorated with dark fuscous, and finely sprinkled with whitish; stigmata very obscure, dark fuscous, plical obliquely beyond first discal: cilia pale fuscous, sprinkled with dark fuscous. Hindwings hardly over 1, apex pointed, produced, termen sinuate; grey or light grey; cilia ochreous-grey-whitish.

Sydney and Blackheath (3500 feet), New South Wales; Perth West Australia; in September, October, and January, six specimens.

133. *P. microdora*, n.sp.

♂. 10 mm. Head and thorax grey-whitish, sides grey. Palpi fuscous mixed with whitish, terminal joint as long as second. Antennæ fuscous-whitish obscurely ringed with fuscous. Abdomen grey, apex whitish. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 connate; light grey, somewhat sprinkled with dark grey; stigmata dark fuscous, plical obliquely beyond first discal; costa posteriorly with obscure indications of alternate whitish and darker spots: cilia grey-whitish, towards base somewhat sprinkled with grey. Hindwings over 1, apex pointed, somewhat produced, termen sinuate; light grey, darker posteriorly; cilia grey-whitish.

Geraldton, West Australia, in November; two specimens.

134. *P. invalida*, n.sp.

♂♀. 8-10 mm. Head white, sides of crown fuscous-tinged. Palpi fuscous sprinkled with white, apex of second joint white, terminal joint as long as second, white, anterior edge sprinkled with fuscous. Antennæ fuscous. Thorax bronzy-fuscous, with a broad white dorsal stripe. Abdomen ochreous-whitish, in ♀ greyer. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex round-pointed, termen slightly sinuate, very oblique; 2 and 3 stalked; light fuscous, irrorated on costal third with dark fuscous, and on dorsal third with whitish; a broad white costal streak from base to near apex, narrowed posteriorly; plical stigma and a spot close to tornus cloudy, dark fuscous: cilia white, with three rows of dark fuscous points. Hindwings 1, apex round-pointed, somewhat produced, termen sinuate; in ♂ grey-whitish, in ♀ light grey; cilia whitish.

Brisbane, Queensland; Sydney, New South Wales; in September and October, four specimens.

135. *P. cladara*, n.sp.

♀. 11 mm. Head whitish, sides sprinkled with fuscous. Palpi white, sprinkled with fuscous, terminal joint as long as second.

Antennæ whitish, ringed with fuscous. Thorax light fuscous, collar whitish. Abdomen whitish-ochreous. Legs fuscous, sprinkled and ringed with whitish, posterior pair whitish. Forewings with costa moderately arched, apex round-pointed, termen slightly sinuate, rather strongly oblique; 2 and 3 connate; fuscous, finely irrorated with white, more strongly and suffusedly towards costa, costal edge quite white; stigmata indistinctly dark fuscous, plical obliquely beyond first discal, another similar dot beneath second discal: cilia whitish, sprinkled with fuscous towards base. Hindwings 1, apex round-pointed, termen sinuate; grey-whitish; cilia whitish.

Hobart, Tasmania, in January; one specimen.

136. *P. sciodes*, n.sp.

♂. 11 mm. Head and thorax light greyish-ochreous mixed with whitish. Palpi fuscous mixed with whitish, terminal joint rather shorter than second. Antennæ whitish-fuscous. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa moderately arched, apex round-pointed, termen very obliquely rounded; 2 and 3 connate; whitish-fuscous, darker-sprinkled, mixed with white in disc; stigmata irregular, dark fuscous, plical obliquely beyond first discal: cilia whitish, towards base sprinkled with fuscous. Hindwings 1, apex tolerably obtuse, termen slightly sinuate; pale grey; cilia grey-whitish.

Geraldton, West Australia, in October; one specimen. Allied to *P. aclera*, but differs by white discal suffusion of forewings, and greyer hindwings, with termen slightly but distinctly sinuate.

137. *P. trichosema*, n.sp.

♀. 12 mm. Head white, sides of crown pale ochreous-yellowish. Palpi white, second joint yellowish-tinged, terminal joint shorter than second, apex greyish. Antennæ grey. Thorax white, with pale brownish lateral stripes. Abdomen grey. Legs grey, posterior pair whitish. Forewings with costa moderately arched, apex obtuse, termen slightly rounded, very oblique; 2

and 3 connate; pale fuscous, mixed with whitish towards dorsum and posteriorly, and with a few dark fuscous scales; a very broad irregular-edged white costal streak from base to $\frac{5}{6}$, partially limited beneath by a black plical streak from near base to middle, and another connecting two discal stigmata, and with some dark fuscous scales round its apex: cilia whitish, basal half barred with dark fuscous. Hindwings somewhat over 1, apex obtuse, termen not sinuate; grey; cilia whitish-grey.

Albany, West Australia, in December; one specimen.

138. *P. aclera*, n.sp.

♂♀. 11-13 mm. Head and thorax whitish-fuscous. Palpi dark fuscous sprinkled with whitish, terminal joint shorter than second. Antennæ whitish-fuscous, sometimes darker-ringed. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa moderately arched, apex round-pointed, termen very obliquely rounded; 2 and 3 connate; whitish-fuscous, thinly sprinkled with fine blackish scales; stigmata blackish, plical obliquely beyond first discal, sometimes an additional dot beneath second discal; sometimes undefined blackish dots along posterior half of costa: cilia whitish, with a few blackish points towards base. Hindwings 1, apex tolerably obtuse, termen not sinuate; grey-whitish; cilia whitish.

Port Lincoln, South Australia, in November; ten specimens.

139. *P. autopis*, n.sp.

♂♀. 14-15 mm. Head and thorax light fuscous, sometimes centrally whitish-tinged. Palpi fuscous sprinkled with white, terminal joint shorter than second. Antennæ whitish-fuscous. Abdomen grey, apex whitish-ochreous. Legs dark fuscous irrorated with whitish, hairs of posterior tibiæ whitish. Forewings with costa moderately arched, apex obtuse, termen very obliquely rounded; 2 and 3 connate; rather light fuscous, sprinkled with dark fuscous; stigmata moderate, dark fuscous, plical obliquely beyond first discal; traces of darker spots on posterior half of

costa and termen: cilia whitish-fuscous. Hindwings somewhat over 1, apex obtuse, termen hardly sinuate; light grey; cilia ochreous-grey-whitish.

Perth, West Australia, in October and November; six specimens.

140. *P. elpistis*, n.sp.

♂♀. 15 mm. Head and thorax light fuscous mixed with whitish. Palpi fuscous mixed with white, terminal joint as long as second. Antennæ whitish-fuscous. Abdomen grey, apex whitish-ochreous. Legs dark fuscous sprinkled and ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex obtuse, termen very obliquely rounded; 2 and 3 connate; fuscous, sprinkled with whitish and dark fuscous; stigmata rather indistinct, dark fuscous, plical obliquely beyond first discal: cilia whitish-fuscous mixed with whitish and sprinkled with dark fuscous. Hindwings rather over 1, apex obtuse, termen not sinuate; light grey; cilia ochreous-grey-whitish.

Perth, West Australia, in November; two specimens. Similar to the preceding, but apparently sufficiently distinguished by the longer terminal joint of palpi, obviously less arched costa of forewings, and their whitish sprinkling.

141. *P. lithina*, Low.

(*Gelechia lithina*, Low., Proc. Linn. Soc. N. S. Wales, 1899, 98.)

♂. 12 mm. Head and thorax whitish-fuscous mixed centrally with whitish. Palpi dark fuscous mixed with whitish, terminal joint somewhat shorter than second. Antennæ fuscous. Abdomen whitish-grey, anal tuft whitish-ochreous. Legs dark fuscous ringed with whitish, posterior pair suffused with whitish. Forewings with costa gently arched, apex obtuse, termen very obliquely rounded; 2 and 3 stalked; whitish, densely irrorated with dark fuscous; stigmata large, dark fuscous, partially edged with white, plical rather obliquely beyond first discal, a similar spot between first and second discal; a row of undefined white spots along posterior half of costa and termen: cilia whitish-fuscous,

with a strongly-marked dark fuscous subbasal line. Hindwings somewhat over 1, apex tolerably pointed, termen slightly sinuate; light grey, darker posteriorly; cilia grey-whitish.

Broken Hill, New South Wales, in October and November; one specimen received from Mr. Lower, who bred the species from larvæ feeding on *Dodonæa lobulata*.

142. *P. argocentra*, n.sp.

♂♀. 11 mm. Head and thorax shining bronzy-fuscous. Palpi dark fuscous mixed with white, terminal joint as long as second. Antennæ fuscous. Abdomen grey, apex ochreous-whitish. Legs dark fuscous ringed with white, hairs of posterior tibiæ white. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 connate; fuscous, slightly purplish-tinged, irrorated with dark fuscous; stigmata formed by white dots partially surrounded with dark fuscous, plical larger, obliquely beyond first discal; posterior $\frac{3}{5}$ of costa marked with a series of white dots: cilia whitish-fuscous, sprinkled with dark fuscous. Hindwings over 1, apex tolerably obtuse, termen slightly sinuate; grey; cilia whitish-grey.

Albany, West Australia, in December; two specimens.

143. *P. liota*, n.sp.

♂. 12 mm. Head white. Palpi fuscous, second joint mixed with dark fuscous, towards base whitish, terminal joint whitish except anteriorly, as long as second. Antennæ fuscous-whitish. Thorax white, partially fuscous-tinged. Abdomen whitish. Legs dark fuscous, posterior pair whitish. Forewings with costa gently arched, apex obtuse, termen rounded, rather strongly oblique; 2 and 3 connate; light grey, densely and suffusedly irrorated with white, and sprinkled with dark fuscous; stigmata moderate, blackish, plical obliquely beyond first discal; some blackish dots along posterior half of costa: cilia grey-whitish. Hindwings somewhat over 1, apex obtuse, termen faintly sinuate; whitish-grey; cilia grey-whitish.

Albany, West Australia, in December; one specimen.

144. *P. hypoleuca*, n.sp.

♂. 11-12 mm. Head ochreous-whitish sprinkled with dark fuscous. Palpi white irrorated with dark fuscous, terminal joint as long as second. Antennæ whitish-fuscous. Thorax whitish irrorated with dark fuscous. Abdomen whitish. Legs dark fuscous ringed with white, posterior pair white. Forewings with costa gently arched, apex obtuse, termen very obliquely rounded; 2 and 3 stalked; light grey, mixed with whitish and sprinkled with dark fuscous; stigmata large; formed of dark fuscous irroration, plical obliquely beyond first discal; the dark fuscous irroration tends to form similar spots on fold before and beyond plical, between discal stigmata, and along posterior half of costa and termen: cilia grey-whitish, sprinkled with dark fuscous. Hindwings slightly over 1, apex round-pointed, termen faintly sinuate; whitish; cilia whitish.

Sydney, New South Wales, in September and October; three specimens.

145. *P. cosmotis*, n.sp.

♂. 13-15 mm. Head and thorax orange-ochreous, face whitish. Palpi deep orange-ochreous, terminal joint as long as second, white, anterior edge and sometimes a supramedian ring blackish. Antennæ whitish ringed with dark fuscous. Abdomen whitish or pale grey, anal tuft whitish-ochreous. Legs dark fuscous ringed with white, posterior pair suffused with white. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 connate; grey or greyish-ochreous, irregularly mixed with white and sprinkled with black; a small ochreous-orange basal patch, in one specimen broadly produced along costa and dorsum to $\frac{1}{3}$; stigmata moderate, blackish, more or less accompanied with white, plical very obliquely beyond first discal, a similar dot between and above first and second discal, second discal followed by a white spot containing two black specks; posterior half of costa marked with alternate dark and whitish spots: cilia grey mixed with whitish, basal half barred with blackish irroration. Hindwings somewhat over 1, apex

round-pointed, termen not sinuate; grey or whitish-grey; cilia grey-whitish, with two faint grey lines.

Perth, West Australia, in October and November; two specimens. Apparently variable, but very distinct.

146. *P. psephias*, n.sp.

♂♀. 12-14 mm. Head and thorax whitish irrorated with grey. Palpi dark fuscous mixed with white, terminal joint as long as second. Antennæ grey. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa gently arched, apex obtuse, termen very obliquely rounded; 2 and 3 approximated at base; pale fuscous, irrorated with whitish and sprinkled with dark fuscous; stigmata large, dark fuscous, undefined, plical obliquely beyond first discal, sometimes additional dots between and above discal, and beneath second discal; posterior half of costa marked with more or less defined white dots alternating with darker spots: cilia grey-whitish sprinkled with dark fuscous. Hindwings somewhat over 1, apex rather obtuse, termen not or faintly sinuate; light grey, paler towards base; cilia grey-whitish.

Geraldton, West Australia, in November; eight specimens.

147. *P. actinota*, n.sp.

♂♀. 16-18 mm. Head white irrorated with fuscous. Palpi white mixed with dark fuscous, terminal joint rather shorter than second. Antennæ grey. Thorax grey-whitish, patagia dark grey. Abdomen whitish-ochreous. Legs dark fuscous, irrorated and ringed with white, posterior tibiæ suffused with white. Forewings with costa gently arched, apex obtuse, termen very obliquely rounded; 2 and 3 stalked; fuscous irrorated with white; veins 2-12 marked with more or less indistinct blackish streaks; a stronger black streak along fold from base to $\frac{2}{3}$; discal stigmata moderate, blackish, with a black white-edged longitudinal dash lying between them: cilia whitish, basal half barred with fuscous, and with a fuscous line beyond middle. Hindwings over 1, apex

obtuse, termen not sinuate; grey, paler towards base; cilia grey-whitish, with a grey subbasal shade.

Geraldton and Perth, West Australia, in November; ten specimens.

148. *P. nyctias*, n.sp.

♀. 18 mm. Head and thorax grey irrorated with dark fuscous, face pale grey. Palpi dark fuscous sprinkled with whitish, terminal joint as long as second. Antennæ dark fuscous. Abdomen grey. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa moderately arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; dark fuscous irrorated with ashy-grey; a conspicuous pale ochreous basal dot in middle; stigmata moderate, dark fuscous, accompanied by some white scales, plical somewhat beyond first discal; some obscure grey-whitish dots along posterior half of costa and termen : cilia grey sprinkled with dark fuscous. Hindwings 1, apex obtuse, termen not sinuate; fuscous, darker posteriorly; cilia whitish-fuscous, darker towards base.

Brisbane, Queensland; one specimen (Raynor).

149. *P. iochlaema*, n.sp.

♂. 15-16 mm. Head white, crown tinged with pale ochreous. Palpi rather dark fuscous mixed with white, terminal joint shorter than second. Antennæ whitish-ochreous. Thorax pale bronzy-ochreous. Abdomen whitish. Legs fuscous sprinkled with whitish, posterior pair suffused with whitish. Forewings with costa moderately arched, apex obtuse, termen rounded, rather strongly oblique; 2 and 3 connate; light fuscous, suffused with ochreous towards base, irrorated with whitish and sprinkled with fuscous; costal edge finely white from $\frac{1}{4}$ to $\frac{3}{4}$; stigmata moderate, very indistinct, dark fuscous, plical somewhat beyond first discal : cilia whitish-fuscous mixed with whitish. Hindwings over 1, apex obtuse, termen not sinuate; grey; cilia grey-whitish.

Perth, West Australia, in November; seven specimens.

150. *P. xestolitha*, n.sp.

♂. 19 mm. Head and thorax pale brownish-ochreous, face whitish, sides dark fuscous. Palpi dark fuscous irrorated with whitish, second joint very long, thick, terminal joint shorter than second, white sprinkled with dark fuscous. Antennæ whitish-fuscous. Abdomen pale whitish-ochreous. Legs dark fuscous ringed and partially irrorated with whitish, posterior pair suffused with ochreous-whitish. Forewings with costa moderately arched, apex obtuse, termen slightly rounded, rather strongly oblique; 2 and 3 stalked; shining light bronzy-fuscous, suffused with brownish-ochreous towards base, somewhat sprinkled with dark fuscous; stigmata small, dark fuscous, rather nearly approximated, plical rather obliquely beyond first discal, a similar dot nearly midway between second discal and dorsum : cilia grey-whitish, base mixed with fuscous. Hindwings over 1, apex rounded, termen not sinuate; light grey, towards base whitish-tinged; cilia ochreous-grey-whitish.

Sydney, New South Wales, in December; one specimen.

151. *P. nephelota*, n.sp.

♂. 16 mm. Head and thorax bronzy-fuscous, face paler. Palpi dark fuscous mixed with ochreous-whitish, terminal joint as long as second. Antennæ fuscous. Abdomen light ochreous-fuscous, anal tuft whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa moderately arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; light fuscous irrorated with dark fuscous; stigmata moderate, dark fuscous, plical rather beyond first discal, a similar dot immediately beneath second discal; a row of obscure pale dots along posterior half of costa and termen : cilia whitish-fuscous, more whitish towards tips. Hindwings somewhat over 1, apex obtuse, termen not sinuate; grey; cilia as in forewings.

Mount Kosciusko (3000 feet), New South Wales; Gisborne, Victoria; in December and January, two specimens.

152. *P. anthracina*, n.sp.

♀. 11-13 mm. Head light bronzy-fuscous. Palpi dark fuscous, terminal joint as long as second. Antennæ fuscous. Thorax fuscous irrorated with dark fuscous. Abdomen light fuscous. Legs dark fuscous ringed with whitish. Forewings with costa gently arched, apex obtuse, termen very obliquely rounded; 2 and 3 stalked; fuscous suffusedly irrorated with dark fuscous, sometimes with a few whitish scales; plical and second discal stigmata obsoletely dark fuscous, each accompanied by a distinct white dot: cilia whitish-fuscous, mixed or sprinkled with dark fuscous. Hindwings over 1, apex round-pointed, termen not sinuate; grey, thinly scaled and semitransparent towards base, darker posteriorly; cilia whitish-fuscous, darker towards base.

Sydney, New South Wales, in March; two specimens.

153. *P. phloeodes*, n.sp.

♂♀. 19-21 mm. Head and thorax light fuscous mixed with dark fuscous. Palpi dark fuscous mixed with whitish, terminal joint as long as second. Antennæ fuscous. Abdomen ochreous-whitish irrorated with fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa gently arched, apex obtuse, termen very obliquely rounded; 2 and 3 stalked; white or whitish-fuscous mixed with white, irrorated with dark fuscous, and with all veins irregularly streaked with blackish-fuscous; second discal stigma dark fuscous surrounded with white: cilia white with dark fuscous rows of points or lines, base barred with dark fuscous. Hindwings over 1, apex obtuse, termen not sinuate; fuscous, darker posteriorly, especially in ♀, towards base thinly scaled and whitish; cilia whitish or whitish-fuscous, with fuscous subbasal shade.

Duaringa, Queensland, in October; two specimens (Barnard).

154. *P. thyridota*, n.sp.

♀. 9 mm. Head bronzy-fuscous, sometimes much mixed with bronzy-whitish. Palpi dark fuscous sprinkled with whitish, terminal joint as long as second. Antennæ fuscous. Thorax

dark fuscous irrorated with whitish. Abdomen fuscous. Legs dark fuscous irrorated and ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex obtuse, termen very obliquely rounded; 2 and 3 stalked; light brown, slightly purple-tinged, irrorated with black and sometimes with whitish; five obscure oblique series of undefined spots of blackish irroration, first (subbasal) and median most conspicuous: cilia whitish-fuscous, basal third irrorated with black. Hindwings over 1, apex obtuse, termen not sinuate; fuscous, darker posteriorly, with a well-marked naked transparent patch towards base; cilia light fuscous.

Glen Innes (4500 feet), New South Wales; York, West Australia; in November and December, two specimens.

155. *P. sarisias*, n.sp.

♂. 11 mm. Head white, palpi white, second joint fuscous-tinged below apex, terminal joint as long as second. Antennæ fuscous. Thorax white, with blackish-fuscous subdorsal lines, patagia bronzy-fuscous. Abdomen ochreous-whitish. Legs white. Forewings narrow, costa gently arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; pale bronzy-fuscous; costa narrowly white from base to beyond middle; a strong white longitudinal streak from base above middle to $\frac{4}{5}$ of costa, upper edge projecting to touch costal streak before and beyond middle, otherwise edged with blackish-fuscous, lower edge margined with blackish-fuscous suffusion on posterior half; a blackish-fuscous streak along fold from base almost to tornus; a moderate cloudy white subdorsal streak from dorsum near base to tornus; a white subterminal streak from above tornus to apex, connected with termen by two fine branches margined with blackish-fuscous dashes: cilia whitish-ochreous, round apex white, with a dark fuscous apical bar. Hindwings over 1, apex tolerably pointed, termen not sinuate; whitish-grey; cilia ochreous-whitish.

Brisbane, Queensland, in September; one specimen.

156. *P. englypta*, n.sp.

♂. 15 mm. Head fuscous, mixed with whitish on crown. Palpi whitish, sprinkled with fuscous, terminal joint shorter than second. Antennæ fuscous. Thorax fuscous sprinkled with whitish. (Abdomen broken.) Legs dark fuscous ringed with white. Forewings with costa moderately arched, apex round-pointed, termen very obliquely rounded; 2 and 3 stalked; pale greyish-ochreous, irrorated with dark brown and sprinkled with white; four dark fuscous spots on fold, first two traversed by a blackish plical line, second and third connected by a white mark, fourth tornal; two dark blotches in disc before and beyond middle, margined above with irregular white suffusion; an angulated series of undefined dark fuscous marks beneath posterior third of costa and along termen: cilia whitish-fuscous, basal half irregularly barred with white and dark fuscous. Hindwings over 1, apex round-pointed, termen not sinuate; whitish-fuscous, more whitish and thinly scaled anteriorly; cilia whitish-fuscous.

Gisborne, Victoria, in February; one specimen (Lyell).

157. *P. aversella*, Walk.

(*Gelechia aversella*, Walk., Tin. 649.)

♂♀. 12-16 mm. Head white or whitish, sometimes slightly fuscous-sprinkled. Palpi dark fuscous mixed with whitish, apex of second joint white, terminal joint somewhat shorter than second. Antennæ fuscous. Thorax whitish, more or less irrorated with fuscous, with blackish subdorsal lines. Abdomen whitish-ochreous. Legs white, banded with brownish or dark fuscous irroration. Forewings with costa gently arched, apex obtuse, termen very obliquely rounded; 2 and 3 stalked; fuscous, irregularly sprinkled with white and dark fuscous, costal half much more mixed with white; small blackish spots on base of costa and dorsum; two very oblique parallel series of ill-defined blackish marks from costa at $\frac{1}{4}$ and before middle to termen, and a third, more connected, along fold; sometimes some indistinct ochreous or reddish-ochreous marks placed amongst these, especi-

ally towards termen : cilia light fuscous, mixed with white round apex, and sprinkled with dark fuscous on basal half. Hindwings over 1, apex round-pointed, termen not sinuate; light grey, darker posteriorly; cilia whitish-fuscous.

Brisbane, Queensland; Glen Innes (3500 feet), Newcastle, and Sydney, New South Wales; Melbourne, Mount Macedon, and Gisborne, Victoria; Mount Lofty, Wirrabara, and Quorn, South Australia; Perth, West Australia; from August to February, common and widely distributed, amongst *Eucalyptus*. One of my specimens shows in one forewing the abnormality of veins 7 and 8 rising out of 6, the other forewing being quite normal.

158. *P. obeliscota*, n.sp.

♂♀. 17-18 mm. Head and thorax whitish with a pale fuscous central line, thorax with blackish-fuscous subdorsal lines, patagia fuscous. Palpi dark fuscous, apex of second joint whitish, terminal joint as long as second. Antennæ fuscous. Abdomen fuscous-whitish. Legs fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; light brown, more or less mixed or suffused with ferruginous; costal $\frac{2}{3}$ occupied by a broad white suffusion, costal edge fuscous-mixed; three oblique blackish marks on anterior half of costa, third connected by a series of short blackish dashes with apex; a blackish mark on base of dorsum; a thick blackish streak along fold from base, attenuated and becoming obsolete posteriorly ; a more or less undefined white streak or suffusion beneath this; a thick black longitudinal streak in disc limiting the white costal suffusion from before $\frac{1}{3}$ to apical series; some white scales or suffusion beneath this towards tornus; an interrupted blackish terminal line : cilia whitish-ferruginous, with two indistinct fuscous lines, and a fuscous bar above apex. Hindwings over 1, apex round-pointed, termen slightly sinuate; light grey, darker posteriorly; cilia whitish-ochreous-grey.

Gisborne, Victoria, in December; four specimens (Lyell). This and the group of closely allied species which follow all frequent the trunks of various species of *Eucalyptus*.

159. *P. sisyraea*, n.sp.

♂. 14 mm. Head and thorax ochreous-whitish, shoulders sprinkled with fuscous. Palpi whitish, second joint irrorated with blackish anteriorly and beneath apex, terminal joint irrorated with blackish, as long as second. Antennæ whitish spotted with dark fuscous. (Abdomen broken.) Legs ochreous-whitish, anterior and middle tibiæ and tarsi banded with dark fuscous. Forewings with costa gently arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; ochreous-whitish, irregularly sprinkled with fuscous and light ferruginous; five elongate marks of dark fuscous irroration on costa, and one on base of dorsum; stigmata blackish, plical very obliquely beyond first discal, preceded and followed by some blackish scales on fold, second discal followed by a short blackish dash, connected with an upright blackish mark from tornus, a line of blackish marks from costa beyond middle to apex; a moderately broad light ferruginous patch along termen: cilia ochreous-whitish, base and a median line mixed with dark fuscous. Hindwings over 1, apex round-pointed, termen slightly sinuate; fuscous-whitish, becoming more fuscous posteriorly; basal $\frac{2}{5}$, except a narrow median hyaline patch, clothed with modified blackish-grey scales, with acute projections on veins reaching to middle; cilia grey-whitish, with grey subbasal shade.

Gisborne, Victoria; one specimen (Lyell). Characterised by the peculiar hindwings, which, however, may probably not be reproduced in the other sex.

160. *P. chenias*, n.sp.

♂♀. 16 mm. Head whitish-ochreous. Palpi whitish-ochreous, second joint mixed with dark fuscous anteriorly and beneath apex, terminal joint dark fuscous, as long as second. Antennæ fuscous. Thorax whitish-ochreous irrorated with dark fuscous. Abdomen whitish-ochreous. Legs dark fuscous ringed with ochreous-whitish. Forewings with costa gently arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; fuscous, sprinkled with whitish and sometimes with dark fuscous,

towards costa posteriorly much suffused with white; a small dark fuscous spot on base of costa; a white mark from base in middle; narrow very oblique dark fuscous marks from costa at $\frac{1}{5}$, and before and beyond middle, with patches of ferruginous suffusion beneath them; a streak of ferruginous suffusion, including some black scales, in disc from $\frac{1}{4}$ to $\frac{3}{4}$, and another on fold; a series of blackish marks beneath posterior third of costa and along termen, preceded by a rather broad ferruginous suffusion: cilia whitish-ochreous, with an indistinct grey median shade, base sprinkled with blackish. Hindwings over 1, apex round-pointed, termen hardly sinuate; pale grey, darker posteriorly; cilia whitish-ochreous.

Glen Innes (4500 feet), New South Wales, in December; two specimens.

161. *P. mechanistis*, n.sp.

♀. 15-16 mm. Head whitish-ochreous, tinged with fuscous. Palpi whitish-ochreous, second joint irrorated with dark fuscous except at apex, terminal joint dark fuscous, as long as second. Antennæ whitish-ochreous obscurely ringed with fuscous. Thorax whitish-ochreous irrorated with fuscous. Abdomen whitish-fuscous. Legs dark fuscous ringed with ochreous-whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa gently arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; pale brownish-ochreous, faintly pinkish-tinged, irrorated with fuscous and dark fuscous; oblique cloudy dark fuscous marks on costa at base, $\frac{1}{5}$, and middle; a row of elongate dark fuscous marks along fold, and two spots in disc representing stigmata; a series of undefined cloudy dark fuscous spots beneath costa posteriorly and along termen: cilia pale whitish-ochreous, fuscous-tinged, a median line and base sprinkled with dark fuscous. Hindwings over 1, apex round-pointed, termen slightly sinuate; pale grey, becoming darker posteriorly; cilia whitish-grey-ochreous.

Evandale and Hobart, Tasmania, in December and January; two specimens.

162. *P. xuthias*, n.sp.

♀. 15 mm. Head whitish-ochreous, slightly reddish-tinged. Palpi whitish-ochreous, second joint much mixed with blackish, terminal joint blackish except towards base above, as long as second. Antennæ fuscous, obscurely pale-ringed. Thorax reddish-ochreous irrorated with whitish. Abdomen whitish-ochreous mixed with fuscous. Legs dark fuscous, anterior and middle pair ringed with reddish-ochreous, posterior pair with whitish. Forewings with costa gently arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; ferruginous, becoming fuscous towards anterior half of dorsum; a fuscous streak along fold, and a fuscous erect mark from tornus, reaching $\frac{2}{3}$ across wing; costal edge blackish, with oblique blackish wedge-shaped marks at base, $\frac{1}{3}$, and before and beyond middle; some black scales in a longitudinal row above middle; stigmata blackish, undefined, plical obliquely beyond first discal; an angulated series of black dots beneath posterior third of costa and along termen: cilia ferruginous-ochreous, sprinkled with fuscous and with a fuscous bar above apex, on termen with apical half whitish-fuscous. Hindwings over 1, apex round-pointed, termen slightly sinuate; grey; cilia pale grey.

Wirrabara, South Australia, in October; one specimen.

163. *P. orthanotis*, Low.

(*Gelechia orthanotos* (later corrected to *orthanotis*), Low., Proc. Linn. Soc. N.S. Wales, 1900, 50.)

♂. 18 mm. Head whitish-ochreous. Palpi ochreous-whitish, irrorated externally with dark fuscous except at apex of joints, terminal joint as long as second. Antennæ whitish-ochreous ringed with fuscous. Thorax whitish-ochreous, with blackish subdorsal stripes. Abdomen blackish, anal tuft whitish-ochreous. Legs pale ochreous, anterior and middle pair spotted with dark fuscous. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 stalked; whitish-ochreous,

partly mixed with pale ochreous, with some scattered fuscous and dark fuscous scales; indications of dark fuscous marks on costa at $\frac{1}{3}$ and $\frac{2}{3}$; a somewhat undefined black streak along fold from base to $\frac{2}{3}$, and another in disc from above apex of this to $\frac{3}{4}$; some blackish scales about apex: cilia whitish-ochreous, with incomplete traces of fuscous median line and apical bar. Hindwings over 1, apex tolerably pointed, termen not sinuate; dark fuscous, somewhat lighter towards tips, towards dorsum ochreous-tinged; a short transparent streak from middle of base; cilia whitish. Forewings beneath with dark fuscous patch covering cell and basal portion of dorsal area.

Gisborne and Stawell, Victoria, in September and November; one specimen (Lyell), and type also seen; the latter is a male, and not female as described.

164. *P. ceramica*, n.sp.

♀. 13-14 mm. Head whitish or ochreous-whitish, sides of crown reddish-ochreous. Palpi whitish-ochreous, second joint irrorated with dark fuscous anteriorly and beneath apex, terminal joint irrorated with dark fuscous, as long as second. Antennæ whitish-ochreous ringed with dark fuscous. Thorax reddish-ochreous mixed with whitish-ochreous. Abdomen whitish-ochreous. Legs whitish, anterior and middle tibiæ and tarsi suffused with reddish-ochreous and banded with dark fuscous irroration. Forewings with costa gently arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; pale rosy-ochreous irrorated with ferruginous; veins partially obscurely indicated with fuscous and whitish irroration; markings undefined, formed of brown-reddish suffusion more or less irrorated or marked with black (in one specimen very little); three small oblique semioval spots on anterior half of costa; a series of short marks along fold; two longitudinal marks in disc representing stigmata; a series of spots beneath posterior half of costa and along termen: cilia whitish-ochreous tinged with reddish, basal half sprinkled with dark fuscous points. Hindwings over 1,

apex round-pointed, termen hardly sinuate; pale grey, becoming darker posteriorly; cilia whitish-ochreous.

Sydney and Newcastle, New South Wales, in September and October; four specimens.

165. *P. hormodes*, n.sp.

♀. 13-14 mm. Head whitish-ochreous. Palpi whitish-ochreous, second joint irrorated with dark fuscous anteriorly and on a subapical ring, terminal joint irrorated with dark fuscous, as long as second. Antennæ whitish-ochreous ringed with dark fuscous. Thorax whitish-ochreous sprinkled with fuscous. Abdomen light fuscous, apex ochreous-whitish. Legs ochreous-whitish, anterior and middle tibiæ and tarsi banded with dark fuscous. Forewings with costa gently arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; white irregularly sprinkled with ferruginous and fuscous; markings blackish, more or less accompanied with ferruginous suffusion, especially on posterior half of wing; three oblique semioval spots on anterior half of costa; a small spot on dorsum near base; three elongate marks along fold, and two in disc representing stigmata; a series of spots beneath posterior portion of costa and along termen: cilia whitish-ochreous, base and a median line sprinkled with dark fuscous points. Hindwings over 1, apex round-pointed, termen hardly sinuate; pale grey, darker posteriorly; cilia whitish-ochreous.

Sydney, New South Wales, in September; three specimens. Closely related to *P. ceramica*, but quite distinct by the white groundcolour, blacker and more developed markings, sides of crown not reddish-ochreous, legs not suffused with reddish-ochreous.

166. *P. plinthactis*, n.sp.

♀♂. 10 mm. Head silvery-white sprinkled with fuscous. Palpi white, second joint dark fuscous anteriorly and on a subapical band, terminal joint dark fuscous, as long as second. Antennæ whitish ringed with fuscous. Thorax white sprinkled with fuscous, with a fuscous spot on shoulder. Abdomen silvery-whitish.

Legs white, anterior and middle pair banded with dark fuscous. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 stalked; white, sprinkled with pale ochreous and dark fuscous; markings pale ochreous mixed or tinged with ferruginous and irrorated with blackish; a small spot at base of costa, and another at $\frac{1}{5}$; a larger and more blackish oblique semioval spot on costa before middle; a mark on base of dorsum; a small spot on fold at $\frac{1}{3}$; an irregular patch above tornus; a row of undefined spots beneath posterior third of costa and along termen: cilia whitish-ochreous, towards base sprinkled with blackish points. Hindwings slightly over 1, apex pointed, termen sinuate; pale grey; cilia ochreous-whitish, in ♂ more ochreous-yellowish round apex.

Sydney, New South Wales, in October; two specimens.

167. *P. decaspila*, Low.

(*Gelechia decaspila*, Low., Proc. Linn. Soc. N. S. Wales, 1899, 99.)

♂♀. 13-16 mm. Head whitish-ochreous. Palpi whitish-ochreous, sprinkled with dark fuscous, terminal joint as long as second. Antennæ in ♂ fuscous, in ♀ whitish-ochreous ringed with fuscous. Thorax whitish-ochreous, partially tinged with ferruginous. Abdomen in ♂ grey, in ♀ whitish-ochreous. Legs dark fuscous ringed with white, hairs of posterior tibiæ whitish. Forewings rather narrow, costa gently arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; whitish-ochreous, partially tinged with yellowish, and sprinkled with ferruginous and sometimes with dark fuscous; five oblique wedge-shaped dark fuscous marks on costa, last two confluent; a dark fuscous mark on base of dorsum; stigmata small or moderate, blackish, accompanied with ferruginous, plical obliquely beyond first discal, second discal produced posteriorly into a longitudinal blackish ferruginous-edged mark, tending to connect with a similar upright mark from tornus; a small ferruginous patch along tornus, including a terminal row of cloudy blackish dots: cilia whitish-ochreous, sometimes obscurely barred or lined with

fuscous, and with a dark grey entire bar above apex. Hindwings over 1, apex round-pointed, termen hardly sinuate; light grey; a whitish-ochreous subdorsal pencil of hairs; cilia whitish-grey.

Gisborne and Stawell, Victoria, from October to December; four specimens, and type seen.

168. *P. mesochra*, Low.

(*Gelechia mesochra*, Low., Trans. Roy. Soc. S. Austr. 1894, 107.)

♂♀. 11-16 mm. Head whitish-ochreous, sides of crown dark fuscous. Palpi whitish-ochreous, terminal joint more or less dark fuscous towards apex, as long as second. Antennæ dark fuscous. Thorax dark fuscous, patagia whitish-ochreous. Abdomen whitish-ochreous mixed with grey. Legs dark fuscous ringed with ochreous-whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa gently arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; whitish-ochreous, faintly yellowish-tinged; four or five fine oblique dark fuscous marks on costa, usually very small, sometimes connected or absorbed into a moderate streak extending from near base to $\frac{5}{6}$; a broad rather dark fuscous streak along dorsum and termen to apex, upper edge irregular, more or less marked with blackish, variably prominent at $\frac{1}{3}$, $\frac{2}{3}$, and near apex, and indented between these: cilia fuscous, towards base sprinkled with dark fuscous, on costa sharply whitish-yellowish. Hindwings somewhat over 1, apex round-pointed, termen slightly sinuate; grey, darker posteriorly; cilia grey.

Sydney and Bathurst, New South Wales; Melbourne and Gisborne, Victoria; Mount Lofty and Wirrabara, South Australia; from August to November, fourteen specimens; type seen. Larva very pale whitish-grey-green, with twelve longitudinal very irregular and partially interrupted dark reddish-purple lines on each segment, anteriorly somewhat confluent; 5 and 6 wholly velvety-black except a small transverse patch on posterior margin of 6; head brownish-ochreous: feeds between joined leaves of *Eucalyptus* sp., in June.

169. *P. stratifera*, n.sp.

♂♀. 11-13 mm. Head rather dark bronzy-fuscous, darker on sides. Antennæ dark fuscous. Palpi dark fuscous, sublateral lines of second joint and anterior edge of terminal yellow-whitish, terminal joint as long as second. Thorax dark fuscous, patagia whitish-yellowish. Abdomen whitish-fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 connate; whitish-ochreous, partially tinged with pale brassy-yellow; a moderate dark fuscous costal streak from near base to $\frac{5}{6}$, narrowed to extremities, lower edge with three blackish marks; a broad dark fuscous streak along dorsum and termen to apex, upper edge irregularly sinuate, forming four slight prominences, and partially blackish-marked: cilia light fuscous partially sprinkled with dark fuscous, above costa sharply whitish-yellowish. Hindwings over 1, apex round-pointed, termen slightly sinuate; rather light grey, darker posteriorly; cilia whitish-fuscous.

Brisbane and Toowoomba, Queensland; Sydney, New South Wales; Melbourne, Victoria; in September and April, five specimens.

170. *P. catarrhacta*, n.sp.

♀. 9 mm. Head shining ochreous-white. Palpi ochreous-whitish, terminal joint as long as second. Antennæ light fuscous. Thorax bronzy-fuscous, patagia whitish-ochreous. Abdomen whitish-ochreous. Legs ochreous-whitish, anterior and middle tibiæ and tarsi banded with dark fuscous. Forewings with costa gently arched, apex pointed, termen extremely obliquely rounded; 2 and 3 stalked; shining whitish-ochreous; five oblique dark fuscous marks or spots on costa, basal minute, others larger posteriorly, last two confluent; a broad dark fuscous dorsal streak from base to tornus, extremities pointed, upper edge projecting at $\frac{1}{4}$ and more strongly at $\frac{2}{3}$; a dark fuscous spot along termen beneath apex: cilia whitish-ochreous, sprinkled with dark fuscous

towards base and termen. Hindwings hardly over 1, apex pointed, termen hardly sinuate; whitish-grey; cilia pale whitish-ochreous.

Sydney, New South Wales, in November; one specimen.

171. *P. tabulata*, n.sp.

♂♀. 10-12 mm. Head whitish-ochreous. Palpi whitish-ochreous, second joint mixed with dark fuscous anteriorly, terminal joint dark fuscous, as long as second. Antennæ fuscous. Thorax fuscous, patagia and anterior corners of dorsal area whitish-ochreous, shoulders more ochreous. Abdomen blackish-fuscous, apex whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa moderately arched, apex obtuse, termen very obliquely rounded; 2 and 3 stalked; fuscous irrorated with dark fuscous; a broad pale yellow-ochreous costal streak from base to $\frac{4}{5}$, becoming ochreous-whitish on edges, enclosing five small oblique blackish costal marks, last two confluent, its lower edge indented in middle, partially edged with blackish-fuscous: cilia whitish-ochreous, with a faint fuscous median shade, base sprinkled with dark fuscous. Hindwings 1, apex round-pointed, termen hardly sinuate; in ♂ dark grey, with an irregular pale ochreous-yellowish patch occupying basal $\frac{2}{3}$; in ♀ grey-whitish, suffused with dark grey towards margins except basally; cilia ochreous-whitish. Forewings in ♂ beneath with an elongate-oval pale yellowish discal patch, broadly surrounded with dark purple-fuscous.

Sydney, New South Wales; Port Lincoln, South Australia; from August to December, four specimens.

172. *P. pelogramma*, n.sp.

♂♀. 16-19 mm. Head whitish-ochreous, partially fuscous-tinged. Palpi whitish-ochreous, irrorated with dark fuscous, terminal joint suffused with dark fuscous, as long as second. Antennæ dark fuscous. Thorax dark bronzy-fuscous, shoulders whitish-ochreous tinged with reddish. Abdomen in ♂ whitish-ochreous mixed with fuscous, in ♀ fuscous, apex whitish-ochreous. Legs dark fuscous ringed with white, hairs of posterior tibiæ

ochreous-whitish. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 stalked; whitish-fuscous densely irrorated with dark fuscous; a moderate irregular pale reddish-ochreous longitudinal streak above middle from base to near apex, irregularly streaked with white, upper edge ill-defined, with three anteriorly oblique wedge-shaped projections almost reaching costal edge on anterior half, lower edge well-defined, at first straight, then with two semioval indentations representing large discal stigmata, and an irregular indentation between them; an elongate whitish dot on fold about middle, and a short pale ochreous dash towards tornus: cilia whitish-ochreous, barred with fuscous above apex, on basal half mixed with dark fuscous. Hindwings over 1, apex round-pointed, termen faintly sinuate; grey, darker posteriorly, near base paler and thinly scaled; cilia pale whitish-ochreous, brownish-tinged.

Melbourne and Gisborne, Victoria; three specimens (Raynor, Lyell).

173. *P. amblopis*, n.sp.

♀. 12 mm. Head and thorax dark fuscous, mixed on sides with reddish-ochreous. Palpi dark fuscous, apex of second joint reddish-ochreous, internally whitish, terminal joint shorter than second. Antennæ dark fuscous. Abdomen fuscous, apex pale whitish-ochreous. Legs dark fuscous, irrorated and ringed with white. Forewings with costa moderately arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; whitish, densely irrorated with dark fuscous; indistinct blackish spots along costa, alternating with smaller pale reddish-ochreous spots, and edged beneath with irregular ferruginous spots; elongate blackish spots in disc before and beyond middle, separated by a pale reddish-ochreous spot; a blackish streak along fold, interrupted by a pale reddish-ochreous spot in middle; some undefined pale reddish-ochreous suffusion towards apex: cilia whitish-ochreous-grey, basal half irrorated with dark fuscous, barred on costa with pale reddish-ochreous, tips more whitish. Hindwings over 1, apex round-pointed, termen hardly sinuate;

fuscous, with an irregular transparent basal patch; cilia pale greyish-ochreous, tips whitish.

Geraldton, West Australia, in December; one specimen bred from an undescribed larva feeding on *Eucalyptus* sp., in November.

174. *P. aeolopis*, n.sp.

♀. 10 mm. Head and thorax whitish, sprinkled with fuscous. Palpi white, second joint irrorated with blackish anteriorly and on a subapical ring, terminal joint suffusedly irrorated with blackish, as long as second. Antennæ dark fuscous. Abdomen dark fuscous. Legs whitish, banded with dark fuscous irroration. Forewings with costa moderately arched, apex pointed, termen very obliquely rounded; 2 and 3 stalked; pale greyish-ochreous, irrorated with dark fuscous; five costal spots of blackish irroration from base to beyond $\frac{3}{4}$; three clear discal patches of whitish suffusion surrounded with pale ochreous at $\frac{1}{5}$, $\frac{2}{5}$, and $\frac{4}{5}$, first and second followed by blackish spots on fold, second and third connected in disc by an elongate blackish mark; a blackish dorsal mark towards base; an irregular streak of blackish suffusion along termen: cilia whitish-fuscous, basal half mixed with blackish and a few whitish scales. Hindwings over 1, apex round-pointed, termen faintly sinuate; dark fuscous, with an irregular transparent patch towards base; cilia whitish-fuscous.

Glen Innes (4500 feet), New South Wales, in December; one specimen.

175. *P. hylias*, n.sp.

♂. 9 mm. Head grey-whitish, sprinkled with dark grey. Palpi white, second joint blackish anteriorly and on a subapical ring, terminal joint blackish except above, shorter than second. Antennæ fuscous. Thorax grey-whitish, irrorated with dark fuscous. Abdomen grey. Legs dark fuscous, ringed with white. Forewings with costa moderately arched, apex pointed, termen extremely obliquely rounded; 2 and 3 stalked; whitish, irrorated with dark fuscous; five black costal spots from base to $\frac{3}{4}$; three elongate black spots arranged along fold, and three in a discal

series obliquely beyond these respectively; a blackish dorsal mark near base: cilia whitish-fuscous, basal half mixed with white and sprinkled with black. Hindwings 1, apex pointed, termen sinuate; grey, paler and thinly scaled towards base; cilia whitish-fuscous.

Mount Kosciusko (5000 feet), New South Wales, in January; one specimen.

176. *P. compsochroa*, n.sp.

♂. 12-13 mm. Head and thorax reddish-ochreous. Palpi reddish-ochreous, terminal joint shorter than second, with a blackish subapical ring. Antennæ fuscous, base reddish-ochreous. Abdomen whitish-ochreous. Legs dark fuscous, ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa moderately arched, apex round-pointed, termen very obliquely rounded; 2 and 3 connate; fuscous, sprinkled with dark fuscous and a few white scales; a broad reddish-ochreous streak along costa from base to $\frac{3}{4}$, lower edge irregular and partially margined with white scales; a streak of blackish irroration beneath this from $\frac{2}{3}$ to extremity, with a short whitish-edged projection upwards at $\frac{1}{2}$, and marked with a white dot representing second discal stigma; a streak of blackish irroration along fold, marked with two or three white dots; a series of white dots alternating with black scales along posterior half of costa; veins towards termen tending to be lined with dark fuscous, with numerous scattered white scales: cilia whitish, basal third with fuscous bars irrorated with blackish, with a fuscous line beyond middle, tips fuscous round apex. Hindwings over 1, apex obtuse, termen slightly sinuate; light grey; cilia grey-whitish, with grey subbasal shade.

Sydney, New South Wales; Port Lincoln, South Australia; from the end of September to November, four specimens (three of them bred from larvæ). Larva slender, whitish, tinged with greyish-ochreous, spots minute, dark grey; head umber-brown, on sides blackish; 2 with an umber-brown shield, anterior margin and sides whitish: mines a large irregular crumpled and swollen blotch in leaves of *Correa speciosa* (*Rutaceæ*), in July.

177. *P. odorifera*, n.sp.

♂♀. 14-17 mm. Head and thorax dark grey, shoulders with a small ferruginous spot. Palpi blackish, somewhat sprinkled with white, terminal joint as long as second. Antennæ dark fuscous. Abdomen whitish-ochreous, in ♀ infuscated and becoming blackish before ochreous-whitish apex. Legs dark fuscous, irrorated and ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa moderately arched, apex round-pointed, termen extremely obliquely rounded; 2 and 3 stalked; a thinly scaled subcostal groove beneath on anterior half; grey, irrorated with dark fuscous and a few whitish scales; a moderate pale ferruginous costal streak from base to $\frac{2}{3}$, enclosing dark fuscous oblique wedge-shaped costal spots at base and $\frac{1}{4}$, and terminated by a larger dark fuscous spot in middle; stigmata whitish, discal placed on a longitudinal black streak, plical obliquely before first discal, placed on a fine black plical streak usually marked with pale ferruginous dots at $\frac{1}{4}$ and near tornus; an irregularly triangular pale ferruginous spot above tornus, preceded by some whitish scales, and followed by a blackish apical suffusion; some undefined blackish spots beneath costa posteriorly, edged beneath with pale ferruginous: cilia whitish-fuscous, basal third irrorated with blackish and barred with white. Hindwings over 1, apex round-pointed, termen not sinuate; light grey, darker terminally, thinly scaled towards costa from base to $\frac{2}{3}$; cilia whitish-fuscous.

Sydney and Shoalhaven, New South Wales, from September to November, and in February; five specimens. Larva undescribed, feeding between joined leaves of *Eucalyptus* sp., in January.

178. *P. micropa*, n.sp.

♂♀. 16-19 mm. Head, antennæ, and thorax dark bronzy-fuscous, face paler. Palpi bronzy fuscous, terminal joint darker, as long as second. Abdomen fuscous, apex whitish-ochreous. Legs dark fuscous ringed with white, hairs of posterior tibiæ whitish. Forewings with costa moderately arched, apex round-

pointed, termen extremely obliquely rounded, 2 and 3 approximated at base; dark purplish-fuscous, sprinkled with grey-whitish; five white costal dots from middle to near apex; plical and second discal stigmata white, partially darker-edged; some minute white dots on termen: cilia fuscous, base and tips whitish, with a broad whitish-ochreous patch below apex, and a dark fuscous subbasal line. Hindwings over 1, apex round-pointed, termen hardly sinuate; grey, darker posteriorly, base thinly scaled; cilia fuscous, tips whitish.

Mount Macedon and Gisborne, Victoria; Mount Lofty, South Australia; in November, five specimens (Guest, Lyell).

179. *P. deltodes*, Low.

(*Gelechia deltodes*, Low., Trans. R. Soc. S. Austr., 1896, 169.)

♂♀. 15-19 mm. Head in ♂ ochreous-white, in ♀ ochreous-fuscous. Palpi in ♂ ochreous-white, in ♀ suffusedly irrorated with dark fuscous, terminal joint as long as second. Antennæ dark fuscous, in ♂ white towards base. Thorax in ♂ ochreous-white, in ♀ dark fuscous. Abdomen fuscous, apex whitish-ochreous. Legs dark fuscous ringed with white, hairs of posterior tibiæ ochreous-whitish. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 stalked; pale ashy-grey, densely irrorated with dark fuscous, with bronzy-purplish reflections; in ♂ a small ochreous-white basal spot, in ♀ a pale ochreous basal dot; ochreous-white dots on costa near base, and at $\frac{1}{4}$ of dorsum, more ochreous in ♀; stigmata blackish-fuscous, plical obliquely beyond first discal, both these followed by ochreous-whitish dots; an ochreous-whitish dot on middle of costa; an ochreous-yellow blotch from tornus reaching nearly across wing, anterior edge convex and margined with an ochreous-white streak separated by some metallic scales, posterior edge straight; an angulated series of ochreous-whitish dots beneath posterior portion of costa and along termen: cilia whitish-fuscous, basal half mixed with dark fuscous. Hindwings over 1, apex round-pointed, termen not sinuate; grey; cilia light grey, towards base ochreous-tinged.

Glen Innes (4500 feet), New South Wales; Gisborne, Victoria; in October and December, five specimens, including type. The remarkable contrast in colouring of the head and thorax in the different sexes is a quite exceptional character.

180. *P. diplanetis*, n.sp.

♂♀. 17-19 mm. Head, antennæ, and thorax dark slaty-fuscous. Palpi dark fuscous sprinkled with whitish, extreme apex of second and terminal joints white, terminal joint as long as second. Abdomen fuscous. Legs dark fuscous ringed with white, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 stalked; dark slaty-fuscous, with more or less distinct blackish streaks along fold and in disc posteriorly; stigmata minute, white, plical obliquely beyond first discal; a rounded yellow-ochreous spot between second discal and tornus, edged anteriorly with ochreous-whitish; a white dot on middle of costa, and a series beneath costa posteriorly: cilia slaty-fuscous, basal half irrorated with dark fuscous. Hindwings over 1, apex round-pointed, termen not sinuate; fuscous, darker posteriorly, more thinly scaled towards base; cilia pale fuscous.

Blackheath (3500 feet), New South Wales; Warragul and Gisborne, Victoria; in October and November; on trunks of *Eucalyptus*, four specimens.

181. *P. cephalota*, n.sp.

♂. 18 mm. Head ochreous-white. Palpi dark fuscous sprinkled with white, terminal joint ochreous-white, as long as second. Antennæ dark fuscous. Thorax dark purplish-fuscous. Abdomen fuscous. Legs dark fuscous ringed with ochreous-white. Forewings with costa gently arched, apex round-pointed, termen very obliquely rounded; 2 and 3 stalked; fuscous irrorated with dark fuscous; stigmata obscure, elongate, dark fuscous, each followed by a whitish-ochreous dot, plical obliquely beyond first discal; a whitish-ochreous dot on dorsum at $\frac{1}{4}$, and one on middle of costa; a small undefined spot of whitish-ochreous suffusion above tornus,

preceded by dark fuscous suffusion, and a fainter spot above this; some indistinct whitish-ochreous dots beneath costa posteriorly and along termen: cilia whitish-fuscous, basal third irrorated with dark fuscous and barred with whitish-ochreous. Hindwings over 1, apex obtuse, termen not sinuate; grey, paler and thinly scaled towards base; subdorsal hairs unusually long; cilia light grey.

Albany, West Australia, in September, on trunks of *Eucalyptus;* two specimens.

182. *P. scytina*, n.sp.

♂. 14-16 mm. Head and thorax ochreous. Palpi ochreous, sometimes sprinkled with dark fuscous, terminal joint shorter than second. Antennæ ochreous or fuscous. Abdomen grey, anal tuft whitish-ochreous. Legs whitish-ochreous, anterior and middle pairs banded with fuscous irroration. Forewings with costa gently arched, apex round-pointed, termen straight or slightly sinuate, oblique; 2 and 3 stalked; ochreous, slightly reddish-tinged; discal stigmata small, blackish; some blackish scales on termen: cilia whitish-ochreous, with two fuscous lines on termen and a fuscous apical bar. Hindwings over 1, apex obtuse, termen slightly sinuate; pale grey; cilia ochreous-grey-whitish.

Bathurst, New South Wales; Port Lincoln, South Australia; in November, four specimens.

183. *P. ananeura*, n.sp.

♀. 11 mm. Head light ochreous, centre of crown whitish-ochreous. Palpi whitish-ochreous, second joint sprinkled with black, terminal joint as long as second. Antennæ pale ochreous. Thorax light ochreous sprinkled with black. Abdomen whitish-ochreous. Legs whitish-ochreous, anterior and middle pairs banded with dark fuscous irroration. Forewings with costa gently arched, apex round-pointed, termen sinuate, oblique; 2 and 3 stalked; light ochreous, sprinkled on veins with fuscous and blackish; a small distinct black dot beneath costa near base;

stigmata small, blackish, plical very obliquely beyond first discal, an additional dot between and above first and second discal, and another beneath second discal; three triangular blackish marks on upper part of termen, middle one largest: cilia whitish-ochreous, with three obscure fuscous lines, and a fuscous apical bar. Hindwings slightly over 1, apex round-pointed, termen sinuate; light grey; cilia ochreous-grey-whitish.

Sydney, New South Wales, in October; one specimen.

184. *P. haemaspila*, Low.

(*Gelechia haemaspila*, Low., Trans. Roy. Soc. S. Austr. 1894, 107, ib. 1896, 169; *G. nana*, ib. 1894, 107.)

♂♀. 15-16 mm. Head and thorax whitish-ochreous, more or less reddish-tinged. Palpi whitish, subapical ring of second joint and two bands of terminal joint dark fuscous, terminal joint as long as second. Antennæ fuscous. Abdomen whitish-fuscous, anal tuft whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; pale ochreous, variably tinged with reddish, whitish, or brownish, veins often marked with streaks of dark fuscous irroration; about six more or less indistinct small dark fuscous spots on costa; a reddish-ochreous dot on dorsum at $\frac{1}{4}$, and another (sometimes blackish) in disc above it; a transverse reddish-ochreous or ferruginous blotch in disc at $\frac{2}{3}$, sometimes edged with dark fuscous and whitish, sometimes very indistinct; second discal stigma blackish, usually with a similar dot beneath it; sometimes a black streak along fold from near base to middle, and another in disc from $\frac{2}{3}$ to termen beneath apex: cilia pale ochreous, more or less reddish-tinged, basal half indistinctly barred with fuscous or dark fuscous irroration, with a fuscous posterior line. Hindwings over 1, apex obtuse, termen not sinuate; grey; cilia ochreous-grey-whitish.

Broken Hill, New South Wales; Adelaide, South Australia; from August to October, and in March; nine specimens received from Mr. Lower.

185. *P. tridecta*, Low.

(*Gelechia tridecta*, Low., Proc. Linn. Soc. N. S. Wales, 1900, 48.)

♂. 18 mm. Head and thorax fuscous-whitish, shoulders with dark fuscous dot. Palpi whitish, subapical ring of second joint and two rings of terminal joint dark fuscous, terminal joint as long as second. Antennæ fuscous. Abdomen whitish-fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; fuscous-whitish, irregularly sprinkled with fuscous; a fuscous basal patch, edge curved, dark fuscous, running from costa near base to dorsum at $\frac{1}{4}$; five small dark fuscous spots on costa; two triangular brown spots in disc at $\frac{1}{3}$ and $\frac{2}{3}$, representing stigmata, blackish-edged except beneath, anterior rather larger; an undefined fuscous suffusion towards apex and upper part of termen: cilia fuscous-whitish, with two indistinct fuscous lines. Hindwings over 1, apex obtuse, termen not sinuate; grey; cilia ochreous-whitish, with indistinct grey basal line.

Adelaide, South Australia, in August; one specimen (Lower).

186. *P. xanthocephala*, n.sp.

♂♀. 15-18 mm. Head pale ochreous-orange, face whitish-ochreous or whitish. Palpi white, base and apical half of second joint dark fuscous, terminal joint as long as second, sometimes sprinkled with dark fuscous. Antennæ dark fuscous. Thorax white, anterior margin and a posterior spot dark fuscous. Abdomen ochreous-whitish, anal tuft more yellowish. Legs dark fuscous ringed with white, hairs of posterior tibiæ whitish-ochreous. Forewings moderate, costa moderately arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; white; four dark fuscous transverse fasciæ, first narrow, straight, basal, second narrow, interrupted beneath costa, much dilated on dorsum, third moderate, narrowed and sinuate on upper half, fourth irregular, terminal, not reaching tornus, including some white terminal marks; dark fuscous costal dots between each

pair of fasciæ; a transverse dark fuscous discal mark preceding and almost confluent with third fascia: cilia ochreous-white, basal third barred with dark fuscous. Hindwings 1, apex obtuse, termen not sinuate; grey, darker posteriorly, paler towards base; cilia pale whitish-ochreous, with a grey shade.

Brisbane, Queensland; Sydney and Blackheath (3500 feet), New South Wales; from January to March, twelve specimens; it is a common species round Sydney.

187. *P. trichalina*, n.sp.

♂♀. 17-18 mm. Head pale ochreous-orange, face ochreous-whitish. Palpi white, base and apical half of second joint dark fuscous, terminal joint as long as second, irrorated with dark fuscous. Antennæ dark fuscous. Thorax white, with about four anterior and three posterior dark fuscous dots, sometimes partially obsolete. Abdomen pale whitish-ochreous. Legs dark fuscous ringed with white, hairs of posterior tibiæ whitish-ochreous. Forewings moderate, costa moderately arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; white, with a few scattered grey or dark fuscous scales; a narrow curved subbasal dark fuscous fascia, interrupted below middle; dark fuscous dots on costa at $\frac{1}{5}$ and before and beyond middle, and on dorsum at $\frac{1}{4}$; a dark fuscous transverse discal spot at $\frac{2}{5}$, and a smaller and narrower one at $\frac{2}{3}$, representing stigmata, anterior connected with an elongate fuscous suffusion along dorsum; a moderate somewhat sinuate dark fuscous fascia at $\frac{3}{4}$; an irregular dark fuscous apical blotch, enclosing some whitish terminal dots: cilia whitish, basal third barred with dark fuscous, with a grey posterior shade. Hindwings slightly over 1, apex obtuse, termen not sinuate; grey, paler basally; cilia whitish, with a grey basal shade.

Geraldton and Perth, West Australia, in November; three specimens.

188. *P. arganthes*, n.sp.

♂. 11 mm. Head shining ochreous-white. Palpi white, second joint with some dark fuscous scales towards base, terminal joint

with partially obsolete subapical dark ring, as long as second. Antennæ fuscous. Thorax dark fuscous. Abdomen ochreous-whitish, anal tuft more ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; ochreous-white, with a few fuscous scales; markings fuscous mixed with blackish; a narrow straight basal fascia; an oblique mark on costa at $\frac{1}{5}$; stigmata rather large, irregular, plical somewhat beyond first discal, confluent with a blotch on middle of dorsum, an additional dot between and above first and second discal, confluent with a blotch on costa before middle, and an additional dot beneath second discal, confluent with a broad irregular suffused subterminal fascia: (cilia imperfect). Hindwings slightly over 1, apex obtuse, termen hardly sinuate; grey; cilia light grey.

Duaringa, Queensland; one specimen, in indifferent condition, in Mr. Lower's collection.

189. *P. selenia*, n.sp.

♂♀. 12-14mm. Head and thorax whitish mixed with blackish, shoulders suffused with brown. Palpi fuscous much mixed with black, terminal joint shorter than second, white, apical half black except tip. Antennæ fuscous, obscurely ringed with dark and pale. Abdomen pale yellowish. Legs whitish, banded with dark fuscous irroration. Forewings moderate, costa moderately arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; whitish-ochreous, more or less wholly suffused with brown, and sprinkled irregularly with blackish; an ochreous-white patch on base of costa, reaching to $\frac{1}{5}$, enclosing a blackish basal mark; some raised subdorsal scales at $\frac{1}{3}$; about six costal spots of blackish irroration; an irregular blotch in disc at $\frac{2}{5}$, outlined with blackish suffusion except towards lower anterior angle, and posteriorly edged with white; a black dot above middle of disc; a black transverse sometimes interrupted mark in disc at $\frac{2}{3}$, edged with white; a series of terminal white dots, preceded by blackish suffusion: cilia whitish-ochreous, sometimes brownish-tinged,

sprinkled with fuscous and towards base more or less barred with blackish irroration. Hindwings slightly over 1, apex obtuse, termen not sinuate; pale ochreous-yellow, apex and termen rather broadly suffused with fuscous; cilia whitish-yellowish, with a fuscous shade.

Sydney, New South Wales, in October and November; four specimens.

190. *P. sodalella*, Walk.

(*Gelechia sodalella* (*sodalisella*) Walk., Tin. 646.)

♂ 12 mm. Head ochreous-white, crown sprinkled with blackish. Palpi white with a few black scales, base and a subapical ring of second joint, and base and a broad subapical band of terminal joint black, terminal joint shorter than second. Antennæ fuscous, obscurely pale-ringed. Thorax whitish, suffused with pale brownish and sprinkled with black, with a defined white posterior spot. Abdomen ochreous-whitish. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings moderate, costa moderately arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; whitish-fuscous, densely irrorated with dark fuscous; a slender ochreous-whitish costal streak from base to $\frac{2}{3}$, extended round base to $\frac{1}{6}$ of dorsum, marked with dark fuscous dots at base and $\frac{1}{5}$ of costa and near base of dorsum; several ochreous-white dots on costa in middle and posteriorly; some raised subdorsal scales at $\frac{1}{4}$; stigmata dark fuscous, partially edged with white and with some whitish suffusion between them, plical very obliquely beyond first discal, an additional dot between and above first and second discal, and another beneath second discal; a subterminal fascia of whitish-ochreous suffusion; some white terminal dots: cilia whitish-ochreous, with incomplete bars on basal half and a subapical line fuscous. Hindwings over 1, apex obtuse, termen not sinuate; whitish-ochreous, apical $\frac{2}{5}$ and termen suffused with fuscous, darker posteriorly; cilia whitish-yellowish, with two fuscous shades.

Toowoomba, Queensland, in December; one specimen.

191. *P. gorgonias*, n.sp.

♂. 12 mm. Head and thorax whitish-ochreous sprinkled with brown and blackish, face whitish. Palpi whitish, second joint irrorated with dark fuscous, scales slightly expanded at apex beneath, terminal joint shorter than second, with blackish subapical band. Antennæ dark fuscous, pale-ringed. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings moderate, costa moderately arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; ochreous-whitish, tinged with brown, and irregularly sprinkled with dark fuscous; a dark fuscous dot on base of costa, and some blackish scales between this and dorsum; some raised subdorsal scales at $\frac{1}{4}$; five rather large costal spots of blackish irroration; an irregular dark blotch in disc at $\frac{1}{3}$, mostly edged with blackish, and margined posteriorly with white; a blackish white-edged dot above middle of disc, and two transversely placed at $\frac{2}{3}$; a blotch of dark fuscous suffusion in disc beyond these, confluent with last costal spot; an apical spot of dark suffusion; some whitish terminal dots: cilia whitish-ochreous, with indistinct bars on basal half of dark fuscous irroration, and a posterior line. Hindwings slightly over 1, apex obtuse, termen hardly sinuate; whitish-ochreous, terminal half suffused with fuscous, darker posteriorly; cilia whitish-ochreous, with a fuscous subbasal shade and round apex a subapical shade.

Rosewood, Queensland, in September; one fresh specimen.

192. *P. chiradia*, n.sp.

♂♀. 11-13 mm. Head and thorax white sprinkled with dark fuscous, shoulders dark fuscous. Palpi white, second joint and apical half of terminal (except tip) irrorated with dark fuscous, terminal joint as long as second. Antennæ white ringed with fuscous. Abdomen grey-whitish, anal tuft ochreous-whitish. Legs dark fuscous ringed with whitish. Forewings with costa moderately arched, apex obtuse, termen straight, oblique, rounded beneath; 2 and 3 stalked; fuscous-whitish, irregularly irrorated

with dark fuscous and sometimes partially ochreous-tinged; stigmata blackish, more or less accompanied with white suffusion, variable in development, sometimes large, plical obliquely beyond first discal, an additional dot between and above first and second discal, and another beneath second discal; an oblique spot of dark fuscous suffusion from base of costa, and usually blotches before and beyond middle; some undefined dark spots towards costa posteriorly and termen: cilia ochreous-whitish, irregularly sprinkled with dark fuscous. Hindwings somewhat over 1, apex obtuse, termen hardly sinuate; yellow-grey-whitish, suffused with light grey towards apex; cilia ochreous-whitish.

Rosewood, Queensland, in September; six specimens, all in poor condition.

193. *P. thyrsoptera*, n.sp.

♂. 14 mm. Head whitish-ochreous, crown sprinkled centrally with fuscous. Palpi whitish-ochreous, sprinkled with dark fuscous, second joint with dark fuscous subapical ring, terminal joint shorter than second, with two bands of blackish irroration. Antennæ fuscous, base whitish-ochreous. Thorax pale ochreous, dorsally sprinkled with fuscous. Abdomen whitish-ochreous. Legs dark fuscous, ringed with ochreous-whitish, posterior pair suffused with ochreous-whitish. Forewings moderate, costa moderately arched, apex obtuse, termen oblique, straight, rounded beneath; 2 and 3 stalked; pale fuscous, irregularly mixed with darker; a pale basal patch, its edge running from $\frac{2}{5}$ of costa to dorsum near base, enclosing small dark fuscous costal spots at base and $\frac{1}{5}$; beyond this a transverse dark fuscous spot from costa, terminating beneath in two divergent slender partially white-edged arms, terminated and connected on fold by a blackish streak produced anteriorly to basal patch; a short black elongate mark in disc above middle; a rather ill-defined black longitudinal streak from middle of disc to termen beneath apex, with an interrupted branch to costa above apex; a cloudy white dot resting on this representing second discal stigma; a series of small dark fuscous spots separated by whitish dots on posterior half of costa; an

interrupted whitish dark-edged terminal line: cilia pale ochreous, on costa barred with dark fuscous. Hindwings somewhat over 1, apex obtuse, termen not sinuate; grey, darker towards apex; cilia ochreous-grey-whitish, with a grey shade.

Rosewood, Queensland, in September; one specimen.

194. *P. phasianis*, n.sp.

♂. 14-17 mm. Head reddish-ochreous. Palpi whitish-ochreous sprinkled with dark fuscous, terminal joint almost as long as second. Antennæ fuscous. Thorax fuscous, patagia reddish-ochreous. Abdomen light grey, anal tuft whitish-ochreous. Legs dark fuscous, irrorated and slenderly ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings moderate, costa moderately arched, apex obtuse, termen oblique, straight, rounded beneath; 2 and 3 stalked; light fuscous, partially tinged with reddish-ochreous, mixed with dark fuscous, and sprinkled with blackish; a moderate reddish-ochreous streak along costa from base to middle; a small dark fuscous costal spot at base, and another near it; stigmata dark fuscous, obscure, plical obliquely beyond first discal, edged posteriorly with a spot of reddish-ochreous suffusion, an additional dark fuscous dot between and above discal stigmata, and another below second discal; a series of dark fuscous spots along posterior half of costa, separated by reddish-ochreous interspaces; a terminal series of pale reddish-ochreous dots, preceded by obscure dark fuscous spots: cilia pale reddish-ochreous, with two fuscous lines, anterior interrupted and mixed with dark fuscous. Hindwings 1, apex obtuse, termen not sinuate; pale grey; cilia pale grey, with two grey shades.

Mount Kosciusko (4700 feet), New South Wales; Melbourne and Gisborne, Victoria; Launceston, Tasmania; in January, four specimens.

195. *P. eumela*, Low.

(*Cleodora eumela*, Low., Trans. Roy. Soc. S. Austr. 1897, 59.)

♂. 13-16 mm. Head and thorax fuscous, sprinkled with dark fuscous and whitish. Palpi fuscous sprinkled with whitish and

dark fuscous, scales of second joint unusually prominent beneath, almost tufted in middle, terminal joint whitish with upper half blackish except tip, as long as second. Antennæ fuscous, apex of basal joint whitish. Abdomen pale fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings moderate, costa gently arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; whitish-fuscous, irregularly sprinkled with fuscous and dark fuscous; about six small blackish spots on costa, and one on dorsum at $\frac{1}{4}$; an irregular fuscous blackish-edged blotch in disc at $\frac{1}{3}$; a blackish dot above middle of disc; a transverse blackish mark in disc at $\frac{2}{3}$; a series of indistinct dark spots before termen: cilia fuscous with rows of whitish points, basal third barred with blackish irroration. Hindwings slightly over 1, apex obtuse, termen not sinuate; grey; cilia whitish-grey, with grey basal line.

Gisborne, Victoria; Launceston, Tasmania; Mount Lofty, South Australia; from November to January, five specimens, including the type. The species is distinguished from all others by the peculiar prominent scales of the second joint of palpi, but this character is not such as to involve generic separation.

196. *P. loemias*, n.sp.

♂. 16-19 mm. Head and thorax bronzy-fuscous, sometimes slightly sprinkled with blackish. Palpi pale fuscous irrorated with dark fuscous, terminal joint shorter than second. Antennæ fuscous. Abdomen whitish-fuscous sprinkled with dark fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings moderate, costa moderately arched, apex obtuse, termen straight, rather oblique, rounded beneath; 2 and 3 stalked; light fuscous, sprinkled with dark fuscous and blackish between the veins, which appear as light streaks; small indistinct dark fuscous spots on costa at base and $\frac{1}{6}$ and along posterior half; an irregular transverse dark fuscous blotch in disc at $\frac{1}{3}$, a dot above middle of disc, and two transversely placed at $\frac{2}{3}$; a terminal series of small indistinct dark fuscous spots between veins: cilia whitish-fuscous mixed with dark fuscous. Hind-

wings over 1, apex obtuse, termen not sinuate; grey, darker posteriorly; cilia whitish-fuscous, with two fuscous shades.

Murrurundi, New South Wales; Gisborne, Victoria; in November, four specimens.

197. *P. megalommata*, n.sp.

♂. 16 mm. Head and thorax bronzy-fuscous. Palpi pale fuscous sprinkled with dark fuscous, terminal joint whitish, almost as long as second. Antennæ whitish-ochreous. Abdomen whitish-ochreous sprinkled with fuscous. Legs dark fuscous suffusedly ringed with whitish, posterior pair whitish. Forewings with costa rather strongly arched, apex obtuse, termen rather obliquely rounded; 2 and 3 stalked; whitish, suffused with dark bronzy-fuscous irroration except on veins and costal edge; two transverse-oval dark fuscous blotches in disc at $\frac{1}{3}$ and $\frac{2}{3}$, outlined with whitish. Hindwings over 1, apex obtuse, termen slightly sinuate; grey; cilia grey-whitish, with a grey shade.

Rosewood, Queensland, in September; one specimen, in poor condition; the species is, however, very distinct by the two dark oval discal blotches and whitish-ochreous antennæ.

198. *P. banausodes*, n.sp.

♂♀. 15 mm. Head and thorax bronzy-fuscous. Palpi whitish-fuscous irrorated with dark fuscous, terminal joint whitish sprinkled with dark fuscous, as long as second. Antennæ fuscous, in ♂ rather stout. Abdomen whitish-ochreous, in ♀ mixed with fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings moderate, costa moderately arched, apex obtuse, termen rather obliquely rounded; 2 and 3 stalked; light fuscous, sprinkled with dark fuscous; stigmata cloudy, dark fuscous, plical beneath first discal, an additional dot beneath and sometimes subconfluent with second discal; a series of indistinct dark fuscous dots along posterior part of costa and termen: cilia whitish-ochreous mixed with fuscous (imperfect). Hindwings hardly over 1, apex obtuse, termen hardly sinuate; grey; cilia grey-whitish, with a grey shade.

Rosewood, Queensland, in September; two specimens.

199. *P. crotalodes*, n.sp.

♂. 14 mm. Head and thorax pale fuscous, slightly whitish-sprinkled. Palpi whitish irrorated with dark fuscous, terminal joint as long as second. Antennæ fuscous-whitish, ringed with fuscous. Abdomen light fuscous, anal tuft pale greyish-ochreous. Legs dark fuscous, mixed and ringed with fuscous-whitish. Forewings moderate, costa moderately arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; whitish-fuscous, sprinkled with dark fuscous; small dark fuscous costal spots at base and $\frac{1}{6}$; stigmata fuscous, plical obliquely beyond first discal, an additional dot between and above discal; a dark fuscous costal mark before $\frac{2}{3}$, and indistinct dark fuscous dots on posterior part of costa and termen: cilia fuscous-whitish, sprinkled with dark fuscous, forming indistinct bars towards base. Hindwings over 1, apex obtuse, termen faintly sinuate; light grey; cilia grey-whitish, with a grey shade.

Rosewood, Queensland, in September; one specimen.

200. *P. molyntis*, n.sp.

♀. 12-14 mm. Head and thorax shining bronzy-fuscous. Palpi dark fuscous sprinkled with ochreous-whitish, terminal joint as long as second. Antennæ and abdomen fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ fuscous-whitish. Forewings with costa gently arched, apex obtuse, termen rounded, rather strongly oblique; 2 and 3 stalked; fuscous sprinkled with dark fuscous; stigmata dark fuscous, plical obliquely beyond first discal, an additional dot beneath second discal; an angulated series of dark fuscous dots beneath posterior part of costa and before termen: cilia whitish-fuscous, with a fuscous line, base indistinctly spotted with fuscous. Hindwings 1, apex round-pointed, termen gently sinuate; fuscous; cilia light fuscous.

Gisborne, Victoria; Mount Lofty, South Australia; in January, three specimens, in Mr. Lower's collection.

201. *P. aspetodes*, n.sp.

♀. 21 mm. Head, antennæ, and thorax dark brown-grey. Palpi dark fuscous, sprinkled with white, terminal joint white, sprinkled at base with dark fuscous, much shorter than second. Abdomen fuscous. Legs dark fuscous ringed with ochreous-whitish. Forewings with costa gently arched, apex obtuse, termen straight, rather oblique, rounded beneath; 2 and 3 approximated at base; dark brown-grey; stigmata dark fuscous, each followed by a minute pale dot, plical obliquely beyond first discal, second discal transverse; a series of pale dots along posterior part of costa and termen: cilia whitish-fuscous mixed with fuscous. Hindwings considerably over 1, apex obtuse, termen faintly sinuate; fuscous; a terminal series of pale dots; cilia fuscous-whitish, with two fuscous shades.

Gisborne, Victoria, in February, one specimen (Lyell).

202. *P. subnexella*, Walk.

(*Gelechia subnexella*, Walk., Tin. 645; *G. bistellella*, ib. 1025; *G. monoleuca*, Low., Trans. Roy. Soc. S. Austr. 1897, 55.)

♀. 16-17 mm. Head, antennæ, and thorax fuscous irrorated with blackish. Palpi fuscous, sprinkled with blackish anteriorly, terminal joint as long as second. Abdomen whitish-ochreous mixed with fuscous. Legs dark fuscous ringed with whitish. Forewings with costa moderately arched, apex obtuse, termen obliquely rounded; 2 and 3 stalked; purplish-fuscous irregularly irrorated with dark fuscous or blackish; a streak of blackish suffusion along fold; a suffused black streak in disc from before middle to near termen, interrupted by rather large white second discal stigma: cilia whitish-fuscous mixed with dark fuscous (imperfect). Hindwings considerably over 1, apex obtuse, termen not sinuate; 8 anastomosing shortly with cell; fuscous, darker posteriorly, thinly scaled towards base; cilia fuscous-whitish, with two fuscous shades.

Sydney, New South Wales, in December and January; three specimens.

31. Arotria, n.g.

Antennæ $\frac{4}{5}$, in ♂ fasciculate-ciliated (3), basal joint moderate, with slight pecten. Labial palpi very long, ascending, second joint extremely long, beneath with appressed scales, above with long projecting scales diminishing gradually to apex, terminal joint less than half second, slender, acute. Forewings: 2 and 3 stalked, 7 and 8 stalked, 7 to costa. Hindwings 1, trapezoidal, termen sinuate, cilia 1; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 stalked.

This distinct genus is so much specialised that its immediate affinity is doubtful; but it is theoretically derivable as an extreme form from *Ephelictis*. Imago with forewings elongate.

203. *A. iophaea*, n.sp.

♂. 13 mm. Head, palpi, and thorax pale brownish-ochreous, strewn with fuscous and whitish points. Antennæ pale ochreous, ringed with fuscous. Abdomen pale yellowish-ochreous. Legs rather dark fuscous, posterior pair suffused with pale ochreous-yellowish. Forewings rather narrow, costa gently arched, apex round-pointed, termen faintly sinuate, almost straight, oblique; pale brownish-ochreous, irrorated with bronzy-fuscous, with purplish-metallic reflections; stigmata darker, plical hardly before first discal; some dark fuscous marks round apex and on termen: cilia brownish irrorated with whitish, base whitish-ochreous. Hindwings grey, towards base thinly scaled and tinged with whitish-ochreous; cilia whitish-ochreous, round apex fuscous-tinged.

Toowoomba, Queensland, in December; one specimen.

32. Ephelictis, n.g.

Antennæ $\frac{3}{4}$, in ♂ minutely ciliated, basal joint elongate, without pecten. Labial palpi very long, curved, ascending, second joint very long, thickened with rough scales above and beneath, terminal joint much shorter than second, slender, acute. Forewings: 2 and 3 approximated or connate or stalked, 7 and 8 stalked, 7

to costa. Hindwings over 1, trapezoidal-ovate, apex obtuse, termen hardly sinuate, cilia $\frac{1}{2}$-$\frac{3}{4}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 parallel.

Type *E. neochalca*. The genus has near collateral relationship to early forms of *Protolechia*. Imago with forewings elongate.

Apex of forewings acute, white costal streak reaching base... ... 204. *megalarthra*.
Apex of forewings obtuse, white costal streak not reaching base ... 205. *neochalca*.

204. *E. megalarthra*, n.sp.

♀. 12 mm. Head ochreous-whitish. Palpi dark fuscous, suffused with white towards base, terminal joint white except anterior edge. Antennæ whitish, faintly ochreous-ringed. Thorax pale shining greyish-bronze, collar white. Abdomen whitish. Legs dark fuscous, posterior pair white. Forewings with costa moderately arched, apex acute, termen very obliquely rounded; 2 and 3 stalked; pale shining grey, sprinkled with darker grey and a few blackish scales; a broad white costal streak from base to $\frac{3}{4}$, posteriorly suffused; stigmata small, blackish, plical obliquely beyond first discal, an additional dot between and above first and second discal; minute dots of blackish scales along posterior part of costa and termen: cilia grey-whitish. Hindwings and cilia whitish.

Geraldton, West Australia, in November; one specimen.

205. *E. neochalca*, n.sp.

♂♀. 17-19 mm. Head light shining greyish-bronze. Palpi rather dark fuscous, irrorated with white towards base, terminal joint white. Antennæ pale bronzy, with faint whitish rings. Thorax shining brassy-bronze. Abdomen whitish-grey. Legs dark grey, basal half of middle tibiæ white, posterior pair suffused with whitish. Forewings with costa moderately arched, apex obtuse, termen rounded, rather strongly oblique; 2 and 3 approximated or connate; shining brassy-bronze; a rather narrow suffused white costal streak from near base to $\frac{3}{4}$, extremities attenuated;

stigmata small, black, plical obliquely beyond first discal: cilia whitish-grey, sometimes mixed with darker, base pale bronzy. Hindwings grey; cilia whitish-grey.

Perth, West Australia, in November; two specimens.

33. Pancoenia, n.g.

Antennæ $\frac{3}{4}$, in ♂ rather stout, serrulate, simple, basal joint moderate, without pecten. Labial palpi long, curved, ascending, second joint with appressed scales, somewhat rough beneath, terminal joint as long as second, acute. Forewings: 2 and 3 stalked, 7 and 8 coincident, to costa. Hindwings 1, rounded-trapezoidal, termen sometimes sinuate, cilia $\frac{1}{2}$-1; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 parallel.

Type *P. periphora*. The genus is a modification of an early form of *Protolechia*, only differing essentially in the coincidence of veins 7 and 8. Imago with forewings elongate, costa moderately arched.

Apex of forewings pointed, plical stigma before first discal.. 206, *periphora*.
Apex of forewings obtuse, plical stigma beyond first discal.. 207. *pelota*.

206. *P. periphora*, n.sp.

♂. 9-10 mm. Head whitish-ochreous. Palpi ochreous-whitish, second joint sprinkled with dark fuscous except apex, terminal joint with dark fuscous supramedian band. Antennæ whitish-ochreous, ringed with fuscous. Thorax whitish-ochreous, irrorated with fuscous, shoulders mixed with dark fuscous. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with apex pointed, termen very obliquely rounded; pale greyish-ochreous, irregularly mixed with fuscous and dark fuscous, especially on margins; a dark fuscous dot below costa near base; stigmata rather large, dark fuscous, plical obliquely before first discal, second discal confluent with an upright mark of dark fuscous suffusion from tornus: cilia pale greyish-ochreous, somewhat sprinkled with fuscous. Hindwings with apex pointed, termen not sinuate; grey, paler towards base; cilia pale greyish-ochreous.

Sydney, New South Wales, in March; two specimens.

207. *P. pelota*, n.sp.

♂. 12 mm. Head and thorax ferruginous-ochreous mixed with fuscous, shoulders dark fuscous. Palpi ochreous-whitish irrorated with dark fuscous. Antennæ fuscous, pale-ringed. Abdomen whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with apex obtuse, termen rounded, rather strongly oblique; whitish-fuscous, irrorated with fuscous and dark fuscous; costal edge suffusedly dark fuscous on anterior half; stigmata dark fuscous, plical obliquely beyond first discal; a suffused dark fuscous mark from tornus towards second discal, not reaching it: a connected series of dark fuscous marks along posterior part of costa and termen: cilia whitish-fuscous, with an interrupted dark fuscous antemedian shade. Hindwings with termen distinctly sinuate; grey; cilia grey-whitish, round apex infuscated.

Sydney, New South Wales, in November; one specimen.

34. ANAPTILORA, n.g.

Antennæ $\frac{3}{4}$, in ♂ serrulate, simple, basal joint elongate, without pecten. Labial palpi long, recurved, second joint thickened with dense appressed scales, projecting towards apex above, terminal joint in ♂ rather shorter than second, thickened with dense scales, with long loosely expanded hair-scales above, in ♀ as long as second, with appressed scales. Forewings: 2 and 3 connate or stalked, 7 and 8 stalked, 7 to costa, 9 absent. Hindwings 1, oblong-trapezoidal, apex obtuse, termen slightly sinuate, cilia $\frac{2}{3}$; 3 and 4 connate, 5 tolerably parallel, 6 and 7 stalked.

Type *A. isocosma*. The genus has collateral relationship to the primitive forms of *Protolechia*. Imago with forewings elongate, apex obtuse, termen obliquely rounded.

Forewings white with brown fascia..... ... 208. *isocosma*.
Forewings pale brownish-ochreous..... ..... 209. *eremias*.

208. *A. isocosma*, n.sp.

♂♀. 13-14 mm. Head white. Palpi white, base brownish-ochreous. Antennæ whitish-ochreous. Thorax ochreous-brown,

with a suffused white anterior spot. Abdomen whitish-ochreous. Legs pale ochreous-yellowish. Forewings with costa gently arched; white; a moderate straight dark brown basal fascia; a broad slightly oblique straight ochreous-brown postmedian fascia; an ochreous-yellowish suffusion towards apex; some cloudy dark fuscous dots round apex and upper part of termen: cilia ochreous-yellowish, towards tips whitish-ochreous, base white, above apex with a patch of blackish suffusion. Hindwings dark grey; cilia whitish-ochreous, with a grey patch above apex.

Duaringa, Queensland; two specimens (Barnard). This species has an extraordinary superficial resemblance to *Eulechria ombrodes*, Low. (described by Mr. Lower as a *Gelechia*), which occurs in the same locality, as I received a specimen of it also from Mr. Barnard; in size, shape, and colouring they are identical in all particulars, except only that in *E. ombrodes* the thorax does not show the white anterior spot. The handsome and conspicuous markings are quite unlike those of any of their nearest allies in either case, and both species are apparently uncommon, so that the suggestion of mimicry is unsupported; it is an interesting case for investigation by local collectors. It may be useful to recall here the structural characters by which the Oecophorid genus *Eulechria* is abundantly distinguished from the present insect, viz.: antennæ in ♂ rather strongly ciliated ($1\frac{1}{2}$), basal joint with strong pecten; palpi in ♂ without the long expanded scales of terminal joint; forewings with 2 and 3 separate, 7 to apex; hindwings with 6 and 7 parallel. This is the closest resemblance between species which are in no way allied that I have as yet discovered in the Australian fauna. I may add that I have seen Mr. Lower's type of *ombrodes*, so there is no doubt of its identity, and his mention of the antennal ciliations and pecten are also conclusive; but his subsequent remarks on the neuration would seem to show that his second specimen was really an example of *isocosma*.

209. *A. eremias*, n.sp.

♂♀. 14-16 mm. Head and thorax pale brownish-ochreous. Palpi whitish-ochreous, sprinkled with dark fuscous. Antennæ,

abdomen, and legs whitish-ochreous, legs irrorated with dark fuscous. Forewings moderate, costa moderately arched; pale brownish-ochreous sprinkled with dark fuscous; stigmata cloudy, dark fuscous, plical beneath first discal; a row of cloudy dark fuscous spots along posterior part of costa and termen; sometimes some dark suffusion towards tornus and apex: cilia whitish-ochreous, somewhat mixed with fuscous. Hindwings grey; cilia pale whitish-ochreous, with a grey shade.

Duaringa, Queensland, in September and October; eight specimens (Barnard).

35. ORTHOPTILA, n.g.

Antennæ $\frac{3}{4}$, in ♂ shortly ciliated, basal joint moderate, without pecten. Labial palpi long, curved, ascending, second joint thickened with appressed scales, slightly rough beneath, terminal shorter than second, acute. Forewings with subdorsal tuft of raised scales before middle; 2 and 3 stalked, 7 and 8 stalked, 7 to costa. Hindwings over 1, trapezoidal-ovate, apex obtuse, termen not sinuate, cilia $\frac{2}{3}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 stalked.

Allied to early forms of *Protolechia*, some of which show raised scales corresponding to the subdorsal tuft of *Orthoptila*, though much less developed; but distinguished from them also by the stalking of 6 and 7 of hindwings. Imago with forewings elongate, apex obtuse, termen obliquely rounded.

210. *O. abruptella*, Walk.

(*Oecophora abruptella*, Walk., Tin. 1032; *Gelechia triforella*, Zell., Hor. Ross. 1877, 336, pl. iv., 108.)

♂♀. 12-15 mm. Head and thorax white, sides of face and collar dark fuscous. Palpi dark fuscous, terminal joint white with incomplete dark fuscous subapical ring. Antennæ white ringed with fuscous. Abdomen pale ochreous-yellowish. Legs dark fuscous mixed with whitish and partially suffused with yellowish, posterior pair pale ochreous-yellowish. Forewings moderate, costa gently arched; ochreous-brown, irrorated with dark fuscous or blackish; a moderate white basal patch, outer

edge rounded; two or three undefined white dots on fold; a broad white transverse blotch from middle of costa, reaching more than half across wing, sometimes much mixed with groundcolour; an irregular suffused white streak from disc beyond this to tornus, where it coalesces with an irregular white subterminal streak, sometimes interrupted: cilia pale ochreous-yellow, towards tips white, with two faint fuscous lines, above apex with a fuscous patch mixed with blackish. Hindwings pale ochreous-yellowish, terminal half fuscous, division irregular and suffused; cilia pale yellowish, with two dark grey shades becoming obsolete towards tornus.

Newcastle and Sydney, New South Wales; Melbourne, Victoria; Launceston, Tasmania; Mount Gambier, South Australia; from November to January and in March, twelve specimens; a common species.

36. Phloeographtis, n.g.

Antennæ $\frac{4}{5}$, in ♂ moderately ciliated (1), basal joint moderate, without pecten. Labial palpi long, recurved, second joint thickened with appressed scales, somewhat roughened towards apex beneath, terminal joint as long as second, acute. Forewings: 2 and 3 stalked, 8 and 9 out of 7, 7 to apex. Hindwings 1 or somewhat over 1, trapezoidal, termen not sinuate, cilia $\frac{2}{5}$; 3 and 4 connate, 5 slightly approximated to 4, 6 and 7 tolerably parallel.

Type *P. macrynta*. A distinct genus, correlated to *Protolechia*, but easily recognised by the neuration; all the species are coloured in adaptation to the trunks of stringy-bark *Eucalypti*, apparently an effective concealment, for they are seldom met with. Imago with forewings elongate, moderate, apex obtuse, termen rounded.

1. Second joint of palpi with defined dark basal area. 2,
   Second joint of palpi without such area.... ..... 213. *zopherota*.
2. Forewings narrowed anteriorly, without dark streaks except towards dorsum..... 211. *macrynta*.
   Forewings not narrowed anteriorly, with scattered dark streaks..... .... 212. *brachynta*.

211. *P. macrynta*, n.sp.

♂. 25 mm. Head, palpi, antennæ, thorax, and legs white sprinkled with dark fuscous; palpi with basal half of second joint dark fuscous; thorax with fine blackish subdorsal lines on anterior half; tarsi dark fuscous ringed with whitish. Abdomen whitish-ochreous. Forewings dilated posteriorly, costa gently arched, termen rather strongly oblique; fuscous, almost wholly suffused with white, and sprinkled with black; an undefined subdorsal streak of dark irroration from near base to middle, and a dorsal streak from $\frac{1}{4}$ to near tornus; stigmata indistinct, dark fuscous, plical obliquely beyond first discal: cilia whitish-fuscous, mixed with whitish and sprinkled with dark fuscous. Hindwings somewhat over 1, fuscous, thinly scaled towards base; cilia whitish-fuscous, with fuscous basal line.

Moe (Gippsland), Victoria; one specimen. The peculiarly shaped forewings are characteristic.

212. *P. brachynta*, n.sp.

♂. 21 mm. Head, palpi, antennæ, thorax, and legs whitish irrorated with dark fuscous; palpi with basal $\frac{2}{3}$ of second joint dark fuscous; (thorax partially defaced, probably dark-streaked;) tarsi dark fuscous ringed with whitish. (Abdomen broken.) Forewings with costa moderately arched, termen oblique; fuscous, suffused with white and sprinkled with dark fuscous; short scattered dashes of dark fuscous suffusion between veins; a streak of dark fuscous suffusion along dorsum; stigmata indistinct, dark fuscous, plical slightly beyond first discal; a terminal series of dark fuscous triangular spots: cilia whitish sprinkled with dark fuscous (imperfect). Hindwings somewhat over 1, fuscous, darker posteriorly; cilia fuscous.

Duaringa, Queensland; one specimen (Barnard).

213. *P. zopherota*, n.sp.

♀. 19 mm. Head, palpi, antennæ, thorax, and legs dark fuscous sprinkled with white. (Abdomen broken.) Forewings with costa moderately arched, termen oblique; fuscous, sprinkled with

whitish and dark fuscous; streaks of dark fuscous suffusion between veins; discal stigmata dark fuscous, connected by a dark fuscous streak: cilia fuscous, irrorated with whitish and dark fuscous (imperfect). Hindwings 1, dark fuscous; cilia fuscous.

Castlemaine, Victoria; one specimen in Mr. Lower's collection. Distinguished by the dark colouring, defined dark streaks, and absence of defined dark area on palpi.

37. Aulacomima, n.g.

Antennæ $\frac{4}{5}$, in ♂ — (?), basal joint moderate, without pecten. Labial palpi long, recurved, second joint with appressed scales, hardly roughened beneath, terminal joint shorter than second, acute. Forewings: 2 and 3 connate, 7 and 8 stalked, 7 to apex. Hindwings hardly over 1, trapezoidal, apex obtuse, termen hardly sinuate, cilia $\frac{3}{5}$; 3 and 4 connate, 5 rather approximated to 4, 6 and 7 stalked.

Probably nearly correlated to the preceding. Imago with forewings elongate, apex obtuse.

214. *A. trinervis*, n.sp.

♀. 13 mm. Head whitish, back of crown with a central blackish spot. Palpi whitish, second joint with a dark fuscous streak externally on apical half, terminal joint suffused with dark fuscous. Antennæ whitish, basal joint dark fuscous above. Thorax whitish, with dark fuscous subdorsal stripes, patagia fuscous-tinged. Abdomen and legs whitish. Forewings with costa gently arched, termen nearly straight, rather strongly oblique; pale fuscous, suffusedly mixed with dark fuscous, forming interneural streaks towards costa posteriorly; four fuscous-white moderate longitudinal streaks, first along costa from base to $\frac{2}{3}$, second median, from base to termen, third out of second before middle along fold to termen, fourth along dorsum from base to near tornus: cilia whitish, with faint traces of fuscous-tinged bars. Hindwings whitish-grey, paler towards base; cilia grey-whitish.

Sydney, New South Wales, in February; one specimen, taken at a lamp.

38. Barantola, Walk.

Antennæ over 1, in ♂ simple, basal joint with moderate pecten. Labial palpi very long, smooth, slender, recurved, terminal joint as long as second, acute. Forewings: 2 and 3 stalked, 7 and 8 stalked, 7 to termen, 9 and 10 stalked. Hindwings 1, trapezoidal, apex round-pointed, termen somewhat sinuate, cilia $\frac{2}{3}$; 3 and 4 connate, 6 and 7 approximated.

This is *Magostolis*, Meyr., which name is superseded. The genus is derivable from *Macrotona*, but stands at present very distinct. Imago with forewings elongate.

215. *B. pulcherrima*, Walk.

(*Barantola pulcherrima*, Walk., Tin. 816; *Magostolis uranaula*, Meyr., Proc. Linn. Soc. N.S. Wales, 1886, 1040.)

♂. 15 mm. Head yellow, face whitish. Thorax grey, collar red; patagia ochreous-whitish, apex red. Abdomen white. Forewings narrow, gradually dilated, apex tolerably acute, termen concave, rather oblique; rather dark grey; a red streak along basal third of costa, bordered beneath by an ochreous-white streak, of which the posterior extremity forms an oblong spot surrounded by a dark grey line; a broad yellow streak, margined beneath with red except on fascia, along middle third of costa; a narrow silvery-white fascia before middle, terminated above by yellow streak, margined anteriorly with red, posteriorly with dark grey and then more broadly with red; a narrow silvery-white fascia, margined with red all round, from beneath at $\frac{2}{3}$ along costa to apex, thence along termen to tornus. Hindwings white.

Brisbane, Queensland. Dr. Turner, who is acquainted with the species and has compared Walker's type, regards my insect and Walker's as identical; I do not possess a specimen, and have extracted the above from my original description.

39. Crocanthes, Meyr.

Antennæ over 1, in ♂ simple, basal joint moderate, without pecten. Labial palpi long, recurved, second joint thickened with

more or less rough scales beneath, terminal joint longer than second, acute, or in ♂ sometimes much shorter, aborted or almost obsolete, rough-scaled, not acute. Forewings: 2 absent, 3 and 4 stalked, 5 sometimes out of 3 near base, 7 and 8 stalked, 7 to costa, 9 absent, 10 sometimes out of 7 near base. Hindwings 1, trapezoidal, apex round-pointed, termen very oblique, slightly sinuate, cilia 1; 3 and 4 stalked, 5 absent, 6 and 7 stalked.

Type *C. prasinopis.* In my original description the peculiarly aborted terminal joint of palpi in ♂ of some species is not noticed; I do not see any reason for separating generically the species with this structure from the others, to which they are in all respects closely related; the genus as a whole is very distinct, and may be regarded as a development of *Sarisophora.* The species are brightly coloured, but not always easy to understand; they are probably numerous in Queensland. The antennæ in some at least of the species are porrected in repose. Imago with forewings elongate, costa gently arched, apex round-pointed, termen more or less sinuate.

1. Forewings towards base wholly dark fuscous ..... 2.
   Forewings towards base partly yellowish ..... 3.
2. Forewings with yellow median fascia ..... 225. *zonias.*
   Forewings without such fascia ..... 216. *diula.*
3. Forewings with dark posterior patch or fasciæ ..... 4.
   Forewings with a dark postmedian line only ..... 8.
4. Hindwings suffused with whitish-yellowish ..... 219. *prasinopis.*
   Hindwings grey or dark fuscous ..... 5.
5. Forewings with dark costal streak from base to near middle ..... 6.
   Forewings without such streak ..... 224. *micradelpha.*
6. Thorax with three dark fuscous stripes ..... 218. *halurga.*
   Thorax without dark fuscous stripes ..... 7.
7. Abdomen dorsally grey ..... 220. *glycina.*
   Abdomen dorsally yellowish ..... 217. *zonodesma.*
8. Hindwings rather dark grey ..... 221. *acroxantha.*
   Hindwings more or less yellowish ..... 9.
9. Postmedian line of forewings faint, incomplete ..... 222. *epitherma.*
   Postmedian line of forewings well-defined, complete ... 223. *perigrapta.*

216. *C. diula*, n.sp.

♂♀. 11-13 mm. Head fuscous, face whitish-ochreous. Palpi whitish-ochreous, second joint somewhat infuscated except at apex, terminal joint in ♂ very short, aborted, in ♀ normal. Antennæ fuscous. Thorax fuscous, with narrow subdorsal ochreous-whitish stripes. Abdomen fuscous. Legs whitish-ochreous, apex of posterior tibiæ fuscous. Forewings with apex produced, termen concave, rather strongly oblique; bronzy-fuscous, irrorated with dark fuscous; an oblique whitish-ochreous mark on costa before middle; a narrow wedge-shaped whitish-ochreous mark along costa beyond $\frac{3}{4}$: cilia dark fuscous, ochreous-white on apical half opposite termen, and on costal spots. Hindwings dark bronzy-fuscous; cilia bronzy-fuscous.

Duaringa, Queensland, in August and April; two specimens (Barnard).

217. *C. zonodesma*, Low.

(*Crocanthes zonodesma*, Low., Proc. Linn. Soc. N. S. Wales, 1900, 50.)

♀. 14-17 mm. Head whitish-yellowish, centre of crown suffused with ochreous-yellow. Palpi ochreous-whitish, second joint yellowish-tinged. Antennæ whitish-ochreous. Thorax yellow-ochreous, with yellow-whitish subdorsal stripes. Abdomen ochreous-yellowish. Legs whitish-ochreous, apex of posterior tibiæ fuscous. Forewings with termen sinuate, oblique; orange-yellow; markings purple-brown; a broad costal streak from base to $\frac{2}{3}$; some scattered scales and dorsal suffusion beneath it; a patch occupying terminal half of wing, anterior edge slightly curved, irregular, from middle of costa to beyond middle of dorsum, enclosing an orange-yellow oval blotch in middle, a dot on dorsum before tornus, and an elongate suffused mark along costa towards apex: cilia pale yellowish, basal third dark fuscous, on tornus and above apex fuscous, on costal spot orange-yellow. Hindwings dark bronzy; cilia bronzy.

Duaringa, Queensland (Lower quotes Rockhampton, but his type is labelled Duaringa,) in January, February, and May; two specimens (Barnard), and type also seen.

218. *C. halurga*, n.sp.

♂♀. 11 mm. Head yellowish, centre of crown pale bronzy-metallic, posteriorly fuscous. Palpi ochreous-whitish, second joint yellowish-tinged, terminal joint in ♂ almost obsolete (?), in ♀ normal, extreme apex dark fuscous. Antennæ whitish-ochreous. Thorax ochreous-yellow, with dorsal and lateral dark fuscous stripes. Abdomen fuscous, lateral margins yellowish. Legs whitish-ochreous, apex of posterior tibiæ dark fuscous. Forewings with termen sinuate, rather strongly oblique; orange; markings dark purple-fuscous; a broad costal streak from base to $\frac{2}{5}$, confluent with an undefined antemedian fascia, which is also connected with base by a subdorsal line; a patch occupying terminal half of wing, anterior edge almost straight, blackish, running from middle of costa to beyond middle of dorsum, enclosing an erect orange blotch from tornus, reaching $\frac{3}{4}$ across wing, and a narrow orange suffusion along costa about $\frac{4}{5}$: cilia dark fuscous, on termen with apical $\frac{2}{3}$ whitish-yellowish, on costal spot orange. Hindwings and cilia dark fuscous.

Duaringa, Queensland, in December; two specimens (Barnard). Nearly allied to the preceding, but smaller and deeper-coloured, with the termen of forewings more oblique, and distinguished by the dark fuscous thoracic stripes, and absence of yellow praetornal dot.

219. *C. prasinopis*, Meyr.

(*Crocanthes prasinopis*, Meyr., Trans. Ent. Soc. Lond. 1886, 277.)

♂♀. 13-15 mm. Head, palpi, antennæ, thorax, abdomen, and legs whitish-yellowish; eyes in life brilliant green; second joint of palpi suffused with ochreous-yellowish except apex, terminal joint in ♂ much shorter than second, somewhat aborted, rough-scaled, not acute, in ♀ normal; shoulders with purplish-fuscous stripe; anterior femora and tibiæ suffused with fuscous, posterior tibiæ with fuscous apical band. Forewings with termen sinuate, rather strongly oblique; rather deep yellow; markings ochreous-fuscous, with purple reflections; a costal streak from base to $\frac{2}{5}$; a

patch occupying terminal half of wing, anterior edge straight or seldom bent, irregular, dark fuscous, running from middle of costa to beyond middle of dorsum, enclosing a roundish suffused central deep yellow blotch : cilia pale ochreous, at apex with a dark fuscous patch, on termen yellow with dark fuscous basal line, on tornus suffused with fuscous. Hindwings whitish-yellowish, posteriorly suffused with fuscous, darker towards apex; a dark grey transverse discal mark; cilia whitish-yellowish, more or less tinged with ochreous-fuscous round apex and upper part of termen.

Brisbane and Toowoomba, Queensland; Glen Innes (3500 feet), Newcastle, Sydney, Bathurst, and Cooma, New South Wales; Melbourne, Victoria; Launceston and Hobart, Tasmania; Mount Lofty, South Australia; also in New Guinea; from September to April, common generally; twenty specimens.

220. *C. glycina*, n.sp.

♂♀. 15-17 mm. Head, palpi, antennæ, and thorax pale yellowish; palpi orange-tinged towards base, terminal joint in ♂ much shorter than second, somewhat aborted, rough-scaled, not acute, in ♀ normal; shoulders with a fuscous stripe. Abdomen grey, lateral margins pale yellowish. Legs pale yellowish, anterior pair suffused with fuscous. Forewings narrow, costa slightly arched, termen sinuate, rather strongly oblique; pale clear yellow; markings bronzy-fuscous, with purplish reflections; a costal streak from base to middle, attenuated posteriorly; a moderate postmedian fascia parallel to termen, anterior edge irregular and finely blackish-margined, strongly or only suffusedly connected on costa with a moderate terminal fascia, sometimes almost connected on tornus also : cilia fuscous, on termen suffused with yellowish. Hindwings grey, darker posteriorly; a darker transverse discal mark; cilia whitish-ochreous, more or less suffused with grey round apex and upper part of termen.

Tasmania, 3 ♂'s without further particulars (Barnard); Gisborne, Victoria, in January, 1 ♀ (Lyell). Differs from *C. prasinopis* by larger size, relatively narrower wings, much more oblique

edge of postmedian fascia, greater development of yellow beyond it, grey hindwings and abdomen.

221. *C. acroxantha*, Low.

(*Crocanthes acroxantha*, Low., Trans. Roy. Soc. S. Austr. 1896, 170.)

♂♀. 13-17 mm. Head whitish, crown ochreous-yellow towards centre. Palpi white, lower half of second joint fuscous, terminal joint normal. Antennæ white. Thorax whitish-ochreous, shoulders dark fuscous. Abdomen ochreous-yellowish. Legs whitish, anterior femora and tibiæ and apex of middle and posterior tibiæ dark fuscous, middle tibiæ in ♂ with whitish-ochreous hairpencil above. Forewings with termen slightly sinuate, rather strongly oblique; ochreous-yellow, sprinkled with dark fuscous or blackish; a dark fuscous costal streak from base to middle; a blackish transverse discal dot at $\frac{3}{5}$, sometimes indistinct; a somewhat irregular dark fuscous or blackish line from $\frac{2}{3}$ of costa to $\frac{2}{3}$ of dorsum, extended posteriorly on costa; a blackish line along termen : cilia ochreous-yellow, apical half blackish-grey on termen and on costal extremity of postmedian line. Hindwings rather dark grey, terminal edge darker; cilia whitish-ochreous, round apex and on termen greyish-tinged except at base.

Mackay and Duaringa, Queensland, in August and November; one specimen (Barnard), and type seen; Mr. Lower took the species freely.

222. *C. epitherma*, Low.

(*Crocanthes epitherma*, Low., Trans. Roy. Soc. S. Austr. 1896, 170.)

♂. 13 mm. Head ochreous-whitish. Palpi white, lower half of second joint ochreous, terminal joint normal, towards apex fuscous. Antennæ whitish. Thorax whitish-ochreous, shoulders with dark fuscous stripe. Forewings with termen sinuate, oblique; rather deep ochreous-yellow; a dark fuscous costal streak from base to middle; some dark fuscous scales towards dorsum

before middle; a dark fuscous mark on costa at $\frac{2}{3}$, whence proceeds a faintly indicated fuscous line half across wing; a blackish terminal line : cilia whitish-ochreous, with a broad blackish-grey median shade opposite termen. Hindwings pale yellowish; a faintly indicated angulated fuscous median line, not reaching dorsum; a dark fuscous terminal line; cilia pale yellow, round apex fuscous.

Mackay, Queensland, in December; type seen. Mr. Lower found this also common.

223. *C. perigrapta*, n.sp.

♂♀. 12-14 mm. Head and thorax yellowish-white, shoulders dark fuscous. Palpi white, lower half of second joint fuscous, terminal joint normal. Antennæ white. Abdomen pale ochreous-yellow. Legs whitish-ochreous, anterior pair more or less suffused with dark fuscous, apex of posterior tibiæ dark fuscous, hairs whitish. Forewings with termen slightly sinuate, rather strongly oblique; ochreous-yellow; a blackish costal streak from base to middle; sometimes a dark fuscous subdorsal dot at $\frac{1}{4}$; a blackish inwards-curved line from $\frac{3}{4}$ of costa to $\frac{4}{5}$ of dorsum, somewhat produced posteriorly on costa; a black line along termen : cilia pale ochreous-yellowish, with broad grey postmedian shade on termen. Hindwings grey, more or less suffused with pale yellowish, apical fourth forming a more or less defined pale yellowish band, terminal edge dark grey or blackish; sometimes a dark grey discal spot; cilia whitish-ochreous, round apex more or less greyish-tinged.

Duaringa and Brisbane, Queensland; Glen Innes (3500 feet), Newcastle, and Sydney, New South Wales; from September to March, twenty specimens; a common species.

224. *C. micradelpha*, Low.

(*Gelechia micradelpha*, Low., Trans. Roy. Soc. S. Austr. 1897, 56.)

♂♀. 11-13 mm. Head whitish-yellowish, crown centrally suffused with orange. Palpi pale yellow, in ♂ normal. Antennæ

in ♂ dark grey, in ♀ suffused with pale yellowish. Thorax orange, with whitish-yellow subdorsal stripes. Abdomen blackish-grey. Legs whitish-yellowish, apex of tibiæ and of tarsi dark fuscous. Forewings with termen almost straight, very oblique; orange; a short fine black oblique mark on costa at $\frac{1}{3}$; a dark fuscous slightly purple-tinged terminal patch, limited by a somewhat inwards-curved blackish line from $\frac{2}{3}$ of costa to $\frac{3}{4}$ of dorsum, enclosing a yellow mark along costa near its anterior edge: cilia dark fuscous. Hindwings and cilia dark fuscous.

Brisbane, Queensland; Sydney, Mittagong, and Broken Hill, New South Wales; from September to November, and in January and March, eighteen specimens; common where it occurs.

225. *C. zonias*, n.sp.

♀. 14 mm. Head pale ochreous-yellowish. Palpi pale yellow, anterior edge of terminal joint dark fuscous. Antennæ whitish-yellowish. Thorax dark bronzy-fuscous, with pale yellow dorsal patch anteriorly. Abdomen dark fuscous, lateral margins and apex yellowish. Legs pale yellowish, posterior tibiæ with dark fuscous apical band. Forewings with termen hardly sinuate, rather strongly oblique; dark purple-fuscous; a moderately broad straight ochreous-yellow fascia about middle, slightly narrowed downwards: cilia dark bronzy-fuscous. Hindwings dark grey; a rather broad irregular pale ochreous-yellow transverse fascia rather before middle, enclosing a dark grey discal dot; cilia dark grey.

Duaringa, Queensland in September; one specimen (Barnard).

40. Sarisophora, n.g.

Antennæ over 1, in ♂ stout, simple, basal joint moderately elongate, without pecten. Labial palpi long, recurved, second joint thickened with somewhat rough scales beneath, terminal joint as long as second, acute. Forewings: 2 and 3 stalked; 7 and 8 stalked, 7 to apex or termen. Hindwings 1, trapezoidal, apex obtuse, termen very oblique, not or slightly sinuate, cilia 1; 3 and 4 stalked, 5 absent; 6 and 7 stalked.

Type *S. leptoglypta*. Probably a development of *Macrotona*, from which it differs mainly in the absence of vein 5 of hindwings. The antennæ are porrected in repose. Imago with forewings elongate, costa slightly arched, apex obtuse, termen rounded.

Second joint of palpi wholly dark fuscous..... ..... 227. *chlaenota*.
Second joint of palpi mostly white and whitish-ochreous... 226. *leptoglypta*.

226. *S. leptoglypta*, n.sp.

♂. 14 mm. Head light fuscous-bronze, sides of crown ochreous-whitish. Palpi whitish-ochreous, second joint beneath an oblique dark fuscous supramedian bar white, terminal joint infuscated above towards apex. Antennæ whitish-ochreous, basal $\frac{2}{3}$ and apical $\frac{1}{6}$ dark fuscous. Thorax bronzy-fuscous, shoulders with a dark fuscous stripe edged beneath with whitish. Abdomen pale yellowish, lateral margins dark fuscous. Legs dark fuscous irrorated with yellow-whitish, posterior pair suffused with yellow-whitish. Forewings with termen oblique; fuscous-whitish irrorated with dark fuscous, all veins marked with fine yellow-whitish streaks; costal edge suffused with dark fuscous; stigmata indicated by very indistinct spots of darker suffusion, plical very obliquely beyond first discal: cilia fuscous, basal third ochreous-yellow except towards tornus. Hindwings light ochreous-yellow; apical third rather dark fuscous; cilia fuscous, becoming pale yellowish towards tornus.

Brisbane, Queensland, in September; one specimen.

227. *S. chlaenota*, n.sp.

♀. 15 mm. Head dark fuscous-bronze, sides of crown whitish-yellowish. Palpi dark fuscous, terminal joint ochreous-whitish. Antennæ whitish-ochreous. Thorax dark fuscous. (Abdomen broken.) Legs dark fuscous ringed with whitish, middle tibiæ ochreous-whitish. Forewings with termen very oblique; bronzy-fuscous, much suffused with dark ashy-fuscous, with a few scattered black scales; stigmata black, very undefined, plical

indefinitely elongate: cilia bronzy-fuscous. Hindwings pale ochreous-yellow, terminal half dark fuscous; cilia bronzy-fuscous.

Sydney, New South Wales, in December; one specimen, on a scorched trunk of *Eucalyptus*.

41. Achoria, n.g.

Antennæ over 1, in ♂ simple, basal joint elongate, without pecten. Labial palpi long, recurved, second joint thickened beneath with rough scales triangularly projecting at apex, terminal joint as long as second, slightly rough anteriorly, pointed. Forewings: 2 and 3 separate, parallel, 8 and 9 out of 7, 7 to costa. Hindwings 1, elongate, apex and termen obtusely rounded, cilia 1¼; 4 and 5 stalked, transverse vein absent, 6 and 7 stalked, 6 to costa; in ♂ a deep longitudinal groove in disc almost throughout, clothed with modified scales, and edged above by a projecting ridge of rough scales, at base with an expanded tuft of hairs.

Nearly related to *Macrotona*, of which it is a derivative with considerable modifications. Imago with forewings elongate.

228. *A. inopina*, n.sp.

♂. 11-12 mm. Head yellow-ochreous. Palpi whitish-ochreous, second joint dark fuscous except apex. Antennæ ochreous-whitish. Thorax fuscous. Abdomen whitish-ochreous. Legs dark fuscous ringed with ochreous-whitish, posterior pair ochreous-whitish. Forewings narrow, costa gently arched, apex pointed, termen very obliquely rounded; whitish-ochreous suffusedly irrorated throughout with dark bronzy-fuscous: cilia pale whitish-ochreous, somewhat sprinkled with dark fuscous. Hindwings pale fuscous, basal and discal areas wholly tawny-ochreous; cilia ochreous-whitish.

Sydney, New South Wales, in September and March; two specimens.

42. Macrotona, n.g.

Antennæ over 1, in ♂ simple, basal joint moderately elongate, without pecten. Labial palpi long, recurved, second joint thickened with dense scales, somewhat rough towards apex

beneath, terminal joint as long as second, acute. Forewings: 2 and 3 stalked, 7 and 8 stalked, 7 to apex or termen, 9 sometimes out of 7. Hindwings 1, trapezoidal, apex obtuse, termen slightly sinuate, cilia $\frac{4}{5}$; 3 and 4 stalked, 5 approximated to 4, 6 and 7 stalked.

Type *M. sobria*. This genus closely approaches the European *Lecithocera*, and may perhaps eventually have to be united with it, when more species are known; at present it is distinguished by the rough scales of second joint of palpi, and stalking of veins 2 and 3 of forewings. Imago with forewings elongate, costa gently arched, apex obtuse, termen rounded, rather strongly oblique.

1. Antennæ fuscous..... 229. *terrigena*.
   Antennæ whitish, sometimes fuscous-ringed..... 2.
2. Head dark fuscous except on sides, 7 to termen..... 230. *micromela*.
   Head whitish or pale ochreous, 7 to apex..... 3.
3. Stigmata small, dot-like..... 231. *cyamitis*.
   Stigmata forming round suffused spots..... 232. *sobria*.

229. *M. terrigena*, n.sp.

♂. 12 mm. Head and thorax dark bronzy-fuscous, sidetufts ochreous. Palpi pale ochreous, second joint fuscous except towards apex. Antennæ rather dark fuscous. Abdomen rather dark fuscous. Legs dark fuscous, middle tibiæ and tarsi and posterior tarsi suffused with whitish-ochreous. Forewings with 9 out of 7; dark bronzy-fuscous: cilia bronzy-fuscous, with darker subbasal shade. Hindwings and cilia rather dark fuscous.

Sydney, New South Wales, in March; one specimen. Resembles a dark *micromela*, but easily distinguished by the dark antennæ and peculiar neuration.

230. *M. micromela*, Low.

(*Gelechia micromela*, Low., Trans. Roy. Soc. S. Austr. 1897, 55.)

♂♀. 11-16 mm. Head dark fuscous or bronzy, sides of crown ochreous-whitish. Palpi ochreous-whitish, second joint fuscous or dark fuscous externally except towards apex, terminal joint dark fuscous on anterior edge and towards apex. Antennæ

ochreous-white, sometimes ringed with fuscous. Thorax dark bronzy-fuscous. Abdomen fuscous. Legs dark bronzy-fuscous, more or less suffused partially with ochreous-whitish. Forewings with 7 to termen, 9 separate; dark bronzy-fuscous, slightly purplish-tinged; stigmata represented by spots of very obscure darker suffusion, often quite obsolete: cilia bronzy-fuscous. Hindwings grey; cilia light grey.

Brisbane and Toowoomba, Queensland; Sydney, Katoomba, and Cooma (3000 feet), New South Wales; Melbourne, Mount Macedon, and Gisborne, Victoria; from September to March, eighteen specimens; a common species. I have seen Lower's type.

231. *M. cyamitis*, n.sp.

♂. 13 mm. Head and thorax ochreous-whitish, slightly fuscous-tinged. Palpi ochreous-whitish, second joint fuscous externally except apex. Antennæ ochreous-whitish. Abdomen ochreous-whitish. Legs dark fuscous ringed with whitish, posterior pair suffused with ochreous-whitish. Forewings with 7 to apex, 9 separate; pale whitish-ochreous, somewhat suffused with fuscous irroration except towards costa; base of costa dark fuscous; stigmata small, dark fuscous, plical obliquely beyond first discal, an indistinct additional dot beneath and rather before second discal; some undefined dark fuscous marks round apex and along termen: cilia fuscous-whitish, partially mixed with light fuscous. Hindwings whitish-fuscous; cilia fuscous-whitish.

Brisbane, Queensland, in September; one specimen.

232. *M. sobria*, n.sp.

♂♀. 16-18 mm. Head and thorax fuscous-whitish to pale brownish-ochreous. Palpi fuscous-whitish, second joint fuscous-sprinkled, terminal joint with fuscous anterior edge. Antennæ whitish or yellowish, ringed with fuscous. Abdomen ochreous-whitish to light yellowish. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish or pale yellowish. Forewings with 7 to apex, 9 separate; brown, densely irrorated with whitish

points, with some scattered black scales; stigmata represented by round spots of dark fuscous or blackish suffusion, often very indefinite, plical sometimes obsolete, slightly beyond first discal, second discal larger and usually better marked, often with an adjacent whitish-ochreous spot beneath it; usually a dark fuscous costal suffusion above this: cilia light brown or fuscous, strewn with whitish points, base sometimes barred with whitish-ochreous or ochreous-yellowish. Hindwings grey or dark grey; cilia pale greyish or fuscous, sometimes suffused with ochreous-whitish or yellowish at base and towards tornus.

Sydney and Blackheath (3500 feet), New South Wales, in August, November, and February; four specimens.

43. Styloceros, n.g.

Antennæ nearly 1, in ♂ stout, simple, basal joint moderately elongate, without pecten. Labial palpi long, recurved, second joint thickened with appressed scales, somewhat rough towards apex beneath, terminal joint as long as second or shorter, acute. Forewings: 2 and 3 connate or stalked or coincident, 7 and 8 stalked, 7 to apex, 9 sometimes out of 7. Hindwings over 1, trapezoidal, apex obtuse, termen hardly sinuate, cilia $\frac{3}{4}$; 3 and 4 connate or stalked, 5 absent, 6 and 7 stalked.

Type *S. cyclonitis*. A derivative from early forms of *Protolechia*, with near collateral relationship to *Macrotona*. Imago with forewings moderate, apex obtuse.

1. Thorax with whitish subdorsal stripes ..... 235. *cyclonitis*,
   Thorax without whitish stripes ..... 2.
2. Forewings with whitish-ochreous posterior costal spot. 233. *trigonias*,
   Forewings without such spot. ..... 234. *lychnocentra*.

233. *S. trigonias*, n.sp.

♂. 16mm. Head rather dark bronzy-fuscous, face and centre of crown whitish-ochreous. Palpi whitish-ochreous, second joint fuscous towards base. Antennæ whitish-ochreous. Thorax bronzy-fuscous. Abdomen whitish-ochreous. Legs dark fuscous, partially suffused with whitish-ochreous. Forewings with costa moderately

arched, apex very obtuse, termen almost straight, little oblique; 2 and 3 coincident, 9 out of 7; dark purplish-bronzy-fuscous; dorsum marked with obscure whitish-ochreous strigulæ; a narrow obscure straight antemedian fascia of whitish-ochreous suffusion; a small whitish-ochreous discal spot at $\frac{2}{3}$; a small triangular whitish-ochreous costal spot before $\frac{3}{4}$: cilia whitish-ochreous, somewhat mixed with fuscous (imperfect). Hindwings pale whitish-ochreous, irrorated with light fuscous except towards base; cilia ochreous-whitish suffused with pale fuscous.

Duaringa, Queensland; one specimen in Mr. Lower's collection.

234. *S. lychnocentra*, n.sp.

♀. 15 mm. Head light shining bronzy-grey, sides light yellowish. Palpi and antennæ pale ochreous-yellowish. Thorax dark shining purplish-fuscous. (Abdomen broken.) Legs dark fuscous, partially suffused with yellowish. Forewings with costa gently arched, termen rounded, little oblique; 2 and 3 stalked, 9 out of 7; dark purplish-bronzy-fuscous; a transverse-oval spot of dark brown suffusion at $\frac{2}{3}$; a smaller transverse yellow-ochreous discal spot at $\frac{2}{3}$, edged with dark suffusion: cilia bronzy-fuscous, darker towards base. Hindwings and cilia rather dark bronzy-fuscous.

Tasmania; one specimen in Mr. Lower's collection, without further particulars. I am inclined to suspect an error here; it is more likely that the real locality is Queensland.

235. *S. cyclonitis*, n.sp.

♂. 11-13 mm. Head rather dark fuscous, sides of crown ochreous-whitish. Palpi whitish, second joint dark fuscous except apex, base of terminal joint suffused with dark fuscous. Antennæ whitish-ochreous. Thorax dark fuscous, with whitish subdorsal stripes. Abdomen whitish-ochreous, lateral margins fuscous. Legs dark fuscous, ringed with whitish-ochreous, hairs of posterior tibiæ whitish-ochreous. Forewings with costa gently arched, termen rounded, rather strongly oblique; 2 and 3 connate, 9 separate; rather dark fuscous, irrorated with whitish-ochreous points, with scattered blackish-fuscous scales; a short black sub-

costal dash from base; a whitish-ochreous plical mark at $\frac{1}{4}$, edged with some black scales; stigmata indicated by obscure spots of blackish-fuscous suffusion, plical obliquely beyond first discal, all followed by some obscure whitish-ochreous suffusion: cilia fuscous, basal half obscurely barred with ochreous and darker fuscous. Hindwings fuscous; cilia light fuscous.

Duaringa, Queensland, in September and November; two specimens (Barnard).

44. Croesopola, n.g.

Antennæ $\frac{4}{5}$, in ♂ — (?), basal joint moderately elongate, without pecten. Labial palpi very long, recurved, second joint thickened with appressed scales, hardly rough beneath, terminal joint as long as second, slender, acute. Forewings: 2 and 3 stalked, 7 and 8 stalked, 7 to apex. Hindwings $1\frac{1}{3}$, trapezoidal, apex obtuse, termen oblique, slightly bisinuate, cilia $\frac{1}{2}$; 3 and 4 connate, 5 parallel, 6 and 7 stalked.

This genus stands remote from any other Australian form, but is probably nearly allied to *Atasthalistis* from the New Guinea region. It seems to be a derivative of *Ypsolophus*. Imago with forewings elongate.

236. *C. euchroa*, Low.

(*Atasthalistis euchroa*, Low., Proc. Linn. Soc. N. S. Wales, 1900, 47; Trans. Roy. Soc. S. Austr. 1901, 80.)

♀. 19-22 mm. Head pale ochreous. Palpi ochreous sprinkled with greenish, terminal joint ochreous-whitish. Antennæ ochreous-whitish ringed with fuscous. Thorax light olive-green, shoulders with a whitish-ochreous spot. Forewings narrow, costa slightly arched, sinuate in middle, termen gently concave, little oblique, tornus prominently rounded; light olive-green, costal edge suffused with whitish-ochreous, or sometimes almost wholly suffused with brownish-ochreous; indications of darker strigulæ towards dorsum; a narrowly semioval blackish spot along costa towards middle, edged with ochreous-whitish beneath: cilia ochreous-whitish, suffused with pale pink except at base. Hind-

wings orange, terminal $\frac{2}{5}$ dark fuscous; cilia dark fuscous, suffused with orange towards tornus.

Duaringa, Townsville, and Brisbane, Queensland, in December and February; two specimens (Barnard, Lower).

45. Hyodectis, n.g.

Antennæ $\frac{4}{5}$, in ♂ shortly ciliated, basal joint moderate, without pecten. Labial palpi very long, recurved, second joint rather short, with very long projecting apical scaletuft beneath, terminal joint twice as long as second, with appressed scales, acute. Forewings: 2 and 3 straight, parallel, 7 and 8 out of 6, 7 to costa. Hindwings 1, elongate-trapezoidal, apex much produced, pointed, termen sinuate-emarginate, cilia $1\frac{2}{3}$; 3 and 4 remote, 5 nearly parallel to 4, 6 and 7 long-stalked.

A distinct form, derivable from *Nothris*. Imago with forewings elongate, pointed.

237. *H. crenoides*, n.sp.

♂♀. 14-17 mm. Head shining white. Palpi dark brown, apex of second joint, and terminal joint except towards apex white. Antennæ dark fuscous. Thorax dark brown, shoulders and patagia shining white. Abdomen grey. Legs dark fuscous, posterior pair suffused with whitish-ochreous. Forewings rather light brown, sometimes golden-tinged; a rather broad straight shining white streak above middle from base to apex, suffusedly edged beneath with dark fuscous, especially posteriorly; sometimes a white dot at $\frac{3}{4}$ touching its lower edge; sometimes an undefined fine whitish almost terminal line: cilia fuscous-whitish, with basal, antemedian, and apical blackish lines, usually marked round apex only, above apex cut by a white bar. Hindwings whitish-fuscous or pale fuscous; cilia whitish-ochreous.

Sydney, Shoalhaven, and Mittagong, New South Wales; also from Victoria; in November, January, March, and June, five specimens.

46. Cymatomorpha, n.g.

Antennæ $\frac{4}{5}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi very long, recurved, second joint rather short, with

triangular apical tuft beneath, terminal joint much longer than second, with appressed scales, acute. Forewings with tufts of scales on surface; 2 and 3 remote, parallel, 7 and 8 out of 6, 7 to costa. Hindwings 1, elongate-trapezoidal, apex much produced, pointed, termen sinuate-emarginate, cilia 2; in ♂ with hairpencil lying along costa from base in a fold; 3, 4, 5 approximated at base, 6 and 7 stalked.

Nearly correlated to *Anarsia*. Imago with forewings elongate, round-pointed.

238. *C. euplecta*, n.sp.

♂♀. 11-13 mm. Head, palpi, thorax, and abdomen grey-whitish sprinkled with grey, palpi with two blackish rings on second joint and three on terminal. Antennæ grey-whitish, ringed with grey. Legs dark fuscous, ringed with ochreous-whitish. Forewings grey-whitish, irrorated with grey or dark grey; a raised white subcostal tuft at $\frac{1}{3}$, edged anteriorly with brownish-ochreous suffusion mixed with black and sometimes extended along costa to base; a blotch of similar suffusion on middle of costa, reaching nearly half across wing; four or five small spots on posterior half of costa, a variable spot in disc at $\frac{2}{3}$, some more or less defined small spots or dashes scattered about wing, and sometimes an irregular suffused terminal patch dark grey or blackish: cilia grey-whitish irrorated with grey, base sometimes spotted with dark grey. Hindwings pale grey, darker towards apex; cilia whitish-ochreous-grey.

Brisbane, Queensland; Sydney, New South Wales; Gisborne, Victoria; Quorn, South Australia; in September and October, ten specimens.

47. LEPTOGENEIA, n.g.

Antennæ $\frac{3}{4}$, in ♂ shortly ciliated, basal joint moderate, without pecten. Labial palpi long, curved, ascending, second joint with large rough projecting tuft of scales beneath, terminal joint as long as second, slender, acute. Forewings with tufts of scales on surface; 2, 3, 4 approximated at base, 7 and 8 stalked, 7 to costa. Hindwings 1, elongate-trapezoidal, apex produced, round-pointed,

termen sinuate-emarginate, cilia 1½-2; 3 and 4 approximated at base, 5 rather approximated to 4, 6 and 7 remote, nearly parallel.

Also correlated to *Anarsia* and *Cymatomorpha*. Imago with forewings elongate, pointed.

239. *L. bicristata*, n.sp.

♂♀. 11-13 mm. Head white, middle line of crown grey. Palpi white, second joint mixed with dark fuscous. Antennæ grey. Thorax white sprinkled with grey. Abdomen grey. Legs fuscous, apex of joints whitish, middle and posterior tibiæ suffused with whitish. Forewings shining whitish, sprinkled with fuscous; veins indistinctly streaked with dark fuscous in disc and posteriorly; a short dark fuscous mark from costa near base; a yellow-whitish scaletuft on fold at ⅔, edged anteriorly with dark fuscous; a whitish-yellow transverse streak of raised scales from tornus, reaching ¾ across wing, irregularly edged anteriorly with dark fuscous, and above touching a costal spot of dark fuscous suffusion; beyond this an oblique white streak from costa to termen beneath apex; costal area above this suffused with dark fuscous: cilia whitish-fuscous, above apex with a black median line, tips beyond this white. Hindwings grey; cilia whitish-fuscous.

Sydney, New South Wales, in November and March; two specimens.

48. Symbolistis, n.g.

Antennæ ⅘, in ♂ thick, serrate, simple, somewhat roughened with scales above, basal joint moderately elongate, without pecten. Labial palpi long, curved, ascending, second joint with dense appressed scales, forming a slight apical projection beneath, and projecting roughly towards apex above, terminal joint as long as second, moderate, acute. Forewings: 2 and 3 widely remote, 7 and 8 stalked, 7 to costa. Hindwings under 1, narrow-trapezoidal, apex acutely produced, termen emarginate, cilia 2½; 3 and 4 remote, 5 somewhat approximated to 4, 6 and 7 somewhat approximated towards base.

Type *S. orophota.* Correlated to *Anarsia* and the preceding genera. Imago with forewings elongate, narrow, apex pointed, termen extremely obliquely rounded. The two species are nearly allied; their distinguishing characteristics are given under *S. argyromitra.*

240. *S. orophota*, n.sp.

♂♀. 11-13 mm. Head whitish-ochreous. Palpi dark fuscous, apex of second joint whitish, terminal joint broadly whitish towards base. Antennæ whitish, fuscous-ringed, with three narrow dark fuscous bands towards apex, in ♂ mostly suffused with brownish-ochreous. Thorax whitish-ochreous, sometimes fuscous-sprinkled. Abdomen pale brownish-ochreous. Legs dark fuscous, ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings very narrow, broadest near base, costa slightly arched; pale whitish-ochreous, on dorsal half brownish-tinged and sometimes much irrorated with dark fuscous; costal edge ochreous; a very elongate wedge-shaped dark fuscous blotch, suffused beneath with yellow-ochreous, along costa from $\frac{1}{3}$ to $\frac{3}{4}$, acute anteriorly; a blackish discal dot before $\frac{3}{4}$; some black scales on costa towards apex: cilia whitish-ochreous, round apex with a dark fuscous median line. Hindwings grey; cilia whitish-ochreous.

Brisbane, Queensland; Newcastle and Bulli, New South Wales; in September and October, three specimens.

241. *S. argyromitra*, n.sp.

♂♀. 9-10 mm. Head and thorax whitish. Palpi white, second joint dark fuscous except apex, terminal joint dark fuscous towards apex. Antennæ whitish, towards apex with three undefined dark fuscous bands. Abdomen pale whitish-ochreous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings with costa gently arched; whitish, dorsal half ochreous-tinged and more or less irrorated with dark fuscous; stigmata dark fuscous, rather obscure, plical obliquely beyond first discal; a wedge-shaped dark fuscous blotch, suffused beneath with yellow-ochreous, along costa from middle to $\frac{3}{4}$, acute

anteriorly; some ochreous suffusion towards apex, edged on costa with blackish: cilia ochreous-whitish, with a blackish median line round apex. Hindwings grey; cilia ochreous-grey-whitish.

Sydney, New South Wales, in March and April; five specimens. Differs from *S. orophota* by the smaller size, less posteriorly narrowed forewings, whiter groundcolour, shorter costal blotch, and more developed stigmata.

49. Anarsia, Zell.

Antennæ $\frac{4}{5}$, in ♂ simple, basal joint moderately elongate, without pecten. Labial palpi with scales of second joint forming a dense projecting tuft beneath, terminal joint in ♂ very short, concealed, in ♀ longer than second, ascending, acute. Forewings: 2 and 3 separate, parallel, 7 and 8 stalked, 7 to costa. Hindwings 1, trapezoidal, termen hardly sinuate; cilia $\frac{3}{4}$-$1\frac{1}{4}$; 3 and 4 connate or approximated, 5 rather approximated to 4, 6 and 7 stalked or seldom approximated.

A small genus, containing five European and Asiatic species, one of which has been introduced into America; probably others will be found in the Indo-Malayan region. In some of these vein 6 of the forewings rises out of 7 near base, but this character does not appear in any of the Australian species. In this genus the secondary sexual structures of the males often afford good distinctions. Imago with forewings elongate.

1.	Hindwings with 6 and 7 separate	246. *epiula.*
	Hindwings with 6 and 7 stalked	2.
2.	Forewings with well-marked dark median costal blotch.	3.
	Forewings without such blotch	4.
3.	Forewings with dark fuscous anterior fascia	245. *leucophora.*
	Forewings without such fascia	244. *molybdota.*
4.	Hindwings posteriorly dark fuscous	243. *dryinopa.*
	Hindwings posteriorly light grey	242. *trichodeta.*

242. *A. trichodeta*, n.sp.

♂. 14 mm. Head pale fuscous irrorated with whitish, face mixed with black. Palpi white densely mixed with black except at apex. Antennæ whitish ringed with fuscous. Thorax whitish,

sprinkled with dark fuscous. Abdomen white, with partially interrupted prismatic-black segmental bands, anal tuft ochreous-whitish. Legs whitish, irrorated with blackish. Forewings with costa moderately arched, apex round-pointed, termen very obliquely rounded, beneath with expansible pencil of long hairs from base covered by hindwings; whitish, irregularly irrorated with brown, dark fuscous, and black; a streak of dark fuscous irroration along fold, with dark fuscous dots beneath it at $\frac{1}{3}$ and near tornus; second discal stigma dark fuscous, at $\frac{3}{4}$; obscure indications of other dark fuscous spots in disc and posteriorly: cilia pale brownish, finely sprinkled with whitish and mixed round apex with dark fuscous. Hindwings with 6 and 7 stalked; pale whitish-grey; a thick streak of black scales beneath costa from base to beyond middle; some black scales along median vein to base of 2; a dorsal streak of black scales; cilia whitish. Forewings and hindwings beneath on basal half broadly streaked on veins with modified black scales.

Broken Hill, New South Wales (Lower); Mount Gambier, South Australia; in October and November, two specimens. The remarkable black streaks on the hindwings and undersurface of forewings, and black abdominal bands are probably not reproduced in the female.

243. *A. dryinopa*, Low.

(*Anarsia dryinopa*, Low., Trans. Roy. Soc. S. Austr. 1897, 57.)

♂♀. 14-17 mm. Head and thorax fuscous irrorated with white. Palpi dark fuscous, apex of second joint irrorated with white, terminal joint white with two dark fuscous rings. Antennæ fuscous spotted with white. Abdomen fuscous, anal tuft whitish-ochreous. Legs dark fuscous irrorated and ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa moderately arched, apex round-pointed, termen extremely obliquely rounded; in ♂ beneath with expansible hairpencil from base covered by hindwings; rather dark fuscous, irregularly irrorated with white; several small undefined dark spots on costa; numerous scattered undefined dots and dashes of black scales: cilia fuscous

irrorated with whitish. Hindwings with 6 and 7 stalked, in ♂ with subcostal pencil of dark fuscous hairs from near base, covered by forewings; fuscous, thinly scaled and semitransparent towards base, darker posteriorly; cilia whitish-fuscous.

Sydney and Broken Hill, New South Wales; Melbourne, Victoria; Launceston and Hobart, Tasmania; Mount Lofty and Port Lincoln, South Australia; from October to December, ten specimens. Larva cylindrical, dull rather light fuscous; head and second segment dark fuscous, third and fourth dark purplish-fuscous, anterior margin of fifth dull whitish; feeds amongst spun-together phyllodia of *Acacia dodonaeifolia* (*Leguminosæ*), in November.

244. *A. molybdota*, n.sp.

♂♀. 10-14 mm. Head and thorax fuscous irrorated with whitish. Palpi dark fuscous, apex of second joint irrorated with white, terminal joint whitish with two dark fuscous rings. Antennæ whitish irrorated with fuscous. Abdomen light fuscous, anal tuft whitish. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex round-pointed, termen extremely obliquely rounded; fuscous, irrorated with white, with a few scattered dark fuscous scales; obscure indications of small darker spots along margins, and in disc at $\frac{3}{4}$; a well-defined triangular dark fuscous blotch on costa about middle, reaching half across wing: cilia light fuscous irrorated with whitish. Hindwings with 6 and 7 stalked, in ♂ with long subcostal hairpencil from base covered by forewings; whitish-fuscous, thinly scaled and semitransparent, towards apex and termen fuscous; cilia pale whitish-fuscous.

Toowoomba, Queensland; Sydney, New South Wales; Gisborne, Victoria; Carnarvon, Perth, and York, West Australia; from August to November, sixteen specimens. Larva undescribed; feeds in spun-up leaflets of *Acacia decurrens* (*Leguminosæ*), in September.

245. *A. leucophora*, n.sp.

♀. 10 mm. Head and thorax white, shoulders sprinkled with dark fuscous. Palpi white, second joint fuscous irrorated with

black, with a white apical band, terminal joint with two dark fuscous rings. Antennæ white ringed with fuscous. Abdomen whitish. Legs white, banded with dark fuscous irroration. Forewings with costa gently arched, apex tolerably obtuse, termen very obliquely rounded; whitish, irregularly sprinkled with fuscous and dark fuscous; a narrow irregular dark fuscous fascia from costa at $\frac{1}{3}$, not reaching dorsum; a triangular dark fuscous blotch from costa about middle, reaching $\frac{2}{3}$ across wing; some scattered blackish scales in disc posteriorly, indicating second discal stigma, and towards apex, and some fuscous suffusion towards apex and termen: cilia light fuscous sprinkled with whitish, with undefined dark median shade. Hindwings with 6 and 7 stalked; whitish-grey, thinly scaled and semitransparent, darker posteriorly; cilia ochreous-whitish.

Broken Hill, New South Wales, in October; one specimen in Mr. Lower's collection.

246. *A. epiula*, n.sp.

♂. 14 mm. Head and thorax fuscous-whitish. Palpi dark fuscous, apex whitish. Antennæ whitish ringed with fuscous. Abdomen light fuscous, anal tuft whitish. Legs dark fuscous, irrorated with whitish (posterior pair broken). Forewings with costa gently arched, apex obtuse, termen very obliquely rounded; fuscous, irrorated and towards costa broadly suffused with white, with a few scattered dark fuscous scales; some indistinct oblique dark marks on costa; an elongate semi-oval blackish-fuscous spot along costa in middle; an elongate blackish-fuscous spot in middle of disc; a dark fuscous dot in disc at $\frac{3}{4}$: cilia pale fuscous sprinkled with whitish. Hindwings with 6 and 7 separate; whitish-fuscous, paler and semitransparent anteriorly; cilia pale whitish-ochreous.

Sydney, New South Wales, in October; one specimen.

50. Deuteroptila, n.g.

Antennæ $\frac{4}{5}$, in ♂ simple, basal joint moderately elongate, without pecten. Labial palpi very long, recurved, second joint with large projecting median and smaller apical tufts beneath, terminal

joint longer than second, slender, acute, with median tuft posteriorly. Forewings: 2 and 3 separate, parallel, 7 and 8 stalked, 7 to costa; in ♂ with expansible hairpencil from base of dorsum beneath. Hindwings over 1, elongate, apex obtuse, termen rounded, cilia over 1; 3 and 4 connate, 5 approximated to 4, 6 and 7 stalked.

A development of *Ypsolophus*, with relation to *Anarsia;* the scaling of the palpi is unique; in general appearance and in some marked details, such as the exceptional colouring of the middle tibiæ, there is close relationship to the peculiar *Ypsolophus zygophorus*. Imago with forewings elongate.

247. *D. sphenophora*, n.sp.

♂♀. 13-14 mm. Head and thorax ochreous-whitish, slightly sprinkled with fuscous. Palpi ochreous-whitish, basal $\frac{3}{5}$ and lower tuft of second joint, and median band and tuft of terminal joint dark fuscous. Antennæ ochreous-whitish, ringed with fuscous, towards apex with three dark fuscous bands. Abdomen pale whitish-ochreous. Legs dark fuscous ringed with whitish, basal half of middle tibiæ ochreous-white, posterior legs wholly ochreous-whitish except spurs. Forewings rather narrow, costa gently arched, apex round-pointed, termen extremely obliquely rounded; ochreous-whitish irregularly irrorated with fuscous; a blackish dot at base of costa, and one beneath costa near base; an indistinct dark fuscous spot on dorsum at $\frac{1}{4}$; a narrow elongate blackish-fuscous blotch along costa from about $\frac{1}{5}$ to $\frac{2}{3}$, lower edge irregularly dilated above middle of disc; a small black dot on fold beneath dilation, and another near tornus; a black streak in disc from $\frac{3}{4}$ to apex, usually once or twice interrupted: cilia whitish-fuscous sprinkled with whitish, round apex mixed with dark fuscous. Hindwings fuscous, thinly scaled and semitransparent anteriorly; cilia whitish-fuscous.

Brisbane, Queensland; two specimens received from Dr. T. P. Lucas.

51. Allocota, n.g.

Antennæ $\frac{3}{4}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi very long, recurved, second joint rather short, shortly

tufted towards apex beneath, terminal joint twice as long as second, posteriorly with a scale-projection towards apex, acute. Forewings: 2 and 3 remote, parallel, 6 to apex, 7 and 8 stalked. Hindwings $1\frac{1}{5}$, trapezoidal, apex obtuse, termen hardly sinuate, cilia $\frac{1}{2}$; 3 and 4 connate, 5 closely approximated to 4, 6 and 7 stalked, 8 remote from cell, connecting bar long and conspicuous; in ♂ with hairpencil lying along costa from base beneath forewings.

Allied to the preceding genus and the *Anarsia* group, but especially to the European *Chelaria*, from which it differs chiefly in neuration, the palpi being quite similar, and the general resemblance considerable. Imago with forewings elongate.

248. *A. simulacrella*, n.sp.

♂. 16 mm. Head and antennæ ochreous-white. Palpi white, with several obscure ochreous bands. Thorax white, shoulders narrowly brownish-ochreous. Abdomen and legs ochreous-whitish, anterior tibiæ with obscure dark bands. Forewings with costa moderately arched, apex obtuse, termen rounded, rather oblique; white, irregularly sprinkled with fuscous and dark fuscous, appearing to form small irregularly scattered dots; an elongate brown spot, centrally suffused with black, along costa slightly before middle; a small dark fuscous spot beneath apex: cilia white, sprinkled with fuscous. Hindwings pale whitish-fuscous; cilia ochreous-whitish.

Sydney, New South Wales, in January; one specimen.

52. Nothris, Hb.

Antennæ $\frac{4}{5}$, in ♂ ciliated, basal joint moderately elongate, without pecten. Labial palpi very long, ascending, second joint with dense projecting tuft beneath, sometimes with rough scales above, terminal joint as long as second or longer, slender, acute. Forewings: 2 and 3 remote, parallel, 6 sometimes out of 7 near base, 7 and 8 stalked, 7 to costa. Hindwings 1, trapezoidal, apex often produced, termen more or less sinuate, cilia $\frac{4}{5}$-$1\frac{1}{2}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 closely approximated or stalked.

Although closely allied to *Ypsolophus*, this genus (which I formerly included with it) appears to be naturally and satisfactorily separated from it by the character of veins 2 and 3 of forewings, which are remote and parallel, whilst in *Ypsolophus* they are stalked. It is represented by a few European species, but will probably be found spread through the Indo-Malayan region, and appears to be fairly numerous in Australia, especially perhaps in the interior. Imago with forewings elongate, more pointed and termen much more oblique than in *Ypsolophus*.

1.	Stigmata large, deep ferruginous	254. *tetrachroa*.
	Stigmata not ferruginous	2.
2.	Forewings yellowish	3.
	Forewings not yellowish	7.
3.	Forewings with dark fuscous costal streak posteriorly	253. *crocina*.
	Forewings without such streak	4.
4.	Forewings with ferruginous apical spot	252. *meliphanes*.
	Forewings without such spot	5.
5.	Hindwings whitish	249. *chloristis*.
	Hindwings grey	6.
6.	Plical stigma present	250. *centrothetis*.
	Plical stigma absent	251. *chloranthes*.
7.	Forewings with white longitudinal streak	8.
	Forewings without white streak	9.
8.	White streak indented beneath by discal stigmata	261. *dentata*.
	White streak not indented	259. *cycnobathra*.
9.	Forewings with ferruginous-ochreous terminal streak	255. *ochroloma*.
	Forewings without such streak	10.
10.	Forewings with ferruginous streak from base beneath fold	256. *macrosema*.
	Forewings without such streak	11.
11.	Plical stigma forming a blackish dash	257. *trichombra*.
	Plical stigma not forming a blackish dash	12.
12.	Forewings narrow, thorax pale whitish-ochreous	258. *mylicotis*.
	Forewings broader, thorax greyish-ochreous	260. *tephrastis*.

249. *N. chloristis*, n.sp.

♂♀. 11-13 mm. Head ochreous-whitish. Palpi white, second joint yellow-ochreous mixed with dark fuscous except apex, tuft long. Antennæ whitish-ochreous, faintly darker-ringed. Thorax pale ochreous-yellow. Abdomen and legs ochreous-whitish,

anterior legs infuscated. Forewings narrow, costa gently arched, apex round-pointed, termen extremely obliquely rounded; pale ochreous-yellowish; base of costa slenderly dark fuscous; plical and second discal stigmata small, dark fuscous, sometimes indistinct: cilia whitish yellowish. Hindwings grey-whitish; cilia whitish.

Carnarvon, West Australia, in October; two specimens.

250. *N. centrothetis*, n.sp.

♂♀. 13-14 mm. Head and thorax whitish-yellowish. Palpi white, second joint dark fuscous except apex, tuft short. Antennæ yellow-whitish, obscurely ringed with fuscous. Abdomen pale whitish-ochreous. Legs fuscous, posterior pair ochreous-whitish. Forewings narrow, costa slightly arched, apex almost acute, termen extremely obliquely rounded; 6 sometimes out of 7; light ochreous-yellow; plical and second discal stigmata dark fuscous, sometimes indistinct: cilia pale ochreous-yellow. Hindwings rather dark grey; cilia light grey, tips more whitish.

Geraldton, York, and Perth, West Australia, in November; four specimens. Differs from *N. chloranthes* by the larger size, shorter tuft of palpi, and presence of plical stigma.

251. *N. chloranthes*, Low.

(*Ypsolophus chloranthes*, Low., Proc. Linn. Soc. N. S. Wales, 1900, 418.)

♂♀. 11 mm. Head and thorax whitish-yellowish. Palpi white, second joint dark fuscous except apex, tuft long. Antennæ ochreous-whitish, obscurely ringed with fuscous. Abdomen pale whitish-ochreous. Legs fuscous, posterior pair ochreous-whitish. Forewings narrow, costa slightly arched, apex almost acute, termen extremely obliquely rounded; pale ochreous-yellow; costa slenderly dark fuscous towards base; second discal stigma blackish, distinct: cilia whitish-yellowish. Hindwings grey; cilia whitish-grey.

Broken Hill, New South Wales, in October and November; a specimen received from Mr. Lower, and type also seen.

252. *N. meliphanes*, Low.

(*Cleodora meliphanes*, Low., Trans. Roy. Soc. S. Austr. 1894, 107.)

♀. 14 mm. Head and antennæ ochreous-whitish. Palpi white, second joint yellow-ochreous suffused with brown except apex, tuft long. Thorax whitish-ochreous. Abdomen and posterior legs ochreous-whitish (other legs broken). Forewings narrow, costa gently arched, apex round-pointed, termen extremely obliquely rounded; pale ochreous-yellowish; a suffused ferruginous apical spot, somewhat produced on termen: cilia whitish-ochreous, round apex ferruginous-tinged on basal half. Hindwings pale whitish-ochreous tinged with grey; cilia whitish-ochreous.

Blackwood, South Australia, in November; type seen.

253. *N. crocina*, n.sp.

♂♀. 13-16 mm. Head whitish-ochreous, sometimes with two fuscous longitudinal stripes. Palpi white sprinkled with dark fuscous, second joint yellow-ochreous densely irrorated with dark fuscous except apex, tuft very short. Antennæ whitish-ochreous. Thorax pale ochreous-yellowish. Abdomen fuscous, basal third ochreous-yellowish. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ ochreous-whitish. Forewings narrow, costa gently arched, apex almost acute, termen extremely obliquely rounded; light ochreous-yellowish, dorsal half tinged with fuscous; base of costa slenderly dark fuscous; a dark fuscous costal streak from $\frac{1}{3}$ to $\frac{3}{4}$, narrowed anteriorly, truncate posteriorly; stigmata dark fuscous, sometimes indistinct or partially obsolete, plical obliquely before first discal; some minute blackish dots on apical part of costa and termen: cilia whitish-yellowish, more ochreous on basal half. Hindwings grey, darker posteriorly; cilia whitish-fuscous.

Sydney, New South Wales; Port Lincoln, South Australia; in November and April, six specimens.

254. *N. tetrachroa*, Low.

(*Paltodora tetrachroa*, Low., Proc. Linn. Soc. N. S. Wales, 1898, 49.)

♂♀. 12-14 mm. Head light grey, face whitish. Palpi white, second joint ochreous mixed with fuscous except towards apex, tuft long. Antennæ grey. Thorax light grey, with ochreous lateral stripes. Abdomen grey, basal third yellow-ochreous. Legs dark grey ringed with whitish, hairs of posterior tibiæ whitish. Forewings narrow, costa slightly arched, apex almost acute, termen extremely obliquely rounded; pale reddish-ochreous; dorsal half of wing and a streak along posterior half of costa fuscous sprinkled with white; stigmata large, deep ferruginous, plical very obliquely before first discal, connected with base by an undefined streak; an indistinct angulated whitish subterminal line: cilia light fuscous with median and apical whitish lines preceded by dark grey shades, base mixed with white and deep ferruginous. Hindwings grey, darker posteriorly; cilia whitish-fuscous.

Broken Hill, New South Wales, in October; two specimens (Lower).

255. *N. ochroloma*, Low.

(*Ypsolophus ochroloma*, Low., Trans. Roy. Soc. S. Austr. 1901, 80.)

♂. 16 mm. Head white, crown ochreous-tinged. Palpi white, second joint fuscous except apex, tuft long, apex of terminal joint grey. Antennæ dark grey. Thorax dark grey mixed with whitish, patagia ochreous. Abdomen grey, basal third ochreous-yellow. Legs dark grey, hairs of posterior tibiæ ochreous-whitish. Forewings narrow, costa slightly arched, apex almost acute, termen extremely obliquely rounded; dark grey, much mixed and suffused with whitish, especially between veins; plical stigma represented by an elongate black dash reaching nearly to base, margined beneath by a ferruginous-ochreous streak dilated anteriorly and reaching base of dorsum; discal stigmata rather elongate, blackish, placed in a line with extremity of plical; an

undefined ferruginous-ochreous streak along termen, marked with small blackish spots at and beneath apex: cilia dark grey, paler and ochreous-tinged towards tornus, with white median and apical lines. Hindwings grey, darker posteriorly; cilia whitish-ochreous, suffused with grey round apex.

Broken Hill, New South Wales, in August and September; type seen.

256. *N. macrosema*, Low.

(*Ypsolophus macrosemus*, Low., Proc. Linn. Soc. N. S. Wales, 1900, 418.)

♀. 13-14 mm. Head white, crown faintly pinkish-tinged. Palpi white, second joint pinkish-ochreous mixed with dark fuscous except apex, tuft long. Antennæ dark grey. Thorax whitish-grey, patagia suffused with ochreous. Abdomen grey, basal third yellow-ochreous. Legs grey, posterior pair whitish. Forewings narrow, costa gently arched, apex almost acute, termen extremely obliquely rounded; 6 sometimes out of 7; white, more or less sprinkled or mixed with dark fuscous in disc and towards median third of costa; a streak of dark fuscous suffusion along dorsum from base to near tornus, narrowed posteriorly, edged above by a ferruginous line from base to end of plical stigma; plical stigma very elongate, black, obliquely before first discal; discal stigmata dot-like, indistinct, dark fuscous, sometimes suffused with pale ochreous or ferruginous; some undefined black dots round apical portions of costa and termen: cilia white, round apex mixed with fuscous, towards tornus ferruginous-tinged. Hindwings grey; cilia whitish-fuscous.

Broken Hill, New South Wales, in October; three specimens (Lower), and type also seen.

257. *N. trichombra*, Low.

(*Paltodora trichombra*, Low., Proc. Linn. Soc. N. S. Wales, 1898, 50.)

♀. 16 mm. Head and thorax white sprinkled with blackish-grey, patagia ochreous-tinged. Palpi white, second joint rather dark fuscous except apex, tuft long, posterior edge of terminal

joint dark fuscous. Antennæ grey. Abdomen grey, basal half yellow-ochreous. Legs dark grey ringed with whitish, hairs of posterior tibiæ whitish. Forewings narrow, costa slightly arched, apex acute, termen extremely obliquely rounded; white, tinged with ochreous and sprinkled with blackish-grey; plical stigma dash-like, undefined, blackish, very obliquely before first discal, discal stigmata dot-like, blackish, indistinct: cilia whitish, with two undefined greyish-ochreous shades. Hindwings grey; cilia ochreous-whitish, towards base fuscous-tinged.

Broken Hill, New South Wales, in October; one specimen (Lower). This and the three preceding species and *N. cycnobathra* are nearly related, and the fact that they all occur in the same locality at the same season certainly raises suspicions of their specific distinctness; but Mr. Lower, who takes some of them pretty freely, expresses no doubt of their being good species; the distinctions are clear enough, provided they are constant.

258. *N. mylicotis*, n.sp.

♀. 16 mm. Head ochreous-whitish. Palpi white, second joint fuscous except apex, tuft long. Antennæ light grey. Thorax pale whitish-ochreous. Abdomen light shining ochreous-grey, basal third ochreous-yellow. Legs grey, hairs of posterior tibiæ whitish. Forewings narrow, costa slightly arched, apex almost acute, termen extremely obliquely rounded; 6 out of 7; greyish-ochreous, much mixed with whitish; stigmata oval, undefined, darker, plical very obliquely before first discal; some dark fuscous scales at apex and on upper part of termen: cilia pale-brownish-ochreous with whitish median and apical lines darker-edged anteriorly. Hindwings light fuscous, darker posteriorly; cilia whitish-ochreous, tips more whitish.

Adelaide, South Australia, in September and October; one specimen (Lower).

259. *N. cycnobathra*, Low.

(*Paltodora cycnobathra*, Low., Proc. Linn. Soc. N. S. Wales, 1898, 50.)

♂. 17 mm. Head and thorax white, slightly ochreous-tinged. Palpi white, second joint fuscous except apex, tuft long. An-

tennæ dark fuscous. Thorax white, shoulders narrowly dark bronzy-fuscous. Abdomen rather dark grey, basal third ochreous-yellow. Legs dark bronzy-grey, hairs of posterior tibiæ ochreous-whitish. Forewings narrow, costa gently arched, apex almost acute, termen extremely obliquely rounded; greyish-ochreous, sprinkled with white; a cloudy white median streak from base to apex, interrupted about $\frac{3}{4}$; stigmata darker, undefined, oval, plical very obliquely before first discal; a small black apical spot, and some blackish terminal scales beneath it: cilia pale ochreous, with whitish median and apical lines edged anteriorly with dark grey round apex. Hindwings light grey; cilia whitish-ochreous, towards tips whitish.

Broken Hill, New South Wales, in October; type seen.

260. *N. tephrastis*, n.sp.

♂♀. 13-15 mm. Head and thorax pale greyish-ochreous, more or less whitish-tinged. Palpi whitish, second joint greyish-ochreous except apex, tuft moderate. Antennæ grey. Abdomen light grey, basal third yellow-ochreous. Legs grey, hairs of posterior tibiæ ochreous-whitish. Forewings with costa gently arched, apex round-pointed, termen extremely obliquely rounded; fuscous, more or less sprinkled or irrorated with whitish; stigmata obscurely darker, often obsolete, plical obliquely before first discal: cilia brownish, with rows of whitish points. Hindwings fuscous; cilia light fuscous.

York, West Australia, in October; eight specimens. Although an obscure species, this is in fact very distinct from the preceding group by the broader and less pointed forewings.

261. *N. dentata*, n.sp.

♂♀. 14-16 mm. Head white. Palpi white, second joint dark fuscous except apex, tuft large. Antennæ dark fuscous. Thorax white, shoulders narrowly dark bronzy-fuscous. Abdomen rather dark grey. Legs dark bronzy-fuscous, hairs of posterior tibiæ ochreous-whitish. Forewings with costa moderately arched, apex obtuse, termen very obliquely rounded; dark golden-bronzy-

fuscous; a rather broad white longitudinal streak above middle from base to apex, posteriorly suffusedly dilated to reach costa, lower edge with irregular blackish indentations before and beyond middle, first triangular, second rounded, representing discal stigmata; plical stigmata elongate, suffused, blackish, very obliquely before first discal; a rather broad dorsal streak of white suffusion from base to tornus, sometimes little marked: cilia white, mixed with fuscous and dark fuscous. Hindwings grey; cilia light grey.

Sydney, Blackheath (3500 feet), Mittagong, and Bathurst, New South Wales; Melbourne, Victoria; in March, common where it occurs; sixteen specimens.

53. Streniastis, n.g.

Antennæ $\frac{5}{6}$, in ♂ serrulate, shortly ciliated, basal joint moderately elongate, without pecten. Labial palpi long, recurved, second joint with extremely long projecting tuft of scales beneath, terminal joint as long as second, acute. Forewings: 2 widely remote, from about $\frac{4}{5}$ of cell, 7 and 8 stalked, 7 to costa. Hindwings 1, trapezoidal, apex round-pointed, termen sinuate, oblique, cilia $1\frac{1}{2}$; 3 and 4 connate, 5 somewhat approximated to 4, 6 and 7 parallel.

Correlated to *Nothris*, from which it differs essentially by the parallelism of 6 and 7 of hindwings. Imago with forewings elongate.

262. *S. thermaea*, Low.

(*Paltodora thermaea*, Low., Proc. Linn. Soc. N. S. Wales, 1897, 271.)

♂♀. 16-17 mm. Head and thorax tawny-ochreous. Palpi ferruginous, terminal joint and apex of second ochreous-whitish. Antennæ whitish-ochreous ringed with fuscous, towards apex forming two or three narrow bands. Abdomen yellow-ochreous, with dark fuscous subbasal band. Legs tawny-ochreous, tibiæ and tarsi somewhat infuscated. Forewings narrow, costa gently arched, apex obtuse, termen extremely obliquely rounded; orange-

tawny, more or less suffused with deep ferruginous towards costa posteriorly: cilia light ochreous, with deep ferruginous median line round apex. Hindwings blackish-grey; cilia grey, on costa paler and ochreous-tinged.

Sydney, New South Wales; Campbelltown, Tasmania; from October to February, four specimens, and type also seen. I believe this species is attached to *Banksia*.

54. Ypsolophus, Fab.

Antennæ $\frac{4}{5}$, in ♂ ciliated, rarely with subbasal sinuation and tooth, basal joint moderately elongate, without pecten. Labial palpi very long, ascending, second joint with dense projecting tuft beneath, sometimes with rough scales above, terminal joint as long as second or longer, slender, acute. Forewings: 2 and 3 stalked, 7 and 8 stalked, 7 to costa. Hindwings 1 or over 1, trapezoidal, termen sometimes sinuate, cilia $\frac{1}{2}$-$\frac{3}{4}$; 3 and 4 connate or stalked, 5 somewhat approximated to 4, 6 and 7 closely approximated or stalked.

A genus of some extent and very general distribution, not, however, found in New Zealand; the Australian species are mostly very similar to those found elsewhere. Imago with forewings elongate.

1. Forewings with elongate dark costal patch	264.	*zygophorus*.
Forewings without dark costal patch		2.
2. Forewings with apex acute, termen very oblique	263.	*ammoxanthus*.
Forewings with apex round-pointed or obtuse		3.
3. Forewings yellow-ochreous or whitish-ochreous		4.
Forewings fuscous		5.
4. Forewings yellow-ochreous, stigmata dark fuscous	270.	*plasticus*.
Forewings whitish-grey-ochreous, stigmata reddish	266.	*melichrous*.
5. Apex of forewings round-pointed, black-edged	265.	*peristylis*.
Apex of forewings obtuse, not black-edged		6.
6. Termen of forewings sinuate	272.	*dryinodes*.
Termen of forewings not sinuate		7.
7. Forewings with series of ferruginous marks above middle	268.	*iodorus*.
Forewings without such marks		8.

8.	Tuft of palpi short or very short.....	9.
	Tuft of palpi moderately long.....	10.
9.	Basal half of cilia darker-barred, tuft very short....	267. *achlyodes.*
	Basal half of cilia not barred	269. *holomelas.*
10.	Forewings with oblique dark plical mark at $\frac{1}{5}$.....	271. *thanatopsis.*
	Forewings without such mark.....	273. *capnites.*

263. *Y. ammoxanthus*, n.sp.

♂. 11-13 mm. Head and thorax yellow-ochreous. Palpi whitish, second joint dark fuscous somewhat sprinkled with whitish, tuft moderately long, anterior edge of terminal joint dark grey. Antennæ pale yellowish ringed with dark fuscous. Abdomen whitish-ochreous, dorsally suffused with fuscous. Legs dark fuscous ringed with whitish, hairs of posterior tibiæ whitish-ochreous. Forewings narrow, costa gently arched, apex acute, termen almost straight, very oblique; yellow-ochreous; costa dark fuscous towards base; stigmata dark fuscous, plical little marked, slightly beyond first discal; some fuscous scales towards termen : cilia ochreous-yellow, tips paler. Hindwings grey, paler and thinly scaled anteriorly; cilia ochreous-grey-whitish.

Duaringa, Queensland, in January and March; three specimens (Barnard). In shape of wings this differs from the rest of the genus, and approximates to *Nothris*.

264. *Y. zygophorus*, n.sp.

♂♀. 11-12 mm. Head and thorax whitish-fuscous. Palpi fuscous, extreme apex of second joint whitish, tuft large, terminal joint white, anterior edge dark fuscous. Antennæ ochreous-whitish, ringed with dark fuscous. Abdomen fuscous. Legs dark fuscous ringed with whitish, basal half of middle tibiæ and hairs of posterior tibiæ whitish. Forewings narrow, costa slightly arched, apex rounded, termen rather obliquely rounded; pale fuscous, mixed with whitish and sprinkled with dark fuscous, wholly suffused with white towards costa; a dark fuscous dot beneath costa at $\frac{1}{5}$; a very elongate subtriangular deep ferruginous patch mixed with dark fuscous along costa from $\frac{1}{4}$ to $\frac{5}{6}$, cut by a fine whitish oblique mark at $\frac{3}{4}$; stigmata dark fuscous,

sometimes indistinct, discal near together, plical obliquely before first discal; sometimes an additional dot obliquely beneath and before second discal; a ferruginous mark round apex, edged by a black terminal line: cilia whitish, with a ferruginous antemedian line, beyond this mixed with brownish except towards tornus. Hindwings fuscous, paler and thinly scaled anteriorly; cilia pale whitish-ochreous, more or less infuscated round apex.

Brisbane, Queensland, in September; three specimens.

265. *Y. peristylis*, n sp.

♂. 11-13 mm. Head and thorax pale whitish-grey-ochreous. Palpi dark fuscous, apex of second joint white, tuft long, terminal joint white except apex. Antennæ grey-whitish. Abdomen whitish. Legs dark fuscous, mixed with whitish, hairs of posterior tibiæ whitish. Forewings with costa gently arched, apex round-pointed, termen hardly rounded, oblique; pale fuscous, sprinkled with dark fuscous, towards costa anteriorly suffused with pale whitish-ochreous; costal edge dark fuscous at base; a dark fuscous dot above fold at $\frac{1}{5}$; stigmata dark fuscous, plical obliquely before first discal; in one specimen some dark fuscous suffusion round these; a blackish terminal line, strongest at apex: cilia pale fuscous, more or less mixed with ochreous-whitish, and round apex with darker fuscous. Hindwings grey, lighter anteriorly; cilia very pale whitish-ochreous.

Geraldton and Albany, West Australia, in November and December; three specimens.

266. *Y. melichrous*, Low. (?) or n.sp.

♀. 15 mm. Head and thorax pale brownish-ochreous, sides of face narrowly dark fuscous. Palpi rather dark fuscous, apex of second joint whitish, tuft moderately long, terminal joint very much longer than second, whitish except apex. Antennæ pale greyish-ochreous, basal joint dark fuscous. (Abdomen broken.) Forewings with costa gently arched, apex obtuse, termen slightly rounded, rather oblique; whitish-grey-ochreous, dorsal $\frac{2}{3}$ tinged with light brown-reddish; a small brown-reddish spot on dorsum

at $\frac{1}{4}$; stigmata faintly traceable, reddish, plical obliquely before first discal: cilia pale ochreous mixed with whitish, basal third on termen ferruginous-reddish, followed by a series of brown spots. Hindwings whitish-grey, with a faint purplish tinge; cilia whitish-ochreous.

Locality unrecorded; one specimen in Mr. Lower's collection. This was sent me labelled as above, and marked "type," but I cannot find that it has been published; I retain the name, however, so that the only uncertainty is as to its author. I think it may probably be from Broken Hill.

267. *Y. achlyodes*, n.sp.

♂. 12 mm. Head, antennæ, and thorax dark fuscous, slightly reddish-tinged. Palpi dark fuscous, apex of second joint whitish-sprinkled, tuft very short, terminal joint whitish posteriorly. Abdomen rather dark grey. Legs dark fuscous, ringed with whitish, hairs of posterior tibiæ grey-whitish. Forewings with costa gently arched, apex obtuse, termen obliquely rounded; fuscous, much suffused with dark purplish-fuscous; stigmata approximated, dark fuscous, obscure, plical largest, obliquely before first discal: cilia whitish-fuscous, basal half barred with fuscous. Hindwings fuscous, thinly scaled anteriorly; cilia light fuscous.

Sydney, New South Wales, in December; one specimen. This is specially distinguished by the unusually short tuft of palpi, and barred cilia of forewings.

268. *Y. iodorus*, n.sp.

♂. 15 mm. Head, antennæ, and thorax rather dark fuscous, slightly purplish-tinged. Palpi rather dark fuscous, apex of second joint whitish-sprinkled, tuft moderate, terminal joint whitish posteriorly. Abdomen rather dark fuscous. Legs dark fuscous, obscurely pale-ringed. Forewings with costa gently arched, apex obtuse, termen obliquely rounded; rather dark fuscous, slightly tinged with purple-reddish; about six ferruginous marks arranged in a double longitudinal series in disc above

middle: cilia fuscous with rows of pale points, round apex with a darker line. Hindwings fuscous; cilia light fuscous.

Brisbane, Queensland, in September; one specimen. This only differs from *holomelas* in the ferruginous marks of forewings, and somewhat longer tuft of palpi; but the difference in the character of the localities renders it improbable that the two forms are conspecific.

269. *Y. holomelas*, Low.

(*Anarsia holomela*, Low., Trans. Roy. Soc. S. Austr. 1897, 57.)

♂. 14 mm. Head, antennæ, thorax, and abdomen dark bronzy-fuscous. Palpi dark fuscous, second joint whitish-sprinkled towards apex, tuft short, terminal joint whitish posteriorly. Legs dark fuscous, obscurely whitish-ringed. Forewings with costa gently arched, apex obtuse, termen obliquely rounded; dark fuscous, faintly purplish-tinged; stigmata faintly darker, hardly traceable: cilia fuscous, with darker line round apex. Hindwings fuscous, darker posteriorly; cilia fuscous.

Broken Hill, New South Wales, in June; type only seen. I conceive that *holomelas* is the correct masculine form of the incorrect feminine *holomela*.

270. *Y. plasticus*, n.sp.

♂♀. 16-18 mm. Head and thorax light ochreous. Palpi whitish-ochreous, second joint rather dark fuscous except apex, tuft moderately long, terminal joint dark fuscous towards apex. Antennæ pale ochreous spotted with fuscous. Abdomen whitish-ochreous. Legs dark fuscous, hairs of posterior tibiæ pale ochreous. Forewings with costa gently arched, apex obtuse, termen slightly sinuate, rather oblique; yellow-ochreous, sprinkled with fuscous; plical and second discal stigmata small, obscure, dark fuscous; a small suffused dark fuscous spot before tornus: cilia pale yellow-ochreous. Hindwings grey, darker posteriorly; cilia light grey.

Sydney, New South Wales, in December; three specimens.

271. *Y. thanatopsis*, Low.

(*Ypsolophus thanatopsis*, Low., Trans. Roy. Soc. S. Austr. 1901, 82.)

♂. 12-14 mm. Head, thorax, and abdomen light fuscous. Palpi fuscous, apex of second joint whitish, tuft moderate, terminal joint posteriorly whitish. Antennæ whitish-fuscous, darker-ringed. Forewings with costa gently arched, apex round-pointed, termen almost straight, oblique; pale fuscous, with some scattered distinct dark fuscous strigulæ; an oblique dark fuscous mark crossing fold at $\frac{1}{3}$; a dark fuscous spot above middle of disc; stigmata dark fuscous, plical obliquely before first discal: cilia whitish-fuscous. Hindwings fuscous; cilia pale fuscous, tips whitish.

Cooktown, Duaringa, and Toowoomba, Queensland, in September and February; two specimens (one received from Mr. Lower).

272. *Y. dryinodes*, Low.

(*Ypsolophus dryinodes*, Low., Trans. Roy. Soc. S. Austr. 1897, 58.)

♂♀. 19-22 mm. Head and thorax brownish-ochreous, sometimes slightly reddish-tinged. Palpi dark fuscous sprinkled with whitish, apex of second joint whitish, tuft long, terminal joint rosy-whitish, apex dark fuscous. Antennæ ochreous ringed with fuscous and dark fuscous, in ♂ abruptly sinuate above basal joint, apex of basal joint produced above sinuation into a hook-like tooth. Abdomen pale ochreous sprinkled with fuscous. Legs dark fuscous, apex of joints and hairs of posterior tibiæ whitish-ochreous. Forewings moderate, costa gently arched, apex obtuse, termen sinuate, rather oblique; light fuscous, slightly reddish-tinged, strewn with usually very indistinct dark fuscous strigulæ; extreme costal edge whitish-rosy; stigmata small, dark fuscous, plical rather obliquely before first discal; a spot of dark fuscous suffusion on dorsum towards base, and another before tornus: cilia light greyish-ochreous, slightly rosy-tinged, with two fuscous lines. Hindwings fuscous, paler and thinly scaled towards base; cilia whitish-fuscous, with darker subbasal shade.

Duaringa, Rosewood, and Brisbane, Queensland, from September to December; eight specimens, and type seen. Whilst superficially very similar to its allies, this species is immediately distinguished by the peculiar structure of the antennæ of male, and the markedly sinuate termen of forewings. The recurrence of this curious antennal structure in various unrelated genera as a character of not more than specific value is a singular phenomenon.

273. *Y. capnites*, n.sp.

♂♀. 16-20 mm. Head and thorax fuscous, slightly reddish-tinged, sides of crown sometimes whitish, shoulders rosy-tinged, edged with dark fuscous. Palpi dark fuscous, apex of second joint whitish, tuft moderate, triangular, terminal joint whitish on sides, very long. Antennæ and abdomen fuscous. Legs dark fuscous, posterior tibiæ paler. Forewings with costa gently arched, apex obtuse, termen rather obliquely rounded; fuscous, indistinctly strigulated with dark fuscous; costa rosy-tinged on basal third, with dark fuscous basal dot; an obscure dark fuscous spot in disc at $\frac{1}{4}$; stigmata rather large, very obscure, dark fuscous, plical somewhat obliquely before first discal: cilia fuscous, tips paler. Hindwings fuscous, darker posteriorly; cilia pale fuscous, with darker subbasal shades.

Toowoomba, Queensland; Mount Lofty, South Australia; in September and October, five specimens.

55. Thalamarchis, n.g.

Antennæ $\frac{4}{5}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi very long, recurved, second joint with appressed scales, terminal joint as long as second, acute. Forewings: 2 and 3 tolerably remote, parallel, 7 and 8 stalked, 7 to termen. Hindwings $1\frac{1}{4}$, ovate, cilia $\frac{1}{3}$; 3 and 4 connate, 5, 6, 7 tolerably parallel.

Although showing simple structural characters, the single species forming this genus appears to stand quite isolated, and I am unable to see that it bears near relationship to any form known to me. In its large size and conspicuous colouring it resembles an Oecophorid of the *Philobota* and *Hypercallia* groups,

and since the palpi and neuration also agree, it might be thought to be really akin to them, but the hindwings considerably exceed the forewings in breadth, and the antennæ of male are quite without ciliations; the combination of these two prohibitive characters seems to me conclusive. The structure of vein 2 of the forewings, which is not widely remote from 3, removes the species from the Xyloryctid group. It accords well with the family characters of the *Gelechiadæ*, but is discordant in every group of that family, and I am compelled to regard it as representing an early unspecialised branch; perhaps other allied forms may be discovered in West Australia.

274. *T. alveola*, Feld.

(*Cryptolechia alveola*, Feld., Reis. Nov. pl. cxl., 35.)

♂♀. 23-26 mm. Head orange. Palpi pale ochreous-orange, base of second joint dark fuscous, terminal joint more or less suffused with dark fuscous. Antennæ blackish. Thorax pale orange, darker anteriorly, with a curved antemedian band and a posterior spot purple-blackish. Abdomen dark fuscous, segmental margins and anal tuft orange. Legs dark fuscous ringed with pale orange, posterior tibiæ more or less wholly pale orange. Forewings elongate, moderate, costa gently arched, apex obtuse, termen almost straight, rather oblique; whitish-ochreous, more or less orange-suffused at base and towards dorsum and termen; four moderate irregular-edged purple-blackish fasciæ, first subbasal, outer edge prominent in middle, second below middle dilated and enclosing a spot of groundcolour, third running into middle of fourth, and connected with dilation of second by a narrow bar, fourth subterminal, enclosing a series of dots of groundcolour in disc, and connected with termen below apex by a bar: cilia whitish-orange, with dark fuscous spots on extremities of fourth fascia and a patch below apex. Hindwings dark fuscous; costa ochreous-yellowish; a large ochreous-yellowish tornal patch; cilia light ochreous-yellowish, with a dark fuscous apical patch and smaller patch below middle.

Geraldton, York, Perth, and Albany, West Australia; from October to December, common; fourteen specimens.

Appendix.

The following species have been erroneously assigned to this family :—

275. *Gelechia strophiopeda*, Low., Trans. Roy. Soc. S. Austr. 1894, 105, is a synonym of *Coesyra discincta*, Meyr. (*Oecophoridæ*).
276. *Gelechia anthracephala*, ib. 105, is probably an *Ocystola* (*Oecophoridæ*).
277. *Gelechia microspiloplaca*, ib. 106, is a synonym of *Sphyrelata melanoleuca*, Meyr. (*Oecophoridæ*).
278. *Gelechia epimela*, ib. 106, is a *Macrobathra* (*Oecophoridæ*).
279. *Gelechia ombrodes*, ib. 1897, 56, is an *Eulechria* (*Oecophoridæ*), but see above under *Anaptilora isocosma*, Meyr.
280. *Aristotelia monostropha*, ib. 57, is a *Periallactis* (*Oecophoridæ*).
281. *Gelechia siccella*, Walk., Tin. 643, is an *Eulechria* (*Oecophoridæ*).
282. *G. arrectella*, ib. 643, is a *Macrobathra* (*Oecophoridæ*).
283. *G. bigerella*, ib. 644, is a *Macrobathra*.
284. *G. alternatella*, ib. 644, is a *Macrobathra*.
285. *G. suppletella*, ib. 645, is a *Linosticha* (*Oecophoridæ*).
286. *G. marmoratella*, ib. 646, is unidentifiable; type lost.
287. *G. advectella*, ib. 647, is an *Ochlogenes* (*Oecophoridæ*).
288. *G. constrictella*, ib. 647, is a *Macrobathra*.
289. *G. lactella*, ib. 648, is an *Oenochroa* (*Oecophoridæ*).
290. *G. moestella*, ib. 648 = *Nephogenes stella*, Newm. (*Oecophoridæ*).
291. *G. absumptella*, ib. 649, is apparently a *Pleurota*, but very worn and unrecognisable.
292. *G. rubicundella*, ib. 649, is a *Macrobathra*.
293. *G. xylopterella*, ib. 650, is not yet satisfactorily determined (not being truly identical with *Eulechria xylopterella*, Meyr.), but is not a Gelechiad.
294. *G. suppressella*, ib. 650, is an *Ocystola* (*Oecophoridæ*).
295. *G. abductella*, ib. 650, is a *Philonympha* (*Oecophoridæ*).
296. *G. consuetella*, ib. 651, is a *Protomacha* (*Oecophoridæ*).
297. *G. rutilella*, ib. 1025, is unidentifiable, type broken and worn.
298. *G. abolitella*, ib. 1025, unidentified, is probably not Australian.

299. *G. subactella*, ib. 1026, hardly identifiable, is perhaps not Australian.

300. *G. vacatella*, ib. 1026, is probably not Australian.

301. *G. adactella*, ib. 1027, worn and unidentifiable, is perhaps not Australian.

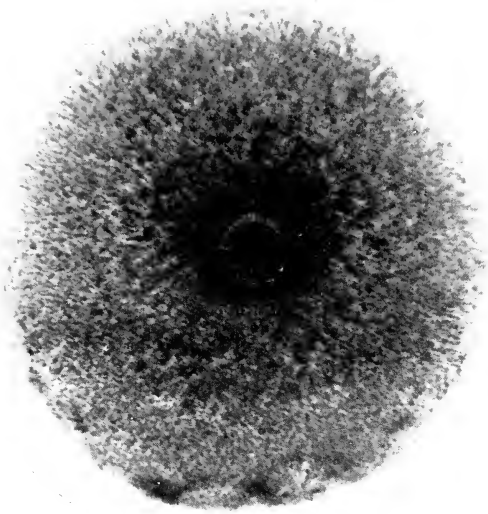
302. *G. melanophorella*, ib. Suppl. 1831, not seen, perhaps a *Bondia* (*Tortricina*).

INDEX OF GENERA.

INDEX OF SPECIES.

The numbers refer to those attached to each species in succession; names italicised are quoted as synonyms or without being adopted; those without authors' names suffixed are new.

[Printed off September 14th, 1904.]



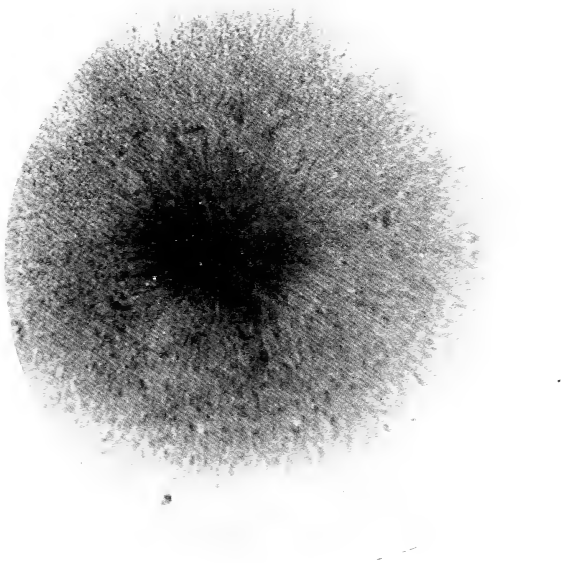
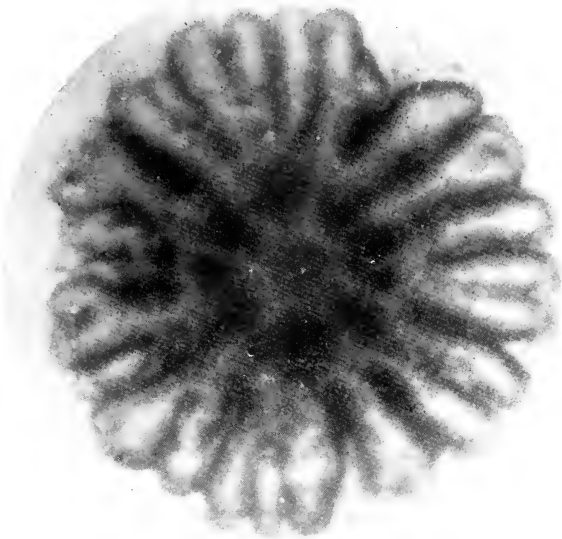


Fig. 2.

BACTERIUM ACACIÆ.

Fig. 3.



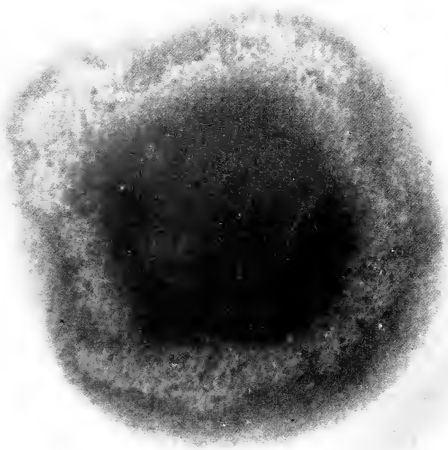


Fig. 4.

BACTERIUM PARARABINUM.

A VARIABLE GALACTAN BACTERIUM

(*Bacillus Atherstonei*, n.sp.)

By R. Greig Smith, D.Sc., Macleay Bacteriologist to the Society.

During an investigation connected with the bacteria occurring in *Strychnos Atherstonei*, Harv., a slime bacterium was isolated which grew upon plates of gelatine media as colonies of a loose, almost powdery, consistency. They lay loosely upon the surface of the medium and broke up into fragments when touched with the needle. This behaviour was suggestive of a very insoluble gum being formed by the bacterium, probably of a kind that had not been credited to bacterial activity. On this account a pure culture of the organism was prepared by repeated culture in glucose-gelatine plates, and experiments were made to obtain and identify the gum.

The repeated purification by plate culture is necessary with most bacteria, but especially is this the case with bacteria which form zooglœa masses which do not liberate individual bacteria upon being shaken up with the molten medium. During the purification, the bacteria were grown in nutrient bouillon in which little slime is formed and in which most of the cells are isolated. The pure culture was infected into a saccharose-peptone-fluid medium, and in the course of time this became ropy.

The bacteria could therefore produce slime from saccharose. The next question was from what other sugars or carbohydrates could the slime be formed? To test this point a peptone fluid was prepared and put into tubes. To these were added small quantities (from 1-2%) of different sugars, etc., and after a week's incubation at 22° the tubes were examined. The casual examina-

tion was not very satisfactory, and so the viscosity of the cultures was determined. The following table gives the time in seconds during which 5 c.c. of the culture passed through a pipette with a capillary orifice.

Sugar added to Medium.*	Viscosity.
Maltose	960
Glycerine	420
Galactose	50
Levulose	48
Dextrose	47
Lactose	47
Invert sugar	46
Mannite	45
Raffinose	
Inulin	
No sugar	

The excessive viscosity of the media containing maltose and glycerine was caused by transparent zoogloea masses or floating films passing very slowly through the capillary point of the pipette. The experiment shows that the bacterium can form slime from levulose, dextrose, invert sugar, galactose, lactose, maltose and glycerine; it had been already found that saccharose must be included among these nutrients.

Since glycerine served so well, and as it is comparatively easy to eliminate from the slime, it was employed in the production of a quantity of the gum. At the end of three weeks the medium† which had been kept at the laboratory temperature (14-17° C.) contained floating slime-films, and a film adhering tenaciously to the surface of the glass above the fluid. The films and the ropy fluid were removed from the flask and evaporated down to about 200 c.c. In this the slime was precipitated by alcohol. The coagulated slime was treated with water and the almost homogeneous slime was again coagulated with alcohol. Neither the

*Peptone 0·25, sodium phosphate 0·2, potassium chloride 0·3, water 100 grms.

† Glycerine 50, peptone 5, sodium phosphate 2, potassium chloride 3, water 1000 grms.

slime nor the first alcoholic mother-liquor contained reducing sugars. The slime, which must have been practically free from glycerine, was treated with water and heated in the autoclave at a pressure of three atmospheres for fifteen minutes. This treatment produced a viscous solution and a small quantity of white curd. The viscous solution was filtered, then clarified with aluminium hydrate and divided into two parts. One of these portions was precipitated with alcohol aided by potassium chloride, filtered, pressed, and boiled with 5% sulphuric acid for six hours. The other portion was evaporated down until a gelatinous mucilage was obtained.

Upon testing drops of the mucilage with drops of reagents upon a glass plate, white curdy masses were obtained with neutral, basic, and ammoniacal lead acetates, barium hydrate produced a translucent white clot, copper sulphate and ferric chloride gave precipitates, milk of lime coagulated and sodium silicate thickened the gum, while Fehling's solution produced a purple jelly. No reactions were obtained with potassium hydrate, Schweitzer's reagent, iodine, or borax paste.

The mucilage when evaporated upon the water-bath dried as a transparent gummy mass. This when treated with water partly dissolved and partly swelled. The swollen portion was easily soluble in dilute sodium hydrate, but difficultly soluble in dilute hydrochloric acid.

The gum was not hydrolysed when boiled with 5% sulphuric acid for 10 hours. The solution was thereupon evaporated down upon the water-bath until it blackened. It was then diluted to the original volume and boiled for 4 hours. The sulphuric acid was removed with barium carbonate and the filtered solution was evaporated and treated with phenylhydrazine acetate solution and heated on the water-bath for two hours. The osazone which separated upon cooling was dried and extracted first with ether, then with hot water, and finally it was dissolved in hot dilute alcohol. Upon cooling the hot dilute alcohol, a pure osazone separated out; the appearance and melting point (193°) showed it to be galactosazone. The hot water dissolved a small quantity

of galactosazone together with traces of a vitreous yellow body. In the dilute alcoholic filtrate from the bulk of the galactosazone a small quantity of galactosazone was also obtained. No other osazone was present, and thus galactose is the sole product of the hydrolysis of the gum, which is therefore a galactan.

When first obtained from the tissues of the plant, the bacterium grew as brittle, translucent white colonies which upon subcultivation became transparent and gelatinous and appeared, microscopically, to consist of an aggregate of gelatinous clumps. To make sure that the culture was pure, a tube of glucose-gelatine was infected and incubated at 30° for three or four hours to obtain a distribution of the bacteria throughout the medium before dilutions were made and plates were prepared. The plates revealed the presence of another organism which produced yellow slimy colonies on glucose-gelatine. To thoroughly eliminate this impurity, a gelatinous colony was inserted into nutrient bouillon which was incubated at 30° for 24 hours. Then dilutions were made in glucose-gelatine and plates were prepared. The colonies that developed were all of the gelatinous type, and a pure culture had apparently been obtained. After some time I noticed the impurity again appearing in my cultures, but a passage through bouillon enabled the culture to be again purified. Once more, after the lapse of a month or so, the impurity again appeared. On considering the matter, it appeared to be extremely probable that the bacteria were one and the same and that the different appearance of the colonies was due to an alteration in the solubility of the gum. Experience had indicated that the change could be brought about quickly by incubating a glucose-gelatine culture at 30°.

To prove the matter, the following process was adopted. The culture was used for infecting nitrate-bouillon, which was, after a period of incubation, employed for preparing dilutions in glucose-gelatine. From the glucose-gelatine a pure colony of the gelatinous bacterium was abstracted, and again nitrate-bouillon was infected and glucose-gelatine plates were prepared. The colonies were entirely of the gelatinous type. Portions of one

colony were transferred to two molten glucose-gelatine tubes. One of these was incubated for 3 days at 30°, the other for a similar time at 22°. The tubes were then used for making dilutions in glucose-gelatine, which were poured into Petri-dishes. The colonies that developed from the culture that had been incubated at 22° were entirely of the normal or gelatinous type, while those from the culture that had been incubated at 30° were all of the slimy type. From this it is evident that the bacteria were the same, and that the incubation in glucose-gelatine at 30° had so influenced the organism that it produced a soluble, yellowish slime instead of an insoluble, transparent, gelatinous carbohydrate. The insolubility of the carbohydrate, by restraining the growth of the cells, also prohibits the production of colour, as I have observed in many cases.

The identity of the types was furthermore proved by the examination of the gum produced from each. That from the slimy bacterium was also a galactan, and it gave the same chemical reactions as the other. In both cases the gum had been obtained by digesting the slimes in the autoclave, so that they were both in the soluble condition.

As neither the original nor the modified type appears to have been described, I propose the name *Bacillus Atherstonei* from its having been found in *Strychnos Atherstonei*.

Cultural Characters.

Shape, etc.—The bacteria appear as plump rods, with rounded ends, and when taken from saccharose-peptone-fluid and stained, measure 0·7-0·8 : 1-2μ; in this medium threads up to 7·5μ long have been observed. In the absence of sugar the cells are thin and sometimes vacuolated. In saccharose-fluid media the bacteria are motile and move with a waltzing and wriggling motion. The flagella could not be stained. Spores are apparently not formed, and the cells are not coloured by the Gram method of staining.

Temperature, etc.—The bacteria grow at 30° C. and at lower temperatures, but at 30° gum or slime is not formed in fluid cultures. It is produced at and below 22°. The organism grew to

some extent under the anaërobic conditions that prevailed under the mica sheet in agar plate culture.

Nutrient-agar plate.—The colonies are dry, raised and glisten faintly. They are very cohesive and are removed *en masse* with the needle. Microscopically the centre is dark and puckered, and coarse granules radiate to the margin. The modified form grows as pale buff, luxuriant, raised glistening colonies. Microscopically they are homogeneous and finely granular.

Glucose-gelatine plate.—The colonies develop as irregular translucent masses or crusts. They are friable and easily removed *en masse* from the medium. Microscopically they appear to be composed of aggregations of different-sized slime-masses arranged irregularly and rising to a point in the centre. The deep colonies are semi-transparent and moruloid. The colonies appear similar when grown in levulose-asparagine-gelatine and in nutrient gelatine, although in the latter they are much smaller. The altered form grows as a pale buff, round, slimy, circular colony. Microscopically it is uniformly and finely granular. The deep colonies are granular and opaque, with a translucent zonate margin. In nutrient gelatine the colonies are white, but otherwise as upon glucose-gelatine.

Saccharose-potato-agar stroke.—The growth consists of dry and leathery fused crusts, which slowly develop into a luxuriant elevated bunch-of-grapes structure. The derived type forms a thin, scarcely visible gum, which flows into the condensed water. Ultimately the growth becomes dry, whitish and glistening.

Nutrient-agar stroke.—There forms a dry, pale buff growth, consisting of a collection of granular, raised, dull crusts. The modified bacterium grew as a pale buff, fat-glistening, raised stroke, with a smooth edge. The colour deepened to a strong yellow.

Glucose-gelatine stroke.—A dull, translucent, raised and corrugated ribbon is developed. The altered bacterium formed a white, gummy growth, which flowed downwards. By the eleventh day a furrow occupied the site of the stroke; the gelatine had been liquefied.

Glucose-gelatine stab.—The canal develops as a rough white line, with a moruloid nail-head like the colonies in plate culture. The stab of the derived type was filiform; the nail-head consisted of a raised slime, which became depressed from a consumption of the gelatine.

Nutrient-gelatine stab.—As in glucose-gelatine, but not so luxuriant.

Potato.—Dry, buff crusts as on nutrient agar. The altered organism formed a pale buff slime, which gravitated into the cotton wool plug. It became deep yellow and dry.

Bouillon.—The medium becomes slightly viscous and turbid, with a surface ring and a granular deposit. The indol reaction was obtained. In nitrate-bouillon, the nitrate is reduced to nitrite. The modified bacterium produced a turbid medium with no surface ring. Otherwise it was as the other.

Milk.—The medium becomes ropy, especially at the surface, on account of the formation of thick floating zoogloea films. The derived organism produced no apparent change in the medium.

THE RED STRING OF THE SUGAR-CANE

(*Bacillus pseudarabinus*, n.sp.).

By R. Greig Smith, D.Sc., Macleay Bacteriologist to the Society.

(Plates xiii.-xv.)

The presence of red-coloured vascular strings in the sugar-cane is not at all uncommon. The phenomenon appears to accompany several diseases of the cane, and at the same time canes which are to all appearance healthy may exhibit the colour. Among the diseases there are (1) the Sereh Disease, concerning the etiology of which there is much doubt; (2) the Sugar-Cane Disease of Massee, caused by *Trichosphaeria sacchari*, Massee,* and a similar disease, the Pine-apple Disease of the Cane, described by Went† as being produced by *Thielaviopsis ethaceticus*, Went; (3) the Red Smut of the Sugar-Cane, occasioned by *Colletotrichum falcatum*, Went, and this is undoubtedly identical with Cobb's Red Rot of the Sugar-Cane.‡ The instances of red string that I have investigated were not, however, related to any of these diseases, for they occurred in cases otherwise healthy and in plants affected with gummosis. The phenomenon must not be confused with the red-coloured tissue of some decayed canes, for in such cases the red colour only indicates that the cellular tissue is dead.

The first example of Red String that I examined was the case of an apparently healthy cane which had only three or four coloured bundles in cross section. The sample was small and

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* Massee, Ann. Bot. vii. 525; also in Text Book of Plant Diseases, London, 1899, 103, 365.

† Went, Ann. Bot. x. 583.

‡ Cobb, Agric. Gazette N.S. Wales, 1893.

contained many bacteria. A transverse section of one of the red bundles showed that the colour was caused by the presence of a red gum in the large vessels (Pl. xv., fig. 12). A red gum is also found in the Sereh Disease and in Red Smut, concerning both of which Went says that the gum is not caused by bacteria.

Other examples which I investigated were canes which were undoubtedly affected with gummosis; these were of the Chenoma variety which had been grown upon low-lying, poorly drained land.

Portions of the red strings were cut out with a sterile knife under aseptic conditions, and were inserted into tubes of molten ordinary glucose-gelatine, which after standing for an hour or two at 30° were poured into Petri-dishes. From the first and second samples I ultimately obtained a mould and several bacteria. In glucose-gelatine the mould produced a brilliant crimson-scarlet colour, and it undoubtedly was the agent which was primarily responsible for the colour of the strings. But from the presence of gum in the vessels I was of the opinion that the mould was accompanied by a slime bacterium, and that the complete phenomenon of red gum was brought about by the simultaneous growth of two organisms, a mould and a bacterium. This view was confirmed during the research. It may, however, be mentioned here that every portion of red vascular bundle that was taken did not contain the mould, but did contain slime-forming bacteria; and from this we must conclude that the mould does not accompany the gum along the whole length of the string, but colours the gum which is carried along the vessels, perhaps by sap-pressure, perhaps by bacterial growth, or that the rapid growth of bacteria starves out the mould after the colour has been produced. At any rate two things are certain, (1) the mould can under certain conditions produce the colour and cannot produce slime, and (2) the bacteria do produce slime.

In the original case three bacteria had been isolated. One of these I shall for convenience call the white slime bacterium, another was *Bact. sacchari*, the third was a race of *Bact. fluorescens liquefaciens*. To test which of these would produce a

crimson colour when grown in combination with the mould, the following experiment was made. A fragment of the mould was planted upon the centre of a plate of nutrient levulose-agar on which medium it seldom produces more than a trace of colour. When the mould had grown outwards as a zonate white pile of about 3 cm. diameter, the bacteria were infected at three places equidistant from the centre. In three days giant colonies had formed at the points of infection, while the mould had spread towards them. As the mould touched the white slime bacterial colony, a brilliant crimson colour developed not only throughout the colony but in the neighbouring medium. The colony of *Bact. sacchari* developed a foxy-red colour at the side towards the mould, and the medium was faintly stained the same colour. The mould refused to grow towards the colony of *Bact. fluorescens liquefaciens*, but grew around it, leaving a vacant space varying from 2 to 3 mm.

The experiment made it evident that of the three bacteria only one, viz., the white slime bacterium, could be of service to the mould in producing the colour of the crimson-red gum in the vessels of the cane. The nature of the slime, which was of the pasty consistency of cane-gum (the product of *Bact. vasculorum*), also showed that it was well adapted for plugging up the large vessels of the vascular strings of the sugar-cane.

This bacterium grew upon fresh sterilised portions of sugar-cane as a white slime, while the mould during its growth upon the same substratum produced practically no colour,* the older cultures only showing spots of pinkish aerial hyphæ. But when both bacterium and mould were grown upon the cane, a deep crimson colour developed upon the outside of the cane where the

* Upon old portions of sugar-cane a red colour developed. Possibly the saccharose had become slowly inverted and the dextrose thus formed had induced the production of colour. Pigment appears to be determined by the presence of dextrose, other sugars or of gum. Saccharose and levulose generally do not cause a formation, but there appears to be no rule in the matter. Upon slices of potato sometimes the young growth is pink, sometimes it is white.

gum was forming. Upon cutting the cane across, many of the vascular strings were coloured; and finally the cotton wool upon which the cane rested also became crimson from the red gum which had flowed down the vessels of the strings. This experiment is, in my opinion, very significant as regards the combined (symbiotic) action of the mould and the bacterium in producing the red gum in the large vessels of the vascular strings of the sugar-cane.

I do not contend that this is the only bacterium that will assist in the red gum-formation, any more than I consider that the mould is the only fungus frequenting the cane that will produce a red colour; but it is clear from these experiments that the two are admirably adapted for producing the phenomenon. Although I have found the mould associated with *Bact. vasculorum* in a case of red string, yet these two did not produce the red colour upon sterile sugar-cane. Again, upon gelatine media the colour produced by these two is not so pronounced as with the mould and the white slime bacterium. The formation of a red colour upon sterile cane by the mould and *Bact. sacchari* was noted. A red gum traversed the vascular strings, but the colour was not so brilliant nor so much distributed as with the white slime bacterium.

The bacterium differed from those which I have previously obtained in forming white colonies and in producing a pasty slime upon levulose-asparagine-tannin agar. Several quantities of the slime were prepared by growing the bacterium upon this medium at different times, and from each quantity a solution of a gum was obtained by digestion in the autoclave. The gum mucilages prepared at different times gave identical reactions with certain reagents, so that these reactions may be taken as being constant and typical for the gum. The method of testing the gum is to place a drop of the thick mucilage upon a sheet of glass and to stir in a drop of the reagent. The following results were obtained. Basic and ammoniacal lead acetates gave a white clot, ferric chloride gave a brown clot, copper sulphate followed by potassium hydrate gave a blue precipitate which coagulated

but did not darken upon boiling the mixture in a test-tube. Sulphuric and phosphotungstic acids produced a curdy precipitate. No reactions were obtained with neutral lead acetate, barium hydrate, silver nitrate, mercuric chloride, copper sulphate, milk of lime, borax, iodine, Fehling's solution or Schweitzer's reagent.

With the exception of the phosphotungstic acid precipitate which is given with most bacterial gums, these reactions are identical with those given by arabin. But I did not, from the nature of the slime, expect the gum to be arabin, and this expectation was confirmed by the examination of the products of hydrolysis. After the gum had been freed from reducing sugars it was boiled for 5 hours with 5% sulphuric acid, when a portion was found to contain no gum precipitable by alcohol and to contain reducing substances. Fehling's solution was rather slowly reduced for a sugar, and as the whole portion gave but a trace of osazone it was evident that the gum was rather difficult to hydrolyse. In this respect it approached the pararabin gums. In two subsequent tests the gum was attacked by evaporating the solution in the water-bath with sulphuric acid until it began to char; then the solution was diluted with water to form a 10% solution which was boiled for two hours. A portion reduced Fehling's solution quickly, and upon the osazone being prepared and purified it was found to be galactosazone. Arabinosazone was carefully sought for at all stages of the purification, but it could not be detected. The gum was therefore a galactan, and was peculiar in giving the chemical reactions of arabin. In view of this behaviour, I propose to call the organism *Bacillus pseudarabinus*.

BACILLUS PSEUDARABINUS, n.sp.

Shape, etc.—The organism is a coccobacterium or short thick rod with rounded ends. In nutrient agar culture the rods measure 0·6 : 0·6-0·9μ, and in saccharose-potato-agar they are 0·7 : 0·8-1μ. In bouillon cultures the cells are actively motile. They stain readily, but are decolorised by the Gram method. The flagella are numerous and peritrichous; up to nine have been seen. No spores were observed.

Relation to oxygen.—The bacterium is a facultative anaërobe, there being a slight growth with gas-production under the mica plate in nutrient agar and saccharose-agar cultures.

Glucose-gelatine colonies.—They are raised, sometimes as hemispheres, circular, white and gummy. Microscopically they have granular radial striations from an almost opaque centre to the transparent edge. The deep colonies are opaque and rounded.

Nutrient gelatine colonies.—These are raised, white, glistening, and circular. Microscopically they are very finely granular with slightly erose margin and turbid or fibrous centre. The deep colonies are irregularly rounded, dark brown and somewhat zonate.

Nutrient agar colonies.—These are white, slightly raised, and from being round they become amœboid. Microscopically they are very finely granular. The deep colonies are oval or lenticular and semi-opaque.

Glucose-gelatine stab.—The needle track becomes filiform and rough. The nail-head is white, raised, and flat, with irregular margin. Gas bubbles are produced in the medium. By the 14th day the porcelain-white nail-head has become depressed centrally.

Glucose-gelatine stroke.—The growth is raised and white, with an irregular, erose margin. The colour becomes porcelain-white and the margin lobular. The growth becomes depressed from a slight liquefaction or rather consumption of the medium.

Nutrient gelatine stab.—More scanty, but otherwise similar to glucose-gelatine. A slight stratiform liquefaction had taken place by the 30th day.

Nutrient agar stroke.—A translucent white, broad, raised growth with spreading base is formed.

Bouillon.—The medium becomes very turbid, with a delicate white film and cohesive white sediment. The indol reaction was obtained and nitrates were reduced to nitrites.

Milk.—The medium had curdled by the 14th day and carried a slimy film.

Potato.—The growth is raised, fatty and dirty-white, but deepens to a flesh colour.

The Red Mould.

When infected upon the surface of nutrient glucose-gelatine the mould, when viewed from above, develops as a white, woolly growth. When seen from below, the surface of the medium is of a bright crimson-scarlet colour. The mycelium grows into the medium to about 5 mm. from the surface, while the colour slowly diffuses to lower depths. The gelatine is slowly liquefied. In faintly acid Hansen's glucose fluid* the mycelium grows throughout the liquid but soon covers the surface, producing a crimson velvety layer of hyphæ, the colour of which is communicated to the medium. Upon sterilised potato, rice, or sugar-cane, colour is not developed to any extent. The aerial hyphæ are white, while the ground hyphæ either remain white or become slightly olive-green. Then pale reddish prominences of hyphæ make their appearance, and as time goes on these are succeeded by black spots. Upon the surface of the potato or cane in contact with the glass wall of the test tube there is a progressive change of colour and variegated patches are produced.

Fragments of mycelium were sown in small hanging drops of nutrient fluid such as Hansen's fluid and ordinary nutrient bouillon. These sent out septate hyphæ, which branched and ramified in a horizontal plane. The refringent growing points of the hyphæ pierced the cell walls of neighbouring hyphæ which they chanced to meet, thus producing an anastomosing network. In some cases two parallel threads would present a step-ladder appearance. From the ground network, long delicate irregularly flattened hyphæ were sent into the air; these were sometimes studded with drops of fluid. In the damp chambers, these aerial hyphæ remained as such and never developed conidia or other organs of fructification; they simply existed as sharp-pointed aerial hyphæ. Besides these long and practically straight hyphæ there developed short, refringent, bent and twisted hyphæ.

* Peptone 10, dextrose 50, potassium phosphate 3, magnesium sulphate 2, water 1000. Neutralise with potassium hydrate until 10 c.c. contains an acidity = 1 c.c. $^{N}/_{10}$ acid.

These rose at right angles to the plane of the glass and appeared to be of the nature of haustoria. Like the hyphæ of the ground mycelium, they were capable of penetrating other hyphæ, but, as they rose vertically, they did not have the same chances of doing so.

When the growth reached a maximum, some of the cells which constituted the anastomosing mycelium became thinner and less refractile, while other cells or groups of cells became stouter and the walls thicker. These thickened cells, however, were no more resistant to the entry of the growing point of a hypha than the ordinary cells, for the point could enter and abstract the contents not only of the cell which was entered but also of its neighbours, thus indicating that the individual thickened cells although divided by a septum were still in communication. These thickened cells were apparently of the nature of oidia.

In solutions of sugar such as Hansen's fluid no further development was observed, but in nutrient bouillon the thickened cells became gradually spherical, dark-coloured, and very granular. Sometimes single cells developed in this way, but generally several adjoining cells began to change (Pl. xiii., figs. 1-2). After becoming dark and opaque, many of the cells divided, usually at right angles to the direction of the original hypha, but not always so. Frequently these secondary cells again divided, and either became spherical or remained attached as hemispheres, forming a small moruloid cluster of cells. At this stage the growth ceased in the damp chambers.

It will be remembered that black patches appeared upon the surfaces of sterilised potato and sugar-cane which had been infected with the mould. Under a low magnification these appeared intensely black, dull or slightly shining, rough and moruloid, apparently consisting of a collection of irregular spheres (Pl. xiii., fig. 3). They were brittle, and under pressure broke up into opaque fragments, at the same time liberating a multitude of minute, colourless, egg-shaped spores, each measuring $5 : 3\mu$ (Pl. xiii., fig. 4). In order to gain an idea of the structure of these spore-cases or perithecia, paraffin sections of a potato culture

were made through a black area. The examination of these sections showed that the perithecia contained spores lying free in the cavity and surrounded by a single layer of black-coloured goblet cells, the apertures of which were directed into the cavity (Pl. xv., fig. 14). No other structures such as paraphyses or conidiophores were present. The section also showed smaller perithecia in the act of fusing, the dividing cellular walls being absorbed and the contents of the smaller perithecia joining to form a larger pycnidium (Pl. xv., fig. 15). The ready absorption of the cell walls indicates that the goblet cells were spherical or palisade cells, the inner ends of which had been dissolved by a cytase.

By this time it had become evident that the presence of sugar in the medium caused a proliferation of hyphæ, while the absence of soluble carbohydrates induced the formation of the spherical, dark-coloured cells. It also occurred to me that if small quantities of an almost sugarless but slightly nitrogenous medium were inserted into parts of a stiff starch-paste, we should have a condition of affairs more suited to the growth of the organism than could be obtained in hanging drops or on gelatine media. A trial showed that the method was valuable, inasmuch as it enabled phases of the development to be observed which were not visible by the usual methods. A 20 % starch-paste was prepared and poured into small Esmarch-dishes to a height of 1 cm. A drop of yeast-water, infected with spores from a perithecium, was introduced beneath the tough surface skin of the starch by means of a sterile capillary glass tube. In two days at 22° the surface of the starch at the point of infection was scantily covered with long, white, pinkish or greenish, branching septate aerial hyphæ, below which were many black points radiating in lines to the margin of the medium. These black points were the perithecia that were found in the potato and sugar-cane cultures. Imbedded in the starch-paste were numerous hyphæ which showed all conditions between the simple cell and the perithecium, thus enabling the various stages in the development of the perithecia to be observed (Pl. xv., fig. 13). When the cylindrical cell becomes

globular, it contains two globules which become four and then eight. The spherical cell then divides, and each portion or daughter-cell contains eight globules (Pl. xiii., fig. 6). These globules are the forerunners of the spores; they are devoid of a cell wall, for they coalesce to form one large globule upon applying pressure to the cover glass. Within the growing or dividing cell they are therefore naked, and only become covered when the process of division ceases. When this occurs the spherical aggregation of cells is a perithecium, the cells being the asci and the outer walls of the peripheral layer of cells being the covering. From the study of the paraffin potato sections, and of what occurs when an immature or a mature perithecium is crushed, it is clear that all the asci break down with the exception of those portions of the asci which constitute the covering of the perithecium. Thus the mould, during the process of forming the perithecium, passes through an ascigerous stage; in other words, during its development it is a member of the Ascomycetes probably akin to *Sphærella*, and when fully mature it is one of the Sphæropsideæ allied to *Phoma* but differing in the absence of conidiophores in the perithecium.

When the mould is sown upon the surface of sugar-nutrient gelatine in Petri-dishes there is formed first a white then a crimson growth of aerial hyphæ which may rise to a height of 3 mm. (Pl. xiv., fig. 8). Upon potato or sugar-cane, small patches of a rusty or pink colour sometimes appear in the white pile. When the growth is white, uncharacteristic hyphæ predominate, while in the red growths the terminal cells of the aerial hyphæ are generally swollen to a flask-shape (Pl. xiv., fig. 9). The contents of the swollen cells may be hyaline or granular. In size they vary considerably; on the surface of fluids such as Hansen's glucose media they are small, while on sugar-gelatine they are large. In many cases the penultimate cell can be seen growing into the flask-shaped terminal cell (Pl. xiv., fig. 11), and there is sometimes presented the appearance of the intergrowth becoming a cluster of cells within the cavity of the terminal cell. The intergrowth may emerge and continue to grow like an ordinary

hypha. The spherical cells behave as conidia or as any cell of the hyphæ, for when isolated and inserted in nutrient media they germinate in a normal fashion (Pl. xiv., fig. 10). The aerial hyphæ may produce the dark-coloured, thick-walled, spherical cells (asci), but this is exceptional. It was observed in the case of white hyphæ growing on sterile sugar-cane.

I cannot identify the mould with any hitherto described fungus, but that may be due to the fact that allied microscopic fungi are classified by means of the perithecia or pycnidia which are formed when the mould breaks through the epidermis of the host plant. This stage I have not seen. But as I have given other details, the mould will, I think, be recognised by future workers.

EXPLANATION OF PLATES XIII.-XV.

Plate xiii.

Figs. 1-2.—Development of the dark-coloured cells in hanging drop of ordinary nutrient bouillon (× 425).
Fig. 3.—Perithecia in outline on sterile sugar-cane (× 80).
Fig. 4.—Spores from a ruptured perithecium (× 425).
Fig. 5.—Spores germinating (× 425).
Fig. 6.—Chain of dark-coloured cells imbedded in starch-paste (× 500).
Fig. 7.—Cells from a ruptured immature perithecium (× 500).

Plate xiv.

Fig. 8.—Growth on the surface of levulose-asparagine-gelatine. Diagrammatic (× 2).
Fig. 9.—Flask-shaped terminal cells of aerial hyphæ (× 425).
Fig. 10.—Isolated terminal cell germinating (× 425).
Fig. 11.—Intergrowth by penultimate cells (× 425).

Plate xv.

Fig. 12.—Red gum in large vessel of vascular string. Section of fresh cane (× 75).
Fig. 13.—Formation of perithecia. Film from starch-paste (× 400).
Fig. 14.—Section of potato culture showing goblet cells of perithecial wall (× 460).
Fig. 15.—Section adjoining the same, showing absorption of wall and fusion of perithecia (× 400).

NOTES AND EXHIBITS.

Mr. A. G. Hamilton exhibited photographs, spirit specimens, and sections under the microscope, showing the characteristics and structure of the West Australian Pitcher-plant (*Cephalotus follicularis*, Labill.), in illustration of a paper read at a recent Meeting of the Society.

Mr. Tillyard showed a series of original water-colour drawings of Australian Dragon-flies (*Odonata*), a group which has not received very much attention from entomologists in Australia.

Mr. S. J. Johnston exhibited, on behalf of Mr. R. T. Baker, F.L.S., who proposes to describe it at an early date, specimens of a supposed new species of *Actinotus* from New South Wales. The most characteristic features of the novelty are umbels on short peduncles; lanceolate bracts, 12 in number, hairy on both sides : pedicels short and thick : all the flowers staminate, only a few central ones pistillate : no petals.

Mr. Steel exhibited an unusually perfect series of the galls of both sexes of *Apiomorpha* (*Brachyscelis*) *pedunculata*, Fuller.

Dr. R. Greig Smith showed cultures of bacteria and of a mould, sections of sugar-cane showing red string, and samples of gum in illustration of his papers.

WEDNESDAY, JULY 27TH, 1904.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, July 27th, 1904.

Dr. T. Storie Dixson, President, in the Chair.

Mr. THOMAS STEPHENS, M.A., F.G.S., Hobart, Tasmania, was elected an Ordinary Member of the Society.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 22 Vols., 80 Parts or Nos., 19 Bulletins, 4 Reports, 3 Pamphlets, and 3 Miscellanea, received from 66 Societies, &c., and 2 Authors, were laid upon the table.

THREE NEW GENERIC NAMES FOR MOLLUSCA.

By Captain F. W. Hutton, F.R.S.

I find, through the publication of the 'Index Zoologicus,' that the following generic names, published by me for Land Mollusca, have been forestalled:—*Pyrrha*, by Cabanis in Aves, 1849; *Carthæa*, by Walker in Lepidoptera, 1858; and *Rhenea*, by Saalmüller in Lepidoptera, 1884. I therefore propose the following names to replace them—*Thermia* for *Pyrrha*, *Serpho* for *Carthæa*, and *Delos* for *Rhenea*.

NOTES ON AUSTRALIAN *COCCIDÆ*, EX COLL. W. W. FROGGATT, WITH DESCRIPTIONS OF NEW SPECIES. No. i.*

By E. Ernest Green, F.E.S., Government Entomologist, Ceylon.

(Communicated by W. W. Froggatt, F.L.S.)

(Plates xvi.-xvii.)

Chionaspis formosa, n.sp.

(Plate xvii.)

Male and female puparia often disposed in stellate groups on the surface of the leaves, as depicted by Maskell for his *Mytilaspis formosa*.

♀. Puparium snowy white: 1st pellicle yellow: 2nd pellicle reddish. Secretionary area smooth; usually broadly dilated, sometimes narrower and more elongate. Long, 2·50 to 3·50 mm.

♂. Puparium (fig. 5) much smaller and narrower. Feebly tricarinate; the median carina distinct, the lateral carinæ obsolescent. Long, 1·50 mm.

Adult ♀ (fig. 6) narrowed in front, broadest across median abdominal area. Margins of segments well demarked. Many small spinnerets and a ventral group of small conical spines on the lateral area of mesothoracic and subsequent segments. A diffuse transverse dorsal series of conspicuous sharply-pointed spines with broadly dilated bases (fig. 7) at the junction of the pro- and mesothoracic segments: and two small groups of 3 or 4 similar spines on the venter, immediately behind the metathoracic spiracles. Pygidium broadly rounded; with a wide median cleft. Median lobes only represented (fig. 8), widely

* For an earlier paper, under a slightly different title, see p. 559 of the Proceedings for 1900.

divergent, forming a narrow chitinous margin to the median cleft, their apices prominent and broadly truncate. Spiniform squames rather large and prominent. Circumgenital glands in 5 groups: median group with 4 to 6 orifices; upper laterals with 10 to 16; lower laterals with 24 to 28. Numerous conspicuous oval pores on dorsal area of pygidium, in the usual linear series. Long, 1·25 to 1·50 mm.

Hab.—On undersurface of leaves of *Eucalyptus tereticornis;* Young, N.S.W. (Coll. W. W. Froggatt, Nos. 332 and 354)—On *Eucalyptus* sp.; Goulburn Valley, Victoria (Coll. C. French, No. 9).

I have been unable to compare the present insect with typical examples of Maskell's *Mytilaspis formosa* (which it resembles so remarkably in the disposition and colour of the puparia): but from that author's figures and description, it is evident that the characters of the female insect are very distinct.

Mytilaspis spinifera, Mask.

Mr. Froggatt has sent me typical examples of this species. On examination, I find that Maskell was mistaken in assigning the position of the remarkable series of spines to the dorsal surface. Their real position is distinctly ventral. This species is peculiar to the "Weeping Myall," *Acacia pendula,* A. Cunn., and has a range as wide as its host plant.

Antonina australis, n.sp.

(Plate xvi.)

Insect enclosed in a white felted sac, with a small aperture at posterior extremity, through which projects a delicate brittle tubular filament. During the life of the insect this filament usually bears at its extremity a globule of the liquid sugary excreta, thus ensuring the discharge of this substance at a sufficient distance to avoid inconvenience to the insect. The sacs are more or less concealed beneath the sheathing bases of the leaves of the plant.

Adult ♀ (fig. 1) dull purple or reddish-brown. Subglobular, somewhat flattened on the ventral area. In the early adult

period there are transverse furrows marking the abdominal segments; but in older examples these are frequently obscured. At the posterior extremity the terminal segment projects slightly and is more densely chitinous, and roughened by small irregular prominences. It bears on its dorsal surface the anal ring, from which spring 6 stout hairs (fig. 2). Antenna (fig. 3) minute and atrophied, consisting of two irregular joints, the basal one incomplete; terminal joint with a few stout hairs. Legs entirely wanting. Spiracles (in macerated examples) large and conspicuous. The whole surface of the body thickly bestrewn with circular spinnerets, some of which give rise to small inconspicuous hairs. Long, 2 to 3·50 mm.; broad, 1·75 to 2·75 mm.

Young larva (fig. 4) with well developed legs and antennæ. Anal lobes minute, each bearing a stout seta. A transverse series of circular spinnerets on each segment,—about 14, of which 8 are dorsal and 6 ventral. Similar transverse series of bristles, alternating with the spinnerets. Antenna 6-jointed; 6th as long as or longer than the previous three together. Tarsus about equal to tibia. Anal ring with 6 hairs. Long, 0·65 mm.

Hab.— On "Nut-grass" (*Cyperus rotundus*), almost subterranean, clustered amongst the bulbous bases of the stems. Said to be destroying this plant "over a large tract of country on the Hunter River Flats, Australia." As the nut-grass is an objectionable weed, this Coccid may be classed amongst the few beneficial species.

Antonina australis bears a strong superficial resemblance to *Chætococcus graminis* of Maskell, but differs (*fide* that author's description) in the following particulars:—In the presence of only 6 (instead of 8) hairs on the anal ring; and in the terminal segment of the abdomen being prominent and tuberculate. It differs from *Ant. purpurea*, Sign., in the greater number and prominence of the circular spinnerets, and in the tuberculate character of the terminal segment. From *A. socialis*, Newst., it may be distinguished by the same difference in dermal characters and in its much smaller size. *A. nortoni*, Parrott and Ckll., differs in having the antennæ distinctly 3-jointed. *A. crawi*, Ckll., has

obscurely 4-jointed antennæ. I have not had access to the description of *A. parrotti*, Ckll., but it is unlikely that a species inhabiting New Mexico will be identical with the Australian insect.

I would here like to correct a statement that occurs in one of Maskell's papers (Trans. N.Z. Inst. 1898, p. 219), in which that author wrongly attributes to me the opinion that his *Chætococcus bambusæ* is specifically identical with *Antonina purpurea* of Signoret. *Chæt. bambusæ* is, of course, markedly distinct. The misconception arose from my suggesting to Mr. Maskell the affinities of his genus *Chætococcus* with the older genus *Antonina*, and pointing my remarks by reference to the type, *A. purpurea*. The lamentable death of the talented author prevented my explanation of his misconception. I am still of opinion that *Chætococcus*, as defined by Maskell, is inseparable from *Antonina*. I consider the difference in the nature of the sac of his type species to be merely environmental.

EXPLANATION OF PLATES XVI.-XVII.

Plate xvi., *Antonina australis*.

Fig. 1.—Adult ♀, ventral aspect (×35).
Fig. 2.— ,, ,, terminal segment, dorsal aspect (×150).
Fig. 3.— ,, ,, antenna (×600).
Fig. 4.—Young larva, ventral aspect (×100).

Plate xvii., *Chionaspis formosa*.

Fig. 5.—Male puparium (×25).
Fig. 6.—Adult ♀, ventral aspect (×100).
Fig. 7.— ,, ,, dorsal spines (×650).
Fig. 8.— ,, ,, extremity of pygidium (650).

ON A NEW SPECIES OF *HETERONYMPHA* AND A NEW VARIETY OF *TISIPHONE ABEONA*, Don.

By G. A. Waterhouse, B.Sc., B.E., F.E.S.

Heteronympha solandri, n.sp.

♂. Length of costa of forewing 26 mm. Shape as in *Het. merope* (♂).

Upperside dark brown, with orange blotches arranged as in *Het. banksii* (♂), but somewhat darker in colour.

Underside.—*Forewing* orange, with an oval black spot $\frac{1}{3}$ from end of cell, a black band just beyond end of cell from near costa, bending inwards near lower end of cell and then expanding to angle, returning half-way along outer margin, it connects with the band on the third median nervule, thus enclosing an orange spot. Between the discoidal nervules a small ocellus, below which is an oval whitish spot. *Hindwing* orange, with three bands of wavy brown marks, first crossing cell, second just beyond cell, third submarginal. Subanal ocellus much smaller than on upperside; subapical ocellus small, with another just below it.

Compared with the other species of the genus this sex may be described as shaped much as in *Het. merope* (♂) and *Het. philerope* (♂); and almost identical in marking with *Het. banksii* (♂) on the upperside; on the underside the forewing is nearest to *Het. philerope* (♂) and the hindwing to *Het. merope* (♂), but the orange is much brighter.

♀. Length of costa of forewing 27 mm. Shape nearly as in *Het. banksii* (♀), but both wings narrower.

Upperside as in the male, but wanting the sexual bar on median nervule; and with the ovoid spot near inner margin of forewing white.

Underside as in the male, except that the spot near inner margin of forewing is much whiter, and that the apical area of forewing and the whole of hindwing is dull brownish-orange.

This sex may be described as almost identical with *Het. banksii* (♀) on the upperside except as regards shape; while on the underside the forewing is nearest to *Het. philerope*, with a submarginal white spot, though the hindwing is distinct from any of the allied species.

The types in the collection of Mr. G. Lyell are from Poowong, Victoria, January, 1893, for the male; and Mt. Erica, Victoria (4500ft.), February, 1903, for the female.

Mr. Lyell has also given me a pair from Mt. Erica, which are very close to the types; and Mr. F. Brown took a male on 28th December, 1903, near the Jenolan Caves, N.S.W.

When shown the type male some years ago, I was inclined to regard it as an aberration; but on seeing both sexes from Victoria, and a male from New South Wales, I have no hesitation in claiming specific rank for this form.

Het. banksii was described by Leach in 1814 from a female, of which he gives figures of both sides. These figures represent the species that is characterised by the rich purplish-brown mottled hindwing below, and of which specimens from both New South Wales and Victoria are in my series, all taken during March and April.

Anderson and Spry* figure the uppersides of both sexes of *Het. banksii*, and give as dates December to March; the earlier date is either intended for *Het. solandri*, or is a mistake, as species of this genus are remarkably constant in their times of appearance, and Mr. Lyell's dates for Victorian *Het. banksii* are all March and April.

I have carefully examined the description of *Het. affinis*, Lucas,† and though only the upperside is described, it clearly represents *Het. banksii*.

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* Victorian Butterflies, i. p. 63, 1893.

† Proc. Linn. Soc. N.S. Wales, 1889, 1065.

Though the uppersides are closely allied, the much narrower wings and the decidedly different underside will easily serve to distinguish *Het. solandri* from *Het. banksii*. To those entomologists who date their specimens (and they are too few, I am sorry to say) another important clue will be given.

TISIPHONE ABEONA, var. ALBIFASCIA, var.nov.

♂♀. Upperside differs from typical *T. abeona* in having the short costal bar towards apex of forewing much broader and paler.

Underside with both bands of forewing paler and larger in size, and in the hindwing the discal white band is markedly broader than in typical *T. abeona*.

Hab.—Victoria and South-Eastern New South Wales.

T. abeona was described by Donovan in 1805; and no doubt, as the date suggests, from a specimen taken in the neighbourhood of Sydney, the typical form being found in the County of Cumberland, somewhat south along the coast, and on the Blue Mts.; while the variety is found in the South-Eastern portion of Australia.

I have considered it necessary to discriminate this variety, as it differs from the typical form in the same way, though in a slightly lesser degree, as *T. joanna*, from the Richmond River, differs from *T. rawnsleyi*, from South Queensland. Though some entomologists consider these distinct, I can see no more reason for doing so than for separating the two forms of *T. abeona*.

ON FOUR NEW SPECIES OF EUCALYPTUS.

By J. H. Maiden, Government Botanist and Director of the Botanic Gardens, Sydney.

1. Eucalyptus Seeana, sp.nov.

Syn. presumably *E. tereticornis*, Sm., var. *linearis*, Baker & Smith, 'Research on the Eucalypts,' p. 74.

A smooth-barked tree of medium size, with blotches on the bark, most closely resembling that of *E. tereticornis;* sometimes with a grey smoothish bark reminding one of that of *E. punctata* and *E. propinqua.*

Juvenile leaves petiolate, narrow-linear and falcate, say 4 inches long and $\frac{3}{8}$ inch wide, with numerous prominent transverse veins.

Mature leaves with long slender petioles, the leaves attaining a length of 9 inches and more, with an average width of, say, $\frac{5}{8}$ inch; texture rather thin, equally dull on both sides, with numerous minute transverse veins; the intramarginal vein distinct and somewhat removed from the edge of the leaf. The foliage slender, graceful and drooping.

Buds narrow, the operculum long and tapering, of the *tereticornis* type. The inflorescence usually up to seven in the head in the axils of the leaves, the peduncle about $\frac{3}{4}$ inch long and the pedicels about $\frac{1}{4}$ inch in length.

Fruit.—The peduncle and pedicel of the fruit are but slightly angular. Fruit small, nearly hemispherical, its diameter about $\frac{3}{16}$ inch; the rim well defined, forming a broadish band with the top of the rim truncate and the valves (three or four in the specimens seen) well exserted.

This is a species that I have had under observation for a considerable period, but I hesitated to raise it to specific rank until I had seen it in the field.

The narrowness of the young foliage is an obvious character, and attracts the attention of the non-botanist. This narrowness sharply separates it from *E. tereticornis*, its closest ally, which has broad juvenile leaves. As regards *E. propinqua*, Deane & Maiden, its superficial resemblance to *E. Seeana* is undoubted, but the buds sharply differentiate the two species, to say nothing of other differences.

The timber is deep red in colour, and Mr. District Forester Wilshire, of Grafton, informs me that it bears a high reputation for durability. He has sent me a piece of a fence post from Nymboida which has been in the ground for thirty years and which is perfectly sound. It is known locally as "Stone Gum."

Mr. J. L. Boorman and I found it a few miles from Grafton on the Glen Innes Road, and also on the Coramba Road. Mr. District Forester Wilshire states that it is plentiful at Nymboida in the Clarence River district. I have also seen it between the Clarence and Richmond Rivers. I received it from the Macleay River in 1893 from Mr. Forester MacDonald under the name of Grey Gum. Its range (it has often been confused with *E. tereticornis*) is a matter for further enquiry.

Mr. Augustus Rudder* refers to a very narrow-leaved variety of *tereticornis* in the Stroud district, with wood "rather lighter red in colour than the other" (*tereticornis*). He refers to the Booral and Stroud districts, but since we have indubitable *tereticornis* with very narrow leaves, and Mr. Rudder (who very kindly presented his valuable herbarium to me) is not positive that he has seen the "Stone Gum," I hesitate to state that the species comes so far south. The timber also is not "lighter red," and I have no specimens of the new species from Mr. Rudder.

It was collected by Leichhardt at Binnandale (*sic*), but whether this is in New South Wales or Queensland I do not know.

I have received specimens from Rockhampton (Queensland) which I doubtfully refer to *E. Seeana*.

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* Agric. Gazette N.S.W. Jan. 1896, p. 15.

I name this graceful and useful species in honour of Sir John See, K.C.M.G., late Premier and Chief Secretary of New South Wales, long my respected official superior, in whose electorate (Grafton) I first found it, and in which it is not rare. This tree will also perpetuate the memory of the late Lady See, who always evinced a keen interest in the vegetation of the State in which she was born.

2. EUCALYPTUS DEANEI, sp.nov.

Syn. *E. saligna*, Sm., var. *parviflora*, Deane & Maiden, these Proceedings, xxv., 464, 628. See also my 'Forest Flora of New South Wales,' Part iv., pp. 84-5 (July, 1903).

I am of opinion that this form should be removed from *E. saligna* (to which it possesses undoubted affinity), primarily on the ground of its broad sucker leaves. For this reason, in part, *E. dives*, *E. melanophloia*, and *E. Cambagei* are rightly considered distinct from *E. amygdalina*, *E. crebra*, and *E. goniocalyx* respectively. In Vol. xxv. of these Proceedings (Pl. xlii., figs.1-4), a mature leaf, half-grown leaf, sucker-leaf and fruits have been figured; and at pp. 464-5, under the name of *E. saligna* var. *parviflora*, this tree has been botanically described.

" Its foliage is magnificent, especially along the Glen Innes-Grafton Road (19-24-mile pegs), appearing like huge camphor laurels. Its habit is spreading, as opposed to the upright habit of Blue Gum, *E. saligna* " (E. C. Andrews).

It may be added that the fruit is uniformly smaller and more urceolate than that of *E. saligna*. Its timber is red, resembling that of *E. saligna*, but the differences have not yet been worked out. " Its butt is much like that of many ordinary Forest Red Gums of New England (*E. tereticornis*) with flaky outer bark " (E. C. Andrews).

In addition to the localities quoted in the 'Forest Flora' under *E. saligna* var. *parviflora*, I have collected it at Wallerawang, N.S.W. " As far as New England is concerned, where it is usually known as Brown Gum, it chooses especially the moist eastern edge of the plateau proper, on granite soil. Specific localities are :—Wilson's Downfall, Undercliffe; Great Dividing

Range east of Bolivia; Glen Innes and Grafton Road" (E. C. Andrews). I have also received it from Stanthorpe, Queensland, where it is a "very large tree, soft timber, thick sap, thick bark" (A. Murphy).

Its range, therefore, as far as is known at present, is the Dividing Range and spurs from near Picton Lakes in the south, to Southern Queensland in the north, its most westerly locality so far recorded being Wallerawang.

I name it in honour of my old friend Henry Deane, M.A., M. Inst. C.E., Engineer-in-Chief for Railway Construction of this State, my coadjutor in much work on the genus published in these Proceedings and whose stimulus and counsel in botanical work I have enjoyed for twenty years. He first drew my attention to this tree in March, 1888, at The Valley, Blue Mountains, and I have had it under observation ever since.

3. Eucalyptus Andrewsi, sp.nov.

A tall tree, on an average say 80 feet in height, with a stem diameter of 2-3 feet. "On the Bulldog Hill, 3,000 feet, (between the Timbarra and Clarence Rivers), it attains a diameter of at least 8 feet, and the height of large trees is most likely from 150 to 180 feet. Here it consorts with true Blackbutts, *E. pilularis*, and Forest Oaks (*Casuarina torulosa*) which even at times rise 100 feet, and 50 or 60 feet without a branch" (E. C. Andrews).

Writing from Drake to Mr. Cambage, Mr. Andrews says:— "One tree we measured 20′ in circumference, about 80′-100′ to first limb, and from 150′-180′ high (guess). Another 23′ circumference, 170′ high (?). Another we measured 25′ 6″ round butt (4′ above ground). Blackbutt-top but about 150′ high then. I suppose there were from 50 to 100 from 18′ to 20′ and 21′ in circumference."

Juvenile leaves rather large and soon becoming alternate, glaucous. The youngest foliage available to me is elliptical and about 4 inches long by half the width, with petioles of $\frac{1}{2}$ inch. "Seedlings have erect habit, with fairly large leaves; pale in colour" (R. H. Cambage).

Mature leaves broadly lanceolate, sometimes falcate, but apparently usually symmetrical. Dull on both sides and even glaucous,* but ultimately glabrous and even shining; equally green on both sides, venation spreading from the base. Usually under 6 inches long and about 1 inch wide. Of a distinct peppermint odour.

Buds clavate, the operculum sometimes slightly umbonate. A free flowerer, the anthers reniform.

Fruits nearly hemispherical, about $\frac{1}{4}$ inch in diameter; with a flat thick rim, tips of the valves flush with the mouth; peduncle thin; angular, $\frac{1}{2}$-$\frac{3}{4}$ inch long, pedicels about $\frac{1}{8}$ inch in length. Fruits abundantly produced, usually six to nine in the head. The fruits remind one of those of *E. hæmastoma* var. *micrantha*.

Bark.—Has "peppermint" bark on the trunk and large branches; only the ultimate branches smooth. Twigs red (claret-coloured), often glaucous, usually round, apparently rarely angular.

Timber pale-coloured, comparatively light in weight, and very fissile, containing a few kino veins. So similar in appearance to that of *E. piperita*, Sm., that I am at present unable to indicate any difference. "Split for palings" (R. H. Cambage). "Timber seemingly preferred to all others for fencing, building, etc." (J. L. Boorman). [In this connection it may be pointed out that the value of a timber is comparative; the best timber of a district may be inferior to that of another district.]

Known locally as "Blackbutt," less frequently as "Peppermint" and "Messmate." It is the "Blackbutt" of Mr. W. Christie's paper,* and his "Specimen No. 11" (p. 35) has been preserved. Known all over New England as "Blackbutt." At Oban it is called "Bastard Stringybark," and at Emmaville "Messmate" (E. C. Andrews).

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* Glaucousness often varies a good deal with the season of the year; *e.g.*, specimens received by me in October last were entirely dull or glaucous, others received in June of the present year are slightly shining.

Plentiful in many parts of New England, N.S.W. The species seems to attain its greatest size around Tingha. Plentiful on belts of porphyritic felsite (R. H. Cambage).

"Grows generally on granitic soils, but it frequently occurs on the junction of basaltic soils with those of poorer formation" (W. Christie).

North and east of Tingha (about 2700 feet above sea-level) and on the roads to Inverell and Guyra (R. H. Cambage); Howell (J. L. Boorman). "Following are New England localities: Wilson's Downfall, Undercliffe, Great Dividing Range west of Bolivia and Deepwater. From the 10- to 25-mile pegs along the Glen Innes-Grafton Road. Along the Glen Innes-Glen Elgin track, Kingsgate, Oban, Tingha, Drake, Glen Innes to Inverell Road, &c., &c. Broadly it selects the high rocky table-lands of New England, especially the eastern edge (if rocky and poor soil like granite), and also the large mesas which extend easterly of the mesas proper, as, for example, that large block of high land 50 miles in length between the Rocky (Timbarra) and Clarence Rivers" (E. C. Andrews). It extends to Queensland.

This species in habit, bark and timber seems to come closest to *E. piperita*. Its buds and fruits are, however, very different. It is also allied to *E. dives*, but it has not the characteristic juvenile foliage of the latter, from which it differs in other respects. Its similarity in fruits to *E. hæmastoma* has already been alluded to.

This species was first prominently brought under my notice by Mr. R. H. Cambage in October, 1903. That gentleman collected it and made extensive notes concerning it. It is named in honour of Ernest Clayton Andrews, B.A., Geological Surveyor, Department of Mines, New South Wales, who has been giving attention to the flora of New England, particularly as regards the vegetation on various geological formations, and

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* "The forest vegetation of Central and Northern New England in connection with geological influences." Journ. & Proc. Roy. Soc. N.S.W. xi. 21, 1877.

who has made special enquiries in regard to the tree that is now called by his name.

The specimens referred to as *E. Sieberiana*, F.v.M., var. *Oxleyensis*, Deane and Maiden, in these Proceedings (xxiii., 794, 1899) for the most part belong, in my opinion, to *E. Andrewsi*. They have smaller fruits, usually more pyriform than the type, but in view of the fact that the fruits of typical *E. Andrewsi* vary more than ordinarily as ripening proceeds, it is premature to define varieties of *E. Andrewsi* at present.

The following specimens belong, in my opinion, to *E. Andrewsi*: The Peppermint of Maiden's Dorrigo Report; summit of Mt. Seaview and adjacent mountains; Tenterfield District; "White Limb" of Glen Innes; "Peppermint," Cobark, on high ground (A. Rudder); Upper Williams River (A. Rudder); "Moore's Reef on top of hill going to the Hole. Tree in general appearance much like *E. piperita*. Height about 120 feet, diameter about 3 feet, with spreading and irregular smooth upper branches to size man's leg. Soil stony with blackish mould. 11/10/93" (A. Rudder).

The Cobark and Upper Williams River specimens were referred by Deane and Maiden (these Proceedings, xxvi., 123, 1901) to *E. fastigata* (pyriform series). Included with these are some specimens which are indubitably *regnans (fastigata)*, and I will refer in detail to the remarkable similarity of some specimens of *E. Andrewsi* to those of *E. regnans* in a forthcoming work on *E. regnans*. I will not enter into further detail at this place, since illustrations will render my observations more easily clear.

4. Eucalyptus Consideneana, sp.nov.

A tree of medium height.

Juvenile leaves narrow-lanceolate, petiolate, soon becoming alternate. A common size is a length of 3 inches with a width of $\frac{1}{2}$ inch. I have them, however, both shorter and broader. They are narrower than those of *E. Sieberiana*, F.v.M., or *E. piperita*, Sm. Of a rather strong peppermint odour, and often

of a silvery appearance. The young branchlets and seedling stems angular.

Mature leaves commonly oblique and falcate, broadly lanceolate. I have them up to 9 inches in length and nearly 2 inches in greatest width; they are rather thick in texture. Colour equally green on both sides, dull or shiny, blue-green or a bright sap-green. Veins strongly marked, spreading from the base, the intramarginal vein at a considerable distance from the edge, often looped (brachydodromous). "Leaves hang straight down" (Cambage).

Buds usually clavate and sometimes with pointed opercula.

Flowers.—Anthers uniform.

Fruits usually pyriform in shape, often nearly conical, rather more than $\frac{1}{4}$ inch in diameter. The valves often well sunk below the rim, but the points of the valves occasionally protruding. Sometimes the rim is slightly domed and the valves rather more exserted. The rim broad, smooth, well-defined and usually red in colour.

A medium-sized tree with grey tough bark to the tips of the branches, said bark being of that subfibrous character well known in Australia as "peppermint," very like that of *E. piperita*, but very different from that of *E. Sieberiana*.

Timber.—Wood pale-coloured, with kino rings, remarkably like that of the common Sydney Peppermint (*E. piperita*, Sm.). "Soft and ringy, not nearly so good as Mountain Ash, *E. Sieberiana*" (Boorman).

Range.—In coastal and coast-range districts of New South Wales, extending, as far as is known at present, from the Ulladulla District in the south across the country to near Goulburn, thence viâ Burragorang to the Blue Mountains (Springwood), and the Penang Mountain near Gosford.

Mr. Deane and I first collected it near Springwood in 1888. I have received it during the last four or five years from the following localities—Pigeon House Mountain, near Milton; grows to within 100 feet of the top, on sandy, rather barren soil; also sandy ground at Burrill, Ulladulla (R. H. Cambage); Wingello

(J. L. Boorman); top of mountain east of Burragorang (R. H. Cambage); Penang Mountain (A. Murphy).

Affinities.—The closest affinity of this species is to *E. Sieberiana* and *E. piperita;* in fact, it is possible that it is a hybrid between these two species. The bark is fibrous like that of *E. piperita*, and the general appearance of the tree reminds one of that species. The leaves, buds and fruits are reminiscent of *E. Sieberiana*, though the leaves are perhaps thinner. The narrow juvenile foliage leaves, however, separate the new species from any with which it is most likely to be confounded.

That the species possesses strong affinity to *E. stricta*, Sieb., there is no doubt; while its affinity to *E. fastigata*, Deane and Maiden, is considerable, in points other than that of the shape of the fruits. It was referred to in these Proceedings by Mr. Deane and myself (1900, p. 109) as *E. stricta* var.; and (1901, p. 123) as a form of *E. fastigata*.

The species can be most conveniently distinguished by its pyriform fruits and "peppermint" bark; the narrow sucker-leaves are also characteristic. Mr. R. H. Cambage, who has prominently brought this tree under my notice, gives the local names as "Peppermint" or "White Mahogany;" Mr. Boorman as "Messmate."

I name this species in honour of First-Assistant Surgeon D. Considen, one of the founders of Australia. In reviewing the "Historical Records of New South Wales" (Vol. i., Part 2) in the 'Sydney Morning Herald' of 23rd July, 1892, I drew attention to the fact that Considen's letter, dated 18th Nov., 1788, to Sir Joseph Banks, is perhaps the most interesting one in the collection to the student of economic botany. From the following passage it would appear that Considen was the founder of the Eucalyptus oil industry. "We have a large peppermint tree which is equal, if not superior, to our English peppermint. I have sent you a specimen of it. If there is any merit in applying these and many other simples to the benefit of the poor wretches here, I certainly claim it, being the first who discovered and recommended them." At this time a bottle of Eucalyptus oil

was sent to Sir Joseph Banks by Governor Phillip. I further wrote in the review, "I think some effort should be made to rescue the name of the first user of Australian plants from oblivion. I trust that at least a species will be named after the pioneer before many months are over."

I regret that the matter slipped my memory on more than one occasion, but I now dedicate to his memory a species very closely allied to that from which he distilled the first Australian Eucalyptus oil.

NOTES AND EXHIBITS.

In addition to examples of the four Eucalypts described in his paper, Mr. Maiden also exhibited a specimen of *Cenchrus calyculatus*, Cav., from Norfolk Island, a grass hitherto unrecorded from thence. He also gave the following additional vernacular names current on the island, viz.:—"Pon-low" (*Evodia littoralis*, Endl.); and "Shiny-leaf" (*Pennantia corymbosa*, Forst.).

Dr. Greig Smith exhibited, under the microscope, preparations of blood smears of Rhodesian Tick Fever, of Combined Rhodesian Tick Fever and Texas Fever, and of *Trypanosoma Theileri*, for all of which he was indebted to Mr. E. Heron, of Pretoria, South Africa.

Mr. Hedley exhibited a rare and interesting old work, the catalogue of the contents of the Museum of James Petiver, published by him in centuries under the title "Musei Petiveriani Centuriæ X., rariora Naturæ continens," &c. (8vo. Londini, 1695-1703).

Mr. Gurney exhibited, on behalf of Mr. Froggatt, specimens of the Coccids described in Mr. Green's paper.

Mr. G. A. Waterhouse exhibited both sexes of *Heteronympha solandri*, n.sp., described in his paper; and for comparison, examples of *Het. banksii*, Leach (♂♀); also the typical form and new variety of *Tisiphone abeona*, with examples of *T. joanna* and var. *rawnsleyi* for comparison.

WEDNESDAY, AUGUST 31st, 1904.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, August 31st, 1904.

Dr. T. Storie Dixson, President, in the Chair.

Mr. Robert C. McKenzie, Sanitary Inspector, (Department of Water Supply and Sewerage), Bronte Road, Waverley, was elected an Ordinary Member of the Society.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 24 Vols., 56 Parts or Nos., 28 Bulletins, 2 Reports, 13 Pamphlets, and 1 Miscellaneous, received from 46 Societies, &c., and 3 Individuals, were laid upon the table.

A REVISION OF THE AUSTRALIAN SPECIES OF *BOLBOCERAS*, WITH DESCRIPTIONS OF NEW SPECIES.

(Coleoptera, Fam. *Scarabæidæ*.)

By Rev. T. Blackburn, B.A., Corresponding Member.

I attempt a revision of the Australian species of this genus only with much hesitation on account of the impossibility of dealing with them in a manner that can be treated as final or authoritative. The published descriptions of these insects are in many instances perfectly useless, and the types are widely dispersed over the world. The largest assembly of types is probably that in the Australian Museum at Sydney, and if there were anyone there working on the Coleoptera of that group he would probably have the best opportunities possible of doing successfully what I am now attempting. But so far as I can ascertain there is no such worker to be found, and, therefore, I am disposed to attempt the task, though with the knowledge that I cannot hope to accomplish more than the publication for the first time in a connected form of all that can be definitely ascertained by a writer outside Sydney as to the Australian species of the genus. This may at any rate form a treatise that may provoke those who have the means of procuring the information necessary for correcting it to do so; and so something more satisfactory may be brought within measurable distance.

These insects, disregarding their sexual characters, are extremely closely allied *inter se*, but on the other hand there are few if any *genera* in which strongly marked sexual characters are more frequent. Nevertheless there is, so far as I can ascertain, no external character that is invariably distinctive of either sex; with the result that it is a frequent experience to meet with

specimens the sex of which cannot be determined without dissection. This is especially the case with a numerous group of very small species, in which either there is very little external difference between the sexes or the difference between the sexes is of a kind that leads to the supposition of the two sexes being distinct species. I have ascertained with tolerable certainty that the former is the case with at least two species of the group in question, and therefore have assumed it to be so with the others (having no evidence to the contrary), but I cannot overlook the possibility that some Bolbocerata which I treat as distinct specifically may eventually prove to be so only sexually.

In Masters' Catalogue 39 names are given as having been applied to Australian species of Bolboceras, 8 of which are quoted as synonyms. Of the 31 species enumerated as valid all but four appear to me entitled to stand without question. *B. Kirbii*, Westw., is, however, probably a variety of *B. proboscideum*, Schreib., as Westwood himself remarks in a footnote added when the description was already in type (Trans. Linn. Soc. Vol. xxi. p. 13), and in any case *Kirbii* was doubly a nom. præocc., *B. Reichei*, Guér. (male), having been redescribed under that name (*Kirbii*) by Hope (Proc. Ent. Soc. 1841, p. 43), and also by a singular coincidence under the same name again (this time the female) by Bainbridge (Trans. Ent. Soc. 1842, p. 79). *B. puncticolle*, Macl., appears to me to be identical with *B. taurus*, Westw.; I can find no material difference between the two descriptions except that Westwood gives the size as long, 8 lines and Macleay as long, $6\frac{1}{2}$ lines. I have seen specimens of the former size, but none smaller than $7\frac{1}{4}$l. The size of the cephalic horns is subject to considerable variation.

B. quadricorne, Klug, judged by the description, must be open to suspicion of identity with *frontale*, Guér. I have, unfortunately, no access to Klug's figure of his insect, and therefore can suggest the synonymy only with hesitation. Westwood says that he had not seen *quadricorne*. The other name that seems open to suspicion is that of *coronatum*, Klug, the description of which reads very much like that of the insect that Westwood described

as the female of *septemtuberculatum*, Bainb. The two are described as having the unusual character of the pronotum being transversely bicarinate, and are both reported from Western Australia. If they are identical and if Westwood is right in referring his insect to *?-tuberculatum*, then *coronatum* must be treated as a synonym. But with the double uncertainty indicated above, it is probably best to regard the two for the present as both valid species, distinguished from each other by the slight differences in tuberculation that are to be deduced from the descriptions. It may be added that Westwood quotes Reiche as considering that *?-tuberculatum* is the female of *B. hastifer*, Bainb., but decides that this is an error and the type of *?-tuberculatum* a male—in which I have no doubt he is right.

The eight names enumerated by Masters as synonyms in the genus, with two exceptions, agree with Westwood's determinations, and are, I have no doubt, correctly so enumerated. The two exceptions consist in the restoration of Guérin's names (*frontale* and *recticorne*) in place of Bainbridge's (*serricolle* and *hastifer*), in which Masters appears to be right.

Since the publication of Masters' Catalogue descriptions of Australian Bolbocerata have been published under ten new names, —three of them by Sir William Macleay and seven by me; eight of these ten are extremely distinct species, while two of them are closely allied to previously described forms—viz., *terræ-reginæ*, Blackb., and *simpliciceps*, Blackb. Since I described *B. terræ-reginæ* I have had the opportunity of examining numerous specimens of *B. proboscideum*, Schreib., from various parts of Australia, and find it so extremely variable in sexual characters that I am now disposed to look upon *terræ-reginæ* as an extreme local form of it, —a possibility that I suggested when I described the Queensland examples. The differences are sexual with the exception of a difference in the striation of the elytra, and with the knowledge that striation is undoubtedly affected by long immersion in spirits I am afraid that the validity of the species cannot be maintained on this character alone. Regarding the relation of *B. simpliciceps*, Blackb., to *B. planiceps*, Macl., I have nothing to add to what I

wrote when I described it,—viz., that the two must be very closely allied, but that unless Macleay was actually *incorrect* in his description of the front tibiæ they are distinct. I now describe 18 new species, bringing the total number to 54.

The Australian Bolbocerata are readily divisible into two main groups, in one of which the hind tibiæ have more than one transverse (or obliquely transverse) carina on their external face above the cariniform apex, while in the other group there is only one such carina. Unfortunately I cannot find that this (in my opinion by far the most satisfactory non-sexual) character is even referred to in any of the hitherto published descriptions of the insects in question, due no doubt to the fact that describers have not had occasion to look for non-sexual characters. But it follows that I am unable to apportion to either group with absolute certainty any species except those which I am able myself to examine. Nevertheless I am able to say that in no instance have I found the tibial sculpture of the First Group in any species not having a particular kind of sexual development (viz., 1 horn on the head and 2 on the pronotum of the male) and that all the species I have seen with that sexual development have the hind tibiæ pluricarinate; and as I have examined one or more species having sexual characters of each of the types of sexual form that have been attributed to Australian Bolbocerata, I am not at all likely to be wrong in assuming that the species not having male characters as indicated above must be excluded from the Group with multicarinate hind tibiæ even though I have not been able to verify the conclusion by examining specimens.

The males and females of the First Group (with the hind tibiæ multicarinate) present such extreme differences *inter se*—indeed have so little in common—that after long and careful efforts I have completely failed to find non-sexual characters on which it is possible to found a tabulation of the species, and therefore I have had to adopt the course of tabulating the males and females separately. The males present some variation in the degree of development of their sexual characters (in the few species of which I have seen numerous examples). Nevertheless there are

undoubtedly some respects in which I can find no variation, especially the *position* of the horns, and the shape and sculpture of the retuse area occupying the middle portion of the front of the pronotum. I find very little variation in the females. I may remark that although Sir W. Macleay in his descriptions seems to attach considerable importance to the form of the transverse carina at the base of the cephalic horn in the male, that character appears to me quite valueless, being absolutely variable and also varying with the point of view from which it is regarded.

There will be seen, when the surface of the head of a Bolboceras is examined, certain areæ marked off by fine raised lines which are arranged in the main on a uniform design in nearly all the Australian Bolbocerata, but which nevertheless vary in some details that appear to be genuinely specific. In males having strongly marked sexual characters on the head, some of the areæ are thrown out of form by the horns, etc., and made to assume different shapes, but essentially they are seen to be identical if carefully considered. As it will be necessary in the following pages to refer frequently to these areæ and lines, it seems desirable now to enumerate and name them. There is no real dividing line between the clypeus and the remainder of the head; nevertheless it seems convenient to use the word "clypeus." Carrying the eye forward from the front of the pronotum, the first inequality of the surface is an elevation (a transverse carina, often bifid or variously horned, or a mere horn or a tubercle), which I shall call the "frontal elevation." Some distance in front of this is another transverse carina (of very variable shape) which I shall call the "clypeal elevation." The clypeal elevation is returned at its extremities backward (in some species at an angle, in others with a curve) and runs longitudinally in varying length towards the back of the head; I shall call this longitudinal carina the "frontal margin," and the area quite or partially enclosed by the frontal elevation, the clypeal elevation and the frontal margins I shall call the "frons." The portion of the head in front of the clypeal elevation (which is divided by fine carinæ in most species into the "middle" and the two

"lateral" "areæ of the clypeus") I shall call the "clypeus." On either side of the frons a flattened or concave process projects over (and cutting into) the eye, which I shall call the "frontal wing," and in some species a carina runs forward from the back of the head close to the eye (in other species that carina is wanting, or confused with the frontal margin) which I shall call the "margin of the head." One of the modifications of the above characters seems to call for special remark, viz., that of the parts that I have called the "clypeal areæ." In the group of species with multicarinate hind tibiæ the lateral areæ (so-called) are in reality *above* and *behind* the middle area (sloping backward towards the eye in the females; scarcely traceable in the males—I think they form the lateral base of the frontal horn). To a casual glance they appear to be behind the clypeal elevation and therefore not part of what I have called the clypeus; but if these species be compared with those of other groups it will be seen that the carina most nearly continuing the line of the truncate middle part of the clypeal elevation does not really correspond with the carina that (where it is not obsolete) in the other groups is evidently the lateral part of the clypeal elevation, but with the carina that in those species runs obliquely forward and is unmistakably on the front face of (and a part of) what I have called the clypeus, and that the real continuation of the clypeal elevation is the hinder of the two carinæ that meet at each extremity of the truncate middle part of the clypeal elevation. As already remarked, this carina is scarcely (or not) traceable in the males of the First Group, but is lost in the base of the frontal horn which throws out of form and includes in itself all the other elevations of the front part of the head except the clypeal elevation. The correspondence indicated above of these carinæ in different Bolbocerata will be most readily observed by comparing a female of the First Group with a specimen appertaining to the Third Group, inasmuch as the carinæ in question take very variable directions in the Second Group, and in most of its species can be identified only when the eye has been trained by previous examination of the corresponding areæ in species of the Third Group and females of the First Group.

In Westwood's work on the Bolbocerata much importance was attributed to the form of the apical portion of the right mandible; but in the following pages I have not relied upon it, chiefly because there are many specimens in which it cannot be definitely ascertained without detaching the mandible. The external outline of the left mandible, however, is variable specifically and is easily examined; I have therefore treated it as of practical value in determining species.

The pronotum of all the Australian Bolbocerata known to me bears a large, usually ill-defined impression on either side somewhat behind the middle and near the lateral margin. I have called this by the name "sublateral fovea." It is variable in form both as an individual and specific character, and does not seem to me easy to use for distinguishing species.

The front margin of the pronotum usually bears a more or less distinct small impression on either side of its middle. In the species of the First Group (only) this impression takes the form of a very deep sharply defined circular fovea or "hole." Beyond that, I have not found it useful as a distinctive character.

I must not conclude these preliminary remarks without referring to the extremely valuable assistance I have received from Mr. W. W. Froggatt, who with most obliging courtesy has examined those of the species described by Sir W. Macleay that were unknown to me and drawn sketches of those parts on whose structure the following tabulation is based. Important parts of this memoir, therefore, are due to his, rather than to my, research.

Tabulation of Groups of Bolboceras.

Group i.—Upper face of hind tibiæ multicarinate transversely. Front margin of pronotum with two very deeply impressed small round foveæ.

Group ii.—Upper face of hind tibiæ with only one transverse carina above the cariniform apex. Front margin of pronotum not having deeply impressed foveæ. Carinæ dividing the clypeal areæ do not meet in the middle of the clypeal elevation.

Group iii.—Upper face of hind tibiæ and front margin of pronotum as in Group ii. Carinæ dividing the clypeal areæ meet in middle of clypeal elevation.

Tabulation of Species.

Group i.

Males.

*A. Frontal horn longitudinally carinate on its front — *Albertisi*, Har.
AA. Frontal horn not longitudinally carinate on its front.
B. Retuse area of pronotum concave.
C. Antennal club normal.
D. Frontal horn non-pilose.
E. Interval between apices of horns of pronotum much wider than head.
F. Frontal horn dentate behind — angulicorne, *Macl.*
FF. Frontal horn unarmed behind.
G. A deep sharply defined longitudinal median sulcus on surface of retuse area of pronotum — hippopus, *Macl.*
GG. Retuse area of pronotum not as in G. — cornutum, *Macl.*
EE. Interval between apices of horns of pronotum not wider than head.
F. 14th and 15th striæ of elytra confluent in front — rhinoceros, *Macl.*
FF. 14th and 15th striæ of elytra not confluent — Macleayi, *Blackb.*
DD. Frontal horn pilose.
E. Horns of pronotum branched, — the front branch long, porrect, —the hind short, erect — Reichei, *Guér.*
EE. Horns of pronotum not as in E.
F. Pronotum without concavities across or behind the retuse portion.
G. Tibiæ (especially the hind) comparatively short and wide (nearly as much so as in *rhinoceros*, Macl.) — cavicolle, *Macl.*
GG. Tibiæ notably more elongate and slender — cornigerum, *Macl.*

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* The names printed in italics are those of species which I do not feel confident of having seen, and whose place in the tabulation is more or less conjectural, being based upon the authors' descriptions.

FF. Pronotum with a very deep and elongate transverse sulcus behind the middle ..... aratum, *Blackb.*

FFF. Pronotum with a large nitid excavation on either side of middle near base.. ..... Sloanei, *Blackb.*

CC. Antennal club globular.

D. Upper part of retuse area of pronotum pilose..... Tatei, *Blackb.*

DD. Retuse area of pronotum glabrous ... .. Bovilli, *Blackb.*

BB. Retuse area of pronotum not concave..... *Carpentariæ*, Macl.

Females.

A. Frontal wings on a plane greatly lower than that of the frons..... ..... cavicollle, *Macl.*

AA. Frontal wings continuing the plane of the frons.

B. Front tibiæ with 6 external teeth..... ..... Sloanei, *Blackb.*

BB. Front tibiæ with only 5 external teeth.

C. Transverse carina of pronotum bent hindward at its ends so as to point to middle of sublateral foveæ.

D. Left mandible (viewed from above) strongly sinuate externally.

E. 14th and 15th striæ of elytra not confluent..... ..... Macleayi, *Blackb.*

EE. 14th and 15th striæ of elytra confluent in their front part .... rhinoceros, *Macl.*

DD. Left mandible (viewed from above) scarcely sinuate externally..... *neglectum*, Hope

CC. Transverse carina of pronotum not shaped as in C (and less strongly cariniform).

D. Left mandible (viewed from above) strongly sinuate externally before apex angulicorne, *Macl.*

DD. Left mandible not (or scarcely) sinuate externally.

E. Elytral interstices non-punctulate; elytra broadly margined at humeral angle... hippopus, *Macl.*

EE. Elytral interstices conspicuously punctulate; elytra narrowly margined at humeral angle.. ..... cornigerum, *Macl.*

GROUP ii.

First Subgroup (species not having, in either sex so far as known, an elongate transverse carina on the pronotum behind the middle).

Males.

A. The clypeus projects in front as a rostrum. Maxillary palpi very long and slender..... .... proboscideum, *Schreib.*
AA. Clypeus not rostriform. (Maxillary palpi less elongate and stouter.)
B. Pronotum with 4 horns or spines placed in a transverse row.
C. The clypeal and frontal elevations confused together into a single elevation ..... Froggatti, *Blackb.*
CC. The clypeal and frontal elevations distinct from each other.
D. The frontal elevation consists of three horns placed transversely..... armigerum, *Macl.*
DD. The frontal elevation consists of a single horn feebly bifid at the apex tenax, *Blackb.*
BB. Pronotum not bearing a transverse series of 4 horns or spines.
C. Head not having horns near the base.
D. The extremities of the clypeal elevation not erected into horns.
E. The retuse area of the pronotum devoid of lateral elevations..... truncatum, *Blackb.*
EE. Retuse area of pronotum with lateral (or sublateral) elevations..... *ingens*, Macl.
DD. The extremities of the clypeal elevation erected into horns..... ..... frontale, *Guér.*
CC. Head armed with two horns between the eyes..... ..... taurus, *Westw.*

Females.

A. The clypeal elevation and clypeal carinæ do not form angles at their points of contact..... proboscideum, *Schreib.*
AA. The clypeal elevation and clypeal carinæ form angles at their points of contact.
B. Clypeal elevations not having an angular projection in the middle.
C. Transverse carina of pronotum having a median tooth..... .... truncatum, *Blackb.*

CC. Transverse carina of pronotum not having a median tooth..... tenax, *Blackb.*
BB. Clypeal elevation furnished with a median angular projection..... taurus, *Westw.*

GROUP ii.

Second Subgroup (species having, in both sexes so far as known, an elongate transverse carina on the pronotum behind the middle).

Males.

A. Middle of transverse carina of pronotum projects as an angular process,..... Richardsæ, *Blackb.*
AA. Transverse carina of pronotum not, or scarcely, angular in middle.
B. One horn on each side of the retuse front of pronotum.
C. Two horns on front of clypeus..... laticorne, *Macl.*
CC. A single horn on front of clypeus..... chelyum, *Blackb.*
BB. Pronotum not having two horns.
C. An erect projection on front margin of pronotum..... Bainbridgei, *Westw.*
CC. The projection on pronotum is erect and rises from centre of retuse area..... .. recticorne, *Guér.*
CCC. The projection on pronotum is horizontal and springs from middle of front margin..... fissicorne, *Bainb.*

Females.

A. A single tubercle on front margin of pronotum... laticorne, *Macl.*
AA. No tubercle on front margin of pronotum..... chelyum, *Blackb.*
AAA. Two tubercles on (or close behind) front margin of pronotum.
B. Frontal elevation with two approximate strong tubercles placed one on each side of the middle line..... recticorne, *Guér.*
BB. Frontal elevation scarcely indicated..... fissicorne, *Bainb.*

GROUP iii.

A. Elytra normally striate.
B. 9th elytral stria not materially different from 10th..... gayndahensis, *Macl.*
BB. 9th elytral stria very much abbreviated in front.

C. Frontal carina in front of frontal wings not, or scarcely, shorter than front margin of frontal wings.
D. Retuse front of pronotum bearing a fine strongly impressed longitudinal median sulcus ... Basedowi, *Blackb.*
DD. Retuse front of pronotum not longitudinally impressed ... clypeale, *Blackb.*
CC. Frontal carina in front of frontal wings notably shorter than front margin of frontal wings.
D. Hind extremities of frontal margins not joined by a continuous transverse carina.
E. Left mandible (viewed from above) strongly and abruptly sinuate externally ... mandibulare, *Blackb.*
EE. Left mandible (viewed from above) not, or scarcely, sinuate externally.
F. 14th elytral stria not confluent with 15th.
G. Hind femora conspicuously punctulate.
H. Eyes not perceptibly faceted.
I. Concavity on front part of pronotum cordiform .... Loweri, *Blackb.*
II. Concavity on front part of pronotum quadrate ..... fenestratum, *Blackb.*
HH. Eyes very distinctly faceted.
I. Pronotum with an excavation in front part and a longitudinal sulcus behind ... fraternum, *Blackb.*
II. Pronotum evenly convex (the sublateral foveæ excepted) ... nitidiceps, *Blackb.*
GG. Hind femora (except extreme front part) non-punctulate.
H. Pronotum with a transverse sulcus on either side ... lævipes, *Blackb.*
HH. Pronotum without transverse sulci ... subretusum, *Blackb.*

FF. 14th and 15th elytral striæ merge in front part into a single stria.
G. No longitudinal sulcus on pronotum (elytral interstices strongly convex)... .... nitens, *Blackb.*
GG. A well defined longitudinal sulcus on hind part of pronotum (elytral interstices notably less convex).
H. Eyes not perceptibly faceted.
I. Pronotum not, or scarcely, retuse in front part..... rotundatum, *Hope*
II. Pronotum strongly and triangularly retuse in front part..... ..... impressicolle, *Blackb.*
HH. Eyes very distinctly faceted.
I. Surface of pronotum, except median longitudinal line, scarcely punctured in middle of front part.
J. Clypeal elevation scarcely angular in middle..... rubescens, *Hope*
JJ. Clypeal elevation strongly angular in middle... globuliforme, *Macl.*
II. Surface of pronotum thickly and strongly punctulate all across front part .... obscurius, *Blackb.*
DD. Hind extremities of frontal margins connected by a transverse carina..... carinatum, *Blackb.*
AA. Elytra with only 11 striæ.
B. Front tibiæ with only 5 external teeth..... simpliciceps, *Blackb.*
BB. Front tibiæ with 6 external teeth..... planiceps, *Macl.*

B. ANGULICORNE, Macl.

I have two specimens sent to me from N. Queensland as male and female of the same Bolboceras (taken at the same place) of which the male is this species, and I have every reason to believe that the female is conspecific; only the male, however, of *angulicorne* has been described, and there is very little beyond circumstances of capture by which to apportion males and females

to each other. The male is readily distinguishable from all the other described males of the group having the hind tibiæ multicarinate (except *B. cavicolle*, Macl.), by its frontal horn having a tooth on its hind face slightly above the middle; and from *cavicolle*, *inter alia multa*, by its front tibiæ having only 5 external teeth. Its frons (which is represented by the front face of the frontal horn) and clypeus are entirely vertical, so that (the specimen being viewed from the side) the clypeal elevation is seen to project horizontally. The female referred to above has the upper outline of the retuse front of its pronotum, though perfectly well defined, yet less cariniform than in any other female Bolboceras known to me of this group; indeed, it is not strictly cariniform at all. This defined outline does not occupy transversely more than the middle one-third of the pronotum, but it is arched forward at its extremities and continues on either side of the retuse front almost to the front margin of the segment without becoming less clearly defined. The retuse front is extremely nitid, but bears sparse lightly impressed somewhat close and not particularly fine punctures. On the non-retuse part of the pronotum there is a median very coarsely punctulate wide longitudinal impression, on either side of which is a scarcely punctulate space, the rest of the surface, except close to the base, being closely punctulate (gradually more coarsely and less closely from the sides towards the middle. Its head does not differ noticeably from that of *B. rhinoceros*, Macl. (female). The striation of its elytra (as in the male) is feebler than that of *rhinoceros*, but the striæ are more conspicuously and less coarsely punctulate than in *B. rhinoceros* (as is also the case with the male).

B. Albertisi, Har.

I have not seen any specimen that I can attribute to this species, which is stated by its author to be remarkable by a longitudinal carina on the lower part of the front face of the frontal horn of its male. This character seems to me likely to be reliably specific, but I have before me specimens that do not differ from the description very widely in other respects. I have no unappro-

priated female that seems likely to be referable to it. The female was unknown to Harold. I feel no doubt but that it should be placed in the group with multicarinate hind tibiæ.

B. CAVICOLLE, Macl.

The author of this species was mistaken as to its female, which he says has a short unarmed frontal horn, and on either side of the retuse front of the pronotum a tubercle. These are all the particulars he supplies. I believe the specimen on which he founded the description to have been the male of another species. I have before me female examples of a Bolboceras which the circumstances of capture conclusively identify with this species. They can be at once separated from the females of all the other species known to me (of the group with multicarinate hind tibiæ) by the piece of the head which I have called the frontal wing being very much below the plane of the frons, the sides of which fall vertically to the inner end of the frontal wings, their lateral vertical face being quite half as high as the length of the frontal wings from their inner to their outer apex. The frontal elevation is much like that of *B. rhinoceros*, Macl. (female), in respect of height and the bifidity of its apex, but is more laminiform in shape owing to the presence of a carina connecting the apex of the frontal elevation with the apex of each of the two lateral areæ of the clypeus, which in this species (owing to the presence of an additional carina simulating a continuance of the clypeal elevation) appear to be distinct from and behind the clypeal elevation, and, in fact, not to be parts of the piece that I have called the clypeus. The pronotum has no tubercles on the sides of the retuse front, and differs very little from that of *B. rhinoceros*, except in the transverse carina above the retuse front being less strongly cariniform and much less extended laterally, and in the puncturation of the non-retuse parts being closer and more extended. The presence of a well-defined 6th external tooth on the front tibiæ is a conspicuous character of this species very unusual in this group of Bolbocerata. The sides of the pronotum are finely serrulate in both sexes.

B. Sloanei, Blackb.

This is the only species known to me having multicarinate hind tibiæ, the frontal horn of the male unarmed, and the frontal wings of the female normal, in which the front tibiæ have a well-defined 6th external tooth.

B. Reichei, Guér.

The female of this species must be regarded as undescribed, inasmuch as the description and figures supplied by Westwood are not sufficiently explicit to distinguish it from other female Bolbocerata. Westwood says that *B. Kirbii*, Bainbridge, is female *Reichei*, but does not state whether his own description of female *Reichei* is founded on Bainbridge's description (or specimen) or on an independent specimen in his own collection. When Bainbridge's description of *B. Kirbii* is referred to it is at once apparent that he has described two females (probably of two species) as male and female of his insect. I think it not unlikely that at least the example which he regarded as a male was the female of *Reichei*, but that cannot be regarded as more than probable, as Bainbridge himself does not associate it with male *Reichei*. The description itself is fairly explicit, but does not seem to me capable of being applied confidently to any Bolboceras in particular, for the numerous details given happen to be those which are common to nearly all the females of the group having multicarinate hind tibiæ. As *Kirbii* was a nom. præocc. in the genus, however, it is not of great importance to identify Bainbridge's insect. I have not myself seen any female Bolboceras that I can regard as being *Reichei*. I am afraid the matter can be cleared up only by a collector in some locality where *B. Reichei* occurs.

B. cornutum, Macl.

A male specimen in the S. A. Museum which was brought by the Calvert Expedition from N.W. Australia agrees very well with the description of this species. It has multicarinate hind tibiæ. It will be readily recognised by the characters indicated in my tabulation, which add some particulars to those furnished

by Macleay. The only remark Macleay makes on the female is that it has "a small bifid tubercle on the forehead and no tubercle on the thorax," which is the case with all its congeners of this group. I am disposed to think that *cornutum* is the male of *B. neglectum*, Westw. I have before me two females from the Port Essington region which (on account of their locality, size, colour and agreement with Westwood's unsatisfactory brief description) are probably Westwood's species. My reason for associating them with *B. cornutum* is that various other species of the Port Essington region extend their habitat to the parts traversed by the Calvert Expedition and from which *B. cornutum* was obtained, that they belong to the same group of Bolbocerata, and that they have in comparison with most of the other females of the group, as *cornutum* has in comparison with the males, a somewhat large portion of the pronotum devoid of puncturation. This is, of course, not sufficient evidence to justify the suppression of *cornutum* as a valid name without further investigation. The most conspicuous character of these females consists in the form of the retuse front of their pronotum, the floor of which is nearly flat, on a plane considerably lower than that of the adjacent parts, and with nearly straight limits laterally, the surface on either side of the retuse part dropping down to its level subvertically, so that the lateral limits of the retuse part have from a certain point of view the appearance of almost straight even furrows, each ending in front with one of the two deep round foveæ that in this group of Bolbocerata are observed on the front margin of the pronotum. The transverse carina of the pronotum is sinuous with its extremities bent (not forward but) hindward in a line that if continued would run into the middle of the sublateral fovea of the pronotum. The external outline of the left mandible, viewed from above, is scarcely sinuate.

B. HIPPOPUS, Macl.

Only the male of this species has been described hitherto. There is a male Bolboceras in the S. A. Museum and a female in my own collection which I have no hesitation in referring to it.

It is a member of the group with multicarinate hind tibiæ. The male is remarkable by the great length of its frontal horn, surpassing that of any other Bolboceras known to me; and also by the curious sculpture of the excavation of its pronotum, on the floor of which there is a sharply cut deep sulcus running from the front to behind the middle and causing the remainder of the excavated portion, when looked at obliquely from in front, to present a considerable resemblance in form to a horseshoe. Some other particulars regarding it are indicated by its place in the tabulation. The female that I pair with it is from the same locality and agrees with the male in size and colour, and also in two unusual characters, viz., the wide interval between the two foveæ on the front margin of the pronotum (which is more than twice as wide as the distance of either fovea from the lateral margin) and in the presence of a fovea within the humeral angle of the elytra, the angle itself being markedly less rounded off than in most Bolbocerata. The sculpture of the pronotum is throughout much like that of *B. angulicorne* (female) described above (except in the much greater distance from each other of the foveæ on the front margin); but the retuse space on the front is evidently wider and consequently more transverse, and has only very fine puncturation and a very small number of larger punctures in the extero-posterior portion, and the puncturation of the non-retuse portion of the surface does not increase so markedly in closeness and fineness from the middle towards the sides.

B. RHINOCEROS, Macl.

The male of this species has been recognisably described by its author, and somewhat fully by Harold. Neither of those authors, however, refers to its multicarinate hind tibiæ. Harold did not know the female, and Macleay's description of it does not distinguish it from the females of other species of the same group. I have before me several examples of the female, one of which was sent to me (along with a male) by the captor as being certainly conspecific with the male accompanying it. These females are extremely like the same sex of the species that I

regard as *B. neglectum*, Westw. (described above under *B. cornutum*, Macl.); indeed, the only definite character I can specify for distinguishing it from that insect is the presence of an extremely strong sinuation on the external margin of the left mandible and the somewhat greater distance towards the sublateral fovea of the pronotum, to which the extremity of the transverse carina of the pronotum is extended on either side. Male specimens differing from the ordinary form of this species in having the horns of the head and pronotum shorter—the latter, moreover, less compressed and at the apex not bifid—I regard as a variety.

B. NEGLECTUM, Westw.

Remarks on this insect will be found (above) under *B. cornutum*, Macl.

B. CORNIGERUM, Macl.

The male of this species is extremely close to that of *B. cavicolle*, Macl. Their author distinguishes the latter from the former by the presence of a tooth on the hind surface of the frontal horn. Varieties of the former, however, have a more or less defined tooth. *B. cavicolle* does not seem to be variable; its horn is comparatively short and laminiform with a very strong tooth (much stronger than in any *cornigerum* that I have seen), but there is a reliable distinction between the two species in the notably shorter and wider tibiæ of *cavicolle*. The females are so readily distinguishable by the structure of the frontal wings and other cephalic characters (see *B. cavicolle*, supra) that there can be no doubt of the validity of the species. The presence of a more or less distinct 6th external (the uppermost) tooth in both sexes on the front tibiæ of *cavicolle* is a distinctive character, but it must be noted that this tooth is in some examples feebly defined. As the female of *cornigerum* has not hitherto been recognisably described, I add some notes on it. It is very distinct from *cavicolle* by its frontal wings being on a plane continuous with that of the frons and by the absence of carinæ connecting the summit of the frontal elevation with the postero-external angles of the lateral clypeal areæ. The retuse front of its pronotum is wider

and is a flat surface, whereas in *cavicolle* the retuse area is somewhat concave owing to its defined upper outline being evidently protuberant in its whole length so as to slightly overhang the retuse area. In other respects I do not find any definite distinctive character on the pronotum, nor do the elytra differ in any notable manner from those of *cavicolle*. Of the females of the other species of the same group having the elytra similarly striate and the front tibiæ similarly toothed, *B. angulicorne*, Macl., differs by the presence of somewhat closely and evenly distributed large feeble punctures on the retuse front of the pronotum; *hippopus*, Macl., by the peculiar humeral angles of its elytra; and *rhinoceros*, Macl., and the species referred to above as probably *neglectum*, Westw., by the defined upper outline of the retuse front of their pronotum being bent backward at its extremities in such fashion that if continued in the same direction it would pass through the sublateral foveæ of the pronotum.

B. Tatei, Blackb.

The pilosity of the concave area on the front part of the pronotum renders the male of this species very distinct from the other described Australian Bolbocerata. It is also remarkable on account of the extraordinary development of its antennal club, the basal and apical joints of which are very strongly convex, with the result that the club is globular, and that its second joint is scarcely visible. The apical joint of the club is much larger and more convex than the basal joint.

B. Macleayi, sp.nov.

Mas. Latum, robustum; modice nitidum; supra glabrum; subtus hirsutum; rufo-piceum; mandibulo sinistro (superne viso) extus pone apicem fortiter sinuato; capite ante eminentiam frontalem confertim ruguloso, pone hanc nitido obsolete punctulato; fronte subhorizontali; eminentia frontali ut cornu simplex subrectum elevata; prothorace fortiter transverso, supra fere lævi (parte laterali utrinque confertim rugulosa excepta), antice area magna profunde concava impresso, parte concava antice cornu suberecto

utrinque armata (hoc late compresso ad apicem bifido), cornuum interspatio quam caput angustiori, margine antico profunde bifoveolato, lateribus vix perspicue serrulatis, angulis anticis vix prominentibus posticis nullis; scutello lævi; elytris sat fortiter 15-striatis, striis punctulatis (14ª 15ªque haud invicem commixtis) interstitiis planis tibiis anticis extus 5-dentatis, posticis transversim 4- vel 5-carinatis. Long. 9, lat. 5½ lin.

Femina a mari (ut supra scriptus) differt capitis et pronoti sculptura; capite crebre ruguloso eminentia clypeali tripartita, carinis quæ areas clypeales dividunt in eminentia clypeali late inter se distantibus; eminentia frontali ut cornu breve ad apicem bifidum erecta; pronoto antice retuso, area retusa minus nitida fere plana dupliciter (puncturis subtilibus cum aliis in medio et ad latera majoribus mixtis) punctulata, ceteris partibus triplo (in medio subtiliter sparsim haud rugulose, ad latera basinque confertim fortius rugulose, in sulco irregulari longitudinali mediano et in partibus sublateralibus haud ad basin extensis grossissime) punctulatis, area retusa postice carina trisinuata marginata. Long. 11, lat. 7 lin. (vix).

This is the only species known to me, of those having the hind tibiæ transversely multicarinate, in which the 14th and 15th elytral striæ do not coalesce; although they are contiguous near their front extremity they are (even at that part) distinctly *two* rows of punctures; in the other species of the group these striæ *coalesce* at the corresponding point and are there a single row of punctures. The male resembles that of *rhinoceros*, Macl., more closely than any other male known to me. It differs from *rhinoceros*, in respect of its head, by the frons being much less vertical; and, in respect of its pronotum, by the horns much wider (viewed from the side) and placed with their broad faces much less parallel to the centre line of the body, so that when viewed from behind the bifidity of both horns is visible, whereas when *rhinoceros* is viewed from behind the bifidity of the horns is not apparent; also, in respect of its pronotum, by the anterior excavation longitudinally (not convex but) concave between the horns, and by the same excavation not crossed in its middle part by a

sharply defined deep narrow sulcus. The female (as regards its distinctively female characters) resembles that of *rhinoceros* in the transverse carina that tops the retuse front being considerably prolonged laterally, and differs from the same by the much greater extension of the coarse puncturation on the pronotum and also by the finer of the two systems of puncturation on the retuse part being (on and beyond the lateral parts of the retuse front) very much less fine than it is in *rhinoceros*. The species differs (non-sexually) from *rhinoceros* by the character already cited in the elytral sculpture also by the elytral striation stronger and more conspicuously punctulate throughout; and by the base and lateral margins of the prothorax meeting in a narrower curve, so that there is more approach to an angle. The males of all the other species known to me (with hind tibiæ multicarinate transversely) have their prothoracic horns either much wider apart from each other or non-bifid at the apex. All the other females (of the same group) known to me have the transverse carina of their pronotum not trisinuate, or much less prolonged laterally, and the retuse front of their pronotum differently sculptured. I am not sure that the female of this insect is not identical with the female which Westwood described as that of *B. Reichei* (though his description is too brief for certainty), but I am quite satisfied that it is not the female of *B. Reichei*.

N. and N.W. Australia.

B. ARATUM, sp.nov.

Mas. Latum; robustum; sat nitidum; supra fere glabrum; subtus hirsutum; rufobrunneum; mandibulo sinistro (superne viso) extus pone apicem valde sinuato; capite ante eminentiam frontalem confertim ruguloso, pone hanc nitido obsolete punctulato; fronte subhorizontali; eminentia frontali ut cornu subrectum sparsim subtiliter pilosum elevata, hoc (a fronte viso) apicem versus dilatato et ad apicem bifido (a latere viso) apicem versus subulato; prothorace fortiter transverso, supra postice longitudinaliter sulcato, fere lævi (partibus lateralibus et sulco longitudinali postico inæqualiter varie punctulatis exceptis), antice area magna

profunde concava impresso, parte concava antice utrinque cornu compresso porrecto ad apicem subbifido armata (postice prope pronoti basin sulco recto valde elongato valde profundo transverso marginata), cornuum interspatio latitudine capitis latitudini æquali, margine antico profunde bifoveolato, lateribus sat fortiter serrulatis, angulis anticis vix prominentibus posticis nullis; scutello medio puncturis nonnullis impresso; elytris sat fortiter 15-punctulato-striatis, striis 14ª 15ªque antice confluentibus, interstitiis planis; tibiis anticis extus 5-dentatis, posticis transversim 4- vel 5-carinatis. Long. 10, lat. 7 lin.

Femina latet.

The most conspicuous character of this fine species is the extraordinary sulcus that runs across the pronotum near the base (almost at the hind limit of the large concavity which occupies the front two-thirds of the middle of the segment). This sulcus is very deep, sharply defined, and nearly straight, and extends on either side to within a short distance from the lateral margin. The nearest approach to this character in the other species known to me is in *B. rhinoceros*, Macl., but in that insect the transverse furrow is less sharply defined, much more arched, much shorter, and is placed slightly in front of the middle of the length of the pronotum. This species, in general characters, comes nearest to *rhinoceros*, differing from it, *inter alia*, by the shape of its frontal horn, the horns of its pronotum wider (viewed from the side) and less erect, and its frontal horn thinly clothed with long fine pilosity. The other species known to me (of this group) having the frontal horn pilose are *Sloanei*, Blackb.; *cornigerum*, Macl.; *cavicolle*, Macl., and *Reichei*, Guér. This Bolboceras was generously given to me by Mr. Froggatt.

N. Queensland (Charters Towers).

B. Bovilli, sp.nov.

Mas. Latum; sat nitidum; supra glabrum; subtus hirsutum, castaneum; mandibulo sinistro (superne viso) extus pone apicem fortiter sinuato; capite ante eminentiam frontalem confertim ruguloso; antennarum clava globosa (hujus articulis 1° 3°que

fortiter convexo, 3° quam 1^{us} multo majori) fronte sat verticali, eminentia frontali ut cornu simplex breve (hoc quam antennarum stipes vix longiori) elevata; prothorace fortiter transverso; supra in partibus antica mediana et postica lævi (in partibus lateralibus ruguloso—a latere versus medium gradatim magis grosse), antice area sat magna sat profunde concava impresso, parte concava ad latera cornu brevissimo conico (hoc quam cornu frontale plus quam duplo breviori) utrinque armata, cornuum interspatio quam caput angustiori, margine antico profunde bifoveolato, lateribus haud serrulatis, angulis anticis vix prominulis posticis nullis; scutello lævi; elytris sat fortiter 15-striatis, striis punctulatis (14^{a} 15^{a}que in parte antica conjunctis), interstitiis sat planis; tibiis anticis extus 5-dentatis, posticis transversim 4- vel 5-carinatis. Long. 6, lat. $4\frac{1}{5}$ lin.

Femina latet.

This species is a pigmy among the Bolbocerata of its Group. It has the general appearance of being a very feebly developed specimen of *B. rhinoceros*, Macl., but differs from that insect in the absence of a transverse sulcus across the excavated portion (and of a coarsely punctured longitudinal depression on the hind part) of its pronotum, and in the form of its antennal club.

N. Territory of S. Australia (taken by the late Dr. Bovill).

The Second Group differs from the First by the structure of the hind tibiæ, which do not bear any transverse (or obliquely transverse) carinæ above the one (present in all the known Australian Bolbocerata) immediately preceding the apical sinuation of the tibia, the upper part of the surface bearing only small tubercles placed at, or close to, the lateral margins of its upper face; also by the absence of the two deep round foveæ (or holes) on the front margin of the pronotum. It differs from the Third Group by the carinæ dividing the clypeal areæ not meeting on the middle of the clypeal elevation, but being given off from (or near) the lateral extremities of the clypeal elevation and usually running more or less hindward instead of obliquely forward. The Group is readily divisible into two Subgroups, distinguished

from each other by the sculpture of the pronotum, which in the Second Subgroup bears in both sexes on its hinder half a carina extending (sinuously or not) in a curve (the general convexity of which is hindward) from, or from close to, the sublateral fovea on the one side to the corresponding part of the other side; while in the other Subgroup there is no such carina in either sex. I have placed the Subgroup in which this prothoracic carina is wanting before the other, because it contains numerous species in which the difference between the sexes is very much greater than in any species of the other Subgroup, and the most natural arrangement of the Australian Bolbocerata seems to be attained by regarding the degree of sexual difference and the size of the insects as the best index to the specific development; and by the arrangement proposed above we begin with the largest species having the strongest sexual characters (in the First Group), and find these characters and also the size gradually becoming enfeebled till in the Third Group we reach species smaller than in any other of the Groups, and in which the sexual differences are slight or almost wanting.

B. ARMIGERUM, Macl.

Only the male of this species has been described. I have seen several examples, all from N. Queensland, but no Bolboceras has come before my notice that seems likely to be its female.

B. TRITUBERCULATUM, Bainb.

The insect that Westwood figures as the female of this species evidently belongs to the First Subgroup of Group ii., while the male described by Bainbridge is a member of the Second Subgroup. This I regard as impossible to be correct, and therefore conclude that Westwood was mistaken in his identification. He gives no description, nor any reason for his identification; and his statement that the female was sent to him from Paris implies that his name for it was not founded on circumstances of capture. I have not seen any Bolboceras that appears likely to be that which he figured as the female.

B. LACUNOSUM, Macl.

Only the male of this species has been described. It was taken near Sydney, and is evidently a member of Group ii., but the description is too brief to enable me to place it in either Subgroup.

B. DENTICOLLE, Macl.

Taken by the Mitchell Expedition in the far North, is known only by the male. It is evidently a member of the First Subgroup of Group ii.

B. INGENS, Macl.

Is known only by a male example from the far North of W. Australia. I should judge it to be a member of the First Subgroup of Group ii.

B. QUADRICORNE, Klug.

I have not seen the original description of this species. Westwood, however, quotes Klug's description, which (as quoted by Westwood, who states that he has not seen the insect) appears to me to be identical with *B. serricolle*, Bainbridge, and Westwood states that *serricolle* is identical with *frontale*, Guér. Klug's description, it should be noted, is too brief for confident identification.

B. FISSICORNE, Bainb.

Is stated by Westwood to be a variety of the male of *B. recticorne*, Guér. (=*hastifer*, Bainb.). I am convinced that this is an error, and that Bainbridge's description was founded on the female of a species quite distinct from *recticorne*, of which I have both sexes before me. Its male differs from that of *recticorne* chiefly by the middle of the clypeal elevation being a horn which is (not erect but) directed obliquely forward, by the left mandible (viewed from above) having an extremely strong sinuation on its external margin, by the horn of its pronotum springing from immediately behind the front margin of the segment and projecting horizontally over the head, by the retuse part of the pronotum coarsely and deeply punctulate on its lateral parts, and by the much narrower and deeper excavation of the retuse front

of the pronotum on the part behind the horn. The female (to which Bainbridge gave the name) differs from that of *recticorne* (which it closely resembles) chiefly by its frontal elevation scarcely defined and not having two approximated tubercles one on either side of its middle, and by the strong sinuation of the external margin of its left mandible (viewed from above).

B. RECTICORNE, Guér.

As far as I can ascertain no description of the female of this species has been published. In common with the other species of the same Subgroup, the female differs from the male much less widely than do the females of species belonging to the First Group and the First Subgroup of the Second Group. It is, however, readily distinguished from its male by the presence of a distinct frontal elevation in the form of a carina which bears two approximate tubercles, one on either side of the middle, by the middle of its clypeal elevation being a small tubercle instead of a short stout horn, by the absence of the upright horn in the centre of the retuse front of the pronotum, and by the presence of two approximate tubercles immediately behind the middle part of the front margin of the pronotum.

B. TENAX, sp.nov.

Mas. Latum, robustum; sat nitidum; supra glabrum; subtus hirsutum; rufum vel rufopiceum; mandibulo sinistro (superne viso) extus vix sinuato; capite (parte postica excepta) sat crebre sat rugulose punctulato; clypeo antice verticali; eminentia clypeali simplici, fere semicirculari (adversus clypeum viso); fronte (a latere viso) sat horizontali; eminentia frontali ut cornu modicum (hoc ad apicem breviter bifido) elevata; prothorace quam longiori fere duplo latiori, supra subtilissime sat æqualiter et acervatim sat grosse punctulato, antice inæqualiter retuso cornubus 4 serie transversa armato (cornubus intermediis porrectis compressis contortis, externis spiniformibus divaricatis), parte pone cornua intermedia foveis 2 magnis maxime profundis impressa, lateribus vix perspicue serrulatis, angulis anticis mucronatis valde prominentibus posticis nullis; scutello lævi; elytris 15-striatis, striis

punctulatis (14ª 15ªque antice contiguis sed vix inter se plane commixtis), interstitiis planis; tibiis anticis extus 6-dentatis, posticis supra carinam apicalem transversim 1-carinatis et hinc sursum duplici serie tuberculatis.

Femina a mari (ut supra scriptus) differt capitis et pronoti sculptura; capitis sculptura a *B. Macleayi* (fem.) vix differt sed puncturis magis subtilibus, eminentia frontali bifida magis lata minus elevata; pronoto fere ut maris punctulato supra sat æquali (parte antica retusa minus alta excepta), hac carina transversa antrorsum arcuata quam capitis latitudo longiori supra marginata, angulis anticis haud mucronatis. Long. 9, lat. $5\frac{1}{2}$ lin.

The male of this species is extremely different from those of all the other described Bolbocerata except *armigerum*, Macl., which latter species it resembles considerably, but differs in respect of its head, *inter alia*, by the frontal elevation being a single horn feebly bifid at the apex, and in respect of the pronotum, by the intermediate horns being of a twisted shape difficult to describe exactly (they are convergent at the apex), and by the foveæ behind the intermediate horns being very much deeper.

The female can be at once separated from all the other described females of the genus by the retuse front of its pronotum margined behind by an arched carina, the convexity of which *is directed forward*, but I have before me other female Bolbocerata (of which I do not know the males) which present the same character. The female of *B. tenax* differs from one of them (which I suspect of being the female of *B. ingens*, Macl., by the transverse carina of the pronotum being extended laterally beyond the width of the head, from another by the upper outline of the subvertical clypeus (viewed from in front) being truncate instead of roundly arched, and from yet another by the left mandible (viewed from above) being scarcely sinuate instead of strongly emarginate. Both sexes of this species differ from *B. armigerum*, Macl., by their front tibiæ having only 5 external teeth. I have examined several specimens of both sexes (in my collection and that of the S. Australian Museum) and do not find the species variable.

S. Australia.

B. FROGGATTI, sp.nov.

Mas. Latum; robustum; sat nitidum; supra glabrum; subtus hirsutum; rufobrunneum; mandibulo sinistro (superne viso) extus vix sinuato; capite (partibus extero-posticis exceptis) confertim ruguloso; clypeo antice verticali; eminentia clypeali in medio ut cornu breve obtusum elevata, ab hoc utrinque ut carina retrorsum oblique ad marginem frontalem continua, cum hoc ut tuberculus conicus utrinque conjuncta; eminentia frontali nulla; capitis parte extero-postica utrinque concava fere lævi; prothorace fere ut præcedentis (*B. tenacis*, Blackb.) sed cornubus intermediis magis latis magis parallelis magis porrectis et inter se magis distantibus et parte postica linea longitudinali impressa; scutello lævi; elytris ut *B. tenacis;* tibiis anticis (exempli typici) carentibus; tibiis posticis ut *B. tenacis*. Long. 11, lat. $7\frac{3}{5}$ lin.

This is another ally of *B. armigerum*, Macl., from which (and from *B. tenax*, Blackb.) it differs by its *clypeal* (not frontal) elevation being raised into a horn, the horn, moreover, being a simple conical elevation like an exaggerated tubercle. The pronotum agrees with that of each of the abovenamed species in having 4 horns placed more or less transversely, but differs by its intermediate horns being parallel, very widely compressed (much like the horns of *B. laticorne*, Macl.) and placed so as to project straight forward; in *armigerum* they are curved somewhat downward, and in *tenax* somewhat upward. It is very much larger than any example that I have seen of either *armigerum* or *tenax*. The unique specimen was given to me by Mr. Froggatt.

N. Queensland.

B. TRUNCATUM, sp.nov.

Mas. Latum; robustum; sat nitidum; supra glabrum; subtus hirsutum; rufobrunneum; mandibulo sinistro (superne viso) extus fortiter sinuato; capite antice creberrime (postice paulo minus crebre) subtilius punctulato vel ruguloso, clypeo antice verticali; eminentia clypeali ut lamina vel cornu breve laminiforme elevatum; eminentia frontali nulla; oculis nonnihil granulatis; prothorace fortiter transverso, supra tripliciter (sc. crebre subtiliter,

ad latera creberrime subtilius rugulose, medium versus grosse acervatim) punctulato, antice alte latissime retuso, parte retusa obsolete inæquali supra carina arcuata marginata (hac antrorsum curvata et in medio leviter obtuse prominenti), parte postica vix longitudinaliter in medio impressa sed utrinque versus marginem lateralem (hoc fortiter serrulato) sulco lævi longitudinali valde profundo impressa; angulis anticis sat prominentibus (nullo modo mucronatis) posticis rotundatis; scutello subtiliter subcrebre punctulato; elytris 15-punctulato-striatis (striis 14^a 15^aque nullo modo inter se commixtis, 9^a 10^a vix dispari), interstitiis planis; tibiis fere ut *B. tenacis*, Blackb., sed anticis extus 5-dentatis.

Femina a mari (ut supra scriptus) differt capitis et pronoti sculptura; capitis sculptura a *B. Macleayi*, Blackb., (fem.) haud multo differt, sed puncturis magis subtilibus; pronoto fere ut maris punctulato, parte retusa multo minus alta minus lata, sulcis longitudinalibus lateralibus carentibus. Long. 9-11, lat. $6\frac{1}{2}$-$7\frac{1}{4}$ lin.

This species does not much resemble any other that has been described except *B. ingens*, Macl., and possibly *B. lacunosum*, Macl. The former is insufficiently described, scarcely anything but the sexual characters of the male being mentioned, but I note that among those the "forehead" is said to be "vertical and slightly retuse," and the retuse area of the pronotum is said to "show three excavated surfaces, the middle one of which is of crescentic form," and to have "a prominent protuberance on each side," while the thorax is said to be three times wider than long (much less than twice as wide as long in *B. truncatum*). The above characters all point to strongly defined differences between the two species. *B. truncatum* (male) has so wide a retuse area on the front part of its pronotum that the insect has the appearance of the front half of its pronotum having been sliced off. The peculiar, somewhat tuberculiform, prominence (distinct, though less strong, in the female) in the middle of the carina that tops the retuse area of the pronotum distinguishes this species from all the others (known to me) having a carina arched forward at the top of the retuse area. *B. lacunosum*, Macl., is

not very clearly described, its "peculiarity" being said to be its "horizontally placed thorax," &c., but it is evidently not the present species, because, *inter alia*, it is said to have a "small horn on the front of the excavation of its prothorax." I owe this species also to the generosity of Mr. Froggatt, and have seen it also in the collection of Mr. Griffith.

N. Queensland.

The remaining species known to me form the Third Group of the Australian Bolbocerata; the distinctive characters common to them and distinguishing them from the species of the other groups have already been discussed under the heading of the Second Group.

B. CLYPEALE, sp.nov.

Fem.(?). Breve; subrotundatum; sat nitidum; supra glabrum; subtus hirsutum; rufobrunneum, mandibulo sinistro (superne viso) extus vix sinuato; capite fere ut *B. mandibularis*, Blackb., sed fronte parum concava marginibus frontalibus ante alas frontales elongatis (quam alæ sublongioribus), fortiter convergentibus, eminentia frontali ut tubercula 2 (his carina leviter inter se connexis) elevata; prothorace fortiter transverso, supra acervatim subfortiter sat sparsim punctulato, antice retuso (parte retusa magna concava nonnihil cordiformi), postice sulco mediano longitudinali leviter impresso; scutello sat crebre sat æqualiter leviter punctulato; elytris fere ut *B. mandibularis* sed striis 14ª 15ªque antice ut punctura subtilissimæ impressis; femoribus tibiisque ut *B. mandibularis*. Long. 5, lat. 3 lin.

This species differs from all its congeners known to me (except *B. Basedowi*, Blackb.) of the Third Group by the great elongation of the portion of its frontal margins in front of the frontal wings. The distance from the point where the frontal margin on either side is in contact with the front margin of the frontal wings to that where the frontal margin meets the clypeal elevation is slightly greater than the distance from the former of those points to the external margin of the frontal wing and the frontal margins (instead of being nearly parallel with each other as in other species) are quite strongly oblique forward so as to be much

nearer to each other in front than at their base. The extremities of the clypeal elevation as well as its middle are quite strongly upturned, so that (especially when looked at obliquely from behind) it appears tritubercule (as in the species I have called *B. globuliforme*, Macl. ?). The frontal elevation, consisting of two strong tubercles joined by a scarcely raised carina, resembles that of *B. lævipes*, Blackb. Its prothoracic concavity is not unlike that of *B. Loweri*, Blackb., but is much larger, especially wider. The extero-front angle of the clypeal wings is a little better defined than in *B. mandibulare*.

N. Queensland (Mr. Koebele).

B. Basedowi, sp.nov.

Femina(?). Breve; subrotundatum; sat nitidum; supra glabrum; subtus hirsutum; obscure piceo-rufum; mandibulo sinistro(superne viso) extus vix sinuato; capite fere ut *B. mandibularis*, Blackb. (ejusdem sexus) sed marginibus frontalibus ante alas frontales elongatis (quam alæ vix brevioribus) sat convergentibus, alarum frontalium angulis extero-anticis minus rotundatis; prothorace fortiter transverso, supra (partibus lateralibus sat crebre minus acervatim punctulatis exceptis) fere lævi, antice retuso (parte retusa sat triangulari in medio longitudinaliter linea profunde impressa) utrinque supra partem retusam fovea sat brevi oblique leviter impresso, parte postica æqualiter convexa; scutello lævi; elytra subtiliter 15-punctulato-striatis, striis 14ª 15ªque haud inter se confluentibus (9ª antice abbreviata) interstitiis planis; femoribus posticis sparsim sat fortiter punctulatis; tibiis anticis extus 5-dentatis. Long. $5\frac{1}{2}$, lat. $3\frac{2}{5}$ lin.

One of the largest species of the Third Group. Easily distinguishable from all the other species known to me of the group (except *B. clypeale*, Blackb.) by its elongate and strongly convergent frontal margins. From *B. clypeale* it is very distinct by, *inter alia*, the entirely different sculpture of the retuse front of its pronotum. It was brought by the Wells Expedition (probably from the Musgrave Ranges or thereabouts) and is in the S.A. Museum.

Central Australia (Mr. Basedow).

B. MANDIBULARE, sp.nov.

Mas (?). Breve; subrotundatum; sat nitidum; supra glabrum; subtus hirsutum; rufobrunneum; mandibulo sinistro (superne viso) extus fortiter sinuato; capite (parte postica excepta) sat crebre subrugulose minus subtiliter punctulato, fronte concava postice minus crebre punctulata; eminentia clypeali in medio tuberculum ferenti, ab hoc utrinque ut carina retrorsum oblique ad marginem frontalem continua; carinis quæ areas clypeales dividunt ab tuberculo frontali ad clypei marginis anterioris extremitates continuis; marginibus frontalibus ante alas frontales brevibus (quam alæ multo brevioribus) alarum frontalium angulis extero-anticis rotundatis; eminentia frontali ut carina brevis transversa (hac leviter retrorsum arcuata, ad extremitates vix prominenti) sat fortiter elevata; capitis margine modice perspicuo, oculum medium vix attingenti; oculis perlævibus; prothorace fortiter transverso, supra acervatim sat grosse punctulato, pone marginem anticum fovea magna ovali vel subcirculari impressa, pone medium longitudinaliter sulcato, partium impressarum fundo sat fortiter punctulato, pronoti puncturis latera versus sat crebris (hinc versus partem medianam et prope basin minus numerosis); scutello subtilius sat crebre sat æqualiter punctulato; elytris sat fortiter 15-punctulato-striatis, striis 14ª 15ª que haud inter se confluentibus, interstitiis parum convexis; tibiis posticis supra carinam 2am haud transversim carinatis, anticis extus 6-dentatis; femoribus posticis subtus crebre æqualiter minus subtiliter punctulatis.

Feminæ (?) fronte minus concava, creberrime sat æqualiter punctulata. Long. 5, lat. 3 lines.

This species, although comparatively large in the Third Group, is much smaller than any species known to me of the First or Second Groups. It differs from all the other species known to me (of the same group) by its left mandible (viewed from above) having an extremely strong external sinuation. It is the only species of the group that I know to occur in New South Wales, whence four specimens were sent to me by Mr. T. G. Sloane, and I have

seen another example (also from New South Wales) in Mr. Jung's collection. I can find no character likely to be sexual except that of the frons in one of my specimens being less concave and much more closely punctured than in the other examples. I have described the sculpture of the head of this species at full length; but as the general character of the sculpture of the head is very uniform throughout the Third Group it seems to me unnecessary to repeat the full description, and I purpose therefore, in dealing with the following species, to confine myself to stating those characters in respect of which their heads are sculptured differently from the above description. Except in respect of the supposed sexual difference noted above, the specimens before me show very little variation *inter se;* there is, however, a certain amount of variation in the shape of the concavity on the pronotum, which, in some examples, is nearly circular, and in others more or less oval.

N. S. Wales.

B. GAYNDAHENSE, Macl.

I possess two specimens which I attribute to this species, and have seen another in Mr. Griffith's collection. Some years ago I compared one of my own specimens with the type and considered it identical, but I hesitate to attach any certainty to the determination, as at the time I made it I had not studied the genus sufficiently to justify my feeling sure that I may not have overlooked some character that called for attention. Every worker on the Coleoptera is, of course, aware that the results of a comparison among closely allied species is unreliable unless the person who makes it has the particular characters that require attention accurately in his mind. Nevertheless, in this case, I believe my determination was right, as (in addition to the apparent identity) the circumstances of capture pointed to the probability of my specimen being *gayndahense*. It agrees with Macleay's description (such as it is), but that alone would certainly not be conclusive. The species is the largest known to me of Group iii. (long. $5\frac{1}{2}$ l.), and is distinguishable from all the others known to me of the same group by the 9th stria of the elytra

scarcely different from (*i.e.*, only very slightly shorter and not at all less strongly defined than) the 10th, that stria in the other species being almost non-existent in at least the front one-quarter of its length.

B. LOWERI, sp.nov.

Mas (?). Breve; subrotundatum; sat nitidum; supra glabrum; subtus hirsutum; rufobrunneum; mandibulo sinistro (superne viso) extus fere æqualiter curvato; capite fere ut *B. mandibularis*, Blackb., sed eminentia frontali paulo magis arcuata; prothorace fere ut *B. mandibularis*, sed parte mediana concava plus minusve cordiformi, parte postica longitudinaliter minus fortiter impressa; scutello ut *B. mandibularis*; elytra fere ut *B. mandibularis* sed striis magis subtiliter magis crebre punctulatis (9ª antice obsoleta); pedibus ut *B. mandibularis*.

Feminæ (?) fronte minus concava, creberrime sat æqualiter punctulata; eminentia clypeali in media vix tuberculata. Long. 5, lat. $3\frac{3}{5}$ lin.

Nearest to *B. gayndahense*, Macl., but quite distinct from that species by its 9th elytral stria obsolete in the front one-quarter of its length. It also differs by the other characters noted above and by the lines connecting the tubercle of the clypeal elevation with the frontal margins being less oblique, so that they meet at the tubercle in a more obtuse open angle. The concavity of the pronotum is less notably cordiform in the specimen that I take to be a female than in the other, but this difference is probably varietal rather than sexual.

N. Queensland (Messrs. Lower and Koebele).

B. FENESTRATUM, Blackb.

This species is somewhat closely allied to *B. Loweri*, Blackb., from which, however, it is readily distinguishable by the quadrate form of the concavity on its pronotum and by the very much coarser puncturation of the lateral parts of that segment, as well as by its smaller size. I have seen numerous examples from the Port Essington region, but not any from elsewhere.

B. NITIDICEPS, sp.nov.

Mas (?). Breve; subrotundatum; sat nitidum; supra glabrum; subtus sat pilosum; testaceo-brunneum, capite pronotoque rufescentibus; mandibulo sinistro (superne viso) extus vix sinuato; capite fere ut *B. mandibularis*, Blackb., sed toto supra nitidissimo sparsissime (in clypeo sat grosse, in ceteris partibus subtilius) punctulato, eminentia frontali antrorsum arcuata, oculis perspicue subtiliter asperis; prothorace fortiter transverso, supra æquali (foveis sublateralibus exceptis), sparsim acervatim punctulato; scutello fere lævi; elytris subtilius 15-punctulato-striatis, striis 14 15ª que haud inter se confluentibus (9ª antice fortiter abbreviata), interstitiis sat planis; femoribus posticis sparsim punctulatis; tibiis ut *B. mandibularis*, Blackb. Long. $3\frac{3}{4}$, lat. $2\frac{1}{2}$ lin.

The unique type of this species stands alone among the species known to me of the Third Group in its frontal elevation being an arched carina with its convexity on the front side. The importance of this character is discounted, however, by the fact that in the few species of which I have seen numerous examples, the frontal elevation is more or less variable, being in some examples straight and in others arched, with the convexity of the arch hindward. But, that character being disregarded, the species is still a very distinct one by virtue of its pronotum evenly convex (apart from the sublateral foveæ, which are present in all the Australian Bolbocerata), and its head notably more nitid and more sparsely punctulate than that of any other of the species (of the group) in which the 14th and 15th elytral striæ are not confluent in front. The hind femora bear puncturation differing from that of the preceding four species in being very much less close, especially immediately in front of the series of setiferous punctures. Another distinctive feature consists in the extreme shortness of that portion of the frontal margin which is in front of the frontal wings, it being scarcely one-third of the length of the front outline of the frontal wings, whereas in the preceding 4 species it is half the length of that outline.

N. Queensland (sent by the late Mr. E. Cowley).

B. LÆVIPES, sp.nov.

Mas (?). Breve; subrotundatum; sat nitidum; supra glabrum; subtus sat hirsutum; testaceo-brunneum; mandibulo sinistro (superne viso) extus vix sinuato; capite fere ut *B. mandibularis*, Blackb., (maris) sed fronte minus concava confertim subtilius æqualiter punctulata, marginibus frontalibus ante alas frontales sat brevioribus, alarum frontalium angulis extero-anticis sat bene definitis, eminentia frontali tuberculis 2 parvis (his inter se vix carina conjunctis) formata; prothorace fortiter transverso, latera versus crebre (in aliis partibus—parte mediana longitudinali excepta—lævi) punctulato, antice oblique subretuso, parte retusa in media longitudinaliter (et latera versus transversim profunde sulcata; scutello fere lævi; elytris sat fortiter 15-punctulato-striatis, striis 14^a 15^aque haud inter se confluentibus, 9^a antice abbreviata, interstitiis sat planis; femoribus posticis subtus (parte antica summa excepta) lævibus; tibiis ut *B. mandibularis*. Long. 4, lat. $2\frac{1}{2}$ lin.

The most conspicuous character of this species is the peculiar sculpture of its pronotum. The front part of the segment is obliquely slightly retuse; from the middle of the summit of the declivity three deep sulci proceed (they do not, however, quite meet at the summit), one of them longitudinally to the front margin of the pronotum, one on each side towards the lateral margin (widening out and becoming obsolete, however, and so not reaching the lateral margin). It is quite probable that in the other sex this sculpture is at least enfeebled, but disregarding it the insect is extremely distinct from all the preceding (of the Third Group) by the well-defined extero-front angles of its frontal wings and by its hind femora quite punctureless between their extreme front margin and the row of setiferous punctures near the hind margin.

N.W. Australia (Mr. F. Bishop).

B. FRATERNUM, sp.nov.

Mas (?). Breve; subrotundatum; sat nitidum; supra glabrum; subtus hirsutum; testaceo- vel rufobrunneum; mandibulo sinistro

(superne viso) extus vix sinuato; capite fere ut *B. mandibularis*, Blackb., sed oculis manifeste granulatis; prothorace ut *B. mandibularis*; scutello inæqualiter subfortiter punctulato; elytris sat fortiter 15-punctulato-striatis, striis 14ª 15ªque haud inter se confluentibus; interstitiis basin versus leviter convexis; femoribus posticis (parte antica summa sat crebre punctulata excepta) subtus sparsim subgrosse punctulatis; tibiis ut *B. mandibularis*.

Feminæ (?) fronte paullo minus concava. Long. $3\frac{1}{5}$-4, lat. $2\frac{1}{5}$-$2\frac{1}{2}$ lin.

This species closely resembles *B. mandibulare*, Blackb., but differs from it by very much smaller size, left mandible scarcely sinuate externally, eyes quite evidently faceted and hind femora less closely and less conspicuously punctulate on the area between the row of setiferous punctures and the near neighbourhood of the front margin. There are before me five specimens taken by the Calvert Expedition, and I possess two in my own collection also from the far North of W. Australia. Two of them are much smaller than the others, and have evidently less close clypeal puncturation; these I take to be males, though, if so, the sexual differences in this species are unusually feebly marked.

N.W. Australia.

B. SUBRETUSUM, sp.nov.

Mas (?). Breve; subrotundatum; sat nitidum; supra glabrum; subtus hirsutum; rufobrunneum; mandibulo sinistro (superne viso) extus vix sinuato; capite fere ut *B. mandibularis*, Blackb., sed carina frontali transversa breviori nec arcuata, capitis margine magis definito fere ad oculi marginem anticum continuo; oculis manifeste granulatis; prothorace fortiter transverso, supra acervatim sat grosse punctulato, pone marginem anticum retuso, supra partem retusam obtuse leviter bifido (parte retusa subinæquali sparsim sat fortiter punctulata), pone medium longitudinaliter leviter impresso: scutello sparsim punctulato; elytris ut *B. mandibularis*, Blackb.; femoribus posticis (parte antica summa excepta) lævibus; tibiis ut *B. mandibularis*.

Feminæ (?) fronte minus concava, creberrime sat æqualiter punctulata. Long. $4\frac{1}{2}$-5, lat. $2\frac{4}{5}$-$3\frac{1}{5}$ lin.

This species is distinguished from all its immediate allies by the front part of its pronotum very conspicuously retuse, with the middle of the retuse front topped by a distinctly bifid obtuse (but by no means strongly prominent) protuberance. It differs from all the preceding species (except *B. lævipes*, Blackb.) also by the punctureless surface (excepting the extreme front and the row of setiferous punctures) of its hind femora; and from *B. lævipes* by, *inter alia*, the extero-front angles of the frontal wings quite rounded off, its frontal elevation consisting of a short transverse carina, its pronotum more closely punctulate in the neighbourhood of the front angles and the 14th and 15th striæ of its elytra very evidently better defined in their front part (*i.e.*, not becoming mere rows of subobsolete punctures).

N.W. Australia.

B. NITENS, sp.nov.

Fem.(?). Breve; subrotundatum; nitidum; supra glabrum; subtus hirsutum; obscure rufobrunneum; mandibulo sinistro (superne viso) extus vix sinuato; capite fere ut *B. mandibularis*, Blackb. (feminæ ?), sed fronte magis plana minus subtiliter punctulata, eminentia frontali ut carina arcuata perbrevis elevata; oculis manifeste granulatis; prothorace fortiter transverso, supra æquali (foveis sublateralibus exceptis), latera versus (et postice in medio sparsissime) acervatim inæqualiter punctulato; scutello lævi; elytris fortiter 15-punctulato-striatis, striis 14ª 15ªque antice confluentibus, interstitiis sat angustis manifeste convexis; femoribus posticis subtus fortiter sparsim punctulatis; tibiis (exempli typici) carentibus. Long. $4\frac{2}{5}$, lat. $2\frac{1}{2}$ lin.

Differs from all the preceding species (of this Group) by the 14th and 15th striæ of its elytra coalescing at a distance from their base of about one-sixth of the length of the elytra and being thence to the base a single row of punctures which are not smaller nor less strongly impressed than in the hinder portion of their length. This species is exceptionally nitid among its congeners of the Third Group, and its elytral interstices are exceptionally narrow and convex. I conjecture it to be of the sex that I regard as the female, on account of its frons being scarcely

at all concave. The unique type has unfortunately lost its tibiæ, but it is very unlikely that they were materially different from those of *B. mandibulare*, Blackb. The frontal margins are (in front of the frontal wings) as short as in *B. nitidiceps*, Blackb.

N. Queensland (sent by the late Mr. Cowley).

B. ROTUNDATUM, Hope.

I have, in my collection, specimens from the Port Essington region which I have no doubt are this species. Their front tibiæ have the 6th (uppermost) external tooth either wanting or very nearly so. The 14th and 15th elytral striæ are confluent in their front portion, the eyes not visibly faceted. The pronotum is longitudinally impressed along the middle, but otherwise devoid of inequalities (except the sublateral foveæ). The front part of the frontal margins is as in *nitens*, Blackb., and *nitidiceps*, Blackb. The hind femora are strongly but not closely punctulate. The difference between the sexes is slight, and of the same kind as in *B. mandibulare*, Blackb.

B. RUBESCENS, Hope.

I have a single specimen from the Port Essington region which I conjecture to be this species. If I am right in my identification it is, I think, distinct from *B. rotundatum*, Hope, though (as Westwood says) extremely close to it. Besides the slight differences noted by Westwood (which, if they were all, I should not consider specific), its eyes are visibly faceted, its clypeal elevation is scarcely tuberculate in the middle, and the carinæ connecting the quasi-tubercle with the extremities of the frontal margins are evidently less oblique, so that they scarcely form an angle at their point of contact with each other.

B. IMPRESSICOLLE, sp.nov.

Mas (?). Breve; subrotundatum; nitidum; supra glabrum; subtus hirsutum; rufobrunneum; mandibulo sinistro (superne viso) extus vix sinuato; capite fere ut *B. mandibularis*, Blackb., maris, sed fronte pernitida sparsim punctulata, eminentia frontali

ut carina brevissima transversa elevata; prothorace fortiter transverso, supra sparsim acervatim punctulato, antice retuso (parte antica pernitida—a fronte visa—triangulari), postice longitudinaliter profunde sulcato; scutello subtilius punctulato; elytris subtilius 15-punctulato-striatis, striis 14ª 15ªque antice inter se confluentibus (9ª antice fortiter abbreviata), interstitiis planis; femoribus posticis subtus (parte antica summa excepta) sparsissime punctulatis; tibiis ut *B. mandibularis*, Blackb. Long. 4, lat. $2\frac{3}{5}$ lin.

The conspicuous characters of this species are the very sparse puncturation of its frons, the extremely short transverse carina which forms its frontal elevation, and the abruptly retuse front of its pronotum, the retuse area (looked at from in front) presenting a triangular face. These characters in combination readily distinguish it from all the other species of the Group having the 14th and 15th elytral striæ coalescent in front. No part of the frons is so closely punctulate as the part of the head behind the frontal elevation.

N.W. Australia (Roebuck Bay).

B. GLOBULIFORME, Macl.

I am not very confident in my identification of this species. The only characters mentioned by its author that seem likely to be specific are the prothorax being "almost free from punctures, a few distant and very fine ones being scattered over it," and the prothorax of the male being "slightly retuse in front." I have a number of Bolbocerata from localities neighbouring to Port Denison (the habitat cited) which seem likely to be *globuliforme*, but although their pronotum is less closely punctulate than is usual in the Third Group, it is not so nearly punctureless as Macleay's description indicates. I note that Macleay regards the specimens with the frons less concave as males, which is not my opinion of them, but I admit that the matter is open to doubt. The species before me belongs to the aggregate having the 14th and 15th elytral striæ confluent in front, and its eyes are visibly (though feebly) faceted. Its elytral interstices are feebly sub-

convex (notably less flat than in *B. impressicolle*, Blackb.). The pronotum is slightly or scarcely less retuse in front, more so in some specimens than in others, but this seems to me a matter of variation rather than sex (which is not Macleay's opinion). The subretuse portion is more or less distinctly impressed down the middle, and its lateral part on either side is separated from the extreme front margin of the pronotum by a somewhat conspicuous transverse furrow. The undersurface of the hind femora is very sparsely punctulate, and the front tibiæ are 6-dentate externally. The frons in one sex is extremely sparsely (as sparsely as in *impressicolle*, Blackb.), and in the other somewhat closely, punctulate. In both sexes the clypeal elevation has a strong tubercle in the middle and another at each extremity (*i.e.*, where it meets the frontal margin).

B. OBSCURIUS, sp.nov.

Fem.(?). Breve; subrotundatum; sat nitidum; supra glabrum; subtus hirsutum; rufobrunneum; mandibulo sinistro (superne viso) extus vix sinuato; capite fere ut *B. mandibularis*, Blackb. (fem. ?) sed eminentia clypeali vix tuberculata, eminentia frontali tuberculiformi, oculis manifeste granulatis; prothorace fortiter transverso, supra minus sparsim minus acervatim (partibus posticis et postico-medianis sat sparsim) punctulato, longitudinaliter (antice leviter, postice valde profunde) impresso, antice subretuso (parte retusa minus nitida dupliciter punctulata, sc. subtiliter et fortiter); scutello subtiliter punctulato; elytris fortius 15-punctulato-striatis, striis 14ª 15ªque antice inter se confluentibus (9ª antice fortiter abbreviata), interstitiis leviter subconvexis; femoribus posticis subtus sparsim punctulatis; tibiis fere ut *B. mandibularis* sed anticarum dente 6° externo vix perspicuo. Long. 4, lat. $2\frac{3}{5}$ lin.

The most conspicuous characters of this species are the close even puncturation of the whole upper surface of the head (probably different in the other sex), which is similar to that of the most closely punctured part of the head of the preceding sp. (*B.*

globuliforme, Macl.?), and the conspicuous puncturation (large and fine punctures intermingled) which extends all across (but in a somewhat acervate manner) the retuse front face of the pronotum. The part of the frontal margin in front of the frontal wings is (as in *B. globuliforme*, Macl., *nitens*, Blackb., &c.) very short.

N. Queensland (sent by the late Mr. Cowley).

B. CARINATUM, sp.nov.

Breve; subrotundatum; sat nitidum; supra glabrum; subtus hirsutum; rufo-brunneum; mandibulo sinistro (superne viso) extus vix sinuato; capite fere ut *B. mandibularis*, Blackb., sed eminentia frontali marginum frontalium extremitates posticas conjungenti, capitis margine utrinque magis elevato; prothorace fortiter transverso, supra æquali (foveis sublateralibus exceptis), minus acervatim minus sparsim (a partibus lateralibus et anticis retrorsum et medium versus gradatim magis sparsim) sat fortiter punctulato; scutello vix vel subobsolete punctulato; elytris sat fortiter 15-punctulato-striatis, striis 14ª 15ªque haud (vel antice vix) inter se confluentibus (9ª antice abbreviata), interstitiis planis vel vix subconvexis, femoribus posticis subtus sat crebre punctulatis, tibiis anticis extus 7-denticulatis. Long. 4-5, lat. $2\frac{1}{2}$-3 lin.

This species is readily distinguishable from all the others known to me of the Third Group by its frontal elevation being an elongate carina reaching the hind extremity of the frontal margin on either side, so that the frons is margined in every part by a well-defined cariniform outline. I have seen enough specimens (14, mostly taken by the Calvert Expedition) to justify the opinion that both sexes are represented, but there is very little difference that seems likely to be sexual. About 6 of the specimens are considerably smaller than the rest and of lighter colour, with their pronotum a little more punctulate; I take these specimens to be of sex different from the others. The presence of 7 distinct external teeth on the front tibiæ is an unusual character.

N.W. Australia.

ADDITIONAL NOTE.

The following names are those of the described Australian species of Bolboceras not discussed or tabulated in the preceding pages. The insects are not known to me, and the descriptions of them do not furnish the particulars required for placing them in a tabulation :—

B. CAPREOLUS, Westw.

Presumably a member of the Second Subgroup of my Second Group. A very conspicuous species (from W. Australia), its male having a cephalic horn, the apex of which is divided into six projections.

B. LACUNOSUM, Macl.

(From Sydney). Probably a member of my Second Group, but it seems doubtful in which Subgroup it should be placed. My conjecture is that its nearest ally is *B. Richardsæ*, Blackb., from which it differs, *inter alia*, by there being no projection on the head of the male.

B. TRITUBERCULATUM, Bainb.

This species also seems to fall in my Second Group, and probably in the Second Subgroup. It is from W. Australia. Its male is described and figured as having three large tubercles placed triangularly in the centre of the retuse area of its pronotum.

B. SWEERI, Macl.

A small species appertaining to my Third Group. It might be any one of numerous species that I have described, and could not be identified without examination of the type. It is from Sweer's Island.

B. CORNICULATUM, Westw.

Evidently a very remarkable and isolated species. I cannot place it in any Group. It is of very small size (long, 3 lines), with (in the male) two horns on the head and two on the pronotum. Its habitat is W. Australia.

APPENDIX.

After the preceding pages had been forwarded to the Linnean Society, a very interesting undescribed species of Bolboceras came before my notice in the S.A. Museum. It is described below :—

B. PONTIFERUM, sp.nov.

Mas. Latum; breve; sat nitidum; supra glabrum; subtus hirsutum; rufum; capite rugulose subgrosse minus confertim (clypeo magis crebre) punctulato, elevatione frontali ut cornu modicum inerme glabrum erecta; prothorace quam longiori ut 12 ad 7 latiori, supra fere lævi (partibus lateralibus mediis sat rugulosis exceptis), parte antica magna profunde excavata, hac utrinque cornu brevi crasso tri-apiculato armata et in fundo longitudinaliter abrupte elevata (parte elevata sat lata supra planata antice et postice dilatata, ad latera abrupte declivi), marginibus lateralibus vix crenulatis, margine antico profunde bifoveolato, angulis anticis vix prominulis posticis rotundatis; scutello subtiliter punctulato; elytris sat fortiter punctulato-striatis, stria 15ª cum 14ª haud coeunti; tibiis anticis extus 5-dentatis, posticis transversim multicarinatis. Long. 7, lat. 5 lin. (vix).

Femina latet.

This very distinct species is a member of Group i. in the preceding tabulation. Unfortunately the unique type has lost the club of both its antennæ, which makes a difficulty in placing it in the tabulation. If the antennal club is normal the species must stand beside *Macleayi*, Blackb., if its antennal club is globose its place is beside *Bovilli*, Blackb., from both which species (and from all others known to me) the remarkable form of the excavated portion of its pronotum readily distinguishes it. That excavation is a large and deep cavity (resembling in area and depth the corresponding cavity in *B. rhinoceros*, Macl.), which is traversed longitudinally by an elevation suggestive of a bridge or viaduct. The horns of the pronotum are stouter and much shorter than those of *B. rhinoceros*, and each of them is truncate

at the summit; from the truncate summit three small blunt projections rise (the smallest of them in front, the two others of equal size and placed behind transversely in such fashion that, viewed obliquely from behind, each horn appears as a short erect lamina bifid at its apex). I have not seen any Bolboceras likely to be the female of this species.

W. Australia (Beverley).

STUDIES IN AUSTRALIAN ENTOMOLOGY.

No. XIV. New Species of Geodephagous Coleoptera from Tropical Australia.

Cicindelidæ (3), and Carabidæ (5) [Platysmatini, Morioni, Perigonini, Masoreini, and Physocrotaphini].

By Thomas G. Sloane.

CICINDELIDÆ.

Cicindela frenchi, n.sp.

♀. Cupreous, elytra with wide lacteous margin; cupreous part of elytra strongly punctate; prothorax narrow, subcylindrical; elytra oval, bimucronate at apex of suture.

Upper surface of head, prothorax and internal part of elytra of a metallic copper-colour, elytra with a wide milky-white margin giving off an internal process about middle of length on each elytron; under surface metallic, cupreous, finely rugulose-punctate and clothed with white hairs on lateral parts, glabrous and of a coppery-green colour in middle, two apical segments of abdomen brownish; legs and four basal joints of antennæ metallic, coppery; tarsi and lower side of tibiæ green; labrum lacteous, with extreme edge infuscate; mandibles lacteous, with apex black (base of dark apical part with cupreous reflections); labial palpi pallid, maxillary lurid, apical joint of all dark green; seven apical joints of antennæ lurid. Head wider than prothorax, 2·5 mm. across eyes. Prothorax a little broader than long (1·6 × 1·8 mm.), strongly rugose (the rugosity rough and intricate), impressed transversely anteriorly and posteriorly, and longitudinally in middle—the disc thus divided into two convex areas; anterior margin roundly produced in middle, not fringed with hairs; upper surface glabrous. Elytra oval (5·5 × 3·1 mm.), cupreous area strongly and closely punctate, —the punctures stronger on basal than on apical area—the white

parts minutely punctulate; sutural edge cupreous for whole length and ending in a sharp apical spur. Length 9, breadth 3·1 mm.

Hab.—Roebuck Bay, N.W.A. (Coll. French).

Allied to *C. rafflesia*, Chaud., but at once differentiated from that species by the larger size and more compact shape of the cupreous part of the elytra, which, too, is more strongly punctate, and (with the prothorax and head) of a copper, not greenish, colour; the prothorax is narrower and more convex; the inner ramification of the white margin is at half the length of the elytra, and is merely a deep bay or indentation (directed a little obliquely backwards) into the discoidal cupreous area, not with its inner part forming an elongate lunulate area as in *C. rafflesia*. The discoidal cupreous area is reduced almost to a millimètre in width in the neck connecting the basal and apical areas (where the two "bays" from the white lateral margins extend towards one another), the apical area is truncated posteriorly about a millimètre before the apex.

Cicindela aurita, n.sp.

Upper surface, including dark part of elytra, coarsely shagreened; prothorax subparallel and bordered on sides, lightly narrowed to apex, strongly produced backwards in an ear-like process on each side at posterior angles; elytra oval, widely rounded at apex, extreme edge of apex dark and minutely serrate under a lens. Upper surface of an olive-bronze colour, with a greenish tinge, especially on head; elytra with a broad cream-coloured margin extending on to the base on each side and forming a humeral lunula, a narrow whitish juxta-sutural vitta uniting with the white apical margin on each elytron, the raised sutural border of each elytron green to the apex; four basal joints of antennæ green; mandibles white with the teeth greenish-black; palpi white, infuscate at apex; under surface metallic green; femora green, brownish near apex, coxæ and apex of abdomen testaceous.

♂. Head wider than prothorax (2·8 mm. across eyes), vertex not concave between eyes when viewed from behind. Labrum

with a setigerous puncture near each external angle, a transverse row of seven closely placed setigerous punctures in middle near anterior margin, the outer of these punctures distant from the lateral puncture; anterior margin lightly produced in the middle into a short wide prominence (external sides of this prominence opposite the outer puncture of the median row). Prothorax rimose, a little broader than long (2·1 × 2·3 mm.), lightly constricted by an arched impression in front, transversely impressed near base; sides lightly rounded, shortly and lightly narrowed to apex. Elytra oval (6·5 × 3·8 mm.), rough (granulate-punctate), the white humeral parts smooth, granulation finer on the white than on the green parts.

♀. A little wider than ♂; the triangular ear-like processes of the prothorax much stronger.

Length 10·5, breadth 3·8-4 mm.

Hab.—Q.: Mackay (Brown; Coll. Sloane). Mr. H. W. Brown found this species at Mackay, and has given me two specimens.

It differs from all other Australian species (unless *C. trivittata*, Macl., unknown to me in nature) by the form of the prothorax. It evidently differs decidedly from *C. trivittata* by colour (not reddish-coppery-bronze); elytra with sutural vitta only present on the apical half, and with no broad twice-interrupted central vitta.

Distypsidera orbicollis, n.sp.

Slender, elongate, cylindrical; head and prothorax roughly shagreened; prothorax with disc orbiculate; elytra punctulate, without undulate sculpture. Head and prothorax emerald green; labrum testaceous with narrow infuscate edge; elytra olive green, brighter towards apex, a large lurid or tawny humeral patch extending one-third the length on each elytron, posterior margin of this patch projecting in the middle in the form of a wide triangle, an infuscate basal space between the light-coloured humeral plagæ, this space very narrow posteriorly, but wide and subrotundate anteriorly.

Head narrower than in other species (1·7 mm. across eyes); eyes much closer together, especially in front. Prothorax granulate-

shagreened, hardly broader than long (1·2 × 1·3 mm.), constricted and cylindrical anteriorly and posteriorly; disc strongly and roundly tumid. Prosternal episterna roughly shagreened like the pronotum, dividing line between these parts (lateral border) indistinct. Elytra much wider than head (4 × 2·2 mm.); derm closely punctate, the puncturation becoming stronger from apex to base, much more coarse on light-coloured basal parts. Length 7, breadth 2·2 mm.

Hab.—Q.: Cairns District (Dodd). Sent to me by Mr. F. P. Dodd from Kuranda on the Cairns Railway.

This species is isolated by its small size, narrow head, globular thorax, densely punctate elytra, without undulate sculpture, and without any lightly coloured fascia across middle of disc.

CARABIDÆ.

Tribe PLATYSMATINI.

Group **Morionides.**

Lacordaire (1854) regarded the Morionides as a distinct tribe, as also did Horn (1881); but Chaudoir, when he monographed the Morionides in 1880, looked upon them as forming part of the great carabidous tribe Platysmatini.*

Genus Morio.

Following Chaudoir the Australian species of *Morio* may be divided into two groups as under:—

i. Prothorax with sides bisetose. Mentum with lobes sinuate on anterior part of external side..... 1. *M. longipennis*, Putz.

ii. Prothorax with sides plurisetose. Mentum with external side of lobes not sinuate..... 2. *M. australis*, Casteln.

3. *M. victoriæ*, Casteln.
4. *M. longicollis*, Macl.
5. *M. novæ-hollandiæ*, Casteln.
6. *M. germanus*, Chaud.
7. *M. pachysomus*, Chaud.
8. *M. crassipes*, n.sp.

*"Les insectes dont nous allons nous occuper font . . . . partie du grand groupe Féroniens." Bull. Mosc. 1880, p. 317. This supports the opinion expressed by me (These Proceedings (2) ix. p. 409) when I did not know Chaudoir's views on the taxonomical value and position of the Morionides.

The following notes indicate my views with regard to the species described from Australia.

1. Morio longipennis, Putzeys.

Ann. Mus. Civ. Genov. vii. p. 727 (1875); Chaudoir, Bull. Mosc. iv. p. 337 (1880).

Putzeys gives the size as 12-19 × 3·3-5·5, Chaudoir as 10-13 × 3-3·5; my specimens (4) measure 13·5-15 × 4·1-4·4 mm.

Hab.—New Guinea : Fly River, Andai, Sorong, Katau, Ramou —Arou Islands (Beccari and D'Albertis, *fide* Putzeys and Chaudoir) — Queensland : Somerset and Mount Ernest (*fide* Chaudoir), Cairns (H. W. Brown; Coll. Sloane).

2. Morio australis, Castelnau.

Trans. Roy. Soc. Vict. viii. p. 122 (1868); Chaudoir, *l.c.*, p. 359.

Clypeus not furrowed ; prothorax cordiform, sides decidedly rounded on anterior four-fifths, strongly narrowed and sinuate to base; elytra with basal border hardly dentate at humeral angles. Length 13-16 × 3·9-5 mm.

Hab.—N.S.W. : Lilyvale, 29 miles S. from Sydney (Taylor), Mittagong (Coates), Goulburn (Sloane).

3. Morio victoriæ, Castelnau, *l.c.*, p. 122.

Resembling *M. australis*, Casteln., but prothorax less sinuate on posterior part of sides, anterior angles less marked (widely rounded). Length 14·5 × 4·5 mm.

Hab.—Victoria (*fide* Castelnau)—N.S.W. : Mount Kosciusko (given to me by Mr. A. M. Lea).

I have compared my specimen with the type in the Howitt Collection, Melbourne.

4. Morio longicollis, Macleay.

Trans. Ent. Soc. N.S.W. ii. p. 95 (1871).

Differs from *M. australis*, Casteln., by clypeus with five longitudinal furrows, the middle one deep and straight, the ones on each side of it oblique ; front less convex between the frontal

impressions; postocular part of orbits larger and more swollen; basal border of elytra more strongly dentate at humeral angles. Length 15-16·5 × 4·1-4·4 mm.

Hab.—N.S.W.: Richmond River (Froggatt)—Q.: Gayndah (Masters).

5. Morio novæ-hollandiæ, Castelnau, *l.c.*, p. 122.

M. australasiæ, Chaudoir, Rev. & Mag. Zool. 1869, p. 122; *M. seticollis*, Macleay, *l.c.*, p. 96.

Smaller and more convex than *M. longicollis*, Macl,; clypeus not furrowed; postocular parts of orbits smaller. Length 10·5-12 × 3·2-3·5 mm.

Hab.—Q.: Gayndah (Masters), Townsville and Cairns (Dodd).

Note 1.—The specimens from Townsville and Cairns are of more robust form, with the elytral striæ distinctly punctate. I regard them as in all probability representing *M. germanus*, Chaudoir (Bull. Mosc. lv. p. 361, 1880), but do not feel convinced of their specific distinctness from the more southern form with simple striæ.

Note 2.—There remains a doubt in my mind as to the identity of *M. australasiæ*, Chaud. (of which I have not seen the description), with *M. novæ-hollandiæ*, Casteln., although this synonymy is given by Chaudoir in his Monograph. I am sure of my identification of Macleay's species, the types of which I have seen; and I feel no doubt, from Castelnau's description, but that *M. novæ-hallandiæ* = *M. seticollis*, Macl., but I cannot help thinking that *M. longicollis*, Macl.,—which I regard as distinct from *M. novæ-hollandiæ*—was included under that species by Chaudoir in his Monograph; his indicating that *M. novæ-hollandiæ* is a species with the clypeus furrowed, and the postocular parts of the orbits large (larger than in *M. australis* and *M. germanus*)—opinions I do not share,—makes this conclusion seem unavoidable. If so, *M. australasiæ* may = *M. longicollis*, but even if that be the case I hold to the opinion that the evidence available to me shows *M. seticollis*, Macl., to be synonymous with *M. novæ-hollandiæ*, Casteln.

7. Morio pachysomus, Chaudoir.

Bull. Mosc. lv. p. 358 (1880).

This species is unknown to me in nature; by the form of the prothorax, without sinuosity on the posterior parts of the sides, it seems differentiated from all our other species; 14·5 × 4·5 mm.

8. Morio crassipes, n.sp.

♂. Elongate, robust. Black. Clypeus deeply excised in middle, each side triangular, prominent and bearing a setigerous puncture; prothorax cordate, widely bordered, four or five setigerous punctures along each margin; elytra parallel on sides, dentate at humeral angles, strongly and simply striate, a very short (almost punctiform) striole at base of first interstice, ninth interstice closely punctate for whole length. Legs stout; intermediate tibiæ curved, posterior tarsi greatly dilatate and subcylindrical.

Head large (4·6 mm. across eyes), generally as in *M. longicollis*, Macl., frontal impressions shallower, wider, spaces between them and eyes less convex; eyes very prominent and, with orbits, reniform; posterior part of orbits greatly developed, equalling eyes in size. Antennæ with four basal joints glabrous. Prothorax cordate (4·7 × 5·6 mm.), truncate at base and apex; moderately convex; basal area depressed; sides lightly rounded on anterior four-fifths (subparallel at widest part), strongly sinuate posteriorly and meeting base at right angles; anterior angles widely rounded; basal angles rectangular, with a setigerous puncture; marginal channel wide; median line strongly impressed. Elytra wider than prothorax (13·8 × 6·8 mm.), convex; interstices convex, hardly narrower or more convex near apex, first without the usual anteapical setigerous punctures, third unipunctate at posterior third. First ventral segment with a deep longitudinal channel in middle. Posterior femora much larger and narrower, and anterior tibiæ more dilatate at apex than in other Australian species; intermediate tibiæ curved, with a hairy brush on inner side near apex; posterior tibiæ smooth, glabrous, longitudinally sulcate on pos-

terior side; tarsi (♂)—anterior differing from other Australian species by being less dilatate, naked beneath, basal joints rounded and not produced at inner apical angle; posterior very thick, second joint widest, third, fourth and fifth successively narrower, fifth as long as third and fourth together, wide at base, parallel on sides, its upper surface with a deep sulciform concavity on outer side at base.* Length 24, breadth 6·8 mm.

Hab.—Q, : Cairns District (Coll. Sloane).

This remarkable species was taken at Kuranda, near Cairns, by Mr. F. P. Dodd. Its position seems to be between *Hyperion* and *Morio;* it might have been regarded as the type of a new genus or subgenus and substantial reasons given for so treating it, but I prefer to look upon *Morio* as a genus which varies sufficiently to include *M. crassipes* as an aberrant form. Its size, incised clypeus, and the strange form of the legs, in combination differentiate it from all other Australian Morionides.

Tribe PERIGONINI.

Bates, Biologia Centrali-Americana, Col. i. p. 133.

Genus PERIGONA.

P. RUFILABRIS, Macl., var. INFUSCATA, n.var.

Closely resembling *P. rufilabris*, Macl.; head piceous, clypeus and labrum ferruginous, prothorax ferruginous, sometimes a little infuscate, elytra subpiceous with margins ferruginous. Differs from *P. rufilabris* by head not such a deep black, elytra with the piceous colour extending much more generally over the elytra (the basal third not rufescent); prothorax (0·8 × 1·2 mm.) less convex, a little less narrowed to base, anterior angles more prominent, margin a little explanate at basal angle Length 3·3-3·8, breadth 1·4-1·65 mm.

Hab.—Q. : Cairns (Dodd; eight specimens : Coll. Sloane).

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* 12: x.: '04. Since this was written Mr. Dodd has sent the ♀, which shows the same characters of legs and tarsi as the ♂.—T.G.S.

This will probably come to be recognised as a distinct species, but, my knowledge of *P. rufilabris* being confined to two specimens, I prefer to place the Cairns species as a variety till more knowledge is gained of the amount of variation occurring in these nearly allied forms. The third interstice of the elytra has a fine puncture about the middle of its length, but I can find no trace of a puncture in front of this; in *P. rufilabris* there is a more strongly impressed puncture at half the length, and another still more distinct on the outside of the third stria about halfway between this median puncture and the base of the elytra.

Note.—*P. australica*, Sl. By an error *P. australica* appears in my tabulation of the Australian species of *Perigona** under the name of *P. apicalis*, a name which should be treated as non-existent.

Tribe MASOREINI.

Bates, Biologia Centrali-Americana, Col. i. p. 174

MASOREUS AUSTRALIS, n.sp.

Oval, subconvex, lævigate; head with two supraorbital setæ on each side. Black; elytra sericeous-maculate; legs piceous; palpi and two basal joints of antennæ ferruginous, rest of antennæ infuscate.

Head wide, short, smooth. Prothorax widely transverse (1·4 × 2·3 mm.), lightly convex; apex emarginate; anterior angles obtuse, distant from head; sides rounded; base wider than apex, obliquely truncate on each side, feebly lobate in middle, basal angles obtuse but marked; lateral basal impressions obsolete; median line finely impressed; two marginal setigerous punctures on each side—anterior a little before middle, posterior at basal angle. Elytra wide, oval (3·8 × 2·8 mm.), lightly convex, depressed near suture, lightly striate; humeral angles widely rounded; sides lightly rounded; apical curve widely rounded without lateral sinuosities; striæ fine, simple, three inner more strongly impressed than others, first outturned to join second at base,

* These Proceedings, 1893, p. 635.

eighth finely impressed, extending forward to humeral angle; border fine, extending from scutellum to sutural apex. Length 6·5, breadth 3·8 mm.

Hab.—Q. : Townsville (Dodd; Coll. Sloane).

Tribe PHYSOCROTAPHINI.

CARPAULUM,* n.g.

Mentum short; lobes short; sinus with wide short triangular pointed median tooth. *Palpi* long: *labial* with penultimate joint long, narrow, bearing several (4 or 5) setæ on apical half of front margin; apical joint as long as penultimate, of a long narrow lightly compressed triangular form, nitid, sparsely setose: *maxillary* with second joint long, bisetigerous in front near apex; second joint conical, shorter than apical, with three long setæ at apex; apical joint stout, almost as long as apical of labial palpi, (of somewhat similar shape to apical of labial, but stouter and less triangular), sparsely covered with short setæ. *Maxillæ* with inner lobe hooked at apex, rather sparsely spinulose on inner side. *Ligula* corneous, wide, free; 5-setose—three long setæ at apex, two similar setæ placed a little backward from the lateral ones of apex: *paraglossæ* membranous, free from ligula; apex very narrow and projecting far beyond ligula. *Labrum* truncate, 6-setose. *Mandibles* prominent. *Head* short, convex, constricted behind eyes to a short subcondyliform neck received to the eyes into the sinus of the prothorax; front with two short rounded impressions; two supraorbital setæ on each side; postocular prominences armed with a small setigerous tubercle near eye. *Antennæ* filiform, reaching backwards to basal third of elytra; all the joints setose, four basal joints cylindrical and sparsely setose; seven apical joints lightly compressed, pubescent; basal condyle exposed; first joint about twice the length of second; second shortest, two-thirds the length of third; third very little longer than fourth and succeeding joints. *Prothorax* depressed, deeply emarginate at apex, explanate on sides; derm punctulate; two lateral marginal setæ on

* *Carpaulum*, a word used by the aboriginals at Cairns, Queensland, to denote an insect—on the authority of Mr. Horace W. Brown.

each side, anterior just behind widest part, posterior at basal angles. *Elytra* truncate at apex (with a narrow coriaceous margin), striate; interstices shagreened and thickly setigero-punctulate; an abbreviate striole at base of first interstice. *Under surface* finely setigero-punctate; first segment of abdomen with a longitudinal concavity in middle in ♂. *Legs* slender: anterior femora hairy on anterior side towards base; anterior tibiæ with upper side lightly arcuate and longitudinally grooved; tarsi setose on upper surface, posterior elongate, first joint about as long as three succeeding joints together, anterior tarsi in ♂ subdilatate with a narrow double row of papillæ in middle of three basal joints; ungues simple. *Form* depressed. Alate.

Baron de Chaudoir formed a special group, Physocrotaphides, to include the genera *Helluodes*, *Physocrotaphus* and *Pogonoglossus* (which Dr. Horn indicated as a tribe*); none of these genera is known to me in nature, but *Carpaulum* evidently differs from *Helluodes* by its small size and head not much wider than thorax; and from *Pogonoglossus* by its long slender antennæ. It is apparently much more closely allied to *Physocrotaphus*, but, apart from my disinclination to bring a genus of Ceylon into our fauna without knowledge of it in nature, there seem tangible differences in the form of the tooth of the mentum—not "*profunde bifido*,"—and the ligula—not "*late truncata*,"—as stated by Chaudoir; the colour too is not *brilliant black* as stated by Lacordaire.

CARPAULUM INFLATICEPS, n.sp.

Brown; elytra darker than head and prothorax; under surface, legs, &c., ferruginous-brown.

Head convex, wide (2·5 mm. across eyes), sparsely setigero-punctate; eyes prominent; orbits greatly developed behind eyes, almost equalling eyes in size and prominence. Prothorax subcordate, transverse (1·8 × 2·8, length 2·2 mm. at sides), a little wider at apex (2·25 mm.) than at base (2·1 mm.), rather closely and finely punctate (each puncture with a decumbent seta); sinus to receive neck truncate at bottom, widely oblique on sides;

* Trans. Am. Ent. Soc. ix. 1881, p. 141.

explanate lateral margins widely triangular and pointed at anterior angles, wide and reflexed posteriorly; sides rounded on anterior half, sinuate posteriorly and meeting base at right angles; base truncate, sloping lightly forward from peduncle on each side; basal angles obtuse, but marked. Elytra depressed, much wider than prothorax (6·2 × 3·7 mm.), parallel on sides; shoulders widely rounded; striæ strongly impressed; interstices equal, hardly at all convex, closely covered with setigerous punctures, 9th very narrow, depressed (convex just behind shoulder), seriate-punctate. Length 11·5, breadth 3·7 mm.

Hab.—Q.: Cairns District (Coll. Sloane). Sent by Mr. F. P. Dodd from Kuranda.

CARPAULUM POROSUM, n.sp.

Upper surface brown-piceous; mouth-parts, legs and under surface light brown; lower side of head, episterna of prosternum, mesosternum and metasternum piceous.

Head convex (2·2 mm. across eyes); frontal impressions strongly impressed, rotundate; eyes prominent, deeply enclosed at base, posterior parts of orbits much smaller and less prominent than eyes; postocular tubercle small, sharp. Prothorax subcordate, transverse (1·7 × 2·6, length 2 mm. at sides), closely set with fine setigerous punctures; sinus to receive head truncate at bottom, sides short, rounded; anterior angles widely rounded; disc lightly convex, finely canaliculate; sides and base similar to those of *C. inflaticeps*, Sl., but margins less widely explanate. Elytra (5·7 × 3·6 mm.) as in *C. inflaticeps*, the juxta-humeral convexity of the 9th interstice less marked. Length 11, breadth 3·6 mm.

Hab.—Q.: Kuranda (Dodd; Coll. Sloane).

Differs from *C. inflaticeps*, Sl., by head smaller, less punctate, eyes less prominent, postocular part of orbits much smaller and less swollen; prothorax wider at base (2·1 mm.) than at anterior angles (1·7 mm.), sides less strongly sinuate posteriorly, disc less closely punctate, lateral margins less explanate especially towards anterior angles, these less prominent, widely rounded (not pointed), sinus to receive head shallower with sides rounded (not long and oblique).

THE BOTANY OF FUNAFUTI, ELLICE GROUP.

By J. H. Maiden, Government Botanist and Director of the Botanic Gardens, Sydney.

These observations are based on collections made by Mrs. Edgeworth David during a residence on the island in July and August, 1897, and also on some specimens collected by Messrs. G. H. Halligan and A. E. Finckh in 1898. To Mrs. David I am further indebted for many valuable notes, including the vernacular names.

Little has been published in regard to the phanerogams and vascular cryptogams of Funafuti. The principal paper dealing with the botany is that by Mr. C. Hedley.* I trust, therefore, that the observations which follow will be of some interest. Owing to the excessive humidity of the atmosphere of the small coral islands, botanical collections are usually destroyed in a short period, and it is mainly to this circumstance, I think, that full lists of the limited insular floras of the South Pacific have not been published long ago.

Some of the specimens were not sufficiently complete for absolute identification; attention has been drawn to these under the genera concerned; in a few instances not even the genus could be determined. Those cases are the plants known by the names of Pula, Molomolo, and Tala-tala-moa; there are also a few fragments of which the native names are not available.

Owing to the difficulty of preserving specimens in the ordinary way,† I recommend that the use of presses be either abandoned or used as a supplementary method, and that plants be preserved in the wet way. To this end the equipment of the botanical

* Australian Museum, Sydney: Memoir iii. "The Atol of Funafuti." Part i.

† Mrs. David made four separate collections o pecimens, attempted to dry them in the plant press, and lost them all.

collector will be much the same as that of his zoological brother, consisting of small casks and drums, and cylindrical glass bottles (preferably preserving jars). These should be chosen with as little shoulder as possible, that is to say, they should have the widest mouths. The preserving fluid should be formol (formalin), say 2 per cent.

Jewellers' tags can be attached to each specimen, with the information written in black lead; the specimens are then placed in the liquid. A supply of muslin bags is also desirable, or muslin or butter-cloth alone for wrapping over certain specimens which are best wrapped up, either because no label can otherwise be readily attached to them or because of their liability to fall to pieces. Before putting them in the preservative, a piece of paper, written in black lead, should be placed inside the bag or cloth. A supply of string will be necessary for tying the muslin or butter-cloth packages. Of course care will be exercised that specimens which impart a deep colour to the liquid may be placed in vessels by themselves. If this little precaution be not adopted, the specimens of pale or delicate colour will be damaged. But these are common-sense matters which will appeal to every collector. Most of the specimens when taken out of the liquid will be found to be comparatively tough. The leaves, fruits, &c., of such plants as readily drop their leaves and fruits in drying will be found for the most part to remain *in situ*. The specimens should be taken out of the liquid carefully, and the liquid removed from them by pressing them gently between folds of porous paper; as soon as the readily absorbable moisture is thus got rid of, the specimens are dried in the ordinary way, *i.e.*, as if they had just been collected.

This method was adopted in the collection of the Funafuti specimens; and it has otherwise proved so successful, during the last five years, that I feel justified in believing that it will prove the key to successful collecting in these islands and other localities where the specimens are laden with salt or where the atmosphere is charged with moisture. To my knowledge, the waste of specimens received from the South Sea Islands (including New Guinea)

through circumstances beyond the collectors' control, is appalling, and has much militated against botanical research. I feel so strongly in the matter that, except under special circumstances, I would abandon presses for island collecting.

The collector will find a cheap box of paints indispensable, in order that he may indicate, in his note-book, the colour of flowers, fruits, &c. I need scarcely point out that knowledge of drawing is unnecessary in this very important matter.

Reference has been chiefly made to the following works :—

Seemann, B.—"Flora Vitiensis," 1864.
Gill, W. Wyatt—"Jottings from the Pacific," 1885.
Guppy, H. B.—"The Solomon Islands and their Natives," 1887.

It will be observed how similar are the Funafuti and Samoan names for the same plants. Several of the Funafuti names are believed to be recorded now for the first time; it is believed also that this is the case with some of the Samoan names.

Kai-kai is a term used for food both here and in the Solomon Islands, but Guppy (p. 91) states that the term has been introduced by traders.

The following note is useful to be borne in mind, as one must be cautious in making assumptions as to the use of any plant in any group of islands :—

"This leads me to remark on the singular fact that the inhabitants of one Pacific group are often unacquainted with, or make but little use of, sources of vegetable food which in other groups afford a staple diet" (Guppy, p. 90).

List of the Plants collected.

CRUCIFERÆ.

Cardamine hirsuta, Linn.—"Atasi," known as "A'atasi" in Samoa.

This may be the plant called *C. sarmentosa* by Hedley.* Both *C. hirsuta* and *C. sarmentosa* are, however, recorded from the South Sea Islands. The description of *C. sarmentosa* in both

* *Op. cit.* p. 39.

DC. Prod., and Fl. Vitiensis is very brief, but I believe the Funafuti plant is *C. hirsuta*.

PORTULACEÆ.

PORTULACA OLERACEA, Linn.—Called "Lau," which also signifies "leaf."

An allied plant, bearing the same name, occurs at Funafala, one of the northern islands of the Atoll, but I have no specimens.

It is apparently not used for food of man or beast in Funafuti. The seed was largely used for food by the aborigines of Australia, and is still used by those of the far interior, while the plant itself is eaten readily by stock.

GUTTIFERÆ.

CALOPHYLLUM INOPHYLLUM, Linn.—"Fetau," the name also used in Samoa.

This is the Tamana or Tamanu of many Polynesian islands, and is a name well known to Europeans. "Tamanu" is also applied to *Maba* sp. in Samoa.

There appears to be little to add to Seemann's full account of this tree. Locally it is used for building purposes and for making wooden dishes; there are but few trees on the main islet, but many more on the northern and western ones

Flowers abundantly with white petals and abundant yellow stamens, with glossy thick green leaves (Mrs. David's note).

SIDA RHOMBIFOLIA, Linn., var.—"Akata"; Mr. Finckh's name is "Pula."

Recognised as a foreign plant by the natives; much fancied by them for wreaths.

This plant has the leaves of *S. cordifolia*, Linn., but the carpels have not the long awns which generally distinguish the species.

Perhaps this is the same as the awnless species from Tahiti referred to by Seemann (Fl. Vit. p. 16).

HIBISCUS ROSA-SINENSIS, Linn.—"Aute"; known by a similar name in Samoa.

"Only one plant of this noticed on main islet of Funafuti, close by a ruined hut belonging to a Samoan trader" (Mrs. David).

According to the Rev. G. H. Nobbs (who spent the greater part of his life at Tahiti and Pitcairn), the Paper-Mulberry or Tappa (*Broussonetia papyrifera*) is also known as "Aute." In that case perhaps the word signifies a fibre-plant, which both *Hibiscus* and *Broussonetia* of course are. See Lady Belcher's "Mutineers of the Bounty" (p. 387).

Mrs. David's note, made at the time of collection, is "Stamens deep yellow, flower buff-colour, crimson at bottom of cup."

Mrs. David states that there is no red Hibiscus on Funafuti, and there seems to be no doubt that the plant belongs to the widely diffused and somewhat variable *H. Rosa-sinensis*. De Candolle (Prod. i. 448) states that the flowers of this species vary from purple to white and yellow ("Variat flore purpureo albo et flavo"). I cannot detect any botanical differences in the forms. The yellow-flowering form is sparingly cultivated in Sydney.

HIBISCUS TILIACEUS, Linn.—"Fou fafine." Called "Fautu" in Samoa. The "Au" or Lemon Hibiscus of Wyatt Gill.

The bast is used for making the "takai" or men's gala dress. It is very largely used for similar purposes and for cordage in the islands. The timber is used by the Samoans for knees in boat-building.

THESPESIA POPULNEA, Corr.—"Milo." The name likewise given in Tonga and Samoa. Wyatt Gill gives the name as "Miro" in Rarotonga, but r and l are of course more or less interchangeable in the South Sea Islands.

Wyatt Gill states that the leaves are heated over a fire and used for a poultice in Rarotonga. The timber is chiefly used for boat-building in Samoa. In Funafuti the principal uses are for house-building, wooden pillows, tuais (coco-nut graters) and boxes.

Mr. Finckh's note is—"15-20 feet high, along swamp near village. Trunk about 5-6 ft.; then many shoots upwards."

TILIACEÆ.

TRIUMFETTA PROCUMBENS, Forst.—Tolo-tolo. The "Mauto futai" of Samoa.

"The plant was used for poultices for sores and boils, but appeared to have no effect" (Mrs. David).

SIMARUBEÆ.

SURIANA MARITIMA, Linn.—See B.Fl. i. 375. Found in Northern Queensland also.

LEGUMINOSÆ.

CANAVALIA ENSIFORMIS, DC., var. TURGIDA (Syn. *C. turgida*, Graham, in Bot. U.S. Exploring Exped.).—"Saketa."

This plant has to be kept in check by the natives, as it chokes small trees and other vegetation. Apparently no use is made of the bean.

CÆSALPINIA BONDUCELLA, Flem.

The seeds of this plant were picked up on the shore. It does not transpire whether this plant grows at Funafuti; this is, however, likely enough.

RHIZOPHORACEÆ.

RHIZOPHORA MUCRONATA, Lamk.—(See Beddome, Fl. Sylvatica for S. India, t. xiii., fig. 4).

"Togo." In Fiji "Dogo" is the name of the same plant (Seemann). In Samoa it would appear that the name "Togo" is applied to another Mangrove (*Bruguiera Rheedii*), while "Tupu" is the name given to *R. mucronata*. Perhaps "Togo" and its variants are generic names applied to Mangroves.

In Funafuti "Togo" wood is used for building; a dye is extracted from the bark, and the fruit is known as "pika." Height 20 to 30 feet (Mr. Finckh).

COMBRETACEÆ.

TERMINALIA sp., probably *T. Catappa*, Linn—"Talie." A similar name is used in Samoa for both *T. Catappa* and *T. littoralis*. Foliage and unripe fruit alone available.

The tree was only observed on Fuafatu, one of the northern islets, where it is a tree of 30 feet.

The leaves are obovate, and up to 6 inches long by 5 broad. The kernels are not used for food in Funafuti. These islanders

have good food supplies, which render them less dependent on the native vegetation. Talie nuts are, however, eaten in Samoa, where the people recognise the Small Talie (*Terminalia Catappa*) which grows inland, and the Large Talie (*T. littoralis*) which is found near the coast. In Funafuti one Talie appears only to be recognised; it is desirable to ascertain the species with certainty, and to ascertain if there is a second one.

In Samoa Talie timber is preferred by natives for making their "Logos" or bells, which are made by hollowing out a portion of the trunk, leaving thin sides and a few inches of wood at each end. These are then beaten with a stick, and form the summons to worship, *e.g.*, a church bell.

MYRTACEÆ.

BARRINGTONIA BUTONICA, Forst. (Syn. *B. speciosa*, Linn.).

"Futu," the name also employed in Samoa; "Utu" of Rarotonga (Gill).

The name *B. speciosa* has obtained such a hold, particularly in this part of the globe, that it seems a pity to revive the older name of *B. Butonica* now, but I follow Kew in this matter.

The flowers of this well-known plant are very fragrant. The grated seed is used as a fish-poison, but its use does not render the fish unwholesome.

The expressed juice of the scraped bark is a Samoan remedy of internal application, for what disease being a secret of the native profession.

"There is one small grove of these trees on the main Funafuti islet; it could not be ascertained that the plant was used for any purpose" (Mrs. David).

LYTHRARIACEÆ.

PEMPHIS ACIDULA, Forst.—"Gie" or "Ngie."

A gnarled shrub, the wood used for "palu" (fish) hooks, pestles (tuki-tuki), and all small articles requiring a tough, hard wood. The best firewood on the island.

ONAGRARIACEÆ.

Jussieua sp.

Pickering* states that the U.S. Exploring Expedition discovered *Jussieua angustifolia* (?) in Polynesia, growing in wet grounds, but possibly introduced with taro-culture.

RUBIACEÆ.

Gardenia taitensis, DC.—"Taili."

The flowers are much prized for wreaths.

Guettarda speciosa, Linn.—"Pua."

The petioles longer and more slender than those of the plant figured in Bot. Reg. t. 393.

It is the "Pua-pua" of Samoa. Seemann says its name in Fiji is "Buabua."

The "Pua" of Rarotonga, &c., is *Fagræa Berteriana*;† the name of this plant is "Pua-vao" in Samoa. Pua is the name of *Gardenia* sp. in Samoa according to Pratt (Samoan Dict.).

The leaves of *Guettarda speciosa* in Funafuti are a foot long, and often the same in greatest breadth. They are used for covering in native ovens. The flowers are much used for wreaths. The wood is rather soft, but is used in buildings, and some inferior dishes and bowls are made of it.

Morinda citrifolia, Linn.—"Nonu," both here and in Samoa; "Noni" and "Nono" are other spellings of the same name in use in other islands.

The root is used for making a reddish-yellow dye. The madder of commerce is, of course, the product of an allied plant (*Rubia tinctorum*, Linn.).

The fruit is, say, a couple of inches long, and of a yellowish-green when dead ripe. It is not eaten by Funafuti natives, but they have the idea that some white men eat it; it is, however, most nauseous to an ordinary palate. The Rev. Thos. Powell‡ states that in Samoa it is cooked as a delicacy for the sick.

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* 'The Races of Man.' Ed. J. C. Hall, 1854, p. 324.

† Wyatt Gill, 'Jottings from the Pacific,' p. 189.

‡ Journ. Bot. vi. 360.

In Samoa this is looked upon as a plant possessing medicinal virtue. Its leaves, when bruised or cut up small, are used for dressing ulcers, sores and open wounds. They are used for poultices in Funafuti.

COMPOSITÆ.

ADENOSTEMMA VISCOSUM, Forst.—Called "Kisi-kisi," by some of the islanders. "Pepe-pepe" is its designation in Samoa. Mr. Finckh gives its name as "Lauti," and says that the root is eaten when cooked.

WEDELIA BIFLORA, DC.—"Lakou-monog."

The common scrambling seaside shrub. It is known as "Ate-ate" in Samoa, where the leaves are used medicinally as a general tonic; they are put to a similar use in Lord Howe Island.

Wedelia strigulosa, DC. (Hedley, p. 39), is not known on the island, and is either intended for *W. strigulosa*, Benth. et Hook. f., or is perhaps *W. biflora*, DC. Both *W. biflora*, DC., and *W. strigulosa*, Benth. et Hook. f., occur in Tonga and other South Sea islands.

GOODENIACEÆ.

SCÆVOLA KŒNIGII, Vahl.—"Ngassu" (Mr. Finckh).

A sea-shore plant found also in Australia.

APOCYNACEÆ.

OCHROSIA BORBONICA, Gmelin.—Fao; the "fau" of Hedley.

Mrs. David brought specimens of an *Ochrosia* which she states is the only fao on the island, and which was the one supplied to Mr. Hedley by the natives. It has been referred by that gentleman to *O. parviflora*, Hensl.* This is an inadvertence, as the fruits of *O. parviflora*, Hensl. (a synonym of *O. elliptica*, Labill.), are red, are not fibrous (not to mention other differences) like the specimens collected both by Mr. Hedley and Mrs. David.

O. elliptica, Labill. (*O. parviflora*, Hensl.) occurs both in Eastern Australia and the Pacific Islands. I have consulted Henslow's description† based on a plant collected by Darwin in

* Hedley, *op. cit.* p. 32.

† Ann. Nat. Hist. i., 345, 1838.

the Keeling or Cocos Islands, and that by G. Don,* based on a plant collected by Forster in the Sandwich Islands, and I follow Bentham† in considering them a synonym of *O. elliptica*, Labill.

The Funafuti species (and it appears to be the only one) is the widely diffused *O. borbonica*, Gmelin.

BORAGINEÆ.

Cordia subcordata, Lamk.—Kanava.

See 'Fl. Vitiensis,' p. 168, also tab. xxxiv.; the plate appears to be a little highly coloured as regards the flowers of a Funafuti tree. It is the handsomest tree on the island; it is commonest at Fuafatu.

Bowls and dishes are made of this wood, for which purpose it is much esteemed; also for the wooden boxes called "Turuma," used for the natives to place in their canoes to store small articles, *e.g.*, matches, tobacco, fish-hooks, which are required to be kept dry. The fresh wood smells like violets, resembling in this respect the Myall-wood (*Acacia pendula*) of Australia.

It is the "Tauanave" of Samoa, and the fruit is eaten in hard times by the natives of that group.

It is the "Nawanawa" of Fiji, according to Seemann, who states that the seeds are eaten in that group also.

Tournefortia argentea, Linn.—"Tausunu."

CONVOLVULACEÆ.

Ipomæa biloba, Forst. (Syn *I. Pes-capræ*, Roth.)—"Fue."

Seemann says the leaves are roasted and used for caulking canoes in Fiji.

ACANTHACEÆ.

Ruellia reptans, Forst.—DC., Prod. xi. 145.

Observed only on the northernmost islets. Opataia, an intelligent native, gave the name as "Kisi Kisi." See *Adenostemma*.

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* General History of the Dichlamydeous Plants, iv. 99.

† B.Fl. iv. 310.

VERBENACEÆ.

PREMNA TAITENSIS, Schauer.—"Valo valo." ("Vallo vallo," Finckh). The "Aloalo" of Samoa, and the "Awahlo" of Tahiti (Solander, quoted by Seemann).

It yields the favourite wood for getting fire by friction in Funafuti. In Samoa the leaves are crushed and mixed with coco-nut oil, which is rubbed on limbs affected with the preliminary symptoms of elephantiasis. Possibly it retards, but it certainly does not cure, this disease.

Mrs. David states that valo-valo leaves are used in Funafuti to scent coco-nut oil for anointing purposes. It is a gnarled tree of about 25 feet.

RIVINA LÆVIS, Linn.

A native of South America and the West Indies; largely cultivated as an ornamental plant. The whole genus, consisting of about 10 species, is from tropical and subtropical America, but has been introduced into tropical Asia and the African Islands, according to Bentham and Hooker's 'Genera Plantarum.' It may have spread from tropical Asia to the South Sea Islands. Recorded from Tonga by Hemsley.* Mrs. David says: "Fruit brilliant scarlet and falls off readily when ripe. Abundant; a common weed."

AMARANTACEÆ.

ACHRYANTHES ASPERA, Linn.—"Polo."

Found at Fuafatu.

NYCTAGINEÆ.

BOERHAAVIA DIFFUSA, Linn.—"Kalisi-lisi." Called "Kisi" by some.

It is apparently pût to no use in the island. In Australia it is a useful fodder plant for sheep. Mr. Finckh's note, "Creeper; they say imported."

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* Journ. Linn. Soc. Bot. xxx., 189.

LAURACEÆ.

HERNANDIA PELTATA, Meissn.—"Puka," ("Buka," Mr. Finckh).

The "Buka" of some other Polynesian islands. The "Pu'-a" of Samoa. Not to be confused with *Gardenia*. The inflated involucel is of a pale green colour. In old times the fruits were made into charcoal, which was used as a pigment for tattooing. The wood is used for making canoes.

CASSYTHA FILIFORMIS, Linn.—"Tetai."

This leafless parasite is used for streamers for purposes of personal decoration.

EUPHORBIACEÆ.

MACARANGA sp.—"Ogogo." (See *Fleurya*).

Apparently very near *M. involucrata*, Baill., but the specimens too imperfect for absolute determination. For a list of South Sea Island Macarangas see 'Fl. Vitiensis,' p. 228.

URTICEÆ.

FICUS sp.—"Felo." "Tefelo," about 20 feet high (C. E. Finckh). "Shiny leaves and yellow fruits."

The specimens at my disposal do not permit me to determine this fig with absolute certainty. It is apparently not more nearly allied to any Indian species than to the Australian *F. eugenioides*, F.v.M. The receptacle is too much advanced in fruit to admit of examination of the male and female perianths.

Mrs. David says that the fruits, which are about the size of a marble, are occasionally used for food in Funafuti, but there are very few trees. The children string the figs together for necklaces.

ARTOCARPUS INCISA, Forst.—"Mei fenua muli." Perhaps the name of one of the numerous cultivated varieties of the Breadfruit. Breadfruit in general is known in Samoa as "Ulu" and in Fiji as "Uto."

FLEURYA RUDERALIS, Gaud. (?)—DC., Prod. xvi. Part i. p. 74. An imperfect specimen. "Luna."

The natives are not afraid of the sting of this nettle (*Cf.* Seemann).

Two species of *Fleurya* are known in Samoa as "Ogogo." See *Macaranga*. *M. involucrata* and *Fleurya* resemble each other superficially.

PIPTURUS VELUTINUS, Wedd.—"Fou tagata." Perhaps the *Broussonetia papyrifera* of Hedley (*op. cit.* p. 34). Used as a fibre plant. Makes the strongest fishing lines, to which manufacture it is chiefly put.

AMARYLLIDEÆ.

CRINUM ASIATICUM, Linn.—"Tapua."

This plant is said by Samoans to indicate the land most suitable for cultivating Breadfruit.

"The trader said he introduced this plant from Samoa. Its flowers are very much valued by the youths and maidens, who bind the long narrow white perianth segments into wreaths" (Mrs. David).

TACCACEÆ.

TACCA PINNATIFIDA, Forst.—The flower is known as "Niupiu," and the whole plant, including the tuber, as "Vatia" ("Vadia," Finckh).

The flowering stalk is 6½ ft. long ("3 ft. high, flower on stem 4-5 ft." Finckh). The tuber makes excellent arrowroot, which is well known but seldom made in Funafuti.

It is the "Māsoā" of Samoa. In that group this arrowroot is used by the natives chiefly in the preparation for sick people of "Vai solo," which is a mixture of the young coco-nut oil and grated arrowroot.

LILIACEÆ.

CORDYLINE TERMINALIS, Kunth.—"Ti."

Very plentiful. The leaves used to be employed for covering up the native ovens. The roots were formerly much used for food on Funafuti.* For an account of the uses of this plant, see Seemann (Fl. Vit. p. 311).

* But since the introduction of taro and bananas the natives have almost abandoned the cultivation of this plant because of the hard work it entails. (Mrs. David).

PANDANACEÆ.

PANDANUS (1).—"Fala vao." "Laufala" of Samoa.

Probably Wyatt Gill's "Thatch-tree." This is the wild plant. The leaves are used for making house mats and for thatching, and the orange-coloured drupes are chewed and much esteemed.

Pandanus timber, though spongy and very inferior, is used for posts and rafters and building purposes generally; it is said to have a life of five to seven years under cover.

PANDANUS (2).—"Fala kai." Probably Wyatt Gill's "Mat-tree." The cultivated plant. The head of fruits ("cone") is larger than that of the preceding, and the fruits more succulent. The kernels ("almonds") of *Pandanus* are not eaten on Funafuti, as better food is more readily available.

The specimens brought to Sydney are insufficient to identify the species with certainty, but according to Wyatt Gill (*op. cit.* p. 183, &c) "fala vao" is probably *P. odoratissimus*, while "Fala kai" is *P. utilis*. To this work we would recommend reference for further particulars in regard to these Pandani. To Guppy's work we would also recommend reference; it contains much information on the subject.

PALMACEÆ.

COCOS NUCIFERA, Linn.

The well known Coco-nut is very plentiful, but I received no specimens.

AROIDEÆ.

COLOCASIA ANTIQUORUM, Schott.—(See Bot. Mag. t. 7364).

There are perhaps six cultivated varieties on Funafuti, of which the names of three are Taro, Ikaluoi and Pulaka.

A spathe brought to Sydney by Mrs. David belongs to the variety called "Pulaka"; the lower part is striped longitudinally with purple.

In Samoa this well-known food-plant is called "Taro" or "Talo." There are many varieties of land and water Taro and wild Taro. Among wild ones are Pula'a, Pula'ū, Pula-fui, Pula, &c.

For further notes on this plant, see Seemann ('Fl. Vit.' p. 285).

For an analysis of the tuber of this plant see *Arum esculentum*, Herapath, Liebig u. Kopp, Jahresb. 1850, Tab. D. (quoted in Wolff's 'Aschen-Analysen,' i. 99).

CYPERACEÆ.

Scirpus sp.—Section *Isolepis*, apparently allied to *S. riparius*, Spreng., but too imperfect for absolute determination.

GRAMINACEÆ.

Eleusine indica, Gaertn.

Common in coastal Queensland and north-coastal New South Wales. Has spread down the coast as far south as Sydney.

Eragrostis ciliaris, Link.

Growing in great profusion near the ruins of the house of Williams, a trader.

The distribution of this grass is given as "Tropical regions and South Africa," but the species does not appear to have been recorded from the South Sea Islands before. Our plant is identical with a specimen from an island off the coast of Florida, U.S.A.

Lepturus acutiglumis, Steud.

Described originally from specimens collected by D'Urville in Tahiti. Collected also by Rev. S. Whitmee in the Gilbert Islands, according to a specimen kindly communicated by Mr. J. G. Luehmann.

Lepturus repens, R.Br.

North Island. Found also in Queensland, in addition to other Pacific Islands.

FILICES.

Pteris marginata; Barz.—"Lakau-sauga."

Asplenium Nidus, Linn.—"Bird's Nest Fern." "Kau."

Found on the North Island, the fronds being from 2 to 8 feet in length. The curled young tip of the frond is cooked in cocoa-nut milk and eaten. It is the "Laumapapa" of Samoa. Our

omnivorous Australian blacks do not appear to have used this fern for food.

NEPHROLEPIS EXALTATA, Schott.—"Sulufe."

Found on trees; the fronds are up to 8 feet in length.

POLYPODIUM NIGRESCENS, Blume. — "Maile," "Maili," or "Meili."

Used for scenting purposes. The young fronds are rubbed on the hands and bodies of the natives, who also use them for scenting coco-nut oil.

LYCOPODIACEÆ.

PSILOTUM TRIQUETRUM, Swartz.—"Fulukimoa."

LICHENES.

PANNARIA MARIANA, Fée.

A handsome foliaceous lichen on bark of a living tree (Coll. C. E. Finckh).

Previously recorded in this part of the world from the Richmond River, N.S.W., Queensland and New Zealand. (Determined by Mr. E. Cheel).

Contemplation of the above incomplete list of 38 species of Dicotyledons, 12 Monoctyledons, 5 Vascular Cryptogams, and 1 Lichen shows that the plants are all more or less widely distributed in the Pacific Islands as denizens of other coral islands or of the coastal tracts of the larger islands. At the same time it is very useful to have a census of the plants found on each island or group of islands in the Pacific; and when this work shall have been undertaken to a very much larger extent than has been done up to the present, we shall be able to draw interesting conclusions as to the migration and geographical distribution of plants which will be very much less based upon guesswork than at present.

The following expresses my views as to the probable or possible ways in which the present vegetation of the island obtained a footing upon it. It is proper to state that in many cases we

have no direct evidence as to the methods by which plants are transmitted over stretches of ocean; this applies to many other islands and territories besides Funafuti.

1. Floating seeds distributed by ocean currents.

Calophyllum inophyllum, Linn.
Hibiscus tiliaceus, Linn.
Thespesia populnea, Corr.
Suriana maritima, Linn.
Canavalia ensiformis, DC. var. *turgida*.
Cæsalpinia Bonducella, Fleming.
Rhizophora mucronata, Lam.
Terminalia sp., prob. *T. Catappa*, Linn.
Barringtonia Butonica, Forst.
Pemphis acidula, Forst.
Gardenia taitensis, DC.
Guettarda speciosa, Linn.
Wedelia biflora, DC.
Scævola Kœnigii, Vahl.
Ochrosia borbonica, Gmelin.
Cordia subcordata, Lam.
Tournefortia argentea, Linn.
Ipomœa biloba, Forsk.
Hernandia peltata, Meissn.
Pandanus sp.
Cocos nucifera, Linn.

2. The seeds adhering to the roots of introduced plants or to the feet of birds.

Jussieua sp.
Scirpus sp.
Eleusine indica, Gaertn.
Eragrostis ciliaris, Link.
Lepturus acutiglumis, Steud.
Lepturus repens, R.Br.

3. The following have succulent fruits which are eaten by birds.

Morinda citrifolia, Linn.
Cassytha filiformis, Linn.
Rivina lævis, Linn.
Premna taitensis, Schauer.
Ficus sp.
Pipturus velutinus, Wedd.

4. A viscid plant which adheres to birds and animals.

Adenostemma viscosum, Forst.

5. The fruits of the following are burrs.

Achryanthes aspera, Linn.
Boerhaavia diffusa, Linn.
Triumfetta procumbens, Forst.

6. The spores of the following ferns may travel for a considerable distance through the agency of wind; also they would

remain alive for a considerable period on the bark of trees conveyed by ocean currents.

Pteris marginata, Borz.
Asplenium Nidus, Linn.
Nephrolepis exaltata, Schott.
Polypodium nigrescens, Blume.
Psilotum triquetrum, Swartz.

7. The following were purposely introduced by man.

Hibiscus Rosa-sinensis, Linn.
Artocarpus incisa, Forst.
Crinum asiaticum, Linn.
Colocasia antiquorum, Schott.
Pandanus sp.

7A. The two following food-plants may have been introduced, by man's agency, to this island.

Tacca pinnatifida, Forst.
Cordyline terminalis, Kunth.

8. The following are widely diffused weeds, and may have been brought by man.

Cardamine hirsuta, Linn.
Portulaca oleracea, Linn.
Sida rhombifolia, Linn.

9. I do not express an opinion as to the way in which the following plants obtained a footing; perhaps there may be a few other plants, but I have not a complete list before me.

Ruellia reptans, Forst.
Fleurya ruderalis, Gaud. (?)
Macaranga sp.

NOTES AND EXHIBITS.

Mr. Stead exhibited a cocoon of *Antheræa eucalypti*, Scott, together with twenty-two parasitic flies (*Lucilia* sp.), the larvæ of which emerged from the cocoon about a fortnight after the caterpillar began to pupate.

Mr. Waite exhibited living examples of *Molge pyrrogastra*, Boie, the red-bellied newt of China and Japan. The specimens shown were part of a consignment brought from China some three months ago; and were purchased from a local dealer.

Mr. Maiden exhibited flowering specimens of *Dracophyllum secundum*, R.Br., from the National Park, of a rich pink colour, the flowers normally being white or cream-coloured. This form is known to have remained constant for at least three years; and it is such a handsome variety that it is proposed to introduce it into cultivation. This interesting novelty was discovered by Mr. J. L. Boorman of the Botanic Gardens.

Mr. Froggatt exhibited a named collection of indigenous or introduced Diptera, comprising representatives of twenty-two species. Some of these were more or less cosmopolitan, and most of them were usually very much in evidence; at the same time their identification hitherto had not in all cases been an easy matter. By the kind co-operation of Mr. D. W. Coquillet, of the U.S. Department of Agriculture, he had now authentically named examples of many dipterous insects for reference. The collection exhibited comprised three species of blow-flies (*Calliphora oceaniæ*, Desv., *C. villosa*, Desv., and *C. incisuralis*, Macq.), three species of blue-bottle flies (*Lucilia Tasmaniensis*, Macq., *L. cæsar*, Linn., and *L. sericata*, Macq.); the drone-fly (*Eristalis tenax*, Linn.); the potato-fly (*Lonchæa splendida*, Linn.); the banana-stalk fly (*Nerius lineolatus*, Wied.); two parasites upon plague locusts (*Tachina œdipodiæ*, Oll., and *Masicera pachytyli*, Skuse); the leaf-miner (*Phytomyza affinis*, Fabr.); the wallaby

louse-fly (*Olfersia macleayi*, Leach); two species of Musca (*M. domestica*, Linn., and *M. cervina*, Fabr.); the cheese-maggot fly (*Piophila casei*, Linn.); and the bot-fly of the horse.

Mr. Fletcher exhibited for Mr. Harding, still in charge of the old garden at Elizabeth Bay House, a proliferous rose, offering a good instance of median floral prolification, unaccompanied, however, by any marked change in the sepals (*see* Maxwell T. Masters' 'Vegetable Teratology,' p. 130).

The Rev. W. Walter Watts contributed the following

Further Notes on Australian Hepatics.

(*Continued from Proceedings, 1902, p. 494.*)

Dr. E. Levier, of Florence, having sent me a list of *Hepaticæ* collected by me during 1901-02, and recently determined by M. Stephani, I beg to submit the following additions to my records, arranged according to locality :—

i. Richmond River, N.S.W.

Anthoceros gracilis, Reichdt.; Wardell, June, 1902.
Chiloscyphus Muelleri, Gottsche; near Ballina, June, 1902.
„ *fissistipus*, Tayl.; Marshall's Falls, Aug., 1902.
Fimbriaria Whiteleggeana, Steph.; Alstonville Cutting, July and Sept, 1902.
Fossombronia sp. ? (cum *Riccia* sp. ?); Ballina Park, Aug., 1902.
Frullania elongata, Steph.; near Ballina, May, 1902.
Jungermannia montana, Steph.; Minyon Falls, Aug., 1902, and Alstonville Cutting, Sept., 1902.
Leptolejeunea rosulans, Steph.; Marshall's Falls, Aug., 1902, and Swamp, Ballina, May, 1902.
Lejeunea tasmanica, Gottsche; several places, 1902.
„ *flava*, Swz. (cum *Mastigolejeunea* sp. ?); Alstonville, Sept., 1902.
Drepanolejeunea ternatensis, Gottsche; Wilson's Creek ?.
Pycnolejeunea imbricata, Nees; East Ballina, June, 1902.
„ *longidens*, Steph.; Swamp, Ballina, May, 1902.
Lepidozia quadrifida, Ldnbg.; Alstonville Cutting, etc., June, 1902.

Lepidozia capilligera, Ldnbg.; Alstonville Cutting, June, 1902, and Glebe, Sydney, Jan., 1902.
,, *centipes*, Ldnbg.; Alstonville Cutting, etc., June, 1902.
,, *longiscypha*, Tayl.; Wardell, June, 1902.
,, *reversa*, Carr. et Pears.; East Ballina, June, 1902.
Lophocolea Bridelii, Nees; Alstonville Cutting, June, 1902.
,, *dargonia*, Gottsche; several places, 1902.
,, *floribunda*, Steph.; near Ballina, June, 1902.
Mastigobryum Mittenii, Steph.; Minyon Falls and Marshall's Falls, Aug., 1902.
,, *accretum*, Ldnbg.; Maclean's Ridges, May, 1902.
,, *Novæ-Hollandiæ*, Ldnbg.; near Alstonville Cutting, June, 1902.
Metzgeria furcata, (L.) Lindb.; Booyong, etc., 1902.
,, *Lindbergii*, Schiffn. in Hep. Jav.; Whian Creek, Aug., 1902.
,, *Wattsiana*, Steph.; Marshall's Falls, Aug., 1902.
Marchantia cephaloscypha, Steph.; Whian Creek, Aug., 1902.
Plagiochila Ferdinandi Muelleri, Steph.; Marshall's Falls, Aug., 1902.
,, *queenslandica*, Steph.; Booyong, July, 1902.
Radula buccinifera, Tayl.; Minyon Falls, Aug., 1902.
,, *multiflora*, Gottsche; Marshall's Falls, Aug., 1902.
Riccia fluitans, L.; Pearce's Creek, June, 1902 (leg. David Gilmour).
Riccia sp. ? ("très interessante"); Ballina Park, Aug., 1902.
Symphyogyna interrupta, Carr. et Pears.; Minyon Falls, Aug., 1902.
Zoopsis argentea, Hook.; Swamp, Ballina, May, 1902.

ii. Blue Mountains, N.S.W.

Lepidozia quadrifida, Ldnbg.; Katoomba Falls, Jan., 1902.
Lophocolea trialata, Gottsche; ,, ,, ,,
Mastigobryum Baileyanum, Steph. ,, ,, ,,
,, *Mittenii*, Steph. ,, ,, ,,
Pallavicinius spinosus, Steph. ,, ,, ,,

Tylimanthus sp. ?; Katoomba Falls, Jan., 1902.

Zoopsis Leitgebii, Carr. et Pears.; Katoomba Falls, Jan., 1902.

iii. Heyington, Vic.

Fossombronia papillata, Steph.; near bank of Yarra, Sept., 1902.

iv. New Species.

This return contains no less than fifteen *species novæ*, which, in the absence of description, may be indicated as follows:—

Richmond River: *Aneura* 1, *Cephaloziella* 2, *Chiloscyphus* 1, *Frullania* 1, *Lepidozia* 2, *Lophocolea* 1, *Mastigobryum* 1, *Radula* 1. Total 10.

Katoomba Falls: *Aneura* 1, *Lepidozia* 3. Total 4.

Heyington: *Fossombronia* 1. Total 1.

Unfortunately M. Stephani has been unable hitherto to publish descriptions of the new species found in my collections, some 30 in all. I have asked him, through Dr. Levier, whether he could not publish them, if only in rough outline, in the Proceedings of this Society. This would not interfere with their fuller description in his great systematic work "Genera Hepaticarum." I have not yet received M. Stephani's reply. It is my intention shortly to have type specimens of these new species deposited for safety and general accessibility in the Kew Herbarium.

WEDNESDAY, SEPTEMBER 28th, 1904.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, September 28th, 1904.

Dr. T. Storie Dixson, President, in the Chair.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 4 Vols., 38 Parts or Nos., 39 Bulletins, 3 Reports, 13 Pamphlets, and 1 Miscellaneous, received from 34 Societies, &c., and 3 Individuals, were laid upon the table.

MONOGRAPH OF THE AUSTRALIAN *CICADIDÆ*.

By F. W. Goding, Ph.D., M.D., and W. W. Froggatt, F.L.S., Government Entomologist.

(Plates xviii.-xix.)

Introduction.

Though several of our large cicadas were among the first insects collected and forwarded to England in the early part of the last century, yet, so far as Australian entomologists are concerned, this family has been one of the least noticed, not a single species having been locally described, and very few even identified in our Museum collections. Yet they are one of the most typical groups of our insect fauna, and no sound is more likely to attract the attention of a traveller landing in Sydney in the summer than the incessant trill of the common green cicada. The original descriptions of our species are scattered through the Proceedings and Transactions of English and Foreign Scientific Societies, Voyages, Memoirs and books, some of which are rare and difficult to obtain; so that the authors think that the bringing together of all the known species, and the descriptions of all the new ones obtained during the progress of their work, will be of some value to future workers in the Homoptera. The descriptions have been made as brief as possible, previous ones amplified or amended after a study of the specimens, rendered necessary where a series of a more or less variable species were under consideration, when both colour and size were often found to vary considerably. The ample material in hand has also rendered it possible to give the exact locality and range of many species, which up to the present have been simply recorded from Australia or New Holland.

In following out the range of the different species the authors have been struck with the fact that though many are strictly confined to the coastal parts of Eastern Australia, others are

found extending over a very large area, reappearing in widely separated districts if the class of country they frequent is similar. Thus *Tibicen willsi*, described by Distant from the neighbourhood of Rockhampton (from which we also have received it), is found at Bourke, N.S.W., ranging up the Queensland Coast to Townsville, and reappearing at King's Sound on the North-west Coast of Australia. *Melampsalta annulata* ranges from the western towns of Wagga and Narromine, N. S. Wales, to Townsville, N. Queensland. The appearance of members of the genera *Gœana* and *Huechys* is interesting as showing the relation of our forms with those of the Indo-Malay region.

This paper contains descriptions of all of the *Cicadidæ* known to us to inhabit Australia, numbering 119 species included in 21 genera. The greater number are in the various collections here; but a few are unknown to us, although most of the types are still preserved. In the National Museum, Melbourne, are several of Walker's species determined by him; these, however, are of little value because the same name is given to distinct species.

Owing to the great number of species in the genus *Melampsalta*, we have separated the new genus *Pauropsalta*, from which it differs principally in the presence of five apical areas in the wings, there being six in the old genus. Eventually those species having the ulnar veins distinct, but contiguous, must be separated from each genus, while another good generic character is the presence of a spine above and just before the apex of the anal appendage.

Our best thanks are due to Messrs. J. A. Kershaw, of the National Museum, Melbourne; C. French, Government Entomologist, Melbourne; J. G. O. Tepper, Entomologist, Adelaide Museum; Henry Tryon, Government Entomologist, Brisbane; George Masters, Curator, Macleay Museum, Sydney; A. Simson, Launceston; R. Illidge, Brisbane; C. W. De Vis, Brisbane Museum; and A. M. Lea, Government Entomologist, Hobart, for the loan or gift of material, and other courtesies.

Our collection, containing many of our types, is temporarily deposited in the Macleay Museum, Sydney.

Species preceded by an asterisk (*) have been examined by us.

HOMOPTERA.

Wings of the same thickness throughout, and usually sloping at sides of body; rostrum arising from posterior part of head below; destitute of a neck, the first pair of coxæ articulating with cheeks.

Table of the Families.

1 (8). Rostrum apparently arising from the sternum, or absent; tarsi one- or two-jointed; antennæ usually prominent and filiform, sometimes absent.
2 (3). Tarsi one-jointed; adult male destitute of a rostrum; with two wings; female wingless, body scale-like or gall-like in form, or grub-like, and clothed with wax. The waxy covering may be in the form of powder, of large tufts or plates, of a continuous layer, or of a thin scale beneath which the insect lives..... Coccidæ.
3 (2). Tarsi usually two-jointed; wings, when present, four in number.
4 (5). Wings opaque, whitish; wings and body covered with a whitish powder..... Aleyrodidæ.
5 (4). Wings transparent.
6 (7). Legs long, slender; antennæ three- to seven-jointed.... Aphididæ.
7 (6). Hind legs fitted for leaping; antennæ nine- or ten-jointed..... Psyllidæ.
8 (1). Rostrum evidently arising from the mentum; tarsi three-jointed; antennæ minute, setiform.
9 (10). Three ocelli; males with musical organs..... Cicadidæ.
10 (9). Two ocelli, or absent; males destitute of musical organs.
11 (12). Antennæ inserted on sides of cheeks beneath eyes... .. Fulgoridæ.
12 (11). Antennæ inserted in front of and between eyes.
13 (14). Pronotum prolonged in a horn above abdomen. ..... Membracidæ.
14 (13). Pronotum not prolonged above abdomen.
15 (16). Hind tibiæ armed with one or two stout teeth, and tip crowned with short, stout spines..... Cercopidæ.
16 (15). Hind tibiæ with a double row of spines below..... Jassidæ.

Family CICADIDÆ.

Head with three ocelli, placed on the disc of the vertex. Disc of the pronotum very large, with a circumscript impression, and two oblique longitudinal impressions on each side, sometimes occupying a large portion of the thorax. The scutellum is broad,

large, little exposed. The tegmina each have one basal area, from which pass out one or two ulnar veins, and one radial vein, the branches forming the various areas, there normally being three discoidal, two ulnar, one radial (or costal), and eight apical areas, and the clavus, which is very narrow. The front coxæ are oblong, prismatic, inserted in the front angles of the prosternum; the middle and posterior are longer, subconical, subcontiguous, remote from the sides of the body. The front femora are thickened, frequently spined below. The tibiæ are smooth. The tarsi are composed of two or three articles, with no arolium. The base of the abdomen in the male is furnished with two sound organs, which are attached to the tympanum.

Synopsis of Subfamilies.

1 (2). Front edge of basal abdominal segment, on each side, produced forward in a leaf-like expansion, which more or less covers the sound organs..... ..... *Cicadinæ.*

2 (1). Front edge of basal abdominal segment straight, not produced forward; sound organs entirely uncovered..... *Tibicininæ.*

Check List.

Subfamily CICADINÆ.

Gen. Platypleura, Am. & Serv.
1. *Tepperi*, G. & F.

Gen. Cyclochila, Am. & Serv.
1. *australasiæ*, Donov.
   olivacea, *Germ.*
   australis, *Leach.*

Gen. Thopha, Am. & Serv.
1. *saccata*, Fabr.
2. *sessiliba*, Dist.

Gen. Henicopsaltria, Stäl.
1. *eydouxii*, Guér.
2. *perulata*, Guér.
3. *interclusa*, Walk.
4. *fullo*, Walk.
5. *nubivena*, Walk.

Gen. Cicada, Linn.
1. *angularis*, Germ.
2. *sylvana*, Dist.
3. *hieroglyphica*, G. & F.
4. *sylvanella*, G. & F.
5. *extrema*, Dist.
6. *intersecta*, Walk.
   internata, *Walk.*
   prasina, *Walk.*

Gen. Psaltoda, Stäl.
1. *mœrens*, Germ.
2. *aurora*, Dist.
3. *flavescens*, Dist.
4. *pictibasis*, Walk.
5. *plebeia*, G. & F.

Gen. PSALTODA, Stäl.
6. *argentata*, Germ.
plaga, *Walk.*
7. *harrisii*, Leach.
dichroa, *Boisd.*
subguttata, *Walk.*
Gen. CRYPTOTYMPANA, Stäl.
1. *nigra*, Stoll.
pustulata, *Fabr.*
atrata, *Fabr.*
atra, *Sign.*
Gen. TYMPANOTERPES, Stäl.
1. *hilaris*, Germ.
subtincta, *Walk.*
albiflos, *Walk.*
tomentosa, *Walk.*
Gen. TETTIGIA, Kol.
1. *tristigma*, Germ.
2. *variegata*, G. & F.

Subfamily TIBICENINÆ.

Gen. VENUSTRIA, G. & F.
1. *superba*, G. & F.
Gen. TIBICEN, Latr.
1. *curvicosta*, Germ.
tephrogaster, *Boisd.*
2. *ruber*, G. & F.
3. *melanopygius*, Germ.
4. *interruptus*, Walk.
5. *doddi*, G. & F.
6. *rubricinctus*, G. & F.
7. *borealis*, G. & F.
8. *gilmorei*, Dist.
9. *kurandæ*, G. & F.
10. *auratus*, Walk.
11. *hirsutus*, G. & F.
12. *coleoptratus*, Walk.
13. *occidentalis*, G. & F.
14. *willsi*, Dist.
15. *burkei*, Dist.
16. *flavus*, G. & F.
17. *gregoryi*, Dist.
18. *muelleri*, Dist.
19. *infans*, Walk.
Gen. GÆANA, Am. & Serv.
1. *maculatus*, Serv.
consors, *White.*
Gen. HUECHYS, Am. & Serv.
1. *vidua*, White.
Gen. PAUROPSALTA, G. & F.
1. *leurensis*, G. & F.
2. *castanea*, G. & F.
3. *prolongata*, G. & F.
4. *extensa*, G. & F.
5. *extrema*, Dist.
6. *nigristriga*, G. & F.
7. *annulata*, G. & F.
8. *nodicosta*, G. & F.
9. *dubia*, G. & F.
10. *encaustica*, Germ.
juvenis, *Walk.*
dolens, *Walk.*
11. *mneme*, Walk.
12. *multifascia*, Walk.
singula, *Walk.*
obscurior, *Walk.*
arclus, *Walk.*

Gen. PAUROPSALTA.
13. *incipiens*, Walk.
14. *rubra*, G. & F.
15. *leichardti*, Dist.
16. *basalis*, G. & F.
17. *puer*, Walk.
18. *emma*, G. & F.
19. *borealis*, G. & F.
20. *sericeivitta*, Walk.
21. *minima*, G. & F.

Gen. MELAMPSALTA, Kol.
1. *torrida*, Erich.
   basiflamma, *Walk.*
   connexa, *Walk.*
   damater, *Walk.*
2. *umbrimargo*, Walk.
3. *convergens*, Walk.
4. *labeculata*, Dist.
5. *interstans*, Walk.
6. *abdominalis*, Dist.
7. *spinosa*, G. & F.
8. *kershawi*, G. & F.
9. *denisoni*, Dist.
10. *castanea*, G. & F.
11. *rubristrigata*, G. & F.
12. *atrata*, G. & F.
13. *varians*, Germ.
14. *landsboroughi*, Dist.
15. *fletcheri*, G. & F.
16. *infuscata*, G. & F.
17. *flava*, G. & F.
18. *oldfieldi*, Dist.
19. *telxiope*, Walk.
   duplex, *Walk.*
   arche, *Walk.*
20. *binotata*, G. & F.
21. *angusta*, Walk.
   bilinea, *Walk.*
   rosea, *Walk.*
22. *rubricincta*, G. & F.
23. *quadricincta*, Walk.
24. *marginata*, Leach.
25. *labyrinthica*, Walk.
26. *nebulosa*, G. & F.
27. *spreta*, G. & F.
28. *fulva*, G. & F.
29. *melete*, Walk.
30. *abbreviata*, Walk.
31. *aaede*, Walk.
32. *latorea*, Walk.
33. *incepta*, Walk.
34. *rubea*, G. & F.
35. *forresti*, Dist.
36. *mackinlayi*, Walk.
37. *tristrigata*, G. & F.
38. *warburtoni*, Dist.
39. *graminis*, G. & F.
40. *eyrei*, Dist.
41. *oxleyi*, Dist.

Gen. KANAKIA, Dist.
1. *congrua*, G. & F.

Gen. GLAUCOCYSTA, G. & F.
1. *viridis*, G. & F.

Gen. CHLOROCYSTA, Westw.
1. *vitripennis*, Westw.
2. *macrula*, Stal.

Gen. CYSTOPSALTRIA, G. & F.
1. *immaculata*, G. & F.

Gen. CYSTOSOMA, Westw.
1. *saundersii*, Westw.
2. *schmeltzi*, Dist.

Gen. TETTIGARCTA, White.
1. *tomentosa*, White.
2. *crinita*, Dist.

Synopsis of the Genera of the Subfamily Cicadinæ.

1 (4). Lateral borders of pronotum dilated, horizontal, front angles directed toward middle of eyes.

2 (3). Anterior border of head almost straight, base of front barely evident; tegmina and wings sometimes opaque and coloured... ..... Platypleura.

3 (2). Anterior border of head very strongly and triangularly produced forward; tegmina and wings colourless..... ... . Cyclochila.

4 (1). Lateral borders of pronotum convex, front angles directed below eyes; tegmina and wings sometimes partly coloured.

5(16). Postcostal marginal space of tegmina linear, not broadened towards apex.

6 (7). Front angles of pronotum covered by lateral parts of head, not prominent; head broader than front of thorax, front very convex; sides of abdomen parallel to beyond middle .... Psaltoda.

7 (6). Front angles of pronotum not covered by lateral parts of head, frequently distinctly prominent.

8(15). Basal area of tegmina somewhat, rarely twice, longer than wide; tympanum wholly covered.

9(10). Metasternum elevated at middle and furnished with a process directed posteriorly .... Cryptotympana.

10 (9). Metasternum little elevated, destitute of a posterior process.

11(12). Apex of clypeus truncated, or subsinuately truncated..... .... Cicada.

12(11). Apex of clypeus acuminate; tympanal coverings frequently developed into enormous sacs.

13(14). Pronotum somewhat broadened forward, or sides parallel; head and front of thorax equal in breadth; ocelli four times more distant from eyes than from each other; opercula short, transverse. Thopha.

14(13). Pronotum narrowed forward, narrower than head; ocelli two, sometimes three times more distant from eyes than from each other; opercula medium Henicopsaltria.

15 (8). Basal area of tegmina twice longer than broad; part of tympanum uncovered; apex of clypeus subacuminate, or a little rounded..... ..... Tettigia.

16 (5). Postcostal marginal space a little broadened towards apex; lateral margins of pronotum somewhat flattened..... . ..... Tympanoterpes.

Genus PLATYPLEURA, Am. et Serv.

1843. Hémip. p. 465.
(*Oxypleura*, Am. & Serv., Hémip. p. 469).
1866. Stäl, Hemip. Afric. iv. pp. 2 & 9.

Head not or barely the width of scutellum, rarely narrower; ocelli rarely a little more than double the distance from the eyes than from each other. *Pronotum* with sides much flattened out horizontally, foliaceous; front angles directed towards the middle of the eyes; front margin sinuate behind eyes; posterior border broad. *Tegmina* with basal area broad; ulnar veins distant at base; interior ulnar area broadened towards apex. Wings with six apical areas. Opercula medium, transverse, apex rounded, slightly overlapping. Front femora spined below.

Type, *Cicada stridula*, Linn.

*PLATYPLEURA TEPPERI, sp.nov. (Plate xviii., figs. 5-5*a*).

Sordid yellow mottled with ferruginous. *Head* broad, sordid yellow, much narrower than middle of pronotum; short, twice broader than long, anterior border lightly convex; a spot occupied by ocelli, a narrow stripe on each side, two spots on base of front united by a curved line, ferruginous; eyes small, lightly inclined backward; vertex equal in breadth to combined diameter on both eyes, ocelli twice the distance from eyes as from each other; front convex, not prominent, ferruginous, sides of face fuscous, a ferruginous band across base; rostrum sordid yellow, tip black, reaching apical border of penultimate ventral segment of abdomen. *Pronotum* sordid yellow; short, broad, deeply furrowed; front border convex; a spot on middle of front, and furrows fuscous-ferruginous; lateral borders entire, broadly flattened out and very convex horizontally; hind border broad, posterior angles not evident. *Mesonotum* convex, sordid yellow, irregular obsolete spots in front and at sides of cruciform elevation, fuscous-ferruginous. *Tegmina* opaque, passing tip of abdomen by one-half their length, sordid yellow, marbled with ferruginous, a row of similar coloured spots along front border; interior ulnar area and

clavus marked with ferruginous only near base. Wings opaque, sordid yellow, with a broad pale ferruginous band around apical border. *Abdomen* sordid yellow, as long as head and chest, broadly and irregularly banded with fuscous. *Body* below sordid yellow; chest variegated with ferruginous; abdomen broadly fuscous, variegated; anal appendage covered with long hairs. Opercula semicircular, covering one-third of abdomen, overlapping, lateral borders projecting beyond sides of abdomen; posterior border broadly rounded; sordid yellow, clouded with ferruginous. Legs concolorous, very hairy, front femora and four hind knees fuscous. Long. corp. 25 mm.; lat. thor. 7 mm.; exp. teg. 80 mm.

Hab.—Northern Territory, Australia; described from three examples collected by Mr. J. G. Tepper. Types in Coll. G. & F., and South Australian Museum.

Similar to *P. guttulata*, Sign. It differs in the position of the ocelli, markings of the tegmina and wings, and much longer rostrum.

Genus CYCLOCHILA, Am. et Serv.

1843. Hémip. p. 470.
1866. Stäl, Hemip. Afric. iv. p. 3.

Head with the front strongly convex, prominently produced forward, destitute of a median longitudinal sulcus. Sides of *pronotum* dilated, the flattened-out portion nearly horizontal; front angles directed toward the middle of the eyes. Sound organs not wholly covered. *Tegmina* vitreous, the basal area irregularly 4- or 5-angled, broad; ulnar veins distant at base, costa and radial vein distant; eight apical areas. Wings vitreous, with six apical areas. Front femora spined below.

Type, *Tettigonia australasiæ*, Donov.

*CYCLOCHILA AUSTRALASIÆ, Donov.

1805. *Tettigonia* id., Ins. New Holl., Hemip. pl. 2, fig. 1.
1830. *Cicada olivacea*, Germ., Thon. Ent. Arch. ii. p. 2.
1834. *Cicada olivacea*, Germ., Silb. Rev. Ent. ii. p. 57.
1835. *Cicada olivacea*, Burm., Handb. Ent. ii. p. 162.
1843. *Cicada olivacea*, Am. et Serv., Hémip. p. 470.

1885. *Cyclochila australasiæ*, McCoy, Prod. Zool. Vic. i. p. 57, pl. 50, f. i.

1887. Green Cicada, Lucas, Proc. Roy. Soc. Vic. p. 173, pl. 1.

1895. *Cyclochila australasiæ*, Frogg., Proc. Linn. Soc. N.S.W. p. 528.

1903. *Cyclochila australasiæ*, Frogg., Agr. Gaz. N.S.W., p. 337, pl. 4, fig. 1; reprinted as Misc. Pub. No. 643, p. 4, pl. 1.

Head yellow or green, a black spot including the region of ocelli, black, the ocelli bright red. *Pronotum*, mesonotum, and abdomen yellow or green. Below yellow or green, the abdomen shining yellow. *Tegmina* vitreous, all veins with costa green, a pale yellow stripe along posterior border of clavus. *Legs* yellow or green, tibiæ and tarsi infuscated. Long. corp. ♂ 50 mm.; ♀ 40 mm.; exp. teg. ♂ 120 mm.; ♀ 100 mm. Size variable.

Hab.—New Holland (Donovan); Sydney, Newcastle, N.S.W.; Melbourne, Vic.; Southern Queensland.

A variety, for which we propose the name *spreta*, is occasionally found. Its differential characters are quite constant, and doubtless it will prove to be a distinct species. Besides the black spot on the vertex there is a transverse black band across the front of the vertex reaching inner border of each eye; a central longitudinal black stripe on pronotum, extending from apex to the inner edge of posterior border. Abdomen black, some small yellow spots on lateral borders; apical border of first segment very sinuous; underneath, basal segment and a large portion of disc black; tibiæ dark red; rostrum reaching middle coxæ.

This is our common Green Cicada popularly known as the "Green Monday," while the less common yellow variety is known as the "Yellow Monday." It is very abundant in early summer in the suburban gardens, in the larval state feeding upon the roots of all the larger trees, appearing in Sydney at the end of October and remaining until the end of January. The male droops his wings down the sides of the abdomen and raises the tip of the body when drumming. Though hundreds have been under observation we have never seen one attempt to feed.

The Green Cicada is common all over Southern and Eastern Victoria, and ranges as far north as Brisbane; we have had no specimens from Western Australia.

Genus THOPHA, Am. et Serv.

1843. Hémip. p. 471.
1866. Stäl, Hemip. Afric. iv. p. 6.

Head short, broad, equal in width to apex of pronotum; eyes more or less pedunculated, prominent; ocelli four times more distant from eyes than from each other; apex of clavus acuminate; front destitute of a longitudinal sulcus. *Pronotum* with sides convex, widened forward. *Tegmina* vitreous, basal area not twice longer than broad; interior ulnar area broadened towards apex; ulnar veins distant at base. Wings vitreous, with six apical areas. Opercula short, transverse. Sides of abdomen in male with well developed sacs.

Type, *Tettigonia saccata,* Fabr.

SYNOPSIS OF SPECIES.

1 (2). Eyes lightly sessile; body pilose above, not glabrous; head, sternum, and opercula dark castaneous beneath; abdomen very little attenuated..... .... *saccata.*
2 (1). Eyes strongly sessile; body glabrous above, not pilose; head, sternum, and opercula ochraceous beneath; abdomen attenuated..... .... *sessiliba.*

THOPHA SACCATA, Fabr. (Plate xviii., figs. 1-5).

1803. *Tettigonia* id., Syst. Rhyng. p. 35.
1843. Am. et Serv., Hémip., p. 471.
1895. Frogg., Proc. Linn. Soc. N.S.W., p. 528.
1903. Frogg., Agr. Gaz. N.S.W., p. 340; and Misc. Pub. No. 643, p. 7, pl. 2, fig. 3.

Head black, a line on front border, an irregular spot on base of front, a stripe on each side, and two spots on vertex, yellow. *Pronotum* ferruginous, anterior and lateral borders black. *Mesonotum* yellow, with four obconical black spots, the outer pair longer and excavated, between inner pair a long narrow stripe

behind which is a transverse stripe, black. *Tegmina* vitreous, venation yellow, brown towards apex, costa striped with black, interior vein black. Wings vitreous, venation yellow. *Abdomen* ferruginous, segments more or less banded at base with black, the sacs red; below piceous, with irregular ferruginous spots, and floury pubescence. *Legs* ferruginous, marked with yellow and black; pectus with a row of yellow spots on each side. Long. corp. 50 mm.; exp. teg. 140 mm.

Hab.—New Holland (Stal); South Australia; Brisbane, Q.; Victoria; Sydney, Newcastle, N.S.W.

This is our largest species, and is popularly known as the "Double Drummer," in reference to the swollen drums of the male projecting on the sides of the abdomen. It frequents the more open forest country, clinging to the trunks of the large rough-barked Eucalypts, where the male produces its deep distinctive note, likened by Bennett to *áwock* uttered three times in rapid succession and then a break before it is again repeated.

*Thopha sessiliba, Distant.

1892. Ann. Mag. Nat. Hist. (6) ix. p. 314.
1903. Frogg., Agr. Gaz. p. 341; and Misc. Pub. 643, p. 8.

Body above dark ochraceous. *Head* with the margin of front and a broad fascia between the eyes pale castaneous. *Pronotum* with the incisures pale castaneous, the lateral and posterior margins stramineous. *Mesonotum* with four obconical castaneous spots, the central pair smallest. *Abdomen* castaneous above, the base ochreous, the apical segment thickly greyishly pilose. *Body* beneath ochreous; the face, fascia between face and eyes, legs, abdomen, and inflated tympana castaneous; anterior margins of tympana ochraceous beneath. *Tegmina* and wings pale hyaline, the venation ochraceous, becoming darker towards apices; the costal membrane and basal area ochraceous; anterior margin of basal area and anterior margin of claval area dark castaneous; claval area pale sanguineous. Long. corp. ♂ 42 mm.; exp. teg. 126 mm.

Hab.—Australia, Sydney (Distant); Northern Territory, S.A.; Townsville, Queensland.

This species differs from *Thopha saccata*, A. & S., the only other described species of the genus, by the much more strongly sessile eyes, a character alone which will instantly separate the species. Besides this structural feature, the colour is much paler, the body almost glabrous above, and not pilose as in *T. saccata*; the head, sternum, and opercula ochraceous beneath and not very dark castaneous, and the abdomen is narrower and more attenuated [Distant].

This handsome insect with its much brighter colouration seems to take the place in the Townsville district of *T. saccata*, which does not extend beyond Brisbane, and is comparatively common.

Genus Henicopsaltria, Stäl.

1866. Hemip. Af. iv. p. 7.

Body oblong. *Head* wider than front of pronotum; front convex, with a median longitudinal sulcus; apex of clypeus acuminate; ocelli two, sometimes three, times more distant from the eyes than from each other. *Pronotum* narrower in front than behind, front angles not covered by lateral part of head, often prominent; lateral borders destitute of denticles. *Metasternum* not elevated, destitute of a posterior process. *Tegmina* with basal area somewhat, rarely double, longer than broad; ulnar veins distant at base; interior ulnar area distinctly broadened towards base. Wings with six apical areas. *Abdomen* robust, the sides in the male sometimes furnished with large sacs laterally as in Thopha; opercula medium in size. Front femora spined below.

Type, *Cicada eydouxii*, Guér.

Synopsis of Species.

1 (4). Sides of abdomen in ♂ developed into enormous sacs covered with white tomentum; tegmina infuscated only on 1st and 2nd anastomoses at apex; opercula widely separated.

2 (3). Anal appendages beneath pitchy..... *perulata.*

3 (2). Anal appendages beneath pale tawny, with a slender, longitudinal, pitchy, median line..... *interclusa.*

4 (1). Sides of abdomen in ♂ destitute of sacs; tips of longitudinal veins, and bases of apical areas infuscated; opercula overlapping.
5 (6). Opercula of ♂ very large, bright rose-red..... .... *eydouxii*.
6 (5). Opercula of ♂ small, tawny or fuscous.
7 (8). Abdomen black, with a pale broad band extending over dorsum of second segment, interrupted in middle; beneath, in ♂, yellow, except borders; in ♀, two lateral, longitudinal, pale stripes; opercula tawny..... *fullo*.
8 (7). Abdomen black, a tomentose spot on each side of disc, one on each side at middle of lateral borders, and the base of anal appendage, white; opercula fuscous..... *nubivena*.

*Henicopsaltria eydouxii, Guérin.

1830. *Cicada* id. Voy. Coq. Zool. ii. p. 181.
1895. *Psaltoda flavescens*, Frogg., Proc. Linn. Soc. N.S.W. p. 530.
1903. *Psaltoda flavescens*, Frogg., Agr. Gaz. N.S.W., p. 420; and Misc. Pub. No. 643, p. 10, pl. 3, fig. 1.

Head ferruginous, a transverse band along front of vertex, including front border, a small spot at base, and a spot on base of front, yellow; two longitudinal stripes along middle, base of front, a large spot on each side anteriorly, and a curved stripe around inner border of each eye, black; front strongly produced, ferruginous, a broad central stripe, and transverse elevated lines on each side, fuscous. *Pronotum* ferruginous, front and hind borders, a longitudinal central stripe, yellow; lateral borders, a broad stripe on each side of central yellow stripe, and front edge of posterior border narrowly black; hind border very narrow. *Mesonotum* ferruginous, with four obconical stripes, the inner pair shorter and narrowly edged with yellow, the outer pair long, narrow, reaching a transverse band in front of cruciform elevation, a narrow, central line joining the transverse band, black; cruciform elevation yellow. *Tegmina* vitreous, veins yellow and ferruginous, front border of basal area, inner border of clavus, apical half of costa, portions of the rami of ulnar veins, bases of all the apical areas except the first, and a spot on tips of all longitudinal veins, black. Wings vitreous, the veins pale yellow and red, the middle vein and apical margin fuscous. *Abdomen*

large, ferruginous, a paler spot on middle of first segment, the bases of the others broadly black, all segments freely tomentose, especially sides of the second. *Body* below ferruginous, varied with black on chest; legs yellow, streaked with black, front tibiæ black. Opercula rose-red, one half the length of abdomen, broad, overlapping. Long. corp. 40-42 mm.; exp. teg. 110-125 mm.

Hab.—Port Jackson, N.H. (Guérin); Newcastle.

This species is placed under the name of *Psaltoda flavescens*, Dist., (a very rare and much larger Cicada) in all the Museum collections we have examined. It frequents the same localities and has very similar habits to *T. saccata*, but odd specimens may be sometimes taken in the gardens in November. It is popularly known as the Mottled Grey Cicada.

*Henicopsaltria perulata, Guér.

1838. *Cicada* id., Voy. Coq. Zool. ii. p. 180, pl. 10, fig. 5.
1843. *Thopha* id., Am. et Serv., Hémip. p. 471.

Dark ferruginous. *Head* ferruginous, with a large spot in region of ocelli, a large spot near inner border of each eye, and upper surface of front, black; front light ferruginous, a line on each side of central sulcus, elevated lines on each side of sulcus, sides of face and clypeus, black; rostrum ferruginous, reaching hind coxæ. *Pronotum* dark ferruginous, a central longitudinal stripe bordered with black, and lateral somewhat dilated borders, ochraceous; furrows, and front edge of hind border, black; hind border broad, dusky greenish-ferruginous, a small black spot on middle. *Mesonotum* dark ferruginous, with four obconical black stripes, the outer pair longer and excavated with ferruginous; behind inner pair, a black stripe which unites posteriorly with a short black band in front of cruciform elevation, the latter, with scutellum, sordid ochraceous and covered with whitish hairs. *Tegmina* vitreous, venation black at base, dark ferruginous beyond, costa paler; 1st and 2nd anastomoses and apex of first apical area strongly infuscated. Wings vitreous, venation greenish-yellow, two spots near apex of anal area fuscous. *Abdomen*

ferruginous, a black transverse band on dorsum of each segment, near base and laterally covered with golden pubescence, elsewhere silvery; sound organs developed in large tawny, white tomentose covered sacs, covering nearly one-half the sides of abdomen. *Body* below tawny, abdomen shining black, a spot on each side of basal segment, and apical segment excepting narrow basal border, sordid yellow, densely clothed with tomentum, that along middle golden, elsewhere silvery; opercula small, sordid pale yellow. The two anterior pairs of legs piceous marked with tawny; hind pair paler. Chest mottled with fuscous. Long. corp. 35-38 mm.; exp. teg. 112-115 mm.

Hab.—Port Jackson (Guérin).

This species appeared in considerable numbers in the vicinity of Sydney in the 1902-3 season. Though described by Guérin so many years ago, it was until then very rare in Museum collections and has a very restricted range.

The beautiful large snow-white sacs of the male make this a very conspicuous insect.

It is rather remarkable that when opening out some nests of digger wasps (*Priocnemis bicolor*) at Mosman Bay, where they were storing their galleries with cicadas, it was found that the moribund insects were nearly all of this species, though many others were numerous.

*Henicopsaltria interclusa, Walk.

1851. *Thopha* (New sp.), List Hom. Brit. Mus. pl. 1, fig. 6.
1858. *Thopha* id., List Hom. Brit. Mus. Suppl. p. 5.

Testaceous, partly green. *Head* green, with a broad band extending between inner borders of eyes across vertex, base of front and two diverging stripes including region of posterior ocelli, black; a central basal spot, and basal border of front, yellow; front ferruginous, a median yellow stripe bordered with fuscous; rostrum testaceous, tip, a median line, piceous, reaching hind coxæ. *Pronotum* ferruginous, with a median yellow stripe bordered with black stripes on each side which extend along front border; furrows black; a yellow spot on each side near front

border; hind border broad, yellowish-green, anterior edge tinged with ferruginous; lateral borders broadly flattened out, yellowish-green; hind border broad. *Mesonotum* ferruginous, with four obconical black stripes, the outer pair longer and much excavated with ferruginous, a narrow central black stripe behind inner pair, and two black spots in front of cruciform elevation; apex broadly yellow; lateral borders and scutellum broadly white tomentose. *Tegmina* vitreous, veins greenish-yellow, darker towards tips; border, and basal area anteriorly, basal portion of exterior and interior border of clavus, radial vein, and apical half of costa, piceous; 1st and 2nd anastomoses very lightly infuscated; transverse vein at base of fifth apical area forming a right angle with longitudinal veins. Wings vitreous, venation greenish-yellow. *Abdomen* black, apical borders broadly ferruginous, the sound organs developed in enormous pale green sacs nearly covering sides of abdomen, and covered with white tomentum. *Body* below tawny, covered with white tomentum; abdomen shining black, apical borders of basal and apical segments broadly, and the other segments narrowly, and anal plate, yellow, a narrow black stripe on apex; opercula small, pale, tomentose. *Legs* tawny, femora marked with black; tips of tibiæ, and tarsi, darker. Long. corp. 25-32 mm.; exp. teg. 75-105 mm.

Hab.—Australia (Walker); Rockhampton and Townsville, Q.; Clarence River, N.S.W. (Masters).

*Henicopsaltria fullo, Walk.

1850. *Fidicina* id., List Hom. Brit. Mus. p. 96.

Head a little narrower than base of pronotum, black, a spot on base, front border on each side of front, yellow; front convex, a spot on each side near base, and lateral borders of face, yellow; rostrum ferruginous, tip black, reaching hind borders of opercula. *Pronotum* black, narrowed forward, a central stripe, front border on each side, lateral and posterior borders, yellow; six large dark red spots occupying spaces between furrows; lateral borders in front of middle denticulated; hind border broad. *Mesonotum* black, with four dark red obconical stripes, the inner pair shorter

and bordered exteriorly with yellow; posterior border and cruciform elevation, and scutellum, yellow. *Tegmina* vitreous, ferruginous and black at base, venation pale yellow, darker towards tips; basal area and costa yellow; bases of apical areas, excepting the sixth, and a row of spots on tips of longitudinal veins, fuscous. Wings vitreous, venation pale yellow. *Abdomen* black, a broad white band in front of middle, tip yellow. *Body* below sordid yellow, lateral borders black, in the female disc also black, oviduct dark red; opercula overlapping, one-third length of abdomen. Legs pitchy, fore femora red, middle and hind tibiæ marked with black. Long. corp. 30 mm.; exp. teg. 75 mm.

Hab.—New Holland, and Swan River, W.A. (Walker).

This species is much powdered below.

*Henicopsaltria nubivena, Walk.

1858. *Fidicina* id., List Hom. Brit. Mus. Suppl. p. 17.

Light ferruginous. *Head* with a broad dusky central stripe, a small yellow spot middle of base; rostrum reaching apex of hind coxæ. *Pronotum* light ferruginous, a central testaceous stripe, a stripe on each side of above stripe, and furrows, black; lateral borders in front of middle denticulated, hind border very narrow. *Mesonotum* light ferruginous, with two short black stripes bordered with yellow, apex broadly fuscous. *Tegmina* vitreous, veins testaceous, borders at base and narrowly to transverse veins, bases of apical areas, and a spot on tip of each longitudinal vein, broadly bordered with black; basal area infuscated. Wings vitreous, venation testaceous, anal area and clavus infuscated. *Abdomen* black, with white pubescence on base, tip, and a large spot on each side white pubescent. *Body* below, with legs, testaceous, abdomen black, apical borders of segments, greater portion of apical segment, and anal plate, testaceous. Long. corp. 20-25 mm.; exp. teg. 54-70 mm.

Hab.—Adelaide, S.A. (Walker), same locality (Tepper).

There is a large series of this handsome species in the Macleay Museum, collected near Gawler, S.A., by Odewahn, so Mr. Masters informs us.

Genus CICADA, Linn.

1766. Syst. Nat. p. 704.

Body robust, moderately long. *Head* broad, equal in width to base of pronotum; front prominent; ocelli double the distance from the eyes as from each other; eyes sessile; apex of clypeus truncated or subtruncated. Sides of *pronotum* convex, lightly broadened. *Tegmina* vitreous, sometimes marked with brown; ulnar veins distant at base; interior ulnar area broadened towards apex; basal area longer than broad; eight apical areas. Wings vitreous, with six apical areas. Front *femora* with three spines below.

Type, *Cicada ciliaris*, Linn.

SYNOPSIS OF SPECIES.

1 (6).	Tegmina with apical areas more or less infuscated.	
2 (5).	Bases of apical areas of tegmina, and apical portion of longitudinal veins lengthily, and external borders of apical areas of wings lightly, infuscated; abdomen unicolorous.	
3 (4).	Black with yellow spots; posterior border of pronotum dark red; fuscous markings on tegmina strongly marked	*angularis.*
4 (3).	Dark castaneous with yellow spots; posterior border of pronotum light yellow; fuscous markings on tegmina lightly marked	*hieroglyphica.*
5 (2).	Bases of 2nd, 3rd, and 4th apical areas, and tips of longitudinal veins only, lightly infuscated; ochraceous, with green markings; base of anal appendage pale	*sylvana.*
6 (1).	Tegmina immaculate; last abdominal segment and anal appendage broadly yellow.	
7 (8).	Dorsum of pronotum and mesonotum immaculate; base of anal appendage black	*extrema.*
8 (7).	Dorsum of pronotum and mesonotum marked with black or green; base of anal appendage yellow.	
9(10).	Mesonotum largely black; opercula of male small	*intersecta.*
10 (9).	Mesonotum green marked with yellow and black; opercula of male large	*sylvanella.*

*Cicada angularis, Germ.

1834. Silb. Rev. Ent. ii. p. 68.
1850. *Fidicina* id., Walk., List Hom. Brit. Mus. p. 78.
1859. Stäl, Fr. Eug. Omk. Jord. Zool. iv., Hem. p. 269.
1895. *Macrotristria* id., Frogg., Proc. Linn. Soc. N.S.W. p. 529.
1903. *Macrotristria* id., Frogg., Agr. Gaz. N.S.W. p. 418; and Misc. Pub. No. 643, p. 8, pl. 2, fig. 1.

Head width of base of pronotum, black, a large spot at inner border of eyes, front border, a spot on base of front, and some smaller spots, yellow; front prominent, black; rostrum black, reaching posterior coxæ. *Pronotum* black, with three yellow spots, the middle one elongated, the posterior border ferruginous. *Mesonotum* black, with four (sometimes six) yellow spots, the outer pair longer and narrower; crucial elevation and scutellum ferruginous, pilose on each side. *Tegmina* vitreous, venation yellow, basal area fuscous, apical areas margined with fuscous. Wings vitreous, inner border at base, and outer margin of anal area, with median vein of clavus, broadly ferruginous. *Abdomen* black. *Body* below dark ferruginous, pilose; apical segment of female emarginate; opercula ferruginous, short, apex broadly rounded, overlapping. Chest variegated with black. *Legs* ferruginous, tibiæ and tarsi blackish. Long. corp. ♂ 45 mm.; ♀50 mm.; exp. teg. ♂ 120; ♀ 140 mm.

Hab.—Sydney (Stäl); Brisbane, Q. (Illidge, De Vis); Adelaide, S. Aust. (Tepper); Victoria; Sydney, Newcastle, N.S.W.

This species is common about the Sydney bush in midsummer, and is known as the "Fiddler," from the fancied resemblance of its call note to the sound of a fiddle. It has a wide range, but its headquarters appear to be in the neighbourhood of Sydney to Newcastle.

*Cicada sylvana, Dist.

1901. Trans. Ent. Soc. Lond. p. 591, pl. 16, fig. 1.

♂. *Head* pale olivaceous-green; front castaneous, ochraceous at base with a central piceous spot, vertex with central area behind front ochraceous, the ocelli bright castaneous margined with black.

Pronotum olivaceous-green, with a large ochraceous discal spot on each side. *Mesonotum* ochraceous, with two large but very obscure central obconical spots at anterior margin, the outer margins of which are intensely black; cruciform basal elevation ochraceous. *Tegmina* and wings pale hyaline with the venation fuscous; costal membrane, upper half of basal area and a subbasal streak olivaceous-green; a submarginal series of small fuscous spots near apices of longitudinal veins to apical areas; wings with some basal lineate fuscous streaks. *Abdomen* above more or less piceous and obscurely greyishly pilose, posterior margins of the second, third, and fourth segments and nearly the whole of the fifth and sixth segments, brownish-ochraceous. *Body* beneath with face castaneous centrally piceous; sternum thickly greyishly pilose with its margins olivaceous-green, abdomen brownish-ochraceous, sparingly greyishly pilose, in the female a central darker fascia; legs castaneous; coxæ, apices of femora and bases of tibiæ ochraceous, hind tibiæ palest.

♂. Opercula ochraceous, about meeting internally, lateral margins obliquely rounded, apices convex.

Long. ♂ 42, ♀ 40; ex. teg. 120 mm.

Hab.—North Queensland, Cairns [Distant].

*Cicada hieroglyphica, sp.nov.

Head broad, short, front border strongly produced, lemon yellow, a fuscous band passing across vertex between eyes, and base of front fuscous; front almost globular, strongly produced, lemon yellow, with lateral fuscous striations which are obsolete except near base, sides of face yellow covered with long white hairs; clypeus fuscous, hairy; rostrum black, base yellow, tip reaching apices of hind coxæ. *Pronotum* lemon yellow, a broad central stripe posteriorly passing into a broad transverse band each end of which is broadened into a large spot on the sides; furrows, spot on each side of central stripe, posterior and lateral edges, fuscous; lateral borders sinuate; the arrangement of the markings reminds one of Egyptian hieroglyphics. *Mesonotum* fuscous, a large triangular spot on each side of disc posteriorly,

and an oval stripe near lateral borders, lemon yellow; cruciform elevation ferruginous, covered with long white hairs. *Tegmina* vitreous, costa broad, dilated towards base, basal third lemon yellow, thereafter castaneous; veins surrounding apical areas lightly infuscated; exterior and interior borders of clavus yellow, veins otherwise including basal area and basal membranes, fuscous. Wings with base and posterior border fuscous, veins otherwise yellow. *Abdomen* black, covered with golden and white hairs, a spot on each side of anal appendage yellow. *Body* below: chest castaneous, streaked with lemon yellow, very hairy. Abdomen lemon yellow, a broad median stripe, and lateral borders, fuscous, hairy. Coxæ, and streaks on femora, lemon yellow. Long. corp. 35 mm.; lat. 15 mm.; exp. teg. 106 mm.

Hab.—King's Sound, N.W.A.; two females in the Macleay Museum (collected by Froggatt, 1887).

*CICADA SYLVANELLA, sp.nov.

Head produced in front, pale green, with numerous dark green lines; five small spots on hind border, spot occupied with ocelli emitting a short band on each side, black; front convex, very prominent, yellow, a broad stripe on each side of middle diverging towards apex; clypeus yellow, rostrum ferruginous, tip black, reaching behind coxæ; eyes sessile. *Pronotum* pale green, front border, furrows anteriorly, and hind border infuscated; posterior edge black. *Mesonotum* pale green, four excavated obconical stripes, the outer pair longer, a transverse band and two dots in front of and a transverse band on each side of cruciform elevation, with lateral borders fuscous. *Tegmina* vitreous, costa green, darker towards apex; veins reddish toward base, black toward tip, posterior border of clavus black, basal membranes yellow. Wings with venation on basal portion yellow, darker towards apex, basal half of posterior border and anterior border of anal area infuscated. *Abdomen* yellow, tympanal covers greenish, base of segments, except the last, broadly black, the black encroaching on the yellow narrowly on dorsum, the last segment broadly yellow, base of anal appendage yellow with three black

dots, apex black with a yellow spot on each side. *Body* below: chest pale yellow streaked with red; opercula long, broad, a little distant, base narrowly fuscous; abdomen fuscous yellow, a broad fuscous band from base to penultimate segment. *Legs* yellow striped with red. Long. corp. 31 mm.; exp. teg. 90 mm.

Hab.—Cairns, Queensland; two males collected by Dodd. One of the examples, doubtless recently emerged, has the obconical stripes on the mesonotum yellow.

Allied to *extrema* and *intersecta*; it is longer and narrower than *extrema*, and pronotum differently shaped.

*Cicada extrema, Dist.

1892. Ann. Mag. Nat. Hist. (6), x. p. 56.

♂. Head and thorax brownish-ochraceous. Pronotum with the lateral and posterior margins pale ochraceous. Abdomen above castaneous, the posterior segmental margins paler; apical half of the last segment and anal appendage ochraceous; tympanal coverings obscure ochraceous. *Head* beneath and sternum brownish-ochraceous; the face, space between face and eyes, lateral margins of prosternum, legs, and opercula, pale ochraceous; femora and tibiæ streaked with castaneous. *Tegmina* and wings pale hyaline, venation fuscous, ochraceous at basal area; costal membrane and upper part of basal area ochraceous. *Abdomen* beneath castaneous, the apex pale ochraceous as above. The face is very globose, centrally sulcated (except at base) and obliquely striated; rostrum reaches intermediate coxæ; opercula short, not extending beyond basal segment, convexly rounded, overlapping at inner margins.

♀. Head and thorax above pale greenish-ochraceous and unicolorous.

Long. corp. ♂ 34, ♀ 30 mm.; exp. teg. ♂♀ 90 mm.

Hab.—Swan River, W.A. (Coll. Distant); Rockhampton, Port Denison, Q.; King's Sound, N.W.A.

This somewhat large species of Cicada is allied to *C. intersecta*, Walk., and like that species has the pale apex to the abdomen; but *C. extrema* may be at once recognised by the more robust and

less symmetrical body, the head and thorax being relatively wider, the unspotted head and thorax, the longer second apical area to the tegmina, etc. [Distant].

*Cicada intersecta, Walk.

1850. *Fidicina* id., List Hom. Brit. Mus. p. 97.
Fidicina internata, Walk., id. p. 98.
Fidicina prasina, Walk., id. p. 100.

Body tawny. *Head* equal in breadth to base of pronotum; a short band on vertex with branches forward and backward, and region of ocelli, black; front very convex, with two broad black stripes, between which frequently is a slender line; rostrum tawny, tip black, reaching middle coxæ. *Pronotum* with two or three black dots near hind border, furrows same colour; more or less tinged with green. *Mesonotum* with four stripes, outer pair longer and excavated, a curved spot in front of cruciform elevation, black. *Tegmina* vitreous, costa pale green, apical part dusky; interior vein black, venation otherwise reddish. Wings vitreous, base and exterior vein of anal area fuscous. *Abdomen* with base of segments black, last segment and anal appendage broadly yellow, a black dot on the latter. *Body* below yellow, abdomen with a broad piceous band which does not reach apex. Legs yellow, thighs near base, front and middle tibiæ and tarsi, ferruginous. Long. corp. 28 mm.; exp. teg. 90 mm.

Hab.—Port Essington, North Aust. (Walk.); Port Denison, Townsville, Q.

Genus Psaltoda, Stäl.

1866. Hemip. Afric. iv. p. 6.

Head very broad; front occupying one-third breadth of face; with eyes much broader than front of pronotum. *Pronotum* with lateral margins attenuated, dilated from base, suddenly rounded in front of middle and obtuse; front angles not produced, usually covered by sides of head. *Tegmina* with eight apical areas; basal area as long as wide; two ulnar veins distant at base; interior ulnar area dilated towards apex; postcostal space linear. Wings

with six apical areas. Sides of *abdomen* parallel beyond middle; tympanum wholly covered by the anterior leaf-like expansion of basal segment; opercula large, widened from base to apex, which is truncated. Front *femora* with three spines below, subapical spine minute.

Type, *Cicada mœrens*, Germ.

Synopsis of Species.

1(12).	Tegmina with 1st and 2nd anastomoses spotted with black.	
2 (9).	Tips of longitudinal veins of tegmina and of apical areas of wings infuscated.	
3 (4).	Sides of abdomen with two yellow spots...	*pictibasis.*
4 (3).	Sides of abdomen without spots.	
5 (6).	Abdomen orange-yellow.....	*aurora.*
6 (5).	Abdomen not yellow.	
7 (8).	Abdomen castaneous.....	*flavescens.*
8 (7).	Abdomen black.....	*mœrens.*
9 (2).	Tips of longitudinal veins of tegmina and apical areas of wings not spotted.	
10(11).	Sides of abdomen with a large silver spot.....	*harrisii.*
11(10).	Sides of abdomen without spots.....	*plebeia.*
12 (1).	Tegmina immaculate.	
13(14).	Abdominal segments broadly pale ferruginous	*argentata.*
14(13).	Abdomen mostly black..... (*dichroa*)	*harrisii.*

*Psaltoda mœrens, Germ.

1834. *Cicada* id., Silb. Rev. Ent. ii. p. 67.
1860. *Cicada* id., Bennett, Wand. Nat. Aust. p. 18.
1885. *Cicada* id., McCoy, Prod. Zool. Vic. Dec. v., p. 53, pl. 50, figs. 1-2.
1895. Frogg., Proc. Linn. Soc. N.S.W. p. 529.
1897. Black Cicada, Kershaw, Vic. Nat. p. 119.
1903. Frogg., Agr. Gaz. N.S.W. p. 340; and Misc. Pub. No. 643, p. 7, pl. 3, fig. 2.

Black. *Head* triangular, black. *Pronotum* black, width of head, posterior margin broad, sordid ferruginous. *Mesonotum* black, a spot on each anterior angle and a spot on each side of

apex yellow. *Tegmina* vitreous, venation piceous, basal area vitreous; the three exterior anastomoses and tips of longitudinal veins infuscated. Wings vitreous, venation yellow, basal half of anterior margin darker, tips of longitudinal veins infuscated. *Abdomen* black above. *Body* below yellow, base and lateral margins fuscous; chest white pilose, black and yellow variegated. *Legs* black, streaked with yellow. Long. corp. 36 mm.; exp. teg. 115 mm.

Hab.—Australia (Germar); Adelaide, S.A. (Tepper); Melbourne, Vic. (McCoy); Brisbane, Q. (Illidge and De Vis); Sydney, Uralla, Orange, &c., N.S.W.; Tasmania.

The Black Cicada or "Red-eye" is seldom found in our gardens, but frequents the trunks and branches of the smooth-stemmed Eucalypts, often congregating in considerable numbers in sheltered localities. They bury their beaks in the bark, sucking up the sap so freely that they are constantly discharging from the anus a fine stream of liquid which falls in a fine spray below. The note of the male, shrill at first, ends in a series of squeaks, and can be heard at a considerable distance.

This species is very abundant in the open forest country of Gippsland and Sydney, running out towards Southern Queensland on the north and Adelaide to the west.

*Psaltoda aurora, Dist.

1881. Trans. Ent. Soc. p. 644.

♂. *Head* black; vertex with a spot at anterior lateral margins; two transverse spots on each side of disc, near anterior margins, ocelli and eyes ochraceous. *Pronotum* dull, obscure ochraceous, with two central longitudinal black fasciæ, more separated, and widest apart at anterior margin, much closer together near posterior margin, where they are joined to a broad basal central fascia of the same colour; an obscure arcuated fascia on each side of disc, and oblique striæ also black. Posterior and lateral margins bright ochraceous, narrowly edged with black. *Mesonotum* dark, obscure ochraceous, with two

central obconical spots, on each side of which is a much longer and more angulated spot, and a large broad spot, elongated and narrowly pointed anteriorly, situated in front of cruciform elevation, black; cruciform elevation bright ochraceous, with the anterior branchlets black. Scutellum black. *Tegmina* pale hyaline; veins fuscous, ochraceous towards base; costal membrane bright ochraceous; transverse veins at bases of second and third apical areas infuscated. Wings pale hyaline; veins fuscous and ochraceous. *Abdomen* orange-yellow; first abdominal segment with centre of basal margin and lateral sides of apical margin black. *Body* beneath bright ochraceous; face, anterior margins of head, inner margins of eyes, anterior and intermediate tibiæ and tarsi and base of metasternum black. Femora ochraceous, streaked with black. Rostrum pitchy, ochraceous towards base. The *face* is long, broad, and very convex, with a narrow central sulcation and strong transverse striations; the rostrum reaches posterior coxæ. The *opercula* are broad, produced, angulated, and slightly overlapping interiorly, subtruncate outwardly, rounded posteriorly, and not reaching anterior margin of tympana. Long. corp. 48; exp. teg. 120 mm.

Hab.—Australia, Rockhampton, Q. (Distant).

This species differs from *P. mœrens*, Germ., not only by its large size and brighter and different colouration, but also by the broader and more convex face, somewhat shorter rostrum, longer and not apically compressed abdomen, etc.

*Psaltoda flavescens, Dist.

1892. Ann. Mag. Nat. Hist. (6) x. p. 55.

♂. *Head* ochraceous; the base and lateral areas of front, the area of the ocelli, a broad fascia between the eyes, a central basal fascia and a linear spot near anterior angles of vertex black. *Pronotum* with the disc castaneous, the lateral and posterior margins and a central fascia ochraceous; inner edge of lateral and posterior margins, a central spot on posterior margin, the furrows, and the margins of the central fascia fuscous black. *Mesonotum* castaneous, with four obconical black spots, the

central pair shortest, the outer pair sometimes broken, and a spot in front of the basal cruciform elevation black. *Tegmina* and wings pale hyaline, venation castaneous. Tegmina with the costal membrane and basal area pale castaneous, the transverse veins at the bases of the second and third apical areas narrowly infuscated, and a series of small and somewhat indistinct fuscous marginal spots on the apices of the longitudinal veins of the apical areas. Wings with the margin of the claval areas infuscated. *Abdomen* above pale castaneous, anterior margins of the segments broadly blackish, especially on the basal segments, where the markings are centrally macular; tympanal coverings, excluding anterior margins, blackish. *Head* beneath, sternum, legs and opercula ochraceous; the central sulcature and numerous striations to face, space between face and eyes, rostrum (excluding base), coxal streaks, anterior tibiæ, apical halves of middle tibiæ, anterior and middle tarsi, and the inner margin of the opercula blackish. Abdomen pale castaneous with the base narrowly black enclosing two small ochraceous spots. The face is very globose, the opercula do not meet centrally, the rostrum reaches the posterior coxæ. Long. corp. ♂ 40, ♀ 30 mm.; exp. teg. ♂ 107, ♀ 90 mm.

Hab.—Australia (Distant); Sydney, New South Wales.

Allied to *P. argentata*, Germ., differs in shape and colour of opercula, the more globose face, different colour-markings, etc.

*Psaltoda pictibasis, Walk.

1858. *Cicada* id., List Hom. Brit. Mus. Suppl. p. 31.

Head pale ferruginous, with two black bands, one across disc of vertex, the other at base of front, a small yellow spot at middle of base; front with sulcus, elevated lines radiating from it, and clypeus black; rostrum piceous, base testaceous, reaching posterior coxæ. *Pronotum* pale ferruginous, a dark yellow central stripe bordered with black, the furrows and a line along anterior edge of hind border black; hind border broad, fuscous-green, lightly dilated on lateral borders. *Mesonotum* ferruginous, with four obconical stripes, the outer pair longer and excavated with ferruginous; a large triangular spot behind inner pair, and a spot on

each anterior ramus of the ochraceous cruciform elevation black; scutellum black, covered with white hairs. *Tegmina* vitreous, tinged with green at base; venation ferruginous, darker towards tips, first and second anastomoses and tips of longitudinal veins clouded with fuscous. Wings vitreous, venation reddish or pale green, tips of first, second, and third longitudinal veins tinged with fuscous. *Abdomen* black, above, with two lateral tawny spots on each side, one pair at base, the other in front of middle; with scattered white tomentum. *Body* below testaceous, chest laterally, and sides of abdomen, densely white tomentose; opercula one-third length of abdomen, reddish-tawny. Legs testaceous, front and middle tibiæ piceous. Long. corp. 40 mm.; exp. teg. 105-150 mm.

Hab.—Moreton Bay (Walker), Rockhampton, Q.

*Psaltoda plebeia, sp.nov.

Head black; front border and three small spots near front yellow; front convex, piceous, spot on base and borders yellow; face piceous, narrowly edged with yellow; rostrum piceous, base yellow, till reaching posterior coxæ. *Pronotum* black, an hour-glass-shaped central stripe and two large spots on each side yellow; lateral borders sinuate. *Mesonotum* yellow, two obconical stripes on disc, two irregular spots on each side, a large anteriorly acuminate spot in front of cruciform elevation, and a spot on each side, black. *Tegmina* vitreous, two exterior anastomoses infuscated; basal half of costa and veins greenish, a stripe on anterior edge of basal area, posterior border of clavus, and apical half of veins, castaneous; basal area opaque yellow. Wings with veins castaneous, yellowish towards base. *Abdomen* black. *Body* below ochraceous, chest lightly marked with fuscous stripes on each side; tarsi castaneous. Abdomen with a broad central stripe, and lateral edges, fuscous. Long. corp. 32 mm.; lat. 14 mm.; exp. teg. 100 mm.

Hab.—New South Wales; one female, in the Macleay Museum.

Since the above was prepared we have seen the male, in the Macleay Museum, which closely resembles the female, but the yellow colour is less in evidence.

*Psaltoda argentata, Germ.

1834. *Cicada* id., Silb. Rev. Ent. ii. p. 66.
1850. *Cicada plaga*, Walk., List Hom. Brit. Mus. p. 109.
Cicada argentata (?), List, etc., p. 110.

Pale yellow to ferruginous. *Head* somewhat broader than pronotum; a broad irregular black band on vertex; front convex, green, or a greenish stripe on middle, sides and streaks black; rostrum tawny, tip black, passing hind coxæ; antennæ ferruginous. *Pronotum* fuscous-olivaceous or ferruginous, with a yellow stripe bordered with black, furrows and sides black; hind border greenish or fuscous, sometimes tawny. *Mesonotum* light ferruginous, with four obconical spots, outer pair longer with inner sides excavated with ferruginous; between middle pair a slender black stripe, broadened towards apex, uniting with a curved transverse band in front of cruciform elevation. *Tegmina* vitreous, green at base, basal half of costa and veins green, thereafter piceous. Wings vitreous, venation tawny. *Abdomen* obconical, black above, hind borders of segments ferruginous, that colour sometimes occupying the entire lateral portions; on each side a large patch of silvery tomentum; tip with black marks; below paler, sometimes with three black longitudinal stripes. *Legs* tawny, femora streaked with black, tips of tibiæ, and tarsi piceous. Long. corp. 34-40; exp. teg. 90-100 mm.

Hab.—Australia (Germar); New South Wales (Walker); Brisbane, Q. (Illidge, Tryon).

*Psaltoda harrisii, Leach.

1814. *Tettigonia* id., Zool. Misc. i. p, 89, pl. 39, fig. 1.
1835. *Cicada dichroa*, Boisd., Voy. Astr. p. 612, pl. 10, fig. 7.
1850. *Fidicina subguttata*, Walk., List Hom. Brit. Mus. p. 95.

Head ferruginous, a transverse band extending across vertex, another at base of front, a large spot in region of ocelli, and basal border, black; front ferruginous, base and transverse streaks, black; rostrum reaching bases of hind coxæ. *Pronotum* ferruginous, two central parallel stripes, furrows, front border, and a transverse curved narrow streak in front of hind border, black;

hind border broad, ferruginous. *Mesonotum* varying from yellow through red to black; with four obconical stripes, outer pair the longer and more or less excavated, a central stripe acuminate towards base broader towards apex where it unites with a large spot in front of cruciform elevation, and scutellum, black; pubescent. *Tegmina* vitreous, venation reddish near base, green or fuscous towards tips, 1st and 2nd anastomoses infuscated, frequently absent. Wings similar. *Abdomen* black, a ferruginous spot near base, and an oval yellow spot on each side at middle, covered with silky white or yellow pubescence. *Body* below ferruginous, abdomen variously marked with black; sides covered with pubescence. Legs concolorous. Long. corp. 25-38 mm.; exp. teg. 80-110 mm.

Hab.—New Holland (Leach); Sydney (Boisduval), Tweed River, N.S.W.; Kuranda, Q.

The markings of this extremely variable species depend upon the amount of colouring material deposited, while it has a wide range in measurements. Some are almost entirely black, while others are quite green, yet there are no structural characters in the one that are not present in the other. In a long series we have never seen a specimen of *dichroa* with the anastomoses of the tegmina infuscated, yet in *harrisii* occasionally one is seen with them not infuscated. In drawing up the above description an average example was in hand.

This cicada is found about the open forest in the vicinity of Sydney, but is not common, seldom more than a pair being taken at the same time. Though so very variable it is easily recognised by the bright silver blotch on either side of the abdomen.

Genus Cryptotympana, Stäl.

1861. Ann. Soc. Ent. Fr. sér. 4, p. 613.
1866. Hemip. Afric. iv. p. 6.

Body oblong. *Head* convex, very broad; eyes salient. Front angles of *pronotum* not covered by sides of head, often distinctly prominent; lateral margins destitute of denticles. *Metasternum* elevated in middle, and furnished with a strong posterior process directed backward. Basal area of *tegmina* somewhat, rarely double,

longer than broad; interior ulnar area distinctly broader toward apex; ulnar veins widely distant at base; eight apical areas. Wings with six apical areas. *Abdomen* conical. Opercula large, overlapping. Front femora spined below.

Type, *Cicada nigra*, Stoll.

*Cryptotympana nigra, Stoll.

1788. *Cicada nigra*, Stoll, Cig. p. 84, pl. 22, fig. 118.
1790. *Cicada* id., Ol., Enc. Méth. v. p. 750.
1794. *Tettigonia pustulata*, Fabr., Ent. Syst. iv. p. 20.
Tettigonia atrata, Fabr., Ent. Syst. iv. p. 24.
1849. *Cicada atra*, Sign., Rev. et Mag. Zool.

Head black; eyes grey; vertex with a sordid white spot near ocelli. *Tegmina* and wings vitreous, with basal fourth brown, blackish at base; without spots. Legs brown, variegated with black. Long. corp. 47 mm.; exp. tegm. 133 mm.

Hab.—China (Oliver); Australia; one example in the National Museum, Melbourne, from Australia.

Genus Tympanoterpes, Stäl.

1866. Hemip. Afric. iv. p. 7.

Body oblong. Front convex. *Pronotum* with lateral margins flattened out, destitute of lateral denticles. *Metasternum* not or very lightly elevated at middle where it is not produced in front. *Tegmina* vitreous, sometimes marked with black spots; basal area rarely double longer than wide; ulnar veins distant at base; interior ulnar area distinctly broadened toward apex; postcostal marginal space with apex a little broadened. Wings with six apical areas. *Abdomen* of female with last ventral segment not or lightly emarginate. Front femora spined below.

Type, *Cicada marginata*, Ol.

Tympanoterpes hilaris, Germ.

1834. *Cicada* id., Silb. Rev. Ent. ii. p. 69.
1850. *Cicada subtincta*, Walk., List Hom. Brit. Mus. p. 147.
Cicada albifios, Walk., id. p. 148.
1858. *Cicada tomentosa*, Walk., id. Suppl. p. 22.

Pale yellow, grey pubescent. *Head* short, width of pronotum; front rounded, occupying half the width of face; vertex double width of eyes, with a stripe and eyes fuscous. *Pronotum* in front width of head, a little wider posteriorly, lateral margins a little sinuate, the sulci fuscous, lateral and posterior margins and median line pale. *Mesonotum* pale yellow, with four obsolete fuscous stripes. Scutellum pale. *Tegmina* vitreous, venation pale, costa pale, with two fuscous spots, apical part of all longitudinal veins, and three anastomoses, infuscated. Wings vitreous, veins pale. *Abdomen* pale yellow, with grey pubescence. *Legs* pale yellow, with fuscous streaks. Long. corp. ♀ 18; exp. teg. 50 mm.

Hab.—Australia (Germar).

Genus Tettigia, Kol.

1857. Mel. Ent. vii. p. 6.
1866. Stäl, Hemip. Afric. iv. p. 7, and p. 23.

Body oblong or a little elongate. *Head* about equal in breadth to front of pronotum; vertex about double broader than eyes; front lightly convex, a little prominent at base, occupying a little more than one-third of the face, the transverse carinæ interrupted in the middle; no middle longitudinal sulcus; clypeus subacuminate or a little rounded. Rostrum reaching or a little passing posterior coxæ. Ocelli about doubly distant from the eyes than from each other. *Pronotum* narrowed forward, lateral margins acute or a little dilated. Basal area of *tegmina* somewhat longer than broad; ulnar veins quite distant at base; costal and radial vein contiguous; apex of interior ulnar area somewhat broadened. Wings with six apical areas. Tympanum largely covered by large dorsal lobe. Opercula short, not contiguous. Front femora with two large spines below and sometimes a subapical spinule.

Type.

Synopsis of Species.

1 (2). Tegmina with first and second anastomoses infuscated... *tristigma*.
2 (1). Tegmina with all anastomoses except last infuscated..... *variegata*.

*Tettigia tristigma, Germ.

1834. *Cicada* id., Silb. Rev. Ent. ii. p. 67.
1850. *Cicada* id., Walk., List Hom. Brit. Mus. p. 162.
1851. *Cicada* id., Walk., List Hom. Brit. Mus. pl. i., fig. 5.
1861. *Tettigia* id., Stäl, Ann. Soc. Ent France, p. 617.

Head obtuse, yellow, not narrower than middle of pronotum, vertex on each side in front of middle with two small oblique stripes, cheeks and a line on clypeus black; ocelli ringed with black; rostrum testaceous, tip ferruginous, reaching anterior apical angles of opercula. *Pronotum* yellow, lateral borders diverging backward and lightly sinuate at middle, median stripe and two obsolete spots black; hind border paler. *Mesonotum* ochraceous, with four obconical black spots, the outer pair longer and narrow, a spot in front and one on each side of cruciform elevation, black. *Tegmina* vitreous, passing tip of abdomen by half their length, venation testaceous, the first and second anastomoses and tip of first apical area infuscated; interior ulnar area with apex not or very little broader than base. Wings vitreous, venation pale tawny. *Abdomen* ochraceous, a transverse fuscous band on some of segments, interrupted in middle. *Body* tawny, opercula very pale, short; abdomen yellow, a fuscous stripe through the middle; in female, a fuscous spot on each side of anal appendage, and a small spot on its dorsum. Legs tawny. Long. corp. 19 mm.; exp. teg. 61 mm.

Hab.—Australia (Germar); New Holland (Walker); Northern Territory, S.A., collected by J. G. Tepper.

*Tettigia variegata, sp.nov.

(Plate xviii., figs. 9-9*a*.)

Head reddish-fuscous, a black spot occupied by ocelli, a yellow band on each side of head and a similar coloured spot on base of front; front convex, pale reddish-fuscous with a dark stripe along middle, and sides of face yellow and densely hairy; rostrum ferruginous, passing hind coxæ. *Pronotum* with the front somewhat narrower than head, yellow, an hourglass-shaped central stripe

enclosing a yellow stripe, a short curved stripe on each side, furrows, front edge of posterior border, and posterior angles, fuscous. *Mesonotum* yellow, four obconical broad stripes, outer pair longer and excavated, a large spot in front of and a transverse band on each side of cruciform elevation with lateral borders black. *Tegmina* passing tip of abdomen by half their length, costa and veins yellow, all apical anastomoses excepting the last, a small spot on tip of first apical area, a small spot near tips of longitudinal veins, posterior border of clavus, and base of radial vein, fuscous. Wings with venation towards apex, short vein of anal area, fuscous, the latter milky on posterior border, otherwise veins pale yellow. *Abdomen* piceous, last segment and anal appendage bordered with yellow; covered with white pubescence. *Body* below: chest sordid yellow covered with white pubescence. Opercula medium, broad, approaching, infuscated. Abdomen fuscous, last segment and anal appendage sordid yellow. Legs fuscous, streaked with yellow, hind tibiæ yellow. Long. corp. 22, lat. 8; exp. teg. 70 mm.

Hab.—Townsville, Q.; two males and one female, collected by Dodd.

SYNOPSIS OF THE GENERA OF THE SUBFAMILY TIBICENINÆ.

1(10).	Tegmina opaque, coloured.	
2 (3).	Body densely hairy; abdomen of male not inflated.	TETTIGARCTA.
3 (2).	Body not hairy.	
4 (7).	Abdomen of male inflated; venation of tegmina very irregular on apical half, forming numerous discoidal and apical areas.	
5 (6).	Basal area of tegmina emitting two ulnar veins ...	CYSTOSOMA.
6 (5).	Basal area of tegmina emitting three ulnar veins.	CYSTOPSALTRIA.
7 (4).	Abdomen of male not inflated; venation of tegmina regular, with eight apical areas.	
8 (9).	Front furnished with a distinct, abbreviated, longitudinal sulcus...	HUECHYS.
9 (8).	Front destitute of a median sulcus.....	GÆANA.
10 (1).	Tegmina vitreous, sometimes with coloured markings.	
11(14).	Basal area of tegmina emitting one (or two contiguous) ulnar veins.	

12(13). Wings with six apical areas..... ..... MELAMPSALTA.
13(12). Wings with five apical areas..... ..... PAUROPSALTA.
14(11). Basal area of tegmina emitting two ulnar veins.
15(20). Abdomen of male inflated.
16(17). Tegmina with eight apical areas; wings with six apical areas; eyes directed obliquely backward... KANAKIA.
17(16). Tegmina with eleven or more apical areas; eyes normal.
18(19). Wings with five apical areas.. ..... CHLOROCYSTA.
19(18). Wings with six apical areas..... ..... GLAUCOPSALTRIA.
20(15). Abdomen of male not inflated.
21(22). Tegmina with eight apical areas; ulnar veins distant at base; front moderately convex; opercula contiguous .... TIBICEN.
22(21). Tegmina with nine apical areas; ulnar veins contiguous at base, briefly parallel; front very convex; opercula small, widely separated..... ... ... VENUSTRIA.

Genus VENUSTRIA, gen.nov.

Head a little broader than apex of pronotum, free from hairs; front border strongly arched forward; obtuse in front; eyes large; ocelli distant from base, equidistant from each other and eyes; front prominent, median sulcus barely marked; apex of clypeus rounded with a tubercle on each side of base; rostrum reaching bases of hind coxæ; vertex a little narrower than the combined diameter of eyes. *Pronotum* not narrowed forward, sides convex, but dilated; front angles separated from eyes, produced in a tooth behind which is another tooth; posterior angles foliaceous, very prominent. *Tegmina* vitreous, tinged with golden bronze; basal area narrow, more than twice longer than broad; costa and radial veins separated; ulnar veins nearly contiguous toward base; interior ulnar area narrowed toward apex; exterior ulnar, and third discoidal areas, broad; postcostal marginal space broadened towards apex; nine apical areas, and three discoidal. Wings vitreous, tinged with golden bronze; six apical areas. *Abdomen* robust, obconical, a little longer than combined length of head and pronotum; below on each side of middle is a row of prominent

carinæ. Opercula short, distant, apical border broadly rounded. Front femora spined below.

Type, *V. superba*, sp.nov.

*Venustria superba, sp.nov. (Plate xix., figs. 7-7*a*.)

Head sordid greenish-fuscous, a narrow pale green stripe starting from middle of vertex passing between ocelli curves to base of each antenna; front convex, prominent, green, a median stripe and striations ferruginous, sides of face green narrowly bordered with yellow; clypeus green, a yellow spot on apex, base ferruginous on each side of which is a tubercle; rostrum yellow, tip black, reaching base of hind coxæ. *Pronotum* pale ferruginous, an hourglass-shaped median stripe enclosing a narrow pale green stripe, spot on each side, furrows, inner edge of lateral borders, fuscous; lateral and posterior borders broad, bright green, front angles toothed, hind angles broad, almost foliaceous. *Mesonotum* pale ferruginous, with four obconical excavated stripes bordered with pale yellow, the inner pair pale ferruginous and shorter, outer pair fuscous, a broad stripe on lateral borders and cruciform elevation bright green excepting a narrow short fuscous line on extreme base on each side of the latter. *Tegmina* vitreous, tinged with beautiful golden bronze; space between costa and radial vein green on basal half thereafter ferruginous, these veins reddish; veins green toward base, fuscous near apex, posterior border of clavus black; basal membrane ferruginous. Wings in colour similar to tegmina, veins brown. *Abdomen* ferruginous, covered with golden silky pubescence; excepting the basal, all segments with apical edges narrowly fuscous, a row of ferruginous spots on each side near lateral border, apex concolorous; sides of abdomen near base clouded with green, tip yellow. *Body* below: chest is green, opercula fuscous-green; abdomen sordid yellow with a broad central stripe and lines between segments on each side fuscous; the lateral carinæ are shining fuscous; anal appendage fuscous. *Legs* pale yellow, front femora, and apex of tibiæ lightly marked with ferruginous. Long. corp. 26-28 mm.; lat. 9 mm.; exp. teg. 80-86 mm.

Hab.—Kuranda, Q.; four males and four females, collected by Dodd (Coll. G. & F.).

This undoubtedly is the most beautiful member of the family yet described, and no printed description could do it justice. In some of the examples the green is displaced by pale ferruginous.

Genus TIBICEN, Latr.

1825. Fam. Nat. p. 426.
1866. Stäl, Hemip. Afric. iv. p. 8.

Body oblong. *Head* varies in width, rarely broader than front of pronotum; front moderately convex, occupying more than one-half the width of face, with a longitudinal sulcus; apex of clypeus subacuminate or lightly truncate. Rostrum short or medium. Ocelli remote from base of head. *Pronotum* with sides rarely a little flattened out, frequently convex; broadened posteriorly. *Tegmina* vitreous, costal margin not or towards base lightly dilated; ulnar veins frequently distant, never contiguous; interior ulnar area lightly dilated towards apex; eight apical areas. Wings vitreous, with six apical areas.

Last ventral segment of female deeply and broadly emarginate. Opercula small or medium, not overlapping, rarely contiguous. Front femora spined below.

Type.

SYNOPSIS OF SPECIES.

1(10). Tegmina immaculate.
2 (7). Abdomen yellow.
3 (4). First and last abdominal segments black, margined with yellow ..... *melanopygius.*
4 (3). First and last abdominal segments concolorous.
5 (6). Ocelli nearer to each other than to eyes; dorsum of abdomen with a scarlet stripe ..... *occidentalis.*
6 (5). Ocelli nearer to eyes than to each other; abdomen immaculate ..... *flavus.*
7 (2). Abdomen black.
8 (9). Lateral margins of pronotum armed with a tooth ..... *rubricinctus.*
9 (8). Lateral margins of pronotum unarmed ..... *infans.*
10 (1). Tegmina with fuscous markings.

11(32). Fuscous markings on tegmina on first three apical areas only.
12(17). Tegmina tinged with bronze.
13(14). Wings with apex of anal area infuscated.. ..... *auratus.*
14(13). Wings with apex of anal area not infuscated.
15(16). Abdomen black, apical margins of segments yellow.. *coleoptratus.*
16(15). Abdomen ochraceous, base of anal appendage broadly black..... .... *doddi.*
17(12). Tegmina not tinged with bronze.
18(27). Wings with apex of anal area not infuscated.
19(22). Lateral margins of pronotum with a tooth at middle.
20(21). Body densely covered with long black hairs; apical margins of abdominal segments with golden hairs... *hirsutus.*
21(20). Body with a few scattering hairs; abdomen destitute of golden hairs..... *borealis.*
22(19). Lateral margins of pronotum unarmed.
23(26). Abdomen fuscous below.
24(25). Anal appendage below black..... ..... *kurandæ.*
25(24). Anal appendage below yellow..... *gregoryi.*
26(23). Abdomen pale ochraceous below, with transverse fuscous fasciæ..... *muelleri.*
27(18). Wings with apex of anal areas infuscated
28(29). Disc of wings with a black spot..... ..... *curvicosta.*
29(28). Disc of wings immaculate.
30(31). Pronotum red, with a broad, distinct, yellow median stripe.. .... *ruber.*
31(30). Pronotum ochraceous, with a broad, distinct, median black stripe ..... *willsi.*
32(11). Tegmina with tips of longitudinal veins and bases of apical areas infuscated.
33(34). Abdomen testaceous, apical borders yellow; veins fuscous ..... *gilmorei.*
34(33). Abdomen black, apical borders paler; venation yellow.
35(36). Front very convex, abdomen below black, last segment and anal appendage testaceous..... *burkei.*
36(35). Front very lightly convex, abdomen ferruginous below. *interruptus.*

*Tibicen curvicosta, Germ.

1834. *Cicada* id., Silb. Rev. Ent. ii. p. 66.
1838. *Cicada tephrogaster*, Boisd., Voy. d'Astr. Ent. p. 611, pl. 10, fig. 5.
1903. Frogg., Agr. Gaz. N.S.W. p. 418, and Misc. Pub. No. 643, p. 8, pl. 2, fig. 4.

Body covered with floury tomentum, ferruginous. *Head* short, obtusely rounded in front, ferruginous; eyes prominent, dark and light ferruginous, front border and region of ocelli black, a yellow spot at base of vertex. *Pronotum* pale ferruginous, a median yellow stripe bordered on each side with black stripe which is very much widened at base and apex, the sutures also black; front angles rectangularly prominent, the tip and a spot on lateral borders black. *Mesonotum* ferruginous, with a percurrent median stripe, a shorter stripe on each side, a spot on cruciform elevation, and scutellum, yellow. *Tegmina* vitreous, costa ferruginous and strongly curved; venation ferruginous, piceous towards apex; basal area opaque, yellow; a spot at union of ramus of postcostal ulnar vein and costa, the two exterior anastomoses, and a spot on the tip, fuscous; veins and costa floury pubescent. Wings vitreous, vein fuscous, exterior vein and apex of anal area, and a spot on disc, fuscous. *Abdomen* ferruginous, some piceous spots on dorsum and sides; dark ferruginous below, floury tomentum everywhere. Opercula large, reniform, pale, not contiguous. *Legs* yellow, tibiæ darker. Long. corp. ♂ 30 mm., ♀ 35 mm.; exp. teg. ♂ 100 mm., ♀ 110 mm.

Hab.—Australia (Germar); Sydney.

This is a common species in the neighbourhood of Sydney in midsummer, and is known as the "Floury Miller" on account of the quantity of silvery pubescence covering the body, which makes it look as if it had been dusted with flour. It arrives somewhat later than the other large cicadas, emerging in December and is most plentiful about the new year; it has a wide range just round Sydney, both in our gardens and bush lands.

*Tibicen ruber, sp.nov.

Head pale red, darker in region of ocelli and sides of front border, a yellow spot on base of vertex; front pale red, sides of face yellow and very hairy, clypeus pale red; rostrum pale red, reaching middle coxæ. *Pronotum* red, hairy, a broad central stripe bordered with black, these borders diverging at each end laterally, posterior border sordid yellow on each side; lateral

borders sinuous, front angles produced. *Mesonotum* red, lateral borders and disc darker, with three obsolete pale red lines on disc, the outer pair curved. *Tegmina* vitreous, costa red on basal half with outer edge pale red; veins reddish, bases of second and third apical areas infuscated, the first area lightly so; basal membranes pale red. Wings with veins pale red, anal area infuscated at base and apex. *Abdomen* red, hairy along sides. *Body* below pale red; opercula broad, reniform, nearly touching, apical borders broadly curved, pale. Abdomen darker red with an irregular median fuscous stripe; covered with whitish tomentum. Long. corp. ♂ 22 mm., ♀ 27 mm.; lat. 9 mm.; exp. teg. ♂ 60 mm.; ♀ 80 mm.

Hab.—Rockhampton and King's Sound, N.W.A; described from several examples in the Macleay Museum.

Like *T. curvicosta*, this species is densely covered with floury tomentum.

*Tibicen melanopygius, Germ.

1834. *Cicada* id., Silb. Rev. Ent. ii. p. 59.
1861. Stäl, Ann. Ent. Soc. Fr. p. 618.

Head and front of pronotum equal in width; front subdepressed, obtuse; black, a yellow spot on vertex. *Pronotum* black, middle line, posterior margin and lateral spots, yellow; lateral margins lightly carinated, parallel, posterior border narrow. *Mesonotum* black, two stripes on dorsum and two lateral stripes, yellow. Scutellum yellow. *Tegmina* vitreous, venation fuscous, costa pale; ulnar veins strongly approaching towards base, not contiguous; interior ulnar area a little broader at middle, base and apex equally broad. *Abdomen* yellow, first and last segments black, margined with yellow, the others with a short black stripe on dorsum; anal segment in male below oval; opercula of male reniform, short, pale; middle femora black; appendix of posterior trochanters triangular, apex acute, barely longer than width of base. Long. corp. 19 mm.; exp. teg. 50 mm.

Hab.—Australia (Germar); Queensland.

*Tibicen interruptus, Walk.

1850. *Cicada* id., List Hom. Brit. Mus. p. 175.

Head a little broader than pronotum, black, with two tawny spots on hind border near ocelli; front very slightly convex, with a tawny spot and stripe; rostrum tawny, tip black, reaching hind coxæ. *Pronotum* rather short, tawny, black spots on each side of furrows; hind border tawny along posterior edge. *Mesonotum* ferruginous on each side, with one ferruginous and two tawny stripes, the latter straight and longer than former; cruciform elevation tawny. *Tegmina* vitreous, long, narrow, tawny at base, and along costa; veins yellow, a slender brown band extends from tip, embracing first apical area, over the anastomoses, excepting the vein between the fourth and fifth. Wings vitreous, venation yellow. *Abdomen* obconical, longer than thorax, black, ferruginous below; apical borders of segments ferruginous; opercula small, piceous, nearly contiguous. *Legs* piceous, marked with ferruginous and tawny. Long. corp. 17 mm.; exp. teg. 45 mm.

Hab.—New Holland (Walker).

*Tibicen doddi, sp.nov.

Head triangularly produced in front, ochraceous, with two short stripes, in which are the ocelli, two lateral spots on disc, three stripes on each side united toward disc running to front border, black; front ochraceous, with a narrow stripe on each side of middle, the striations, a stripe on each side of face, black; rostrum ochraceous with a median line and tip black, passing hind coxæ. *Pronotum* much narrower in front than head, broadened posteriorly, the lateral and posterior borders somewhat dilated; ochraceous, with two narrow median stripes not reaching hind border, three submarginal spots on each side, and front edge of posterior border, black. *Mesonotum* ochraceous, somewhat pubescent, with four obconical infuscated stripes, inner pair shorter and bordered with black, outer pair obsolete, two spots in front of cruciform elevation, and two short narrow discal stripes, black. *Tegmina* vitreous and tinged with bronze, costa, basal area, and veins of basal portion, ochraceous, apical venation, a large spot on apex,

and base of first apical area, broadly fuscous; the postcostal marginal area broadened toward apex. Wings vitreous, very lightly tinged with bronze, veins ochraceous darker toward apex. *Abdomen* length of thorax, ochraceous, covered with golden pubescence, a spot on base of first and second segments, apical borders of last three segments very narrowly, and anal appendage, black, the latter with a short transverse ochraceous band. The tympana are situated obliquely, widely separated, and rather narrow. *Body* below: chest ochraceous, covered with white pubescence; opercula broad, approaching, apical border broadly rounded, not reaching apical border of mesosternum, infuscated; abdomen black, sides of basal segment sordid ochraceous, covered with dense white pubescence. *Legs* ochraceous, femora streaked with ferruginous. Long. corp. 25 mm.; lat. 9 mm.; exp. teg. 80 mm.

Hab.—Kuranda, Q. Eleven males and five females (collected by Dodd).

This species is nearly allied to *Venustria superba*, but differs in the presence of eight apical areas in the tegmina, etc.

*Tibicen rubricinctus, sp.nov.

Black, striped with red. *Head* long, strongly produced forward, black (with a faint tinge of red), a median percurrent stripe, spot on each side near eyes, and spot at base of antennæ, pale red; front convex, black, borders and spot on base pale red, face black, covered with long white hairs; rostrum reddish-black, base pale red, tip reaching middle coxæ. *Pronotum* in front a little narrower than head, lateral borders sinuous and armed with a tooth at middle, front angles prominent; black; front border, median line, a sinuous transverse band posteriorly, stripe on each side near lateral borders, spots on each side, and posterior edge, pale red. *Mesonotum* black, two triangular spots on disc, a central line anteriorly, lateral borders, and sides of cruciform elevation, pale red. Scutellum pale red, a black spot on each side, and one on disc. *Tegmina* with basal half of costa, anterior border of clavus, and basal membranes pale red, venations otherwise fuscous red. Wings with veins and basal membranes red;

anal area largely infuscated *Abdomen* black, front border of sound cavities, hind borders of segments, and anal appendage, orange red; tympana pale. Abdomen is robust, equal in length to thorax. *Body* below black, streaked with pale red; opercula small, distant, pale, the basal half black. *Legs* fuscous streaked with pale red; abdomen orange yellow with a broad, well-defined stripe (not including posterior segmental margins), fuscous, which does not reach anal appendage. Long. corp. 26 mm.; lat. 8 mm.; exp. teg. 65 mm.

Hab.—Australia; described from several examples in the Macleay Museum.

This is the most gaily coloured member of the genus, superficially resembling some of the larger Melampsaltæ.

*Tibicen borealis, sp.nov.

Black, marked with red. *Head* black, with a light red spot at base of vertex; front black, lightly convex, lateral borders pale red, sides of face black, with long white hairs; rostrum dark red, base pale red, tip reaching base of middle coxæ. *Pronotum* in front width of head, lateral borders sinuous and armed with a tooth at middle; black, a median stripe pale red, portion of front border, lateral and posterior edges, narrowly red. *Mesonotum* black, lateral borders narrowly, disc of cruciform elevation, apex, and two large irregular spots on disc, pale red. Scutellum pale red, with a black spot on disc. *Tegmina* vitreous, the costa and basal membranes red, veins black, first two anastomoses near apex densely and broadly infuscated. Wings with borders of clavus white, basal half of venation pale red, apical portion fuscous; anal area infuscated, not reaching apex; basal membranes red. *Abdomen* black, tympana pale, their borders red and hairy; posterior segmental margins bright red, with a yellow spot on each side of last segment; anal appendage yellow, disc black. *Body* below: chest black, striped with pale red; opercula medium, broad, semicircular, touching, pale yellow; abdomen pale red, base of segments reddish-fuscous. Legs yellow, marked with fuscous. Long. corp. 20 mm.; exp. teg. 46 mm.

Hab.—King George's Sound, W.A.; several examples in the Macleay Museum.

*Tibicen gilmorei, Dist.

1882. P.Z.S.L. p. 127, pl. 7, fig. 8.

♂. Body above testaceous. *Head* castaneous, vertex darker than front, area of the ocelli blackish. *Pronotum* with a central fuscous longitudinal fascia, base wide and triangular, hind margin fuscous, posterior edge pale ochraceous. *Mesonotum* with two central obconical spots bordered with ochraceous, a curved fascia on each side of disc connected with anterior branches of cruciform elevation ochraceous, a lateral black fascia bordered outwardly and inwardly with ochraceous; basal elevation ochraceous, a black spot at centre and one on each branch near apex. *Tegmina* and wings pale hyaline; veins fuscous, anastomoses and connecting longitudinal veins (excepting that before the last anastomosis) infuscated, apices of longitudinal veins narrowly infuscated. *Abdomen* sparingly pilose, posterior segmental margins ochraceous. *Body* beneath and legs ochraceous; face castaneous; disc of abdomen castaneous, posterior segmental margin pale, anal appendage with a central longitudinal fuscous streak. Body short; front of head produced and prominent, face long, convex, rostrum reaching posterior coxæ; opercula small. Long. corp. 18 mm.; exp. teg. 60 mm.

Allied to *T. interrupta*, Walk., but larger, body shorter and more robust; front much more produced.

Hab.—Swan River, Aust. (Distant). One male in the collection of the Public Museum, Adelaide, collected by Mr. J. G. Tepper, has the venation yellow in places.

*Tibicen kurandæ, sp.nov.

Head ochraceous, lateral borders, large irregular spot on vertex, black; front convex, ochraceous, a median stripe divided at apex does not reach base or apex of front; sides of face ochraceous, with a broad black stripe; clypeus ochraceous, with a median fuscous stripe; rostrum tawny, tip fuscous, passing far beyond hind coxæ; covered with dense white floury tomentum. *Pronotum* ochraceous, two curved central stripes which do not reach posterior border, a spot behind each eye, a submarginal stripe on

each side, spot on each posterior angle, and front edge of posterior border, black. *Mesonotum* castaneous, darker in front of cruciform elevation, in front of which are two black dots, two obconical black spots on disc, their centre castaneous, lateral and posterior borders with cruciform elevation tawny. *Tegmina* vitreous, costa and veins tawny on basal half, fuscous on apical portion; the two exterior anastomoses broadly infuscated, which extends on anterior border of first apical area. Wings with veins tawny, at apex fuscous. *Abdomen* sordid ochraceous, paler at base, base of anal appendage rich dark brown, tip tawny. *Body* below covered with dense white tomentum, pale tawny; opercula small, triangular, distant, apical half fuscous; abdomen fuscous, posterior edges of segments tawny, covered with floury tomentum. *Legs* tawny, stripes on femora, knees, tips of tibiæ, those of tarsi, fuscous. Long. corp. ♂ 18 mm., ♀ 16 mm.; exp. teg. ♂ 50 mm., ♀ 55 mm.

Hab.—Kuranda, Q.; described from many examples collected by Dodd (Coll. G. & F.).

*Tibicen auratus, Walk.

1850. *Cicada* id., List Hom. Brit. Mus. p. 215.

Thickly clothed with golden hairs. *Head* width of front of pronotum; black, a spot on base of vertex, one in front of each eye, and one on base of front, ochraceous; front dark ferruginous, with its lateral borders ochraceous; rostrum pale yellow, tip black, reaching middle coxæ. *Pronotum* black, front, lateral and hind borders, a short median stripe, and two spots at hind border, ochraceous; lateral border armed at middle with a tooth. *Mesonotum* black, with two discal stripes which are dilated in middle, lateral and hind borders, and a spot on each side of cruciform elevation, ochraceous. Scutellum ochraceous. *Tegmina* vitreous, costa red, basal half of venation ochraceous, apical half fuscous; 1st and 2nd anastomoses black. Wings vitreous, venation on basal half yellow, apical portion black; apex of anal area broadly infuscated. *Abdomen* velvety black, apex and sides with golden pubescence. *Body* below yellow, abdomen with sides and

a median broad stripe black; opercula pale pink, small, wide apart. *Legs* yellow, front tibiæ, and streaks elsewhere, black. Long. corp. 19-23 mm.; exp. teg. 40-54 mm.

Hab.—Tasmania (Walker); Melbourne, Vic.; Clyde River, Currie Creek, Moruya, N.S.W.

This handsome little cicada is found in ferntree gullies, and in such localities in Gippsland and Tasmania is common in the summer, having a sharp distinctive call-note.

*Tibicen hirsutus, sp.nov.

Black, covered with long black hairs. *Head* black, a spot on base of vertex and three spots on front border ochraceous, covered with long black hairs; front strongly convex, prominent, a spot at base, and borders ochraceous, covered with long black hairs; rostrum fuscous-ferruginous, hairy, reaching tips of middle coxæ; ocelli equidistant from each other and eyes. *Pronotum* black, covered with long black hairs, narrower in front than head, sides broadly convex, expanded at middle in a large, flat, acuminate tooth on each side; a narrow median stripe and a spot on each side of fore border ochraceous; hind angles very prominent; hind border median. *Mesonotum* black, lateral borders and two small spots on disc ochraceous; covered with black hairs. *Tegmina* broad, short, anterior ulnar area with apex double the width of base; venation pale ferruginous, lightly marked with fuscous, the two exterior anastomoses infuscated. Wings with veins ochraceous, marginal vein black; anal area milky towards base, the apex not infuscated; tegmina and wings have a bluish opalescent tinge. *Abdomen* stout, as long as head and thorax, covered with short black hairs which create an appearance of velvet, anal borders of segments dark ochraceous and covered with golden hairs. *Body* below; chest black, covered with long black hairs and with ochraceous lines; opercula broad, a little distant, hind border broadly rounded, fuscous. Abdomen black, hind borders of segments dark ochraceous. *Legs* black marked with yellow, hind tibiæ yellow. Long. corp. 25 mm.; lat. 9 mm.; exp. teg. 51 mm.

Hab.—South Australia; one male in the Macleay Museum.

This species, which resembles *T. aurata*, is much larger, apex of anal appendage not infuscated, and is covered with long black hairs.

*Tibicen coleoptratus, Walk.

1850. *Cicada* id., List Hom. Brit. Mus. p. 223.

Head narrower than apex of pronotum; black, with a short median stripe, and sides of front border, yellow; front black, lateral borders and sides of face ferruginous; rostrum tawny, tip black, reaching apex of middle coxæ. *Pronotum* fuscous, front and lateral borders, and sometimes an obsolete median stripe, with outer portion of posterior border, yellow. *Mesonotum* fuscous-black, lateral borders and scutellum yellow; sides and cruciform elevation with yellow hairs. *Tegmina* vitreous, tinged with golden bronze; short; costa red, venation piceous; postcostal marginal space percurrently broad; bases of first, second and third apical areas and clavus infuscated. Wings vitreous, tinged with brown near base; venation yellow. *Abdomen* black, hind borders of segments narrowly edged with dark yellow. *Body* below yellow; chest variegated with fuscous; abdomen broadly banded with fuscous; opercula short, broad, not touching at inner borders. *Legs* yellow; femora, tips of tibiæ, and tarsi, piceous. Long. corp. 15 mm.; exp. teg. 30 mm.

Hab.—Victoria; S. Australia; several examples in the National Museum, Melbourne, and the Macleay Museum, Sydney.

*Tibicen occidentalis, sp.nov.

Head much depressed, yellow, with a fuscous band passing across head between eyes; ocelli much nearer to each other than to the eyes; front very prominent, convex, with a median sulcus not reaching apex, sides of clypeus and a spot on each side at base of face fuscous; rostrum yellow, reaching middle coxæ; antennæ fuscous. *Pronotum* yellow, narrower than head, sides parallel, hind angles barely evident, hind border medium; disc with a reddish broad median stripe. *Mesonotum* yellow, the disc darker, with two obconical fuscous stripes at middle of base,

an obsolete one on each side, a fuscous spot in front of cruciform elevation. *Tegmina* and wings with veins yellow; apex of interior ulnar area a little broader than base. *Abdomen* yellow, short, with a bright scarlet median stripe broadest at base gradually attenuated to apex which does not reach tip of abdomen. *Body* below yellow; opercula pale yellow, oval, rather long, a little distant, semicircular at apical border. *Legs* yellow. Long. corp. 13 mm.; exp. teg. 36 mm.

Hab.—West Australia; one male, in the Macleay Museum.

*Tibicen willsi, Dist.

1882. P.Z.S.L. p. 127, pl. 7, fig. 4.

♀. Body above black. *Head* with the apex testaceous, the ocelli red. *Pronotum* with three large confluent ochraceous spots on each side, narrowly separated at centre, almost extending to lateral margins. *Mesonotum* black, with two very obscure obconical spots; basal cruciform elevation dull ochraceous. *Tegmina* and wings pale hyaline; tegmina with venation fuscous, costal membrane, basal and claval areas ochraceous, transverse veins at base of second and third apical areas, with connecting longitudinal vein, infuscated; wings with basal and claval areas ochraceous. *Abdomen* black, the apical segmental margins testaceous; anal appendage obscure pitchy-testaceous. *Body* below and legs pale testaceous; head between face and eyes black; lateral margins of sternum spotted with fuscous, a lateral abdominal segmental row of transverse spots of same colour. The face is very convex, narrowly and longitudinally sulcated, sides transversely striated, rostrum reaching posterior coxæ; posterior lateral angles of pronotum somewhat acutely ampliated and produced. Long. corp. 20 mm.; exp. teg. 53 mm.

Hab.—Peak Downs, Queensland; Sydney (Distant); Cairns, Townsville, Q.; Bourke, N.S.W.; King's Sound, N.W.A.

♂. Opercula pale ochraceous, margin somewhat paler, reaching base of first abdominal segment, slightly directed inwardly, inner margins rounded, produced, but considerably apart, posterior margins wide, very slightly rounded.

*Tibicen burkei, Dist.

1882. P.Z.S.L. p. 126, pl. 7, fig. 3.

♂. *Head* castaneous, area of ocelli and two spots at base black, base ochraceous, more or less margined with black. *Pronotum* ochraceous, with a central hourglass-shaped fuscous fascia, its centre longitudinally ochraceous; on each side of disc is a small black curved fascia; oblique striæ, inner borders of lateral margins, lateral angles, and anterior border of posterior margin blackish. *Mesonotum* black, a small central angulated spot on disc, laterally a waved and angulated fascia, joined to anterior branches of basal cruciform elevation, followed by a straight sublateral fascia, ochraceous; cruciform elevation ochraceous. *Tegmina* and wings pale hyaline; tegmina with costal membrane and basal portion of venation ochraceous, costal area fuscous, anastomoses infuscated. *Abdomen* black, sparingly pilose; posterior margin of apical segment and anal appendage testaceous. *Below*: head, sternum and opercula ochraceous and pubescent, the last with disc fuscous, posterior margin narrowly ochraceous. Face castaneous, the centre black. Front legs ochraceous, femora streaked with fuscous; base of tibiæ and apex of tarsi fuscous, apical half of tibiæ castaneous. Middle and hind legs and coxæ luteous; femora pitchy, apices luteous; middle tibiæ castaneous, base ochraceous. *Abdomen* beneath black, apical segment and anal appendage testaceous. Rostrum passes apices of hind coxæ; face with sides transversely striated, its width about equal to distance from its lateral margin to inner margin of eyes; opercula not covering apical margin of metasternum, posterior margins broadly rounded. Long. corp. 21 mm.; exp. teg. 65 mm.

Hab.—Peak Downs, Queensland (Distant); Port Denison, Rockhampton, Q.

*Tibicen flavus, sp.nov.

Yellow, or pale greenish-yellow. *Head* width of pronotum in front, front border convex; ocelli red, a little nearer to eyes than to each other; front convex, prominent, with a median sulcus which does not reach apex; rostrum reaches tips of middle coxæ.

Pronotum with sides parallel, front angles prominent forward, hind angles laterally prominent; hind border narrow. *Tegmina* a little longer than abdomen, its veins and those of wings yellow; interior ulnar area with base and apex equally broad. *Abdomen* a little longer than head and thorax; opercula broad, very short, barely evident. Tibiæ red. Long. corp. 15 mm.; exp. teg. 40 mm.

Hab.—Cairns, Endeavour River, Q.; described from several examples in the Macleay Museum (possibly *C. congrua*, Walk.).

*Tibicen gregoryi, Dist.

1882. P.Z.S.L. p. 129, pl. 7, fig. 7.

♂. Body above pale ochraceous. *Head* with ocelli reddish, eyes tinged with fuscous. The head is broad, and, including eyes, width of pronotum, of which the anterior and posterior width is subequal. The face is large, elongate, and very convex, with faint transverse striations; rostrum reaches posterior coxæ. *Mesonotum* with two obscure central obconical spots, a central discal longitudinal and two sublateral fasciæ. *Tegmina* and wings pale hyaline; tegmina with venation ochraceous; apical longitudinal veins and apical margins of apical areas, pale fuscous; transverse veins at bases of second and third apical areas broadly infuscated. *Abdomen* covered with greyish pilosity. *Body* beneath and legs ochraceous; abdomen pale fuscous. Opercula small, broad, rounded posteriorly, reaching posterior edge of metasternum. Long. corp. 10 mm.; exp. teg. 34 mm.

Hab.—Peak Downs, Queensland (Distant).

"This species is allied to *T. muelleri*, Dist., from which it differs in the broader and less anteriorly produced head, the shape of the pronotum, and in the different markings of the tegmina, abdomen, etc." (Distant).

*Tibicen muelleri, Dist.

1882. P.Z.S.L. p. 128, pl. 7, fig. 6.

♀. Body above ochraceous. *Head* with two small spots at base of front, a spot near anterior lateral angle of vertex, and area of ocelli fuscous; eyes tinged with fuscous. *Pronotum* with

two central longitudinal black fasciæ sinuated at centre and meeting on anterior and posterior margins; a small oblique fascia commencing from behind eyes and terminating on lateral margins also fuscous. *Mesonotum* with two small obconical spots, inwardly margined with fuscous, and an elongate fuscous spot on disc in front of cruciform elevation. *Tegmina* and wings pale hyaline; tegmina with costal membrane and basal half of venation ochraceous, transverse veins at bases of first and second ulnar areas, anastomoses with some of the connecting venation, apical longitudinal veins, apical margins of apical areas, and claval margin fuscous; transverse veins at bases of second and third apical areas broadly infuscated. Scutellum with a central fuscous spot, continued and narrowed on the first three segments of the abdomen; anal appendage with a large fuscous spot on each side. *Body* beneath and legs pale ochraceous, abdominal segments with a transverse series of broad fuscous fasciæ. The head has the front prominently produced; its width less than that of base of pronotum; the face is large, elongate, very convex, with a faint longitudinal impression, and somewhat obscure transverse striations; rostrum reaches posterior coxæ. Long. corp. 11 mm.; exp. teg. 38 mm.

Hab.—Peak Downs, Queensland (Distant); Port Denison, Rockhampton, and Endeavour River, Q. (Macleay Mus.); Cairns, Q. (Dodd.)

*Tibicen infans, Walk.

1850. *Cicada* id., List Hom. Brit. Mus. p. 201.

Head black, yellow pubescent; a median stripe yellow; front with a central basal spot, and lateral borders yellow; rostrum tawny, tip black, reaching middle coxæ. *Pronotum* black, front and lateral borders, and a central stripe, yellow; narrowed towards front which is a little narrower than head. *Mesonotum* fuscous-ferruginous, with two longitudinal stripes on disc which are broadened posteriorly, lateral borders and apex except a fuscous spot on cruciform elevation yellow; scutellum yellow, a fuscous spot on middle. *Tegmina* vitreous, short, tawny at base, costa,

and costal area tawny, the latter bordered with fuscous; venation ferruginous; postcostal marginal space percurrently quite broad, and somewhat opaque. Wings vitreous; venation yellow, central vein of anal area fuscous. *Abdomen* longer than the united length of head and thorax, fuscous, hind borders of segments yellow which widen towards yellow tip, where sides are largely yellow. *Body* below yellow; chest variegated with black; abdomen with a median fuscous stripe which reaches middle; opercula rather long, broad, inner edges contiguous, pale yellow. *Legs* yellow, front tibiæ and tarsi, and streaks on femora, fuscous. Long. corp. 11-14 mm.; exp. teg. 25-30 mm.

Hab.—Adelaide, South Australia (Walker).

Genus GÆANA, Am. et Serv.

1843. Hémip. p. 463.
1866. Stäl, Hemip. Afric. iv. p. 4.

Head broader than front of pronotum, front strongly swollen forward, destitute of a longitudinal sulcus; ocelli double the distance from the eyes as from each other, distant from base. *Pronotum* convex, not laterally expanded, front angles directed below eyes. *Tegmina* opaque, coloured, basal area broad, not more than twice longer than broad; ulnar veins distant at base; interior ulnar area broadened towards apex; costa and radial vein distant; eight apical areas. Wings opaque, coloured, with six apical areas. Front *femora* spined below.

Type, *Tettigonia maculata*, Fabr.

*GÆANA MACULATA, Drury. (Plate xviii., figs. 4, 4*a*, 4*b*.)

1773. *Cicada* id., Drury, Ins. ii. p. 69, pl. 37, fig. 1.
1790. *Cicada* id., Oliv., Enc. Méth. v. p. 750, pl. 112, fig. 2.
1808. *Tettigonia* id., Syst. Rhyng. p. 37.
1834. *Cicada* id., Germ., Silb. Rev. Ent. ii. p. 74.
1840. *Cicada* id., Blanch., Hist. Nat. Ins. iii., Hémip. p. 165, pl. 10, fig. 3.
1843. *Gœana* id., Am. et Serv., Hémip., p. 464.
1850. *Gœana consors*, White, Proc. Zool. Soc. p.

Black; head with a yellow spot on each side of vertex. *Pronotum* immaculate. *Mesonotum* with a transverse row of four yellow spots, sometimes two in front of these, a spot of the same colour on each side of cruciform elevation. *Tegmina* black, with two spots near base, three across middle, two behind these, yellow, the apical areas mostly pale. Wings black, a basal spot and some of apical areas yellow. *Abdomen* black. *Body* below dark brown, with two rows of yellow spots; apical edges of segments above narrowly bordered with yellow. Long. corp. 30-35 mm.; exp. teg. 90 mm.

Hab.—China (Fabricius); Northern Territory, S.A.; three examples, collected by Mr. J. G. Tepper (South Australian and Macleay Museums).

Genus HUECHYS, Am. et Serv.

1843. Hémip. p. 464.
1866. Stäl, Hemip. Afric. iv. p. 4.

Head rather small, as broad as front of pronotum; front triangularly produced, with a distinct, abbreviated median, longitudinal sulcus. *Body* slender. Sides of *pronotum* convex, not laterally dilated, front angles directed below the eyes. *Tegmina* entirely opaque, coloured; ulnar veins distant at base; interior ulnar area a little broadened towards apex; eight apical areas. Wings vitreous or opaque and coloured, with six apical areas. *Abdomen* elongated.

Type *Cicada sanguinea*, De Geer.

The number of apical areas of the tegmina seems to vary, as in three species before us, *vidua*, has nine; *sanguinea* eight; and *philæmata* has nine in one, and ten in the other.

*HUECHYS VIDUA, White. (Plate xviii., figs. 10, 10*a*, 10*b*.)

1846. Ann. Mag. Nat. Hist. p. 332.

Head black, front very prominent, gamboge yellow. *Pronotum* black. *Mesonotum* black, with two large gamboge yellow spots. *Tegmina* uniform blackish-brown. Wings vitreous, tinged with brown around edge. *Abdomen* black, the middle, tip, and

beneath vermilion red; in the female laterally, near the tip, also red. Long. corp. 25 mm.; exp. teg. 45-58 mm.

Hab.—New Holland (White).

♀. Var. Two or three lighter streaks on tegmina near posterior margin. One female in the National Museum, Melbourne.

Genus PAUROPSALTA, gen.nov.

Head width of or a little broader than front of pronotum; vertex about twice the width of eyes, ocelli about equidistant from each other and eyes; front convex, with a median sulcus more or less distinct. *Pronotum* with sides parallel or narrower in front, lateral margins obtuse, sometimes a little flattened out. *Tegmina* with basal area quadrangular, frequently longer than broad; ulnar veins at base contiguous or united; eight apical areas. Apex of last ventral segment of the *abdomen*, in the female, deeply and broadly emarginate. Opercula small or medium. Front *femora* with three spines below.

Type *P. leurensis*, sp.nov.

SYNOPSIS OF SPECIES.

1(24).	Apex of anal area infuscated.	
2(11).	Abdomen not black.	
3 (8).	Tegmina with two contiguous ulnar veins.	
4 (5).	Base of abdominal segments fuscous.....	*borealis.*
5 (4).	Base of abdominal segments not fuscous.	
6 (7).	Basal, and base of apical segment only, fuscous.....	*extrema.*
7 (6).	Basal, and base of apical segment, concolorous.....	*extensa.*
8 (3).	Tegmina with one ulnar vein.	
9(10).	Abdomen with apical segmental margins yellow.....	*castanea.*
10 (9).	Abdomen with row of transverse bands on disc.....	*nigristriga.*
11 (2).	Abdomen black.	
12(17).	Venation pale.	
13(14).	Body long, slender.....	*prolongata.*
14(13).	Body normal.	
15(16).	Wings with fuscous spot on apex of anal area distinct	*encaustica.*
16(15).	Wings with fuscous spot on anal area obsolete.....	*multifascia.*
17(12).	Venation black.	
18(19).	Costa black.....	(♂) *leurensis.*
19(18).	Costa pale.	

20(21). Basal segment of abdomen wholly black..... *annulata.*
21(20). Basal segment of abdomen with apical border pale.
22(23). Apical borders of abdominal segments distinctly red. (♀) *leurensis.*
23(22). Apical borders of abdominal segments very pale..... *mneme.*
24 (1). Apex of anal area not infuscated.
25(32). Abdomen black.
26(27). Costa with a node near apex of radial area..... *nodicosta.*
27(26). Costa destitute of a node.
28(29). Apical margins of abdominal segments pale..... *dubia.*
29(28). Apical margins of abdominal segments distinctly red or yellow.
30(31). Interior border of tegmina black; abdomen normal.. *incipiens.*
31(30). Interior border of tegmina pale; abdomen swollen... *puer.*
32)25). Abdomen yellow or red.
33(36). Abdomen immaculate.
34(35). Pronotum with black stripes..... *minima.*
35(34). Pronotum immaculate..... *sericeivitta.*
36(33). Abdomen more or less marked with black.
37(40). Base of abdominal segments with transverse fuscous bands.
38(39). Fuscous abdominal bands obsolete; pronotum mostly black..... *rubra.*
39(38). Fuscous abdominal bands on dorsum distinct ..... *leichardti.*
40(37). First abdominal segment only black.
41(42). Basal abdominal segment narrowly black..... *basalis.*
42(41). Basal abdominal segments entirely black, a narrow black stripe along middle of dorsum..... *emma.*

*Pauropsalta leurensis, sp.nov. (Plate xviii., figs. 8, 8*a*).

Head reddish-fuscous, a yellow spot at base of vertex, front border shining black; front black, bordered with red; rostrum black, reaching middle coxæ. *Pronotum* reddish-fuscous, a central stripe, part of hind border, and produced front angles, red; width of head. *Mesonotum* black, front rami of cruciform elevation (except a small spot on each), lateral borders, and scutellum, red. *Tegmina* vitreous, costa and veins black, basal membranes red. Wings vitreous, veins black, interior border of anal area reddish milky, its apex broadly fuscous. *Abdomen* velvet black, excepting the first, apical borders of segments orange-red, tip pale yellow. *Body* below black, chest with a few

red marks; opercula black, broad, extending a little beyond sides of abdomen, separated; abdomen bright red, black at base and apex, and a row of black spots on each side. *Legs* black, spot near base of tibiæ and most of tarsi pale yellow. Long. corp. 21 mm.; exp. teg. 55 mm.

Hab.—Leura, N.S.W.; Adelaide, Onkapinge, Summerton, S.A.

♀. Var. *Head* with a percurrent median stripe; *pronotum* with a median stripe, two large spots on each side, lateral and hind borders, pale red; *mesonotum* with lateral borders, two middle stripes uniting with cruciform elevation which are angulated at middle interiorly, cruciform elevation, hind borders of all segments of abdomen, red; anal appendage with a dorsal stripe and large spot on each side red; costa red bordered with black; legs striped with red.

This is the common Black Squeaker on the Blue Mountains around Leura and Katoomba about the new year. It clings to the stems of the small Eucalypts, making a short flight when disturbed; the male when calling depresses the tip of the body, drops his wings, and produces a regular sharp squeaking note repeated several times.

*Pauropsalta castanea, sp.nov.

Head castaneous, middle of front border black; front lightly convex, castaneous, with lateral black streaks; rostrum castaneous, passing hind coxæ. *Pronotum* width of head, not narrowed in front; castaneous, the furrowed space, on each side, occupied with a large, well defined, piceous spot. *Mesonotum* castaneous, two longitudinal discal lines, lateral and posterior borders with cruciform elevation, yellow. *Tegmina* vitreous, costa and veins sordid yellow. Wings with venation pale yellow. *Abdomen* castaneous, apical borders of segments and anal appendage yellow, the latter with two castaneous stripes and tip black. *Body* below castaneous; abdomen sordid yellow, tip of ovipositor fuscous. *Legs* castaneous. Long. corp. 23 mm.; exp. teg. 60 mm.

Hab.—Karth; one female in the South Australian Museum, collected by C. M, Bagot.

One of the robust species and may easily be separated from its congeners by the description.

*PAUROPSALTA PROLONGATA, sp.nov.

Head black, spot on base of vertex, one on each side of front border, band across front, red; front black, middle strip and borders pale red, sides of face black; rostrum pale red, reaching middle coxæ. *Pronotum* width of head; front angles produced tooth-like; pale red, two central stripes united at base, irregular streaks on sides, and front edge of hind border, black. *Mesonotum* pale red, four obconical stripes, the outer pair longer and extended to sides of cruciform elevation, a large spot in front of the latter, black. *Tegmina* vitreous, costa and veins pale red, costa separated from radial vein. Wings with veins pale red; *Abdomen* reddish-black, apical borders of segments and anal appendage red, the latter with two black stripes on disc. Long and slender. *Body* below: chest black; abdomen pale red, apical borders of segments yellow, a middle stripe and anal appendage fuscous; ovipositor ferruginous, extending far beyond tip of abdomen. *Legs* pale red, lined with darker red. Long. corp. 21 mm.; exp. teg. 50 mm.

Hab.—Australia; one female in the South Australian Museum, Adelaide.

This long, slender species may be easily recognised by the markings, and the extended abdomen.

*PAUROPSALTA EXTENSA, sp.nov.

Head sordid red; front convex, middle stripe and lateral borders pale red. *Pronotum* the width of head, front angles prominent, lateral borders parallel; all borders and a middle stripe sordid yellow, some black streaks on furrows; rostrum reddish, reaching middle coxæ; posterior angles prominent. *Mesonotum* sordid red, two narrow yellow stripes on disc. *Tegmina* with front border sinuous, costa and veins yellow. Wings with veins yellow, apex of anal area infuscated. *Abdomen* long, double the length of head and thorax, gradually attenuated to apex, sordid red;

apical borders of segments yellow; anal appendage with a stripe on disc and a large spot on each side yellow. *Body* below sordid yellow, a pale fuscous stripe along middle of abdomen; anal appendage ferruginous, ovipositor same colour and extends far beyond apex of abdomen. *Legs* yellow mottled with ferruginous Long. corp. 22 mm.; exp. teg. 50 mm.

Hab.—Murray River, S.A.; one female (Adelaide Museum).

A very lengthy species, in form resembling *prolongata*.

*Pauropsalta extrema, Dist.

1892. Ann. Mag. Nat. Hist. (6) ix., p. 323.

Head, pronotum, and mesonotum black. *Head* with front excluding two marginal spots, anterior marginal angles of vertex, and ocelli ochraceous. *Pronotum* with margins, and central longitudinal fascia, on each side of which are discal curved and transverse streaks, ochraceous. *Mesonotum* with two central fasciæ thickened posteriorly, lateral margins and cruciform elevation (excluding anterior angles and central margins) ochraceous. *Tegmina* and wings pale hyaline, bases very narrowly ochraceous; venation generally fuscous; costal membrane to tegmina ochraceous, with its outer margin narrowly fuscous. Wings with inner margin and outer apical angle of claval areas infuscated. *Abdomen* ochraceous, basal margin and two apical segments black; a central longitudinal spot to penultimate segment and posterior margin of apical segment ochraceous. *Body* beneath and legs ochraceous; femora streaked with castaneous; a broad central fascia to face; head beyond face, coxal fasciæ, sternal spots and basal angles of abdomen black. Upper surface of abdomen of female with transverse central segmental black spots, two terminal segments not wholly black as in male. Long. corp. 18 mm.; exp. teg. 47 mm.

Hab.—Roebourne, N.W. Australia (Distant).

*Pauropsalta nigristriga, sp.nov.

Head black, a spot on vertex and one on each side of front border, yellow; front lightly convex, fuscous, sides pale yellow,

and a spot of same colour on base, hairy, face black, covered with long white hairs; rostrum pale red, tip black, reaching hind coxæ. *Pronotum* in front narrower than head, broadened posteriorly, front angles produced; black, anterior, lateral, and posterior borders, and a median stripe, pale yellow, a black spot on middle of hind border. Covered with short hairs. *Mesonotum* black, lateral borders broadly, two central stripes broadest at middle, and cruciform elevation, pale yellow; hairy. Scutellum pale red. *Tegmina* vitreous, costa pale red, its anterior edge dark red; veins and basal membrane dark red. Wings with veins fuscous, anterior and posterior borders pale red; base and apex of anal area infuscated. *Abdomen* pale reddish-yellow covered with white hairs, a series of short transverse black bands along disc, and base of anal appendage, black, tip pale. *Body* below: chest pale yellow, hairy, streaked with fuscous; opercula short, reniform, pale yellow, base infuscated; abdomen sordid reddish-yellow, apex fuscous, tip pale. Long. corp. 30 mm.; exp. teg. 54 mm.

Hab.—Endeavour River, Q.; one male in the Macleay Museum.

The row of transverse black bands on the pale yellowish abdomen will easily distinguish this species.

*Pauropsalta annulata, sp.nov.

Head black, a yellow spot at base of vertex; front convex, black; rostrum black, reaching middle coxæ. *Pronotum* black, a little narrower than head, front angles produced; a middle stripe or spot, front border laterally, and hind border, pale yellow. *Mesonotum* black, lateral and hind border, pale yellow. *Tegmina* vitreous, costa pale edged with black exteriorly, somewhat distant from radial vein; veins black, basal membranes yellow, opaque. Wings vitreous, veins black, paler towards base and front border; anal area milky near base, apex infuscated. *Abdomen* black, apical borders of segments (excepting the first), broadly orange red. *Body* below black, abdomen orange-yellow, a row of lateral spots, and one along middle, black. Opercula small, black, separated, posterior border narrowly yellow. *Legs* black, tips of

front coxæ, femora, and front tibiæ, dark red. Long. corp. 13 mm.; exp. teg. 40 mm.

Hab.—Townsville, Gatton, Southport, Gin Gin, Q.; Narromine, Wagga, N.S.W.; eight examples, collected by Froggatt and Todd (Coll. G. & F.). The Gatton example has the usual markings on mesonotum, and all pale markings bright red.

This species was plentiful upon the Melaleuca bushes about Southport in October, where a large series was taken. The male has a very low squeaking note.

*Pauropsalta nodicosta, sp.nov.

Head black, convex, a small yellow spot at base of vertex, three red spots in front border; front black, a broad middle stripe and lateral borders, red; rostrum reddish-fuscous, reaching middle coxæ; eyes prominent, somewhat sessile. *Pronotum* narrower than head, black, a middle stripe, and posterior borders, red; front angles prominent. *Mesonotum* black, two short stripes on disc, lateral and posterior borders, and cruciform elevation, red. *Tegmina* vitreous, costa pale red, with a large triangular node at middle; venation black; first six apical areas long and narrow, discoidal areas short and broad. Wings vitreous, front edge pale red, veins black. *Abdomen* black, apical half of each segment red, a spot at base of anal segment and tip black. *Body* below pale red mottled with black, abdomen with anal appendage, ovipositor, and a spot at its base, fuscous. *Legs* pale red striped with dark red, front tibiæ dark red. Long. corp. 17 mm.; exp. teg. 40 mm.

Hab.—Kalgoorlie, W.A.; one specimen (♀) (Coll. G. & F.)

This is the only species of cicada received from Kalgoorlie through G. W. Froggatt while collecting in that district for several years.

*Pauropsalta dubia, sp.nov.

Head black; front lightly convex, not prominent, black; rostrum brown, tip black, reaching middle coxæ; a pale spot on vertex. *Pronotum* width of head, black, three fuscous yellow spots, on each side, and a middle yellow stripe. *Mesonotum* black, posterior border and cruciform elevation yellow. *Tegmina* vitreous, short;

costa angulate at middle, pale yellow, darker towards apex; veins dark yellow. Wings with veins yellow. *Abdomen* black, apical borders of segments yellow; anal appendage fuscous-yellow. *Body* below sordid yellow; opercula very small, distant; abdomen yellow, base of segments and tip fuscous; ovipositor yellow, tip black. *Legs* yellow, striped with black. Long. corp. 12 mm.; exp. teg. 30 mm.

Hab.—Ferrishaw and Kewell, Vic.; Lucindale, S.A.; two pairs, in the National Museum, Melbourne, and South Australian Museum.

*Pauropsalta encaustica, Germ.

1834. *Cicada* id., Silb. Rev. Ent. ii. p. 62.
1850. *Cicada arclus*, Walk., List Hom. Brit. Mus. p. 184.
Cicada juvenis, Walk., ibid. p. 188.
Cicada dolens, Walk., ibid. p. 190.

Head black, with a pale occipital line; rostrum black, tawny near base, reaching middle coxæ. *Pronotum* narrower than head, black, hind border red or yellow, sometimes a red or yellow spot near front border; hind angles produced horizontally. *Mesonotum* black, pilose, with four stripes and apex, yellow; in some examples the borders only are red and yellow, while others have but two red or yellow stripes. *Tegmina* vitreous, costa yellowish, sometimes bordered with black; venation testaceous, blackish towards apex. Wings vitreous, venation fuscous, apex of anal area infuscated. *Abdomen* black, apical margins of segments red or yellow; much longer than chest. *Body* below yellowish, with an obsolete fuscous stripe. Opercula short, widely separated, yellow, disc pale. *Legs* yellow, marked with black. Long. corp. 15 mm.; exp. teg. 36-50 mm.

Hab.—Australia (Germar); Port Stephens, New Holland (Walker); Mittagong, N.S.W.

*Pauropsalta mneme, Walk.

1850. *Cicada* id., List Hom. Brit. Mus. p. 181.
Cicada antica, Walk., ibid. p. 182.

Head and chest clothed with short black hairs; head hardly narrower than pronotum, with a slender interrupted stripe; front

slightly convex, not prominent, red on each side; eyes rather prominent; antennæ black, stout; rostrum black, reaching middle coxæ. *Pronotum* a little narrower in front than behind, with a slender red stripe not reaching hind border. *Mesonotum* with sides, cruciform elevation, and hind border tinged with red. *Tegmina* vitreous, costa dark red, rather convex; veins black, tawny and marked with black at base. Wings with apical area brown at base, hind border, and tips. *Abdomen* obconical, a little longer than chest, with whitish shining down; hind borders of segments, tip and below red; opercula very small, dark red, blackish towards base, wide apart. *Legs* black, rather hairy; fore femora streaked with red, a tawny band near base of the four hind tibiæ; hind tibiæ tawny towards base; hind tarsi tawny, tips black.

♀. Abdomen a little longer than ♂, last segment red, except two divergent black stripes; oviduct red. Long. corp. 17 mm.; exp. teg. 50 mm.

Hab.—Tasmania (Walker); New South Wales; Victoria.

*Pauropsalta incipiens, Walk.

1851. *Cicada* id., List Hom. Brit. Mus. p. 189.

♀. Body black, rather short. *Head* broad as pronotum; front rather prominent, forming very obtuse angle, a tawny mark on each side in front; antennæ dark tawny. *Pronotum* not narrower in front, with or without a slight tawny stripe. *Mesonotum* with two wavy, tawny stripes, hind border tawny; posteriorly mostly tawny. *Tegmina* vitreous, tawny at base; costa ferruginous far as middle; veins black. *Abdomen* tapering, tawny, much longer than thorax, mostly black above at base, whence three black stripes or spots decrease in size, along back, end before tip. *Legs* tawny, striped with black, with short tawny hairs. Long. corp. 10 mm.; exp. tegm. 30 mm.

Hab.—Adelaide, S.A. (Walker).

*Pauropsalta rubra, sp.nov.

Head pale red with irregular black lines; front very convex, triangularly produced, pale red, with a broad black stripe on each

side; rostrum pale red, reaching hind coxæ. *Pronotum* width of head, hind angles prominent; pale red, two short central stripes, two lateral stripes, and hind angles, black. *Mesonotum* pale red, with four obconical black stripes, the outer pair much longer and excavated. *Tegmina* vitreous, costa and veins pale red, the exterior vein of basal area and posterior margin of clavus black. Wings with fore border pale, the veins fuscous, anal area fuscous behind inner vein. *Abdomen* pale red, a row of short obsolete transverse bands along dorsum, and a row of small spots near lateral borders, black; anal appendage with two black stripes on disc. *Body* below pale red, tip of ovipositor black. *Legs* pale red, femora streaked with black. Long. corp. 18 mm.; exp. teg. 45 mm.

Hab.—Sale, Vic.; one female collected by Kershaw, in National Museum, Melbourne.

*Pauropsalta leichardti, Dist.

1882. P.Z.S.L. p. 132, pl. 7, fig. 5.

♀. Body above ochraceous. *Head* with anterior margin, a spot on anterior lateral angles of vertex, an oblique fascia behind eyes, two small spots between ocelli and eyes, a transverse spot on anterior margin of vertex, black. *Pronotum* with two central black lines, not extending to posterior margin, widened and angulated near anterior margin, oblique striæ, and inner border of posterior margin, black. *Mesonotum* with two short contiguous obconical spots, on each side of which is a more elongate and broken one, and two small rounded spots in front of cruciform elevation, black. *Tegmina* and wings pale hyaline; tegmina with costal membrane, and area and veins enclosing basal ulnar area pale ochraceous, remaining venation fuscous. *Abdomen* with a series of dorsal transverse black fasciæ, decreasing in width towards apex; anal appendage with a black line on each side. Body beneath ochraceous; base and lateral margins of face, apex of rostrum, and ovipositor, black. Legs ochraceous; femora streaked with fuscous; front tibiæ black, annulated with ochraceous near base. Head, including eyes, equal in width to prono-

tum; rostrum reaching middle coxæ; face somewhat compressed, centrally and longitudinally broadly sulcated for half its length, and transversely striate. Long. corp. 10 mm.; exp. teg. 25 mm.

Hab.—Peak Downs, Queensland (Distant).

A male of this species in the Macleay Mus., Sydney, is larger, abdomen lightly inflated and yellow, excepting the basal segment and a stripe along the dorsum black.

*Pauropsalta multifascia, Walk.

1850. *Cicada* id., Walk., List Hom. Brit. Mus. p. 185.
Cicada singula, Walk., ibid. p. 186.
Cicada obscurior, Walk., ibid. p. 187.

Head breadth of pronotum, black, a red spot on vertex; front convex, not prominent, sometimes a spot, and sides of face, yellow; rostrum black or dark red, reaching almost to hind coxæ. *Pronotum* black, sometimes with a median stripe widened in front and behind, and hind border, dark red. *Mesonotum* black, lateral and hind borders, and sometimes two parallel stripes, dark red. *Tegmina* vitreous, costa red, venation black. Wings vitreous, venation black, middle vein and near base red or tawny. *Abdomen* longer than chest, black, apical margins of segments yellow or red. *Body* below yellow or red, with or without three fuscous stripes. Opercula small, widely separated, pale yellow. *Legs* black and yellow, or black and red. Long. corp. 10-12 mm.; exp. teg. 30-32 mm.

Hab.—Adelaide, S.A.; New Holland (Walk.).

*Pauropsalta basalis, sp.nov.

Head yellow, vertex mostly black; front lightly convex, sides of face and a broad central stripe, black; rostrum black, base yellow, reaching middle coxæ. *Pronotum* a little narrower than head, furrows fuscous. *Mesonotum* yellow, four broad stripes, the middle pair shorter and confluent, two dots and a spot in front of cruciform elevation, black. *Tegmina* vitreous, costa white, separated from radial vein; veins black. Wings vitreous, veins black, interior vein of anal area broadly milky. *Abdomen* orange-

red, base of first segment black, apical margins of segments yellow. *Body* below yellow, opercula small, white; apical half of abdomen bright orange-red. *Legs* yellow, front coxæ and a stripe on front femora fuscous. Long. corp. 18 mm.; exp. teg. 35 mm.

Hab.—Townsville, Q.; one example collected by Dodd (Coll. G. & F.).

*Pauropsalta puer, Walk.

1850. *Cicada* id., List Hom. Brit. Mus. p. 200.

♂. Body tawny. *Head* a little broader than pronotum; disc black, a black mark on each side beneath; front convex, with black striations; rostrum tawny, tip black, reaching middle coxæ, black spot above near base; antennæ tawny, black toward tips. *Pronotum* not narrower in front, sutures black, hind part narrow, slightly widened and rounded on each side. Disc of *mesonotum* black, four tawny stripes communicating with hind border. *Tegmina* vitreous, tinged with brown along the veins near tip of costa, tawny at base and costa; veins piceous, tawny at base. *Abdomen* swollen, much longer than chest, black above at the base whence a row of black spots proceeds nearly to the tip. Opercula pale tawny. *Legs* pale brown, clothed with yellow hairs, coxæ and knees yellow; yellow ring near base of each tibiæ; femora striped with piceous and yellow. Long. corp. 10 mm.; exp. tegm. 27 mm.

Hab.—Adelaide, S.A. (Walker).

*Pauropsalta emma, sp.nov. (Plate xviii., fig. 11).

Head black, a little broader than front of pronotum; front convex, not prominent, ochraceous, sides of face black, hairy; rostrum reaching apex of middle coxæ. *Pronotum* black, with three ochraceous spots on each side; lateral borders parallel, hind angles a little prominent. *Mesonotum* black, with two small spots on posterior part of disc and cruciform elevation ochraceous. *Tegmina* short, broad, postcostal area very broad throughout; veins on basal portion yellow, those of apical portion, hind border of clavus, front and apical borders of basal area, fuscous. Veins

of wings yellow. *Abdomen* yellow, base and metanotum shining black, a black median stripe along dorsum which reaches last segment. *Body* below ochraceous, hairy; opercula ochraceous, nearly round, a little distant; abdomen reddish-yellow, a black spot at base. *Legs* yellow, front tibiæ and tips of tarsi fuscous. Long. corp. ♂ 11 mm., ♀ 9 mm.; exp. teg. ♂ 30 mm., ♀ 28 mm.

Hab.—Rockhampton, Q.; described from a number of specimens in the Macleay Museum.

This beautiful little species is dedicated to Mrs. Emma Froggatt, in appreciation of her kindly interest in our work.

*Pauropsalta borealis, sp.nov.

Head convex, yellow, vertex mostly black; front black, borders yellow; rostrum yellow, tip black, reaching hind coxæ. *Pronotum* a little narrower than head, sordid yellow, two middle stripes broader at base and apex, a short stripe on each side, and furrows, blackish; front angles prominent. *Mesonotum* sordid yellow, four broad stripes, middle pair shorter and confluent, extending to front border and cruciform elevation, including it, black. *Tegmina* vitreous, costa pale yellow, venation black. Wings with anal area milky, near base tinged with fuscous; veins dark red. *Abdomen* with base of segments sordid red, followed with orange-red, again followed with yellow on posterior border; anal appendage dark red, a yellow spot on each side; covered with short white hairs. *Body* below black variegated with yellow; abdomen same as above; ovipositor reddish. *Legs* reddish, streaked with yellow, hind tibiæ yellow. Long. corp. 14 mm.; exp. teg. 40 mm.

Hab.—Northern Territory, S.A.; one example, collected by J. G. Tepper (Coll. G. & F.).

*Pauropsalta sericeivitta, Walk.

1862. *Cicada* id., Journ. Ent. p. 304.

♂. Pale testaceous-yellow. *Head* as broad as pronotum, with a black point on each side of vertex. *Pronotum* with four furrows, which converge hindward. *Mesonotum* with a black

stripe on each side. *Abdomen* beneath with a line of blackish points. Fore tarsi and tips of fore tibiæ black. *Tegmina* and wings vitreous, veins of tegmina whitish, black towards tips and along interior border; 1st and 2nd transverse veins upright; wings with five apical areas. Long. corp. ♂ 12 mm.; exp. teg. 30 mm.

Hab.—Sydney (Walker), Clarence River, N.S.W.; one example in the National Museum, Melbourne, and several in the Macleay Museum.

*Pauropsalta minima, sp.nov.

Head yellow, front border darker; front yellow with a broad brown stripe on middle. *Pronotum* narrower than head, yellow, furrows darker. *Mesonotum* yellow, with two long lateral stripes, between which are two very short narrow stripes from base, black. *Tegmina* vitreous, costa white, veins yellow. Wings with veins pale yellow. *Abdomen* yellow, long, narrow, with a narrow obsolete median stripe. *Body* below yellow. Long. corp. 9 mm.; exp. teg. 24 mm.

Hab.—Northern Territory, S.A.; collected by J. G. Tepper.

This is one of the smallest species examined, of which we have seen three examples; they are in the South Australian Museum and our own Collection.

Genus Melampsalta, Kol.

1857. Mel. Ent. vii. p. 19.
1857. *Cicadetta*, Kol., id. p. 19.
1857. *Tettigetta*, Kol., id. p. 24.
1866. *Melampsalta*, Stäl, Hemip. Afric. iv. p. 42.

Head subequal in breadth to front of pronotum; vertex about double broader than eyes; front lightly convex, with a more or less distinct median longitudinal sulcus. *Pronotum* broader behind than in front, lateral margins obtuse, rarely a little flattened out. *Tegmina* with two contiguous ulnar veins or joined in one towards base, eight apical areas, basal area quadrangular. Wings with six apical areas. Apex of last ventral segment of

the *abdomen* in the female very deeply and broadly emarginate. Opercula small or medium. Front *femora* spined below.

Type,

Synopsis of Species.

1(14).	Tegmina with fuscous spots.	
2 (5).	Tegmina with an irregular stripe on bases of apical areas.	
3 (4).	Lateral margins of pronotum, at middle, with a tooth	*umbrimargo.*
4 (3).	Lateral margins of pronotum unarmed	*oxleyi.*
5 (2).	Tegmina with the two exterior anastomoses only, spotted.	
6 (7).	Lateral margins of pronotum, at middle, with a tooth	*torrida.*
7 (6).	Lateral margins, near middle, unarmed.	
8(13).	Abdomen black.	
9(10).	Abdomen unicolorous, without red or yellow spots	*binotata.*
10 (9).	Abdominal segments with margins red or yellow.	
11(12).	Pronotum and mesonotum black, without spots	*spreta.*
12(11).	Pronotum and mesonotum ochraceous, black-striped	*labeculata.*
13 (8).	Abdomen pale; body long, slender	*convergens.*
14 (1).	Tegmina without fuscous spots.	
15(16).	Ulnar veins distinct but contiguous; apex of anal area of wings infuscated	*infuscata.*
16(15).	One ulnar vein apex of anal area of wings unspotted.	
17(24).	Lateral margins of pronotum armed at middle with a tooth.	
18(23).	Abdomen black.	
19(20).	Third abdominal segment only, orange-red	*rubricincta.*
20(19).	All abdominal segments banded with red or yellow.	
21(22).	Anal appendage armed with a spine before tip	*spinosa.*
22(21).	Anal appendage unarmed	*marginata.*
23(18).	Abdomen pale, with three rows of black dots	*labyrinthica.*
24(17).	Lateral margins of pronotum unarmed.	
25(26).	Dorsum with a broad percurrent castaneous stripe	*oldfieldi.*
26(25).	Dorsum destitute of a percurrent stripe.	
27(54).	Abdomen black, marked with red or yellow.	
28(39).	Front angles produced, almost tooth-like.	
29(30).	Costa black; abdomen black	*denisoni.*
30(29).	Costa red.	
31(36).	Apical margins of abdominal segments red or yellow.	
32(33).	Veins of tegmina and wings black	*nebulosa.*

33(32). Veins of tegmina and wings red.
34(35). Front of pronotum narrower than head..... *fletcheri.*
35(34). Front of pronotum the width of head..... *rubristrigata.*
36(31). Apical margins of abdominal segments concolorous.
37(38). Veins of tegmina and wings pale red or yellow... ... *kershawi.*
38(37). Veins of tegmina and wings blackish..... *abdominalis.*
39(28). Front angles not prominent.
40(43). Costa black.
41(42). Head narrower than front of pronotum..... *ædæ.*
42(41). Head width of pronotum..... *melete.*
43(40). Costa red.
44(45). Abdomen without stripes or spots above..... .... *atrata.*
45(44). Abdomen with apical borders of segments red or yellow.
46(51). Mesonotum tawny or yellow.
47(48). Pronotum yellow..... .... *mackinlayi.*
48(47). Pronotum black.
49(50). Body black, not hairy.... .... *latorea.*
50(49). Body tawny, very hairy..... *angusta.*
51(46). Mesonotum black.
52(53). Abdomen with ferruginous and green bands on segments..... .... *quadricincta.*
53(52). Abdomen with red bands on segments, interrupted on the back. ..... *incepta.*
54(27). Abdomen not black.
55(60). Venation fuscous or black.
56(57). Mesonotum red .... *tristrigata.*
57(56). Mesonotum black.
58(59). Pronotum black..... .... *abbreviata.*
59(58). Pronotum dull ochraceous..... *landsboroughi.*
60(55). Venation not fuscous or black; pale.
61(64). General colour red or reddish.
62(63). Mesonotum without spots or stripes; opercula small. *rubea.*
63(62). Mesonotum with fuscous stripes; opercula large, disc-shaped, convex on interior surface, laterally extending beyond sides of abdomen, posteriorly reaching middle of abdomen, touching, red..... *castanea.*
64(61). General colour yellow or yellowish.
65(66). Mesonotum without fuscous marks... .... *fulva.*
66(65). Mesonotum spotted or striped with fuscous or black.
67(70). Two stripes on mesonotum.
68(69). Mesonotum yellow, with fuscous marks..... *flava.*

69(68). Mesonotum dark castaneous, with pale marks..... *warburtoni.*
70(67). Four fuscous stripes on mesonotum.
71(72). Postcostal area of tegmina infuscated..... *convicta.*
72(71). Postcostal area not infuscated.
73(78). Apical borders of abdominal segments not fuscous.
74(77). Abdomen marked with fuscous.
75(76). Front with a median longitudinal sulcus..... *eyrei.*
76(75). Front destitute of a longitudinal sulcus... ..... *graminis.*
77(74). Abdomen without fuscous spots..... *telxiope.*
78(73). Apical borders of abdominal segments fuscous.
79(80). Pronotum without black stripes, two fuscous spots on anterior margin..... *forresti.*
80(79). Pronotum with black stripes.
81(82). Head with a large black spot on vertex..... *interstans.*
82(81). Eyes surrounded with black. ..... *varians.*

*Melampsalta torrida, Erich.

1842. *Cicada* id., Archiv f. Nat. viii. p. 286.
1850. *Cicada basiflamma*, Walk., List Hom. Brit. Mus. p. 170.
Cicada connexa, Walk., ibid. p. 173.
Cicada damater, Walk., ibid. p. 178.

Head a little broader than front of pronotum; testaceous, with two short stripes at base, a broad curved stripe passing middle and reaching front border on each side, and front edge on middle, black; front convex, prominent, with a very broad longitudinal stripe enclosing a small yellow spot near base, and borders of face including clypeus, black. *Pronotum* narrowed a little towards front, testaceous; lateral borders with an acute tooth on each side near middle, front angles prominent, the posterior angles very prominent and obtuse; transverse and oblique impressions, two central stripes, with some indistinct spots, black; hind border narrow, fuscous. *Mesonotum* convex, testaceous, with four obconical stripes, the outer pair longer reaching apical border, and a narrow median stripe terminating in a spot in front of cruciform elevation, black. *Tegmina* vitreous, venation testaceous, black towards apex and interior border; interior ulnar area with sides parallel, apex rounded above; postcostal marginal space broadened at origin of first transverse vein; a black spot on first

and second anastomoses. Wings vitreous, venation fuscous, the anal area milky-white with a vitreous spot. (Spot sometimes absent). *Abdomen* black, apical margin of segments testaceous; in the male it is almost entirely black above and below; in the female the margin of the segments, two narrow stripes on the dorsum and sides of anal segment above with a broad stripe on each side below, testaceous. Opercula small, testaceous-red, blackish at base, wide apart. *Legs* testaceous, all femora striped, and front tibiæ, black. Long. corp. ♂ 20, ♀ 25 mm.; exp. teg. ♂ 60, ♀ 64 mm.

Hab.—Tasmania; New Holland (Walker); Victoria; New South Wales; Queensland.

In its markings and size this is a very variable species, especially the males which are most frequently almost entirely black, although the typically marked examples do occur. It may be easily recognised, when the tegmina and wings are at rest, by the very prominent milky-white stripe on the anal area of the wings which is seen through the transparent tegmina. Walker's synonyms are due to his peculiar methods for separating species.

*Melampsalta umbrimargo, Walk. (Plate xviii., fig. 12).

1858. *Cicada* id., List Hom. Brit. Mus. Suppl. p. 32.

♀. Yellow. *Head* with two broad irregular black stripes, connected between ocelli, front with a lanceolate black stripe, emitting branches along furrows, contains a yellow dot, almost connected on each side with a band. *Pronotum* with two black stripes, connected in middle, widened and diverging in front and behind, where there is a black dot; the black streaks on each side, border edged with black, and armed with a tooth on each side. *Mesonotum* with four obconical black stripes, a lanceolate black streak behind the inner pair, which are short. *Tegmina* vitreous, narrow, veins yellow, black toward tip, clouded with brown at tips and exterior border, hind vein black; first, second and third transverse veins clouded with brown. *Abdomen* with a black band on the fore border of each segment; last segment with two black

stripes and two black dots. Long. corp. 24 mm.; exp. teg. 70 mm.

Hab.—Swan River, W.A. (Walker); Ardrossan, Yorke Peninsula (Tepper), Gawler, S.A. (Macleay Mus.).

*Melampsalta convergens, Walk.

1851. *Cicada* id., List Hom. Brit. Mus. p. 114.

Head a little narrower than pronotum; vertex with three red dots; front convex, red, with two black stripes having black bands on each side; rostrum tawny, tip black, reaching middle coxæ. *Pronotum* with a tawny stripe at middle, and on each side three broad red stripes, the middle one interrupted; hind border tawny, tinged with black, almost angular at base of tegmina, excavated on each side. *Mesonotum* pale red, three very broad, obconical, black stripes, middle one shortest and broader, united at tip to a black spot near cruciform elevation. *Tegmina* lightly tinged with tawny, costa pale red, piceous towards tips; veins black, first and second anastomoses and longitudinal vein between them, clouded with dark brown. *Abdomen* obconical, a little longer than pronotum, a black stripe and a little black near base below; oviduct pitchy. *Legs* tawny, marked with black. Long. corp. 20 mm.; exp. teg. 65 mm.

Hab.—New Holland (Walker); Queensland.

*Melampsalta labeculata, Dist.

1892. Ann. Mag. Nat. Hist. (6) x., p. 66.

♂. *Head* and thorax above ochraceous; head with margins of front, a lineate spot near anterior angles of vertex, and a broad fascia between eyes, enclosing ocelli, black. *Pronotum* with two central fasciæ rounded and joined posteriorly, a spot on each side, and furrows, black; a black spot on posterior margin at lateral angles. *Mesonotum* with four large obconical spots, the central pair shortest, a central lanceolate fascia, anterior margin of cruciform elevation, a spot on its anterior angles, a small spot in front, and posterior lateral margins, black. *Tegmina* with venation fuscous, costal membrane ochraceous, and with a

large spot blackish on transverse veins at bases of second and third apical areas; wings with venation ochraceous and fuscous. *Abdomen* black, moderately pilose, posterior segmental margins narrowly ochraceous; a spot on each side of last dorsal segment, two large lateral spots (basal and apical), and two central lines to anal appendage, ochraceous. *Body* beneath and legs ochraceous; a broad central fascia to face on each side of sulcation, base and apex of rostrum, sternal spots, longitudinal streaks to femora, anterior tibiæ (excluding bases), bases and apices of middle tibæ, apices of tarsi, a broad central fascia to abdomen, and anal appendage, black. Long. corp. ♀ 20; exp. teg. 62 mm.

Hab.—Australia (Distant).

*Melampsalta interstans, Walk.

1858. *Cicada* id., List Hom. Brit. Mus. Suppl. p. 32.

♀. Tawny, testaceous beneath. Disc of vertex black, face with four broad black stripes. *Pronotum* with two black stripes, which are widened in front to enclose a testaceous stripe, three irregular black streaks on each side; hind border narrow, testaceous, hardly widened on each side. *Mesonotum* with four obconical black stripes, two black spots behind inner pair, which are short. *Tegmina* vitreous, veins tawny, black towards tip. *Abdomen* reddish-tawny, a black band on fore border of each segment, last segment with black dilated and connected stripes. *Legs* with black stripes. Long. corp. 14 mm.; exp. tegm. 40 mm.

Hab.—Adelaide, S.A. (Walker).

*Melampsalta abdominalis, Dist.

1892. Ann. Mag. Nat. Hist. (6) ix., p. 323.

Body above black. *Head* with a central spot to front, apical margins of vertex, a central spot near base, ochraceous. *Pronotum* with a central discal elongated spot, beneath which are two small transverse spots, ochraceous. A spot on each side of cruciform elevation and metanotal margin ochraceous. *Tegmina* and wings pale hyaline, venation blackish; costal membrane and postcostal area of tegmina ochraceous. *Abdomen* with two oblique

reddish-ochraceous macular fasciæ on last three segments, and in female two elongate sulphureous spots at base of anal appendage. Head beneath and sternum black; a spot at base and margins of face, a marginal spot near insertion of antennæ, coxal margins, legs and abdomen beneath, reddish-ochraceous; longitudinal fasciæ to legs, anterior tibiæ, tarsal claws, central basal spots, and a series of marginal spots to abdomen black. Long. corp. 20 mm.; exp. teg. 58-60 mm.

Hab.—Australia (Distant); Uralla and Monaro, N.S.W.; Gisborne, Vic. (Lyell); Adelaide, S.A. (Zietz).

This is a common species about Gisborne, where Lyell collected a number, but rarer in New South Wales. The white stripe or sheen on the sides of the body when the wings are closed is very striking.

*Melampsalta spinosa, sp.nov.

Head pale red, a broad curved band in front of vertex, including area of ocelli, reaching borders in front of eyes, two spots behind ocelli, and front border, black; front pale red, the middle and streaks fuscous; rostrum pale red, reaching middle coxæ; eyes surrounded with black. *Pronotum* short, broad, front angles produced in teeth, the front equal to width of head, and broadened posteriorly; lateral borders dentate at middle, posterior angles prominent; pale red, two middle stripes, furrows, lateral and posterior borders black. *Mesonotum* pale yellow, four obconical stripes, the middle pair shorter, outer pair excavated, lateral borders, a spot in front and one on each side of cruciform elevation with a small spot on its disc, fuscous. *Tegmina* vitreous, long, costa red, darker towards tip, veins strong, dark red. Wings with veins pale red, anal area milky along posterior border. *Abdomen* long, conical, fuscous-red, bases of segments and a central stripe which becomes more intense posteriorly, fuscous, a broad band on each side of last segment, and two stripes on its disc, and an irregular stripe on anal appendage, bright yellow; just before the tip of anal appendage is a long, slender, fuscous spine. *Body* below: chest is blackish marked with fuscous;

abdomen purple, a row of spots on each side, last segment and anal appendage bright yellow; sides of sheath of ovipositor purple. *Legs* black and pale yellow variegated. Long. corp. 42 mm.; lat. 9 mm.; exp. teg. 74 mm.

Hab.—Australia; one female, in the South Australian Museum.

This is one of the largest members of the genus.

[Since writing the above we have examined a male, in the Macleay Museum, which agrees with the description of the female, including the slender spine just before the apex, but is only 23 mm. long.].

*Melampsalta kershawi, sp.nov.

Head reddish-fuscous, base of front pale red, also spot on base of vertex and posterior border; front very convex, produced, fuscous-red, borders pale red, sides of face reddish-fuscous; rostrum with basal half dark red, apical portion tawny, reaching middle coxæ. *Pronotum* width of head, widened posteriorly, front and hind angles prominent; dark red, a central stripe, front and hind borders, and three irregular spots on sides, pale red. *Mesonotum* red, with four obconical stripes, the outer pair longer, lateral borders, a stripe on disc, and a large spot in front of cruciform elevation, black. *Tegmina* vitreous, costa and veins pale red, basal membranes bright red. Wings with veins yellow, basal membranes red, posterior border of anal area broadly milky. *Abdomen* robust, black; anal appendage pale red, a spot on each side of base, and two stripes on disc which unite at apex, black. *Body* below: chest pale red variegated with yellow and black; abdomen black, a row of small spots on each side and last segment bright red, anal appendage fuscous-red. *Legs* red, streaked with darker red. Long. corp. 27 mm.; lat. 8 mm.; exp. teg. 76 mm.

Hab.—Marysville, Vic. (Kershaw); one female, in the National Museum, Melbourne.

This is the largest species of the genus we have seen.

*Melampsalta denisoni, Dist. (Plate xviii., figs. 7-7*a*).

1893. Ann. Soc. Ent. Belg. p. 78.

Head black, a small pale spot at base of vertex; front triangularly produced, very hairy, a row of reddish spots on lateral

borders; rostrum reaching base of posterior coxæ. *Pronotum* width of head, black, rugose; front angles produced. *Mesonotum* black, rugose, a red spot on each side of scutellum. *Tegmina* vitreous, costa and venation black, postcostal marginal space bright red, first and second transverse veins very lightly infuscated in some examples; basal membranes red. Wings with interior and exterior borders and basal membranes red; veins black. *Abdomen* black, apical borders of segments, excepting the first and last, bright red. Below: chest black with scattering red marks; opercula red or pale yellow, black at base, reniform, distant; abdomen red or yellow, base, central stripe, blackish. Legs black, femora and tibiæ marked with red. Long. corp. 24-27 mm.; exp. teg. 62-72 mm.

Hab.—Port Denison, Queensland (Distant); Cooma, N.S.W.; Tooya and Lakes' Entrance, Vic.

Allied to *abdominalis*.

*Melampsalta castanea, sp.nov.

Head castaneous, two black spots enclosing ocelli; front convex, castaneous, middle broken stripe and borders yellowish; rostrum castaneous, reaching hind coxæ. *Pronotum* a little narrower in front than head, broader posteriorly, castaneous, furrows, and two narrow central black stripes between which is a yellow stripe. *Mesonotum* castaneous, with four obconical obsolete black stripes, the middle pair shorter and edged narrowly with yellow; posterior border, cruciform elevation, and scutellum yellow. *Tegmina* vitreous or suffused with brown, venation, with that of wings, castaneous. *Abdomen* equal in length to combined length of head and thorax, dark castaneous, apical borders of segments and anal appendage red, the latter with two lateral spots and two dorsal stripes fuscous. *Body* below: chest castaneous mottled with yellow; opercula very large, disc-shaped and convex on the lower surface with the borders impressed, the inner borders touching, laterally extending beyond sides, posteriorly reaching middle of abdomen, red; abdomen red, base of first and last segments and tip of ovipositor

fuscous. *Legs* castaneous, posterior tibiæ and tarsi yellow. Long. corp. 20 mm.; exp. teg. 48 mm.

Hab.—New South Wales; one male, in the National Museum, Melbourne, and one female, in the South Australian Museum.

*Melampsalta rubristrigata, sp.nov.

Head black, a spot at base of vertex and two spots on front border red; front convex, black, lateral borders red; rostrum black, base red, reaching middle coxæ. *Pronotum* width of head, not narrower in front, front angles prominent, tooth-like, red; front border at sides, a central stripe, red; hind border rather broad, with a transverse band and a spot on the prominent posterior angles black. *Mesonotum* red, with three broad stripes, the outer pair irregular towards apices and reaching sides of cruciform elevation, the median stripe extending from base to front of cruciform elevation, its exterior margins notched at middle. *Tegmina* vitreous, broad; costa, veins, basal membranes, red; posterior border of clavus black. Wings with veins and basal membranes red; anal area milky near base, apex infuscated. *Abdomen* strong, black, apical borders of segments and anal appendage red. *Body* below: chest black streaked with red; opercula medium, reniform, transverse, distant, apical half red; abdomen black, basal segment and all other segments on apical margins broader laterally, and anal appendage, red. *Legs* red, streaked with black. Long. corp. 23-25 mm.; exp. teg. 60-64 mm.

Hab.—Mt. Lofty, S.A.; two males and one female, in the South Australian Museum, Adelaide (collected by Zietz).

The female is similar to the male in the arrangement of the markings; the abdomen is much prolonged, conical, the ovipositor extending far beyond the apex of the abdomen, its tip black.

*Melampsalta atrata, sp.nov.

Wholly black, with the following exceptions: an obsolete narrow middle stripe on pronotum, lateral and posterior borders of mesonotum and front side of tympana red; below black, chest red-lined; opercula broad, short, broadly rounded, black,

the apical border sordid yellow; basal segment of abdomen pale red, disc black, apical borders of succeeding segments pale red; legs marked with red. *Tegmina* short, costal margin black, separated from radial vein, the space between and postcostal marginal space red; the costa broadly rounded; veins red, interior ulnar vein and those surrounding basal area black; basal membranes red. Wings with venation reddish-black; interior vein of anal area broadly reddish-fuscous. Long. corp. 12 mm.; exp. teg. 30 mm.

Hab.—New South Wales; three males, in Coll. G. & F.

*Melampsalta varians, Germ.

1834. *Cicada* id., Silb. Rev. Ent. ii. p. 59.

Head short, transverse, rounded in front, transversely impressed, greyish pale yellow, eyes surrounded with black. *Pronotum* subnarrower than head, posterior angles a little prominent, grey pale yellow, median stripe black-margined and ordinary rugæ surrounded with black. *Mesonotum* grey pale yellow, four abbreviated stripes, the intermediate shorter, black. *Tegmina* vitreous, immaculate, base of veins pale, at apex fuscous; costa yellowish, apex fuscous. Wings concolorous. *Legs* pale, middle tibiæ ciliated, remotely spined. Opercula short, rounded. *Abdomen* grey pale yellow, incisures blackish, last segment with two black stripes above, below pale, median stripe obsolete fuscous. Long. corp. 23 mm.; exp. teg. 68 mm.

Var. Black colour of body largely extended, abdomen above with a black median stripe, sometimes almost wholly black.

Hab.—Australia (Germar).

*Melampsalta landsboroughi, Dist.

1882. P.Z.S.L. p. 131, pl. 7, fig. 14.

♀. *Head* black, a central longitudinal line to front and three basal spots ochraceous. Rostrum about reaches posterior coxæ; the face is broad, deeply and longitudinally sulcated, and transversely strongly striated; the head, including eyes, is considerably narrower than base of pronotum. *Pronotum* dull ochra-

ceous, a central pale fascia bordered with black, a short angulated fascia on disc, and oblique striæ also black, lateral and posterior margins shaded with black. *Mesonotum* black, obscurely marked with ochraceous, basal cruciform elevation pale ochraceous. *Tegmina* and wings pale hyaline; tegmina with costal membrane greenish-ochraceous, veins fuscous. *Abdomen* ochraceous, a broad central black fascia; anal appendage with sides broadly black. *Body* beneath, with head, black, lateral margins of face ochraceous; sternum shaded with black. *Legs* ochraceous, coxæ and femora streaked with black and fuscous; anal appendage black, a large spot on lateral margins and extreme apex luteous. Long. 16 mm.; exp. teg. 45 mm.

Hab.—Sydney (Distant); Shoalhaven, Mittagong, N.S.W.; Melbourne, Vic.

This is the species described in the Agricultural Gazette, 1903, under the name of the "Red-winged Squeaker" (*M. encaustica*). It is one of the commonest species of this genus, and one of the first to appear in the season. It frequents open forest country, clinging to the trunks of the smaller trees, the male producing a short squeaking note.

*Melampsalta fletcheri, sp.nov.

Head black, spot at base of vertex, one on each side on lateral border, and a narrow ring around eyes, pale red; front convex, dark red, a spot at base, and lateral borders, pale red; rostrum dark red, base pale red, reaching middle coxæ. *Pronotum* narrower than head, black, the front, lateral, and hind borders, and a central stripe not reaching base, red; sides parallel; front angles prominent, tooth-like. *Mesonotum* red, with three broad, obconical stripes, the middle one shortest, a large spot in front of and one on each side of cruciform elevation, black. *Tegmina* vitreous, costa and radial vein separated, the intervening space, continued to apex, pale red; veins towards base dark red, black towards apex; basal membrane pale red, interior border of clavus black. Wings with veins dark red near base, black toward apex. Scutellum red. *Abdomen* black, apical borders of segments

red, a row of transverse yellow bands on each side in front of the red; anal appendage tawny. *Body* below: chest black, streaked with red; opercula small, distant, reniform, transverse, apical half tawny; abdomen red, a row of discal spots, last segment, and a spot on each side at base of anal appendage, black, apical borders of segments yellow. *Legs* red streaked with fuscous. Long. corp. 18 mm.; exp. teg. 52 mm.

Hab.—Sydney, N.S.W.; one male, in the National Museum, Melbourne.

This is quite distinct from any examined.

*Melampsalta infuscata, sp.nov.

Head black; convex in front, a pale red spot on base of vertex; front black, a red stripe on each side, sides of face black, the borders pale red, hairy; rostrum dark red, reaching hind coxæ. *Pronotum* narrower than head, sides parallel, black, front and hind borders, and an obsolete median stripe, pale red; front angles produced. *Mesonotum* black, two median stripes broadened at middle, lateral borders, and disc of cruciform elevation, pale red. Scutellum pale red, a black spot on each side and one at middle. *Tegmina* vitreous, the two ulnar veins distinct but contiguous and for a distance parallel; veins sordid red. Wings with veins reddish, base and apex of anal area infuscated. *Abdomen* black, apical borders of segments pale red, tip of anal appendage yellow. *Body* below: chest fuscous streaked with pale red; opercula pale, basal half fuscous, small, short, distant; abdomen light fuscous, hind borders of segments pale red, apex pale. *Legs* reddish-fuscous. Long. corp. 10 mm.; exp. teg. 44 mm.

Hab.—South Australia; several examples in the Macleay Museum.

This is the only species of the genus seen with apex of anal areas of wings infuscated.

*Melampsalta flava, sp.nov.

Yellow, two stripes on disc of mesonotum, two dots following them, a short narrow stripe on each side of these dots, base and

tip of abdomen, and ovipositor, fuscous. Long. corp. 20 mm.; exp. teg. 42 mm.

Hab.—Australia; one female, in the South Australian Museum, Adelaide.

We have seen but one mutilated specimen.

*Melampsalta oldfieldi, Dist.

1883. Proc. Zool. Soc. p. 191.

♂. Head, pronotum, and mesonotum greenish ochraceous, a central longitudinal castaneous fascia extends from base of head to apex of abdomen. *Head* with four large black spots on vertex, two at area of ocelli, and two in front of eyes. Rostrum just passes middle coxæ, apex castaneous; face laterally compressed, concave on each side, central sulcation deep. *Mesonotum* with pale ochraceous margins to the central castaneous fascia; central base of abdominal margins blackish. *Body* beneath pale greenish ochraceous; face castaneous, disc black. *Tegmina* and wings pale hyaline; tegmina with costal membrane and basal venation greenish, remaining venation pale fuscous; claval area and that between postcostal vein and postcostal ulnar ramus ochraceous. Wings with base and claval area ochraceous, veins greenish, becoming fuscous towards outer margin. Anal sheaths enclosing ovipositor fuscous, and projecting beyond apex of abdomen; ovipositor dark castaneous; last abdominal segment triangularly excavated. Long. corp. 21 mm.; exp. teg. 55 mm.

Hab.—New Holland (Distant); Gympie; Taylor's Range, Brisbane, Q.

The broad central castaneous fascia on the upper side of the body of this species renders it very distinct from all other Australian species.

*Melampsalta telxiope, Walk.

1850. *Cicada* id., List Hom. Brit. Mus. p. 194.
Cicada duplex, Walk., id. p. 194.
Cicada arche, Walk., id. p. 195.

Head width of pronotum, pale red or tawny; vertex with a black band crossing ocelli with a branch on each side towards

hind border; front convex, rather prominent, with two black stripes; rostrum tawny, tip black, reaching middle coxæ. *Pronotum* not narrower in front, posterior angles prominent; pale tawny tinged with green, or pale red. *Mesonotum* pale tawny, with or without pale ferruginous discal stripes, a black spot on each side of apex. *Tegmina* vitreous, costa and veins ferruginous or tawny. *Legs* yellow, femora streaked with black. Long. corp. 16 mm.; exp. teg. 35 mm.

Hab.—New Holland (Walker).

*Melampsalta binotata, sp.nov.

Head black, a spot at middle of vertex, three spots on front border, yellow; front black, lateral borders yellowish; rostrum fuscous, reaching middle hips. *Pronotum* black, a little narrower than head; front angles prominent; middle stripe, front and lateral borders, and posterior edge, yellow. *Mesonotum* black, two large spots on disc, lateral borders, and cruciform elevation, yellow. *Tegmina* vitreous, costa pale red narrowly margined with dark red, veins of basal half pale red, those of apical portion dark red; first two anastomoses and most of first apical area infuscated. Wings with venation reddish-yellow, inner border of anal area milky. *Abdomen* black, covered with short golden hairs. *Body* below yellow; base, a middle row of large spots, black; ovipositor ferruginous. Long. corp. 16 mm.; exp. teg. 46 mm.

Hab.—Ardrossan, Yorke Peninsula, S.A.; one example (Tepper), and several collected by Masters (Coll. G. & F.)

Allied to *M. angusta.*

*Melampsalta angusta, Walk.

1850. *Cicada* id., List Hom. Brit. Mus. p. 174.
Cicada rosea, Walk., ibid. p. 220.
1858. *Cicada bilinea*, Walk., ibid. Suppl. p. 34.
1862. *Melampsalta rosea*, Stål, O. V. Ak. F. p. 484.
1890. *Cicada muta*, Hudson, Tr. N. Z. Inst. p. 51 (in part).

♂. Body tawny, very hairy. *Head* small, a little narrower than pronotum; discs of vertex and front black; rostrum tawny, tip black, reaching middle coxæ. *Pronotum* with three yellow stripes, the lateral pair irregular and oblique. *Mesonotum* with two very large black obconical marks, and between each of these and the side is an oblique black stripe. *Tegmina* vitreous, veins pale tawny, darker along costa, marked with black at base and tips. *Abdomen* obconical, much longer than chest, black above, tip and hind borders of segments tawny; a stripe of pale hairs extends along back. *Body* below with a broad short piceous stripe in disc. Opercula pale, moderate in size, almost meeting, one-third length of abdomen. *Legs* pale tawny, femora streaked with black.

♀. Pale greenish-testaceous. *Head* and thorax somewhat pubescent; head with a few black marks on vertex. *Pronotum* broader than head, with a paler stripe which is sometimes bordered with brown; four lateral brown streaks, occasionally obsolete; border rounded in front, dilated hindward on each side. *Mesonotum* with four tawny stripe which are more or less marked with black. *Tegmina* vitreous, veins pale testaceous. *Abdomen* with a stripe of whitish silky tomentum bordered with black on each side towards base. Long. corp. 16 mm.; exp. teg. 50 mm.

Hab.—New Zealand (Walker); Adelaide and Victoria.

*Melampsalta rubricincta, sp.nov.

Head black, sides of front border, spot on each side near eye, spot on middle of vertex, and posterior part of base of front, sordid pale red; front convex, prominent, a basal spot and lateral borders pale red; rostrum dark red, base yellow, tip passing hind coxæ. *Pronotum* black, width of head, three irregular spots on each side sordid red; two spots on front border and posterior edge of hind border sordid yellow; front angles prominent, hind angles flattened out; lateral borders with a tooth at middle. *Mesonotum* black, an obsolete stripe on each side of disc, lateral and posterior borders and front rami of cruciform elevation sordid

pale red. *Tegmina* vitreous, costa fuscous-red and angulate at middle; veins dark red, basal membrane reddish. Wings with veins red, anal area fuscous-red. *Abdomen* black, a narrow band at base of tympana, which are very broad and approaching to each other; apical margins of segments, excepting the first and last, red; the third segment entirely orange-red with a black dot on middle; anal appendage sordid yellow. *Body* below black; chest mottled with pale red; opercula medium, reniform, separated, apex broadly rounded, apical half sordid pale red; abdomen with apical border of first and all of the following three segments orange-red, a row of oblique black lines on each side near lateral borders; apex of last segment and anal appendage sordid yellow. *Legs* black, all marked with pale red; hind tibiæ wholly yellow. Long. corp. 21 mm.; exp. teg. 50 mm.

Hab.—West Australia; one example, in National Museum, Melbourne.

The orange-red band across the middle of the abdomen will distinguish this species from all others.

Melampsalta quadricincta, Walk.

1851. *Cicada* id., List Hom. Brit. Mus. p. 191.

Body black; head nearly breadth of pronotum; a tawny spot on each side of front, and on hind border, convex, not prominent; rostrum black, reaching middle coxæ. *Pronotum* with two tawny spots, one near each side, ferruginous on hind borders. *Mesonotum* with two oblique ferruginous stripes on each side, hind border lightly excavated. *Tegmina* vitreous, costa ferruginous for nearly two-thirds its length, then black for a short space; veins ferruginous, black towards tips. *Abdomen* piceous, obconical, not longer than thorax, hind borders with ferruginous and green bands, a tawny stripe on each side below; opercula rather large, almost white, longer than one-third of abdomen, separated by a narrow space. *Legs* tawny, black-striped, tarsi and front tibiæ black. Long. corp. 14 mm.; exp. teg. 37 mm.

Hab.—New Holland (Walker).

*Melampsalta marginata, Leach.

1814. *Tettigonia* id., Zool. Misc. i. p. 89, pl. 39, fig. 1.

Head pale red, a broad band across vertex and base of front black; front convex, pale red with a broad central stripe and sides of face blackish. *Pronotum* pale red, a little narrower than head; front angles prominent, middle of lateral borders armed with a tooth, two central stripes, a spot on each side, furrows, and front edge of posterior border, black. *Mesonotum* black, lateral and posterior borders, two large spots on disc, and sides of cruciform elevation, pale red (the black surface varying in different individuals). *Tegmina* vitreous, costa pale red, veins black, basal membranes red. Wings with venation blackish, basal membranes and anal area reddish. *Abdomen* black, apical borders of segments and anal appendage red, the latter with a broad stripe on each side united near apex. *Body* below: chest reddish streaked with paler; opercula medium, pale red, broadly rounded, almost contiguous; abdomen pale red, with a central black stripe. *Legs* blackish streaked with red. Long. corp. 15-20 mm.; exp. teg. 45-53 mm.

Hab.—New Holland (Leach); Tasmania (Walker); South Australia and Northern Territory, S.A. (collected by Mr. J. G. Tepper).

The description given by Leach is too brief to identify this species, but his illustration is of considerable aid. The examples we have in hand are identical with the representation given in Zoological Miscellany, and are of a robust build.

Melampsalta labyrinthica, Walk.

1851. *Dundubia* id., List Hom. Brit. Mus. p. 75.

♂. Body tawny; head of medium size, a little narrower than pronotum, with a broad, irregular, lightly curved, black band which includes two tawny spots, with two branches to hind border; front prominent, very convex, pale green, with two broad black stripes; rostrum tawny, tip black, reaching middle coxæ; antennæ black. *Pronotum* with a black dot at middle

and on each side of hind border, furrows blackish, with a stout tooth on middle of each side. *Mesonotum* with four obconical black stripes, middle pair shorter, followed with two large black spots. *Tegmina* vitreous, green along fore border, veins green, black at tips and hind border. *Abdomen* obconical, much longer than thorax, above with three rows of black marks, last segment with two short black stripes, a short black stripe below; oviduct black. *Legs* tawny, marked with black. Long. corp. 17 mm.; exp. teg. 47 mm.

Hab.—New Holland (Walker).

*Melampsalta nebulosa, sp.nov.

Head black, convex, with a narrow central pale stripe; front black, borders yellow. *Pronotum* narrower than head, black with a narrow central stripe; front angles produced; lateral and posterior borders pale infuscated. *Mesonotum* black, lateral borders and cruciform elevation yellow. *Tegmina* tinged with brown, costa pale red, fuscous towards apex; venation black. Wings with venation black. *Abdomen* black, apical borders of segments broadly pale red; anal segment pale red, a broad angular stripe on each side. *Body* below: chest black, red-lined; abdomen pale red with a darker line on each side, base and apex black. *Legs* ferruginous, streaked with black. Long. corp. 13 mm.; exp. teg. 34 mm.

Hab.—Queensland (Tryon); Windsor, N.S.W.

This pretty little species may be readily recognised by the suffused tegmina and wings.

*Melampsalta spreta, sp.nov.

Head black, a pale red spot at base of vertex; front very convex and produced at middle, black, lateral borders narrowly red near base; sides of face black, hairy; rostrum fuscous, red at base, tip reaching middle coxæ. *Pronotum* broader in front than head, lateral borders sinuous; black posterior border narrowly and obsoletely reddish; covered with golden hairs. *Mesonotum* black, lateral edges pale red, cruciform elevation with patches of yellow

hairs. Scutellum black, the posterior edge pale red on each side of middle. *Tegmina* vitreous, broad, rather short, the two ulnar veins joined at base; costa pale red, front edge of apical half fuscous; basal membranes red; veins pale red, terminal portion of longitudinal veins, posterior border of clavus, and lateral borders of basal area, fuscous, the two exterior anastomoses and borders of first apical area infuscated. Wings with veins pale red, the marginal veins fuscous; basal membranes red. *Abdomen* black, hind borders of segments bright orange-red which is almost obsolete narrowly along the middle, the red on the basal segment limited to a narrow short stripe on each side, last segment broadly red; anal appendage black above, the sides pale red. *Body* below: chest black streaked with red; opercula small, distant, oval, sordid tawny with base fuscous, hairy around edges; abdomen pale red, a transverse fuscous band on basal segment which is obsolete on the others, and a row of lateral black spots on each side. *Legs* black, streaked with red. Long. corp. 18 mm.; exp. teg. 52 mm.

Hab.—Tasmania; one male in the National Museum, Melbourne, identified by Walker as *C. basiflamma*.

*Melampsalta fulva, sp.nov.

Entirely fulvous, with the following exceptions: two dots on each side of vertex, a central stripe and lateral and posterior borders of pronotum, sordid yellow; costa greenish-yellow at base, thereafter reddish, veins and basal membranes pale red; veins of wings pale red. Long. corp. 22 mm.; exp. teg. 70 mm.

Hab.—New South Wales; one female, in the National Museum, Melbourne.

Melampsalta æde, Walk.

1851. *Cicada* id., List Hom. Brit. Mus. p. 181.

♀. Body black; head a little narrower than pronotum; front very convex, a dark red spot on each side, an interrupted tawny stripe on vertex corresponding to a short tawny stripe on pronotum; rostrum and antennæ black. Hind part of *pronotum* wrinkled. *Mesonotum* with a large tawny spot on each side of

the cruciform elevation. *Tegmina* vitreous, costa black, brown beyond middle which is whitish; veins black, tawny at base. *Abdomen* obconical, much longer than thorax, with a narrow red band; under side and tip red, the latter with two black stripes; oviduct dark red. *Legs* black, knees and tip of tibiæ tawny; fore femora striped with tawny; hind tibiæ tawny, tips black; hind tarsi tawny. Long. corp. 18 mm.; exp. teg. 50 mm.

Hab.—Adelaide, S.A. (Walker).

Closely allied to *M. melete*, in structure of chest, but narrower.

MELAMPSALTA MELETE, Walk.

1851. *Cicada* id., List Hom. Brit. Mus. p. 179.

Body black, rather narrow. *Head* nearly width of pronotum, three red spots along hind border, a red band, a red stripe branching from it to middle ocellus, and three red stripes on the front; front convex, not prominent; rostrum piceous, reaching middle coxæ. *Pronotum* a little narrower in front, bordered with red, the intervening spaces marked with red, near hind angles much excavated on each side. *Mesonotum* red on each side and behind, two slender red stripes which join the cruciform elevation, that also mostly red. *Tegmina* vitreous, veins black, ferruginous towards base, brown towards tips. *Abdomen* obconical, a little longer than thorax, a red band much narrower above than below where it has a row of black dots on each side, and a more slight row in the middle; tip red. Opercula black, small, broadly separated. *Legs* red, coxæ and femora black, tips red, front ones streaked with red, fore tibiæ and tarsi and middle tarsi black; middle tibiæ black, base red, a black spot at base of each hind tibia. Long. corp. 18 mm.; exp. teg. 50 mm.

♀. *Abdomen* red beneath, a row of black spots on each side; last segment black, a large red spot on each side; oviduct ferruginous.

Hab.—New Holland; Swan River (Walker).

*MELAMPSALTA ABBREVIATA, Walk.

1862. *Cicada* id., Journ. Ent. p. 303.

Black, short, stout; pronotum with a slender yellow hind border. *Pronotum* with a yellow stripe on each side. Opercula

yellow. *Tegmina* vitreous, rather short; veins black, pale yellowish at base. *Abdomen* testaceous, along each side and beneath; hind borders of segments testaceous. *Legs* yellow, striped with black; fore legs black, striped with yellow. Long. corp. 11 mm.; exp. teg. 29 mm.

Hab.—Adelaide (Walker).

MELAMPSALTA LATOREA, Walk.

1851. *Cicada* id., List Hom. Brit. Mus. p. 183.

♂. Body black; head a little narrower than pronotum; vertex with an interrupted tawny stripe, a tawny spot on each side; front lightly convex, with an irregular tawny band behind a small tawny spot and sides of that colour; rostrum dark red, tip black, reaching middle coxæ; antennæ black. *Pronotum* a little narrower in front, tawny along fore border, with six oblique tawny stripes excavated on each side. *Mesonotum* tawny, with four broad, black, obconical stripes, the inner pair much shorter, united towards base, furrows mostly black along hind border. *Tegmina* vitreous, costa dark tawny, piceous beyond middle; veins ferruginous, black towards tips. *Abdomen* obconical, a little longer than thorax, hind borders of segments mostly red; below are two yellow stripes tapering from base, not extending beyond half the length; opercula yellow, medium size, not far apart, more than one-third length of abdomen. *Legs* long, striped with tawny. Long. corp. 15 mm.; exp. teg. 40 mm.

Hab.—New Holland (Walker).

*MELAMPSALTA INCEPTA, Walk.

1851. *Cicada* id., List Hom. Brit. Mus. p. 187.

Body black, slender. *Head* little broader than pronotum, some pale red marks; front prominent, mostly red; rostrum pale red, tip black, reaching middle coxæ and beyond. *Pronotum* marked with pale red. *Mesonotum* marked with pale red, cruciform elevation pale red. *Tegmina* vitreous, long and narrow; costa pale red as far as middle which is pale brown. *Abdomen* oblanceolate, longer than thorax, red below except tip, with more or

less red bands which are partly interrupted on the back. *Legs* red, striped with black. Long. corp. 13-15 mm.; exp. teg. 40-45 mm.

Hab.—Adelaide, S.A. (Walker).

*Melampsalta rubea, sp.nov.

Entirely ruby-red, with the exceptions noted; a black spot at base and on each side of front; a large spot on each side of pronotum; apical margins of abdominal segments narrowly yellow; front angles of pronotum prominent; opercula small, short, broad.

In the female the furrows of the pronotum only are fuscous. It is a little larger than the male. Long. corp. 15-17 mm.; exp. teg. 40-42 mm.

Hab.—Brisbane. Q.; N. W. Australia.

There is one pair in our collection from Mr. Tryon. It is a very pretty species, the bright ruby-red colour of the body and veins at once attracting attention. In the Macleay Museum are a large number of this species, from North-west Australia, which, however, are considerably paler than the type.

Melampsalta forresti, Dist.

1882. P Z.S.L. p. 129, pl. 7, fig. 10.

♂. Body above ochraceous. Head with a transverse black fascia between the eyes; rostrum just passes middle coxæ; face longitudinally sulcated, and strongly transversely striate. *Pronotum* with frontal portion of interior edge of lateral margins narrowly, anterior edge of posterior margin broadly, black; two small obscure fuscous spots on anterior margin. *Mesonotum* with the following fuscous markings:—Two central obconical spots, two near lateral margins, one commencing near outer edge of anterior margin; the other joins anterior angles of basal elevation; angles bordered outwardly by an angulated spot, inwardly by a small rounded spot with a central longitudinal line. *Tegmina* and wings pale hyaline, venation ochraceous, becoming darker towards apex. *Abdomen* with a series of pale fuscous transverse

segmental fasciæ. *Body* beneath and legs pale ochraceous. Body above sparingly pilose, apex black. Long. corp. 15 mm.; exp. teg. 41 mm.

Hab.—Peak Downs, Queensland (Distant).

*Melampsalta mackinlayi, Dist.

1882. Proc. Zool. Soc. Lond. p. 130, pl. 7, fig. 13.

Head mostly black above; face yellow, front mostly black. *Pronotum* yellow, two central stripes and furrows black, hind border infuscated; width of head. *Mesonotum* yellow, with four obconical stripes, middle pair much shorter; black; with two black dots behind; width equal to that of head. *Tegmina* vitreous, costa pale yellow exteriorly, edged with black; venation with that of wings, pale yellow. *Abdomen* black, apical borders of segments yellow, interrupted in middle. Below, yellow, a black central stripe on abdomen. Long. 15 mm.; exp. teg. 38 mm.

Hab.—Peak Downs (Distant); Townsville, Queensland.

Closely allied to *M. varians*, Germ., but smaller; head broader, including eyes equal in width to base of pronotum; rostrum just passing intermediate coxæ; opercula small and pale ochraceous; tegmina much shorter, with the costa more rounded.

*Melampsalta graminis, sp.nov.

Head yellow, with a broad black stripe between eyes; front convex, prominent, with a broad fuscous stripe; rostrum reaching middle coxæ. *Pronotum* narrower in front than head, sides parallel, hind angles a little prominent; yellow, obsoletely marked with fuscous. *Mesonotum* yellow, with four irregular obconical stripes, middle pair shorter and followed by two dots and a spot in front of cruciform elevation; scutellum yellow. *Tegmina* short, broad, veins yellow, as are those of wings. *Abdomen* yellow, irregularly clouded with fuscous, a row of lateral spots and base of anal appendage the same colour. *Body* below yellow; opercula short, broad, pale yellow, a little distant, apices broadly rounded. *Legs* yellow, lightly marked with fuscous; abdomen

pale yellow, with a fuscous spot on base. Long. corp. 13 mm.; exp. teg. 30 mm.

Hab.—South Australia; several examples, of both sexes, in the Macleay Museum.

*Melampsalta tristrigata, sp.nov.

Head sordid red, convex, with several small spots on vertex; front sordid red, with a broad dark central stripe, and a basal yellow spot. *Pronotum* subequal to breadth of head, front angles prominent; sordid red, two broken central stripes, two lateral stripes, stripes along the furrows, and hind angles, fuscous. *Mesonotum* pale red, with four obconical black stripes, the inner pair shorter, behind which are two dots, outer pair excavated. *Tegmina* vitreous, costa red, venation black, basal membranes red. Wings with venation black. *Abdomen* stout, pale red, a central stripe, and a row of lateral dots, base of last segment, and a stripe on each side of anal segment, black. *Body* below: chest red and black variegated; abdomen pale red, a band on base and a large spot on anal appendage black; opercula short, narrow, apical border rounded, pale red with base black. *Legs* pale red streaked with black. Long. corp. 16 mm.; exp. teg. 44 mm.

Hab.—Kuranda, Q. (collected by Dodd); Sydney, N.S.W.; five examples (Coll. G. & F.).

Allied to *M. landsboroughi*, but with different facies.

Melampsalta warburtoni, Dist.

1882. P.Z.S.L. p. 129, pl. 7, fig. 9.

Head with vertex black, front ochraceous, with a black central longitudinal line. *Pronotum* ochraceous, a central longitudinal fascia, lateral and posterior margins dark castaneous. *Mesonotum* dark castaneous, with two pale irregular fasciæ on disc, commencing on anterior margin and terminating at anterior angles of cruciform elevation; anterior lateral margins narrowly ochraceous. *Tegmina* and wings pale hyaline, with the venation

ochraceous. *Abdomen* ochraceous. *Body* beneath and legs ochraceous.

The body is sparingly pilose above; rostrum just passes the middle coxæ; the face is deeply sulcated longitudinally, and strongly transversely striate. Long. 15 mm.; exp. teg. 38 mm.

Hab.—Peak Downs, Queensland (Distant).

Melampsalta convicta, Dist.

1892. Ann. Mag. Nat. Hist. (6) ix. p. 322.

Body above brownish-ochraceous. *Head* with frontal margins and area of ocelli black. *Pronotum* with three small obscure black spots near anterior margin, incisures somewhat darker. *Mesonotum* with four obconical black spots, the outermost two long, two rounded spots in front of anterior angles of cruciform elevation, black. *Tegmina* and wings pale hyaline, venation ochraceous; tegmina with postcostal space infuscated. *Abdomen* with transverse fasciæ at anterior segmental margins and a series of lateral marginal spots, black. *Body* beneath brownish-ochraceous; the disc of lateral striations to face, apex of rostrum, and a basal spot to abdomen black; femora pale castaneous. Long. corp. 19 mm.; exp. teg. 56 mm.

Hab.—Norfolk Island (Distant).

*Melampsalta eyrei, Dist.

1882. P.Z.S.L. p. 130, pl. 7, fig. 12.

♂. *Head* black, anterior and lateral margins testaceous, a small central basal ochraceous spot; rostrum just passing middle coxæ; face broad but compressed, broadly and longitudinally sulcated and distinctly transversely striate. *Pronotum* ochraceous, with two large rectangular oblique black spots, commencing on inner edge of lateral margins, and divided on disc by a central longitudinal fascia, widened anteriorly and posteriorly, and marked at base by a small spot. *Mesonotum* with two central obconical spots, and two larger ones near lateral margins, black. *Tegmina* and wings pale hyaline; venation ochraceous, becoming darker towards apex. *Abdomen* with the disc tinged with reddish,

posterior segmental margins bright ochraceous, apical segments irregularly marked with black. *Body* beneath ochraceous; face black, the anterior margins testaceous, the lateral margins ochraceous; inner margin of eyes to base of rostrum, a few scattered and irregular spots on sternum, apex of rostrum, and apical segments of abdomen black. Long. corp. 16 mm.; exp. teg. 44 mm.

Hab.—Peak Downs, Queensland (Distant); Rockhampton (Macleay Mus.); Herberton, Q. (Brisbane Museum); Townsville.

MELAMPSALTA OXLEYI, Dist.

1882. P.Z.S.L. p. 131.

♀. Body above ochraceous. *Head* with frontal margin, lateral margins of vertex, inner margins of eyes, and area of ocelli dark castaneous. The head is broad, and with outer margins of eyes about equals in width base of pronotum; the face is moderately convex, with a deep longitudinal sulcation and strong transverse striations; rostrum reaching the middle coxæ; body sparingly pilose above and more densely so beneath. *Pronotum* with a pale central longitudinal fascia, bordered with black, widest anteriorly and narrowed posteriorly; lateral and posterior margins much paler, inner border of first, and outer third of inner border of the second, narrowly fuscous. *Mesonotum* with two short central obconical spots and two large sublateral and subtriangular spots dark fuscous, and a rounded small fuscous spot at each anterior angle of cruciform elevation. *Tegmina* and wings pale hyaline; tegmina with the venation pale ochraceous, transverse veins at bases of second and third apical areas broadly and darkly infuscated; upper margin of first apical area, outer margin of first to seventh apical areas, the whole of the sixth and greater part of the fifth and seventh areas, and apical external margin dark fuscous. *Abdomen* with segmental bases broadly fuscous, a large fuscous streak on each side of anal appendage. *Body* beneath pale ochraceous; face, rostrum and two small spots at base of ovipositor more or less fuscous. Long. corp. 18 mm.; exp. teg. 48 mm.

Hab.—Peak Downs, Queensland (Distant).

Genus KANAKIA, Dist.

1892. Ann. Mag. Nat. Hist. (6) x. p. 62.

Head convexly produced in front, about equal in length to space between eyes, including outer margins of eyes about equal in width to base of mesonotum; eyes large, obliquely directed backwardly; ocelli about equally distant from eyes as from each other; a distinct broad central sulcation from between ocelli to base. *Pronotum* more than twice as broad as long, lateral margins prominently and somewhat acutely angulated, lateral posterior angles moderately ampliated. *Mesonotum* large, cruciform elevation well developed, tympana totally exposed and uncovered. *Tegmina* hyaline, eight apical areas; interior ulnar area with anterior margin convex, base and apex subequally broad; ulnar veins distant; basal area twice as long as broad. Wings hyaline, with six apical areas. *Abdomen* in male moderately inflated, beneath grooved before lateral margins; opercula small; anterior femora armed with four spines, basal and median longest and very prominent, other two small, near apex, apical one minute. Face long, somewhat depressed.

Type, *K. typica*, Distant.

*KANAKIA CONGRUA, sp.nov. (Plate xviii., figs. 6, 6*a*, 6*b*).

Head, pronotum, and mesonotum pale green; eyes surrounded with yellow; borders of pronotum with a central stripe pale yellow; mesonotum indistinctly striped with yellow. *Tegmina* with venation red, darker towards apex. Wings with venation red. *Abdomen* moderately inflated in the male; in the female it is obconical, in both sexes longer than the combined length of head and thorax, the sexual organs at the end, not below; yellow, a median stripe and mottled with green; in some lights the apical borders of the segments yellow. *Body* below: chest is green clouded with pale red; opercula triangular, distant, reaching almost to posterior border of metasternum, pale reddish, mixed with green; abdomen red, apical borders of segments bright red. Long. corp. 20 mm.; exp. teg. 52 mm.

Hab.—Kuranda and Brisbane, Q.; one male and two females (collected by Tryon and Dodd). One of the female examples is red.

This may be identical with Walker's *Cicada congrua*, described in the Journal of Entomology (i. p. 303) in 1862 from Moreton Bay, as one of these examples was collected by Mr. Tryon near Brisbane. As no reference has been made to Walker's species in entomological literature since his description was published, its modern generic position is doubtful, and to avoid a possible synonym, the above name is proposed. Mr. Distant has informed us that Walker's type is not in the Pascoe Collection. Doubtless it is lost.

Walker's description is as follows:—"Female. Grass-green. Head short, conical along the fore border; front very convex. Abdomen yellowish-white on each side of the oviduct, which is ferruginous. Tarsi, fore tibiæ, except the base, and tips of posterior tibiæ pale tawny; fore femora incrassated with stout oblique spines. Tegmina vitreous; veins black; tegmina very long; costa white, bordered with black. Length of body 8 lines; of wings 24 lines. Moreton Bay, Queensland. This species has most affinity to *C. infans* of New Zealand."

Genus GLAUCOPSALTRIA, gen.nov.

Vertex a little more than equal to combined width of eyes, a median and two lateral furrows, ocelli distant from base, equidistant from each other and eyes; front strongly arched forward, with a very shallow median sulcus, apex of clypeus acuminate. *Pronotum* broad, short, front border close to eyes, sides parallel to middle, then widely dilated into prominent posterior angles posteriorly truncated; narrower in front than head. *Mesonotum* convex. *Tegmina* broad, vitreous tinged with green and extend half their length beyond apex of abdomen; front border lightly convex, basal area more than twice longer than broad, sides parallel, emitting two ulnar veins a little distant at base; interior ulnar area slightly narrower at apex, widest at middle, exterior ulnar area very broad at apex; costa and radial veins contiguous;

postcostal marginal space distinctly broadened towards apex; clavus narrow; ten or eleven discoidal areas; fourteen or fifteen apical areas. Wings with six apical areas. *Abdomen* obconical, equal in length to head and thorax; last segment of female below deeply emarginate. *Legs* normal, front femora spined below.

Type *G. viridis*, sp.nov.

This genus is closely allied to *Chlorocysta*, but differs in the much broader exterior ulnar area, the less acutely produced front of head, and six apical areas in the wings. Like that genus, there is a diamond-shaped vitreous area in the front margin of the wing, at the origin of the first transverse vein. We have not seen the male.

*Glaucopsaltria viridis, sp.nov.

Head, pronotum, abdomen, and venation of tegmina and wings, and legs, green. Front greenish-yellow, rostrum yellow, reaching middle coxæ. Lateral borders of mesonotum bordered with white silky pubescence which unite on cruciform elevation and extends for some distance on the abdomen. Long. corp. 20 mm.; lat. 8 mm.; exp. teg. 68 mm.

Hab.—Tambourine Mountain, Q. (French); two females (Coll. G. & F.)

Genus Chlorocysta, Westw.

1851. Ann. Mag. Nat. Hist. p. 208.

Head a little broader than apex of pronotum; front very convex, prominent, with a longitudinal sulcus; vertex equal in width to diameter of both eyes, ocelli distant from base, equidistant from each other and eyes. *Pronotum* convex, front angles directed below eyes; posterior border very narrow; hind angles a little prominent, lateral borders dentate in front of middle. *Tegmina* vitreous, basal area narrow, more than twice as long as broad; costa and radial vein contiguous; postcostal marginal space broadened towards apex; interior ulnar area with side parallel, apex acuminate; ulnar veins little distant at base; eleven to thirteen long apical areas. *Wings* vitreous, with five

apical areas. *Abdomen* inflated in the male; genital organs near apex. Opercula short, narrow, widely separated. Last ventral segment of female deeply emarginate at middle.

Type *C. vitripennis*, Westw.

Synopsis of Species.

1 (2). Pronotum narrowed from base to apex; ocelli equidistant from each other and eyes; apex of anal area of wings infuscated..... *vitripennis.*

2 (1). Pronotum with lateral borders parallel; ocelli nearer to each other than to eyes; apex of anal area of wings not infuscated..... *macrula.*

*Chlorocysta vitripennis, Westw. (Plate xix., fig. 6).

1851. Ann. Mag. Nat. Hist. p. 208.

1903. *Cystosoma* id., Frogg., Agr. Gaz. N.S.W. p. 422; and Misc. Pub. No. 643, p. 12.

Head equal in width to front of pronotum, front border strongly arched forward; sordid greenish, front border and marks on each side pale ferruginous; ocelli equidistant from each other and eyes; front convex, with a longitudinal pale ferruginous stripe which broadens towards apex; rostrum tawny, tip black, reaching apices of posterior coxæ. *Pronotum* broader at base than in front, lateral borders dentate in front of middle, posterior angles somewhat broadened, prominent; sordid greenish, the furrows and irregular spots ferruginous, hind border narrow. *Mesonotum* sordid greenish, with four obconical ferruginous stripes, the outer pair longer and reaching hind border, very much excavated; a ferruginous spot in front of cruciform elevation, the anterior branches of that elevation with a yellow spot. *Tegmina* vitreous, costa pale greenish, venation pale ferruginous; ulnar veins distant; ulnar area with sides parallel, apex acuminate. Wings vitreous, venation dark brown, anal area with apex and streaks near base infuscated. *Abdomen* inflated in the male; pale greenish-ferruginous, apical borders of segments darker, a row of ferruginous spots on each side, with golden hairs. *Body* below sordid green, apical borders of abdominal segments darker; mesosternum elevated.

Opercula short, narrow, angulate, pale green, distant from each other. Tympana much exposed, easily seen above and below. *Legs* green, front femora, tibiæ and tarsi with black streak. Long. corp. ♂ 27 mm., ♀ 20 mm.; exp. teg. ♂ 70 mm., ♀ 64 mm.

Hab.—New Holland (Westwood); Kuranda, Q.; Tweed River, N.S.W.

The female is considerably smaller than the male, greenish or reddish, the abdomen is conical, well developed, but not inflated.

These insects frequent the low scrub, and are easily captured by shaking the bushes. The specimens from the Tweed are all green or yellowish, while those from North Queensland are quite brownish. We have never heard the male make any sound.

*Chlorocysta macrula, Stäl.

1863. Trans. Ent. Soc. Lond. p. 575.

Pale green. Vertex a little more than double broader than diameter of both eyes; ocelli nearer to each other than to eyes. *Pronotum* with lateral margins broadened behind middle, equal in breadth, in front, to head; hind border narrow, broadened at each lateral angle. *Tegmina* vitreous, venation green, costa yellow or red; ulnar veins very near at base; ulnar area lightly narrowed from base to apex, broadest at base, apex acuminate; eleven long narrow apical areas. Wings vitreous, anal area not infuscated; five apical areas, and a small, vitreous, oval area in the margin at the base of the first transverse vein. *Abdomen* of the male lightly inflated, with a pale line running along the dorsum. Opercula rather broad, short, triangular, pale green, posterior border pale yellow. *Legs* green, tarsi sordid yellow. Long. corp. ♂ 21 mm., ♀ 17 mm.; exp. teg. ♂ 44-50 mm., ♀ 48-56 mm.

Hab.—Moreton Bay (Stäl); Tweed River, N.S.W.

The abdomen of the female is equal in length to that of the head and thorax, conical, with a yellow spot on the dorsum, last ventral segment with apical margin deeply emarginate at middle; the ovipositor ferruginous.

We have taken a number of specimens of this species on low shrubs on the Tweed and Richmond Rivers, N.S.W. They are sluggish insects, easily captured in the day-time.

Genus CYSTOPSALTRIA, gen.nov.

Head width of pronotum in front, small, long as broad, strongly produced forward to an acute point; front border emarginate on each side; front very prominent, laterally compressed, with a very lightly impressed longitudinal sulcus; eyes small, directed obliquely backward encroaching on front border of pronotum; ocelli distant from base, equidistant from each other and eyes. *Pronotum* convex, much broader at base than apex; anterior border notched to receive eyes; lateral borders neither sinuate nor dentate, widely diverging backward; posterior border not broad, posterior angles somewhat produced. *Mesonotum* small, wrinkled on each side. *Tegmina* opaque, convex exteriorly when closed, and a little longer than abdomen; basal area more than double longer than broad, emitting three ulnar veins, two from apex which are contiguous, and one from posterior border a little in front of middle; interior and middle ulnar areas similar in size and shape, parallel, broadest toward apices; exterior ulnar area acuminate at base and apex, parallel with radial area; costa and radial vein contiguous; postcostal marginal space obsolete; venation of apical two-thirds very irregular, forming innumerable areas. Wings vitreous, with nine apical areas which are multiplied by transverse veins. *Abdomen* inflated, double the combined length of head and thorax, posteriorly conical; genital apparatus below, some distance in front of apex. Opercula short, broad, distant, curved toward middle; posterior inner angle acute. Metasternum elevated at middle. Front *femora* spined below.

Type, *C. immaculàta*, sp.nov.

*CYSTOPSALTRIA IMMACULATA, sp.nov. (Plate xviii., figs. 1-1*a*).

Immaculate greenish-yellow; eyes streaked with fuscous; apex of clypeus acuminate; furrows on pronotum deeply excavated;

rostrum reaching apices of middle coxæ; tegmina much wrinkled. Long. corp. ♂ 40 mm.; exp. teg. ♂ 90 mm.

Hab.—Queensland; described from one example, a male, presented by Mr. Charles French (Coll. G. & F.).

Genus Cystosoma, Westw.

1842. Arc. Ent. p. 92.

1866. Stäl, Hemip. Afric. iv. p. 3.

Head small, triangular, as long as wide, front border emarginate on each side, and produced in a foliaceous short process in front of eyes; front prominent, laterally compressed; eyes small, directed obliquely backward; ocelli distant from base, equidistant from each other and eyes. *Pronotum* rather small, convex, much wider at base than at apex; front border straight; lateral borders dentate in front of middle, sinuate, widely diverging backward, front angles produced below eyes; posterior border sinuate, hind angles very prominently produced, almost foliaceous. *Mesonotum* convex, rather small, not covering scutellum. *Tegmina* opaque, convex exteriorly when closed, tips reaching apex of abdomen; basal area more than twice longer than broad; the two ulnar veins approaching each other, almost contiguous, diverging; interior ulnar area with base broader than apex; costa and radial vein contiguous; postcostal marginal space obsolete; apical half with venation irregular, forming many areas. Wings vitreous, with nine apical areas which are sometimes divided by transverse veins. *Abdomen* in male inflated, the genital apparatus below at apex; opercula short, widely separated, posterior inner angle rather acute. Mesosternum somewhat elevated. Front femora spined below.

Type, *C. saundersii*, Westw.

Synopsis of Species.

1 (2). Abdomen enormously inflated; posterior border of pronotum on each side produced backward, covering front angles of mesonotum; interior ulnar vein strongly curved ..... *saundersii.*

2 (1). Abdomen moderately inflated; posterior border of pronotum very lightly sinuate; interior ulnar vein straight *schmeltzi.*

*Cystosoma saundersii, Westw.

1842. Arc. Ent. p. 92, pl. 24, fig. 1.
1843. Amy. et Serv., Hémip. p. 460.
1851. Walk., List Hom. Brit. Mus. pl. 2, fig. 4.
1852. Scott, Proc. Zool. Soc. p. 14.
1854. Scott, Ann. Mag. Nat. Hist. p. 336.
1860. Bennett, Gatherings of a Nat. in Aust. p. 313.
1883. Wood, Ins. Abroad, p. 732.
1903. Frogg., Agr. Gaz. N.S.W. p. 422; and Misc. Pub. No. 643, p. 12.

Head yellow or green, with front produced in an obtuse angle. *Pronotum* yellow or green, posterior angles foliaceous, strongly produced outward and backward, covering anterior angles of mesonotum; lateral borders toothed anteriorly. *Mesonotum* yellow or green. *Tegmina* opaque, yellow or green, costa white; interior ulnar vein strongly curved forward; interior ulnar area broadest at middle, apex nearly acuminate; venation irregular on apical half. Wings vitreous, venation greenish-yellow. *Abdomen* yellow or green, enormously inflated, with an obsolete brown percurrent stripe on dorsum. Long. corp. ♂ 48 mm.; ♀ 35 mm.; exp. teg. ♂ 90-100 mm.; ♀ 98 mm.

Hab.—Australia (Westwood); Ash Island, near Newcastle, Glen Innes, Lismore, N.S.W.

The female resembles the male, but is somewhat smaller; and the abdomen, while robust, is not inflated.

This curious insect was originally described from Ash Island, where they were said to be very abundant in several orange orchards, resting in the day and calling with a loud, deep guttural '*r*,' continued incessantly with vibrations, just before twilight; and appeared about September. The specimens in all the Museum collections seem to have come from the same locality. We have had it from Glen Innes, where it is said to frequent the willow trees; one specimen was taken on a low shrub on the Ballina Road, near Lismore; another very large male is in the Brisbane Museum Collection.

*Cystosoma schmeltzi, Dist.

1882. Proc. Zool. Soc. Lond. p. 132.

Pea green. Lateral borders of pronotum diverging, not dentate; posterior angles rounded, prominent; hind border lightly sinuate, very lightly produced backward on each side. *Tegmina* pea green, opaque, costa white; interior ulnar vein straight; interior ulnar area gradually narrowed from base to apex, which is obtuse; venation irregular on less than apical half. Wings vitreous, very delicate, veins white. *Abdomen* a little longer than head and thorax, inflated in the male; opercula small, obscurely sinuated on interior and posterior margins. The abdomen of the female is obconical; last ventral segment deeply emarginate at middle, and lightly so on each side; ovipositor ferruginous. Long. corp. ♂ 25 mm.; ♀ 21 mm.; exp. teg. ♂ 62 mm, 70 mm.

Hab.—Gayndah, Queensland (Distant); Townsville, Port Denison, Q.

Genus Tettigarcta, White.

1845. App. Eyre's Travels in Aust. i. p. 412.

Head very small; front destitute of a longitudinal sulcus, not prominent anteriorly; vertex very narrow, occupied by ocelli; clothed with long black hairs; front ocellus placed vertically on the posterior side of a depression on base of front. *Pronotum* long and broad, produced posteriorly, almost covering mesonotum, convex and wrinkled; lateral borders flattened out, nearly horizontal, front angles directed toward centre of eyes. *Mesonotum* small, posteriorly produced in a triangular process; "cruciform elevation" in the form of a narrow ridge anteriorly broadened in an elevation. *Tegmina* semi-opaque; basal area four or five times as long as broad; two ulnar veins, distant; radial vein anastomoses with first ulnar vein at apex of basal area widely distant from costa, thus forming a broad costal area; interior ulnar area suddenly very much broadened near its apex; with an elevated line across middle; eight apical areas. Wings vitreous, with seven apical areas. Opercula obsolete. Front *femora* with a

tubercle below, not spined. *Body* below: apex of abdomen, sides of mesonotum and head, clothed with long hairs.

Type, *T. tomentosa*, White.

Synopsis of Species.

1 (2). Pronotum with lateral borders, near middle, produced in a sharp tooth on each side; spotted with fuscous ..... *tomentosa.*

2 (1). Pronotum with lateral borders destitute of teeth; without spots ..... *crinita.*

*Tettigarcta tomentosa, White. (Plate xviii., figs. 2, 2*a*).

1845. App. Eyre's Trav. Aust. i. p. 413, pl. 4, fig. 4.
1846. White, Ann. Mag. Nat. Hist. p. 330.
1847. White, Ann Mag. Nat. Hist. p. 223.
1851. Walk., List Hom. Brit. Mus. pl. 2, fig. 2.
1903. Frogg., Agr. Gaz. N.S.W. p. 420; and Misc. Pub. No. 643, p. 10.

Of various shades of brown, variegated with fuscous; very hairy. *Head* small, with vertex black, bordered on each side with tawny hairs, almost wholly occupied with red ocelli; front tawny, base and a central stripe fuscous; front borders, on each side very short, enclosing base of antennæ; rostrum ferruginous, excepting base, reaching apices of hind coxæ. *Pronotum* very long and broad, front border sinuous; lateral borders rather short, diverging almost directly outward, lightly sinuate; hind border very long, broadly convex, joining lateral borders where they form a strong pointed tooth; posteriorly it nearly covers mesonotum; variously striped and banded with fuscous. *Mesonotum* small, very hairy, produced posteriorly in the middle in a triangular protuberance, on which is the "cruciform elevation" in the form of a narrow ridge which anteriorly broadens in an elevation, black on basal half, apex yellow. *Tegmina* semi-opaque, brown, variously streaked and spotted with ferruginous and fuscous; a broken stripe passes along bases of apical areas, and spot on tip of longitudinal veins, black. Wings pellucid, tinged with brown. *Abdomen* dark ferruginous, apical margins

paler; laterally, anal appendage is yellow. *Body* below light brown, clothed with long white hairs. Opercula obsolete. *Legs* yellow, hairy; tibiæ and tarsi mostly black. Long. corp. ♂ 38 mm., lat. 15 mm.; ♀ 42 mm., lat. 18 mm.; exp. teg. ♂ 80 mm.; ♀ 96 mm.

Hab.—Tasmania (White), Launceston, Tas. (Simson).

This insect is also said to come from Gippsland, but it is probable that it has been confounded with the second species described by Distant, as all the specimens we have obtained came from Tasmania. Nothing is known about its habits, but it probably frequents thick forest country.

*Tettigarcta crinita, Dist. (Plate xviii., figs. 3, 3*a*).

1883. Proc. Zool. Soc. Lond. p. 188, pl. 25, fig. 5.
1903. Frogg., Agr. Gaz. N.S.W. p. 420; and Misc. Pub. No. 643, p. 10.

All reddish-brown, without spots. *Tegmina* opaque reddish-brown. Wings vitreous, veins reddish-brown. *Pronotum* with a circular excavation on each side, anteriorly; lateral borders entire, not toothed. Opercula obsolete. Long. corp. ♂ 33 mm., ♀ 36 mm.; lat. ♂ 13 mm., ♀ 15 mm.; exp. teg. ♂ 50 mm., ♀ 100 mm.

Hab.—Australia (Distant); Melbourne, Kunell East, Gippsland, Victoria.

Addendum.

Cicada (?) lowei, Etheridge and Olliff.

1890. Mem. Geol. Sur. N.S.W., Palæontology, No. 7, p. 6, pl. 1, fig. 1.

"*Sp. Char.*—Elongate, moderately robust, the three divisions of the body—head, thorax, and abdomen—very distinct; head rather large and broad, with a lateral tuft of setæ on each side at the base; no antennæ, rostrum, eyes, or ocelli visible; thorax longer than broad, truncate both before and behind, the sides rounded; abdomen nearly one-half longer than the head and

thorax together, slightly constricted at the base, narrowed posteriorly, with seven distinct segments of nearly equal length; wings ample, rather narrow, reaching considerably beyond the extremity of the body, evidently hyaline; forewing with the costa slightly arcuate, rounded at the extremity, the venation chiefly longitudinal, a hindmarginal vein unites the longitudinal veins, and cross-veins divide the apical from the basal area of the wing at a point about its middle; hind wing much shorter than fore wing. Length 16 mm.; length of fore wing 14 mm.; greatest width of abdomen (at second segment) 5 mm."

"*Locality and Horizon.*—Southern boundary Boyce's Selection, Bligh, N.S.W. Lower Mesozoic."

EXPLANATION OF PLATES XVIII.-XIX.

Plate xviii.

Fig. 1.—*Cystopsaltria immaculata*, n.sp.; tegmina.
Fig. 1*a*. ,, ,, head and thorax.
Fig. 2.—*Tettigarcta tomentosa*, White; tegmina.
Fig. 2*a*. ,, ,, head and thorax.
Fig. 3.—*Tettigarcta crinita*, Dist.; tegmina.
Fig. 3*a*. ,, ,, head and thorax.
Fig. 4.—*Gœana maculata*, Fabr.; tegmina [upper fig. 4].
Fig. 4*a*. ,, ,, head and thorax.
Fig. 4*b*. ,, ,, wing [lower fig. 4].
Fig. 5.—*Platypleura tepperi*, n.sp.; tegmina.
Fig. 5*a*. ,, ,, head and thorax.
Fig. 6.—*Kanakia congrua*, n.sp.; tegmina [upper fig. 6].
Fig. 6*a*. ,, ,, head and thorax.
Fig. 6*b*. ,, ,, wing [lower fig. 6].
Fig. 7.—*Melampsalta denisoni*, Dist.; tegmina [upper fig. 7].
Fig. 7*a*. ,, ,, wing [lower fig. 7].
Fig. 8.—*Pauropsalta leurensis*, n.sp.; tegmina [upper fig. 8].
Fig. 8*a*. ,, ,, wing [lower fig. 8].
Fig. 9.—*Tettigia variegata*, n.sp.; tegmina.
Fig. 9*a*. ,, ,, head and thorax.
Fig. 10.—*Huechys vidua*, White; tegmina [upper fig. 10].
Fig. 10*a*. ,, ,, head and thorax.
Fig. 10*b*. ,, ,, wing [lower fig. 10].
Fig. 11.—*Pauropsalta emma*; tegmina.
Fig. 12.—*Melampsalta umbrimargo*, Walk.; tegmina.

PLATE XIX.

Fig. 1.—*Thopha saccata*, Fabr.; tegmina.

1-8, apical areas; 9, interior ulnar area; 10, exterior ulnar area; 11, first discoidal area; 12, second discoidal area; 13, third discoidal area; 14, radial area; 15, anal area; 16, basal membrane, above which is the basal area; 17, first anastomosis; 18, second anastomosis; 19, postcostal space; 20, exterior ulnar vein; 21, interior ulnar vein; 22, costa.

Fig. 2.—*Thopha saccata*, Fabr.; wing.

1-6, apical areas; 7, radial area; 8, exterior ulnar area; 9, interior ulnar area; 10, 11, 12, 13 together are the clavus; 13 alone being called the anal area (Walker calls it the flap).

Fig. 3.—*Thopha saccata*, Fabr.; vertical view of head.

Fig. 4.— ,, ,, dorsal view of head.

Fig. 5.— ,, ,, ventral view of abdomen, showing opercula.

Fig. 6.—*Chlorocysta vitripennis*, Westw.; tegmina.

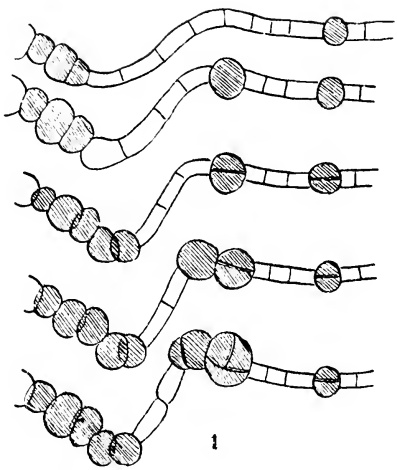
Fig. 7.—*Venustria superba*, n.sp.; tegmina.

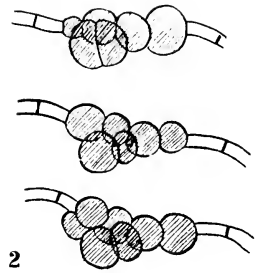
Fig. 7*a*. ,, ,, head and thorax.

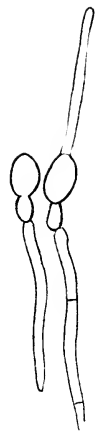
INDEX.

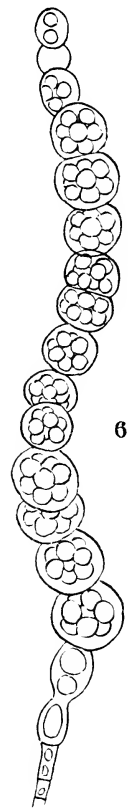
(Names in Italics are Synonyms.)

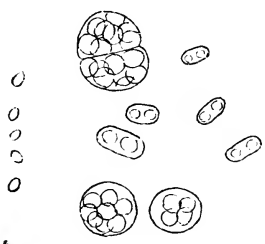
[Printed off December 12th, 1904.]

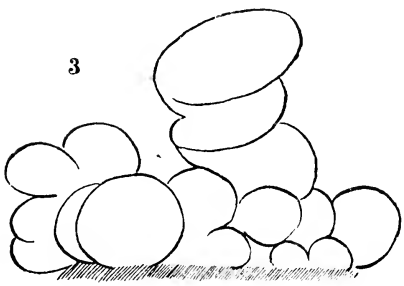












MOULD OF THE RED STRING OF THE SUGAR-CANE.

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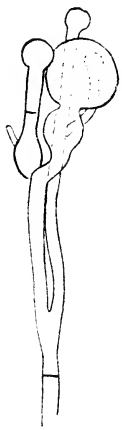

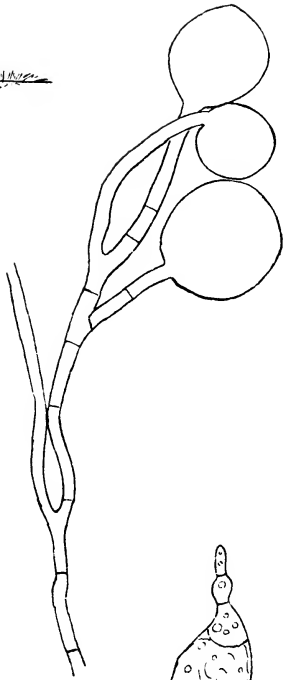

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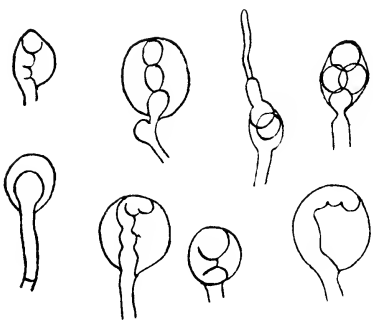

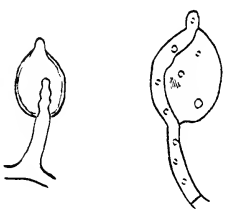

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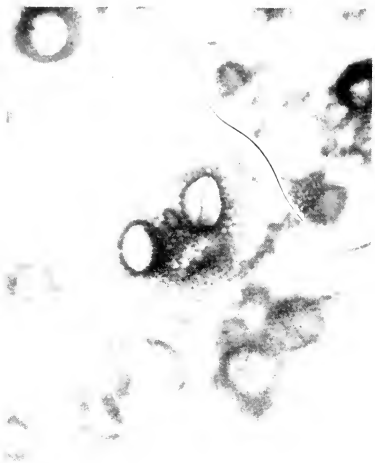

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

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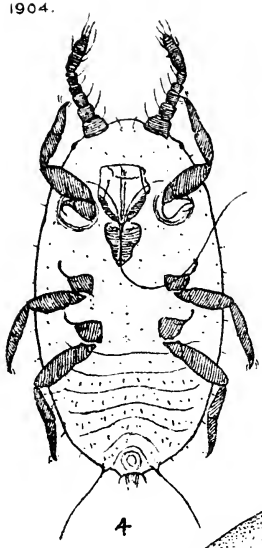

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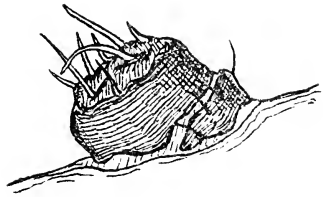

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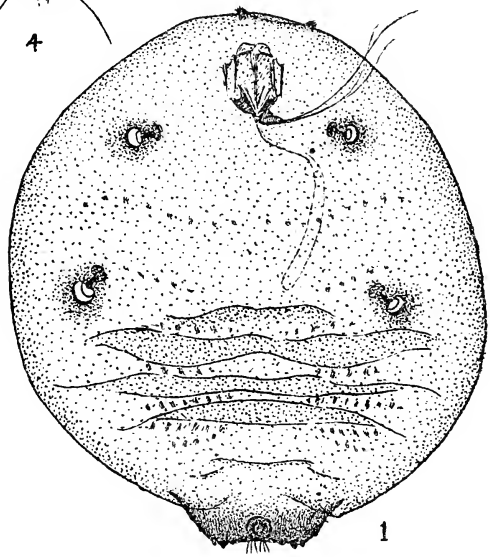

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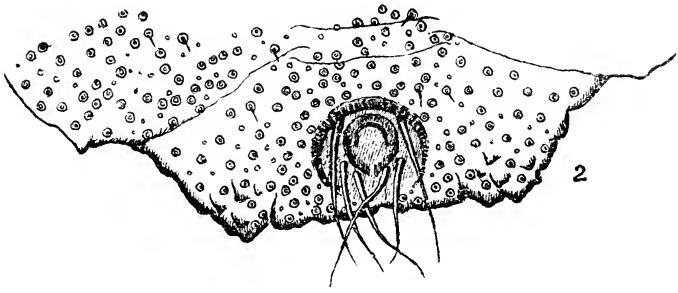

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ANTONINA AUSTRALIS, *n. sp.*

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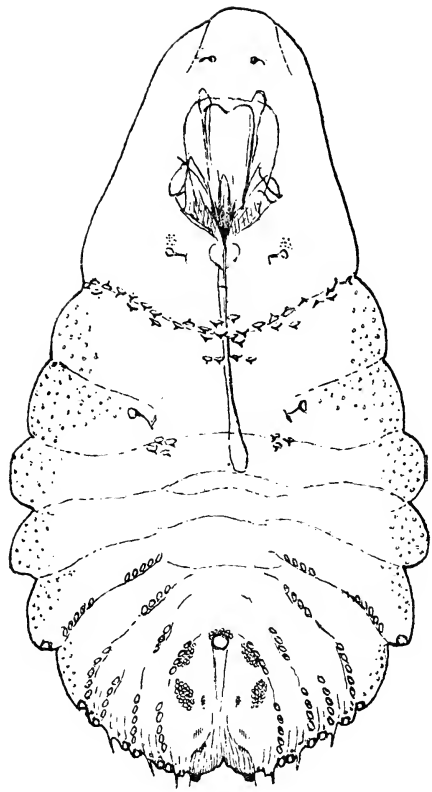

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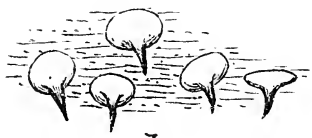

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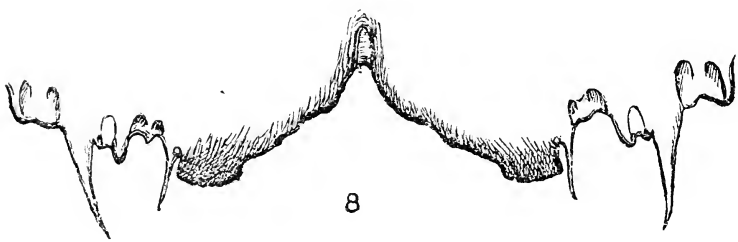

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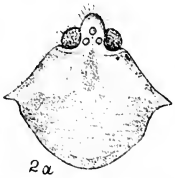
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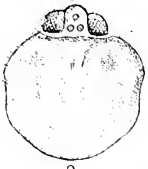
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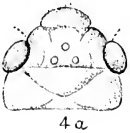
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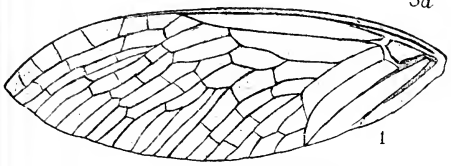
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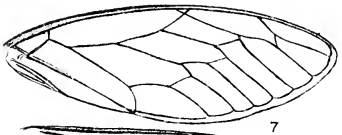
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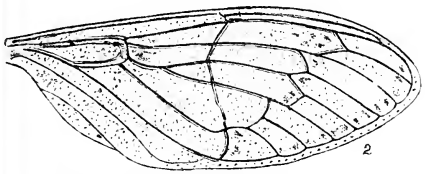
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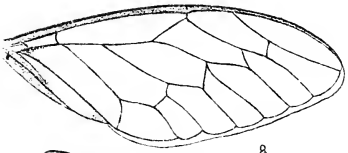
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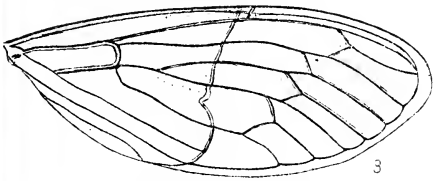
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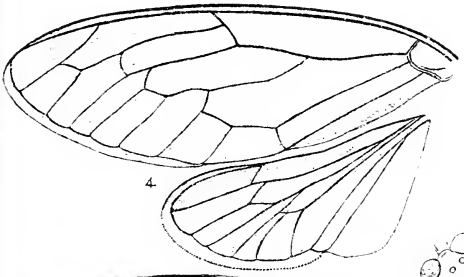
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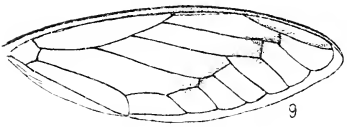
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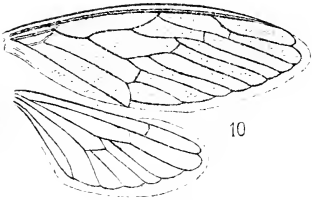
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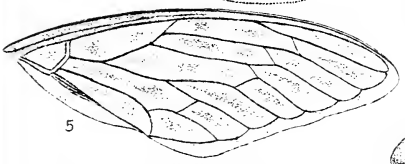
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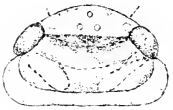
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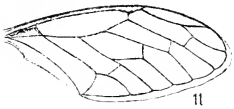
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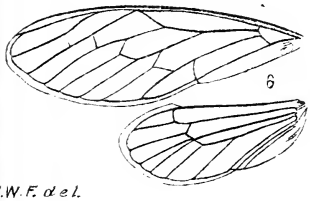
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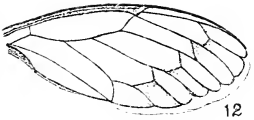
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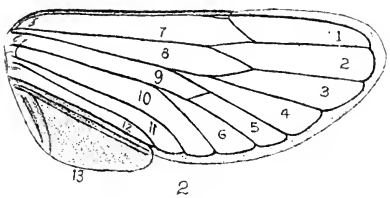
W.W.F. del.

AUSTRALIAN CICADIDAE



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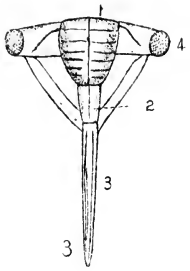

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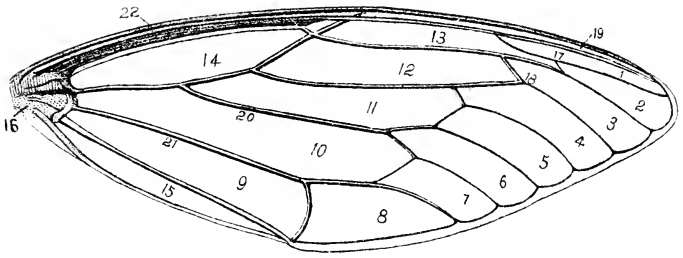

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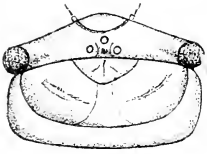

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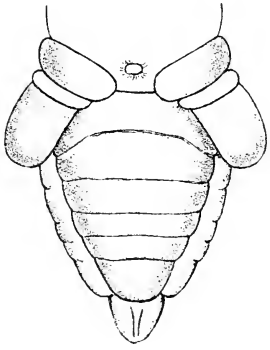

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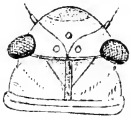

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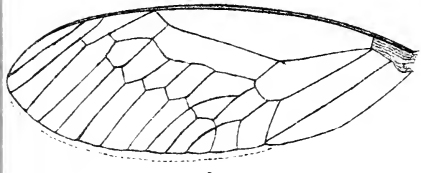

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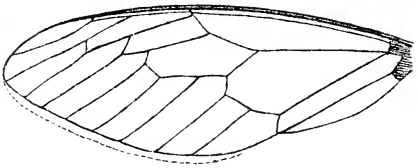

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W.W.F. del.

AUSTRALIAN CICADIDAE

POSTSCRIPT (*added 25 : xi. : 04*).—While this paper has been passing through the press, two papers have appeared, written by Mr. Distant, containing descriptions of two new Australian species :—

Macrotristria nigrosignata, Dist., Trans. Ent. Soc. Lond. 1904, p. 673, pl. 29, fig. 7.—*Hab.* Cossack, W.A.

Henicopsaltria pygmæa, Dist., Ann. Mag. Nat. Hist. (7), 1904, p. 303.—*Hab.* S.W. Australia.

NOTES ON *NEUROPTERA* AND DESCRIPTIONS OF NEW SPECIES.

By Walter W. Froggatt, F.L.S.

(Plate xx.)

Very little attention has been given to the small things among Australian insects, until the last few years, in any of the Orders outside the Coleoptera and Lepidoptera; so that when one is working at Economic Entomology and has to know something about the more obscure groups, one is frequently coming across strange insects overlooked by the specialist. This is very noticeable in such an anomalous Order as the *Neuroptera*, which until the late Robert McLachlan took up the study of their habits, had almost been passed over by English entomologists.

I now record the discovery of two members of the Family *Embiidæ*, hitherto unknown in Australia; and a second species of the Family *Nemopteridæ*, the only other one known having been described by Westwood over fifty years ago.

Family EMBIIDÆ.

The exact location of these curious little insects is still somewhat uncertain. Sharp places them in the second family of the Neuroptera, next to the Termites. Redtenbacher brackets them between the latter and the Blattidæ; but McLachlan doubts whether they are related to the Termites; while Wood-Mason calls them Orthopterous insects. Grassi, after working out their anatomy, leaves them midway between the two Orders, and considers that they should be raised into a separate Order. Hagen considers that they are more closely related to the Termites than to any other family, but show affinity to the Psocidæ. Latreille

formed the Genus *Embia*, now typical of the family, in 1825, briefly dismissing it with the following remark, "Voisin du précedent (Termes) mais à antennes différentes." Westwood defined the family in 1837, and gave the characters of the genera, describing the two known species *Embia savignii*, Latr., which the author described from a specimen first figured in Savigny's great work,* and another that he called *Oligotoma saundersi*, from India, discarding Grey's genus *Olyntha* as a synonym of *Embia*. Lucas described the next species from Algeria in 1849 under the name of *Embia mauritanica*. In 1876 M. Michael gave an interesting account of the habits of an insect found upon the roots of his orchids in Scotland, probably introduced with the plants from India, which produced silken webs like spiders; this was published in the Gardeners' Chronicle, illustrated with his drawings, and some notes by Westwood. McLachlan subsequently described it scientifically after its discoverer, with two other species from South America collected by Bates in 1878. Wood-Mason gave an account of the life-history of *Oligotoma saundersi*, common in India under stones, and discussed the wing-structure of the insects, in 1883. In the same year McLachlan described a species, collected in the roofs of the native houses in Hawaii by Blackburn, under the name of *Oligotoma insulans*; an interesting account of its life-history has since been furnished by Perkins, who says it is a very common insect, the males winged and the females apterous, living in silken webs under bark or stones. Grassi in 1893 studied the habits and anatomy of two species found under stones in Southern Europe. Hagen monographed the family in 1885, recording 17 species.

OLIGOTOMA GURNEYI, n.sp. (Plate xx., figs. 2-3.)

Length of body 7: across outspread wings 17 mm.

General colour dull chocolate-brown, wings variegated with pale parallel lines.

Head large, rounded, longer than broad, turned down in front; eyes circular, projecting on the sides; antennæ in front of the

* Description de l'Egypte Névropt. pl. 2, f. 9.

eyes, cylindrical basal joint stout, from behind the eyes head broadly rounded to apex. Prothorax not as broad as head, swelling out in line with base of forewings and of uniform thickness to hind pair. Wings of the usual elongate form, parallel on the costal margin, narrowly rounded at the tips. All the segments of the legs swollen, hairy on the tibiæ and tarsi. Abdomen elongate [damaged].

Hab.—Sydney, N.S.W.; taken round the lamp in the house, 6 : x. : '02 (W. B. Gurney).

OLIGOTOMA AGILIS, n.sp. (Plate xx., figs. 4-6.)

Length 12 mm.

General colour ferruginous mottled with dull yellow; mouth-parts and tarsi of fore legs lighter; the whole insect clothed with short scattered black hairs.

Head very large, half as long as thorax, convex, rounded; antennæ standing out in front of eyes, 9-jointed [apparently mutilated], 1st broadest, cylindrical; 3rd longer than 2nd, the next moniliform, gradually increasing in size to the tip: eyes small, not projecting, coarsely faceted, irregularly reniform. Thorax not quite as long as abdomen, divided into three distinct segments, the central or mesonotum longest; wings wanting; fore legs with femora at tibia thickened, the 1st tarsal joint dilated into a broad round disc, flattened beneath and impressed with a median parallel suture; 2nd tarsal joint small, coming to a point at apex, and furnished with small sharp claws; middle legs not so robust; hind pair with the femora thickened, and the tarsi formed of two large joints terminating in large tarsal claws. Abdomen of uniform circumference, apparently composed of ten segments when viewed from above, but the 9th (much smaller than the rest) appears to form a part of the 10th when viewed from the side, rounded at the extremity. Anal tubercles large, finger-shaped, two-jointed, standing out on the sides.

Bomen, Wagga, N.S.W; two specimens taken under stones in April.

They are active little creatures, hiding in the dust when disturbed.

Family NEMOPTERIDÆ.

Some writers place these insects in a subfamily of the *Hemerobiidæ*, but others rank them as a distinct family. Klug included all the known species in 1836 in the genus *Nemoptera*: but Rambur in 1842 divided them up into three well defined genera—(1) *Nemoptera* for the black and yellow forms, with the mouth strongly produced into a beak; (2) *Halter*, comprising species with transparent forewings, long slender hind ones, more or less dilated at the tips, and the mouth produced into a beak; (3) *Brachystoma*, containing a single hyaline species, in which the mouth is short in front. In 1844 Westwood placed them in two groups according to the dilation or otherwise of the hind wings, and in 1885 McLachlan added the genus *Croce* to contain those with filiform hind wings. Kirby, cataloguing the family in 1900, divided them up into seven genera containing 33 species, all of which, with two exceptions, are confined to the old world, extending from the Mediterranean region of Southern Europe to Africa on the one side, and Asia into India on the other; of these species, 14 are represented in the British Museum. *Stenorrhachus walkeri*, discovered on the Chilian coast by Mr. J. J. Walker, was described by McLachlan in 1885; and *Chasmoptera hutti*, Westwood, was captured on the edge of a swamp near the town of Guilford, Western Australia, in 1847.

I place my species in the genus *Croce* formed by McLachlan, who defined it as follows—"Of small size, characterised by the front being very strongly produced into a slender beak, by short antennæ (which are usually somewhat thickened towards the apex), by transparent anterior wings with very open neuration, and usually with a strongly-defined pterostigmatic mark, and especially by long setaceous posterior wings, strongly ciliated, in which even the rudiments of neuration are scarcely to be traced."

C. attenuata agrees in all particulars, except the cilia, but these appear to have existed and to have been detached through being placed in spirits or rubbed in transit.

CROCE ATTENUATA, n.sp. (Plate xx., fig. 1.)

Length of outspread wings 25; of hind wings 27; of body 10mm.

General colour purplish-brown; head, except eyes and sides of prothorax, yellow; meso- and metathorax mottled with the same colour; legs light yellow; forewings transparent, costa tinged with yellow, nervures black, hind wings light brown; abdomen variegated with yellow markings.

Head large, elongated in front; eyes large, rounded, projecting on the sides; antennæ situated between fore margin of the eyes, erect, curving round. Prothorax elongate, cone-shaped, narrow at junction with head, lightly clothed with short bristles on the sides, meso- and metathorax lobed, together broadly rounded. Forewings large, nearly straight on costal edge, sharply curved round near the tips; hind wings thread-like, extending out beyond tip of abdomen, flattened on the upper surface, composed of three stout parallel nervures running close beside each other, showing traces of scales along the edges. Abdomen elongated, narrow, rounded at the tip.

Hab.—Pajingo Station, Charters Towers, N.Q. (Mrs. Black).

This insect was received from Mrs. Black with a number of other specimens in a bottle of spirits of wine; and carefully dried and mounted on card.

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EXPLANATION OF PLATE.

Fig. 1.—*Croce attenuata*, n.sp.
Fig. 2.—*Oligotoma yurneyi*, n.sp.
Fig. 3.— ,, ,, wing, showing veins.
Fig. 4.—*Oligotoma agilis*, n.sp.
Fig. 5.— ,, ,, tarsus of hind leg.
Fig. 6.— ,, ,, tarsus of fore leg.

NGARRABUL AND OTHER ABORIGINAL TRIBES.

Part II.—Distribution of the Tribes.

By John MacPherson, M.A., B.Sc., M.B., Ch.M.

(Plate xxi.)

Following is an account of the distribution of the indigenous tribes in the north-east of New South Wales and south of Queensland, as furnished by my native informants, in accordance with the languages spoken. As Ridley* observes, the language of a tribe is often named after the expression of negation "No," occasionally after that of affirmation "Yes." Thus "no" in *Kogai* is *ko;* in *Wailwun*, *wail;* in *Wolaroi*, *wol.* On the other hand, "yes" in *Pikumbul* is *pika.* My informant told me that "no" in *Kamilroi* is *kamil;* in *Koomilroi*, *koomil;* and in *Yookumbul*, *yookah.* Strangely enough, "no" in *Pikumbul* is *yūga* (Ridley), in *Turrubul* (Brisbane River) it is *yugār* or *wūkka,* and on the north-west coast *gar.* In Yookumbul "yes" is *yo,* and "truly" is *toroogah.* Ridley also gives *yoai* as "yes" in Dippil (north of Moreton Bay, Queensland) and *Turrubul.* In *Kamilaroi*, *yo* is "yes," and *gir* "verily." In *Bundel* "no" is *ukúmbi,* and in *Koombainga*, *bi-ō-i.*

To pass on to the individual languages or dialects :—

1. *Gŭttáhn* is spoken at Port Stephens. W. J. Enright† gives *Kut'thung* as the tribe occupying the south of Port Stephens, and mentions at least seven other tribes in the vicinity. In Ngarrabul, however, they were collectively designated Guttahn,

* Kamilaroi and other Australian Languages, 1875.

† Journ. Proc. Roy. Soc. N. S. Wales, 1900, pp. 103 *et seq.*

just as, for instance, we ourselves term the inhabitants of India Hindoos, or of New Guinea, Papuans, &c.

2. *Dáng-getti* or *Táng-getti.*—From Kempsey to the Upper Macleay River. My Ngarrabul informant includes the whole of this area within the limits of one language, but that many tribes were situated in this locality we know from the writings of Hodgkinson,* Henderson,† and others.

3. *Himbérrong.*—East of the New England Range, at Walcha, Ingleba, &c.

4. *Inŭwon* or *Nee-ínuwon.*—West of the Range from Bundarra to Uralla.

5. *Boorkŭtti.*—From Armidale eastwards to and including the Nambucca and Bellingen Rivers, embracing Hillgrove and Wollomombi.

6. *Koombaínga.*—The Nymboi River, Newton Boyd, and south-westerly almost to Wollomombi.

7. *Báhnbi* or *Ahnbi.*—A circumscribed area embracing Ben Lomond, Glencoe, Marowan, Mt. Mitchell and Kookabookra.

8. *Enni-won* or *Yénni-won.*—West of the Range, at Cope's Creek, Tingha, Wandsworth, Ollera, Boorolong Creek, Black Mountain and Guyra. The Oban aboriginal placed Oban and Ward's Mistake in *En-neé-win* (evidently the same as *Enni-won*). A Ngarrabul Black included Oban in the *Ahnbi* district. The authority of the Oban native himself should have the greater weight. Possibly a frontier locality such as this would be a subject of tribal conflict and warfare, and its possession vary from time to time in accordance with the prowess of adjoining tribes. R. H. Matthews,‡ describing a New England Bora, says that, over the New England District from Moonbi to Ben Lomond, and east perhaps to Walcha, Hillgrove and Oban, westerly almost to Bundarra and Inverell, the Bora differed somewhat in different localities, and that the latter (western)

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* Australia from Port Macquarie to Moreton Bay, 1845.

† Excursions and Adventures in New South Wales, 1851.

‡ Proc. Roy. Soc. Vic. N.S. ix., 1896.

area adjoined on the Kamilaroi all the way. This we shall see is inaccurate as regards the tribal boundaries. He speaks of the languages *Nowan* and *Yunggai* as obtaining over this area. *Nowan* may be both my *Inuwon* and *Enneewin*, which would account for a good deal of the area mentioned, including Oban to Bundarra, and a considerable extent of the New England Range. Ben Lomond, however, is just outside the Enneewin boundary. Walcha and Hillgrove also are in Himberrong and Boorkutti. Moonbi and Bendemeer I have no observations upon; possibly they are in the Yunggai of that writer—a name somewhat suggestive of Danggetti. His names for Dingo and Bora (*Goomat* and *Barbung*) are different from those in my Oban vocabulary.

9. *Yookúmbul.*—From Boggy Camp and Inverell, almost to Bingara on the west, Bundarra on the south, and Tingha on the south-east.

10. *Ngárrabul.*—From Stonehenge north to Bolivia, including Beardy River and Beardy Plains, Matheson, Waterloo, Ilparran, Glen Innes, Clairvaulx, Wellingrove, Wellingrove Creek, Glendon, Yarraford, Furrucabad, Beaufort, Dundee, Ranger's Valley, Emmaville (Vegetable Creek), Deepwater, and Wellington Vale.

11. *Bŭndel* or *Bŭndĕla.*—Yugilbah and Gordon Creek.

12. *Gee-én-yun.*—About Tabulam.

13. *Márbŭl.*—About Tenterfield.

14. *Kweémbul.*—Ashford, Fraser's Creek, Severn and Sovereign Rivers, and possibly at times Inverell, as one of my informants included this last-named place within the territory of this tribe, although others placed it in Yookumbul. Being close to the border-line, it may have been the subject of intertribal feuds.

15. *Bee-gŭmbul.*—Bonshaw; Yetman and Bogabilla (on the MacIntyre River); Callandoon and the Weir River—in part (in Queensland). Ridley includes within his *Pikumbul* region the MacIntyre River, Callandoon and the Weir River. Matthews gives Goondiwindi (MacIntyre R.) and Welltown (Weir R., Queensland) as belonging to the *Pickumbil* Tribe.

16. *Kao-ámbul.*—Inglewood (Queensland), and extending towards the Dumaresque and Mooni Rivers. Ridley gives Kingki and Paiamba as the languages of the adjacent Darling Downs.

17. *Wigal-wollŭmbul.*—Mooni River (Queensland).

18. *Wee-n'gŭl-la-m'bŭl.*—Queensland, beyond the Weir River.

19. *Gínniebal* or *Gínnieval.*—Wallangra and Blue Nobby.

20. *Wólroi.*—Terry-hie-hie, Paramallowa, Molroy, Warialda, and on the south almost to Bingara. Ridley* gives Wolaroi (with the half vowel *a*, which my informants did not sound) as obtaining on the Bundarra or Gwydir River. Part of the Gwydir is certainly within their area, but the name Bundarra River is usually reserved for the upper affluent stream—in the Inuwon territory.

21. *Giróombul.*—Mt. Lowry, Manilla, Barraba, and on the Gwydir River at Bingara.

22. *Kóomilroi.*—This I was told was a tribe quite distinct from Kamilroi, and had its own expression of negation—*koómil.* This language was spoken at Breeza, on the Namoi (Narrabri, Boggabri, Gunnedah), on the Gwydir (Moree, and extending almost to Bingara). In a southerly direction the tribe adjoined upon Kamilroi, while north-westerly it crossed the Queensland border and reached as far as St. George.

23. *Kámilroi.*—I always heard this name pronounced as written, without the half vowel *a* between the second and third syllables (*Kámilaróí*). Other writers have spelt the word thus—*Gummilroi* and *Comleroy.* Breton† describes an aboriginal fight which took place at Wollombi, near the Lower Hunter, and in which the Comleroy blacks engaged. The precise area occupied by the Kamilroi tribe appears to be involved somewhat in obscurity, different writers expressing widely divergent opinions. The limits ascribed generally seem to be extraordinarily wide in

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* *Loc. cit.* p. 119.

† Excursions in New South Wales, Western Australia, and Van Dieman's Land, 1833.

comparison with the territory of other tribes. In this, as in other cases, faulty information supplied by the blacks owing to the lack of accurate knowledge, may in some measure explain the discrepancies. Probably, however, the boundaries of a tribe were not fixed and permanent, but varied from time to time by right of conquest, or altered owing to the intermingling of adjoining tribes. My informants limited the Kamilroi region to the Upper Hunter (Muswellbrook), Quirindi, Peel River (Tamworth), and reaching on the north almost to Manilla. They sharply discriminated between this tribe (negative *Kamil*) and the Koomilroi tribe above defined.

Sir Thomas Mitchell* gives a vocabulary obtained on the Karaula (MacIntyre) River at 29° S. lat. (*i.e*, about the site of the present Mungindi). Now this resembles Ridley's Pikumbul tongue, but more so the Kamilaroi. However, it is palpably different from both. "Yes" and "no" in this vocabulary are like those of the Wiradhuri dialect of Wellington and the Lower Castlereagh. There are also other slight affinities to this language, but at the same time conspicuous differences. Mitchell himself remarks that it was nearly but not altogether the same as the Wallamoul (Tamworth) language. Now this is what we should expect from my observations, for Mungindi is in Koomilroi and Tamworth in Kamilroi.

Ridley, in a published lecture delivered in Sydney in 1864,† thus gives the limits of the Kamilaroi tribe:—"All down the Namoi, along the Barwon from the Mooni to the junction of the Namoi, on the Bundarra [*sc.* Gwydir], northward, and the Liverpool Plains and the Upper Hunter southward." This includes both Kamilroi and Koomilroi. He further observes that the Kamilaroi language "is understood on the Balonne," which is the farthest extent of my Koomilroi. The same writer‡ includes the Balonne within the Kamilaroi area, although elsewhere§ he

* Australian Expeditions, Vol. ii., App. 1839.

† The Aborigines of Australia, p. 15.

‡ Kamilaroi and other Australian Languages, p. 1, 1875.

§ *Loc. cit.* p. 119.

gives the Yualarai language as obtaining on the Balonne, and further states that the Wolaroi tongue is spoken on the Bundarra (or Gwydir) River—which latter observation agrees with my own data.

John Fraser* gives the Kamilaroi range as the Gwydir (my Koomilroi), Mt. Gravesend and Terry-hie-hie (my Wolroi), and also the MacIntyre River (which is partly in my Koomilroi and partly in my Beegumbul). Elsewhere† he includes Yaggabi, on the Gwydir, within the Kamilaroi area. This, too, would form part of my Wolroi.

R. H. Matthews,‡ in his account of the Kamilaroi Bora, gives as the localities in which Kamilaroi is spoken, Meroe, Mogil Mogil, Gundablouie, Mungindi and Kunopia, in New South Wales; and in Queensland, Tallwood, Redbank Creek, Moogan, Warril Creek, and the lower Mooni, all of which accord well with my Koomilroi. Further, the native words used in Matthews' account are altogether different from Ridley's Kamilaroi language. Again, Matthews, in his description of the New England Bora, gives the Kamilaroi range as extending over the Namoi, Gwydir, Barwon and west of the latter (Koomilroi again), but also the MacIntyre and Severn Rivers, which is opposed to Ridley's authority as well as his own in another article. Matthews includes St. George in the *Kogai* tongue, but Ridley places Kogai west of the Balonne.

24. *Wáilwun.*—At Wee Waa on the Namoi. According to Ridley, this language is spoken on the Barwon for about 40 miles below the junction of the Namoi. Being so remote from the haunts of my Ngarrabul informant, I cannot lay stress on this discrepancy. Doubtless Ridley's information is the more accurate.

Ngarrabul mythology ascribes unity to all the blacks until a great flood overwhelmed the land. After that the survivors

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* Stories about the Kamilaroi Tribe, 1882.

† Journ. Proc. Roy. Soc. N.S. Wales, 1882, p. 203.

‡ Proc. Roy. Soc. Vic. N.S. ix., 1896.

separated and went different ways, and so founded different tribes and acquired separate languages. The tribes then became distributed in groups. As a rule three tribes—no more—thoroughly understood each other's tongue. Outside these groups of three, although different tribes could make themselves comprehended, they were not completely conversant with one another's language. Appended are some of these groups, set down just as I was informed, but I fear containing many inconsistencies.

1. Koombainga, Boorkutti and Danggetti thoroughly understood each other.

2. Himberrong understood Inuwon but not Enniwon as well.

3. Inuwon, Enniwon and Yookumbul thoroughly understood each other. Further, Enneewin presented marked affinities to Ngarrabul.

4. Marbul, Ngarrabul and Yookumbul understood each other.

5. Kweembul, Ngarrabul and Marbul understood each other.

6. Ngarrabul, Kweembul and Yookumbul. Kamilroi was but little understood by Ngarrabul.

7. Kweembul, Ginniebal and Wolroi. Beegumbul was not intimately known by this group, but possessed many affinities to it.

8. Wolroi, Ginniebal and Koomilroi.

9. Kaoambul, Beegumbul and Wigalwollumbul.

10. Koombainga and Bundela were closely related.

In the early days aboriginals were very numerous in Central and Northern New England. Present residents can well remember the times when Oban, Deepwater, Guyra, Wellingrove, &c., were the scenes of large concourses of the dusky inhabitants. The remnants of the tribes are now comparatively few and degenerate, yet in some ways clinging tenaciously to their old tribal customs. At Wellingrove, when I left the district in 1901, was located an old native named Peter Perry. Perry was born at Yugilbah. As a lad he was taken away by the whites, but again returned to his old habits and joined the Ngarrabul tribe. After the extinction of the tribes he moved to Inverell, but

finally settled at Wellingrove. His household consisted of a half-caste wife and four three-quarter children, with two quarter-caste step-children. His own youngest child was then about 5 years old. One of his daughters had a baby by a white father. Perry's grandfather and grandmother, as well as his uncles, were from Nymboi. He said that in the early days the tribes were very populous, and that as a rule the New England tribes were friendly with each other, but hostile to the Queensland and Macleay River tribes, with whom they had many battles. At Inverell I used to see an old North Queensland black tracker, Bungaree. Steve O'Brien was an Inverell tribesman in the prime of life. He had been a station hand at Callandoon in Queensland. He, with other Blacks from the inland plains, paid frequent visits to Wellingrove. At Show time many natives of all ages and both sexes would wander through Glen Innes from distant parts of the State. At Oban-Kookabookra was a little band of about eighteen. At Oban is a Government reserve for the aboriginals, but this they rarely occupy, as some of their dead are there buried. Dicky Nelson, the patriarch of them all—an old man a quarter of a century ago—was a familiar figure prospecting for precious metal in the bed of the creek, and thus passing his declining days—alone.

PLATE XXI.

Map showing Distribution of Aboriginal Tribes in Northern New South Wales and Southern Queensland.

NOTES ON THE NATIVE FLORA OF NEW SOUTH WALES.

By R. H. Cambage

Part i.—The Tumbarumba and Tumut Districts.

These notes were taken in March, 1903, when the effects of the drought were to be seen on every side, consequently only the conspicuous members of the flora were noticed.

Perhaps the chief feature brought out in this paper is the regulating influence which elevation exercises over the vegetation. Starting from Wagga Wagga, at an altitude of about 600 feet above sea-level, an ascent is made through Tumbarumba to Laurel Hill, where the height is about 3,300 feet. During this ascent, the flora changes absolutely, scarcely a plant being found at the latter place, which is also common to the low land. After travelling northerly for about 25 miles from Tumbarumba, a descent is made to Tumut (900 feet), which is reached at about 40 miles, and in this descent, and also that continued to Gundagai (750 feet), a return is made to the same warm-country flora as that of similar levels to the south-west.

Probably the tree which most definitely marks the dividing line between the warmer- and colder-country floras is the White Box, *Eucalyptus hemiphloia* var. *albens*, Miq., the upper margin of its habitat, when met with in a descent from the mountains, being an undoubted sign of an approaching warmer temperature, and in a given latitude the presence or absence of this tree on the western slopes at once supplies the observer with an approximate idea of the elevation. In following this species northerly a splendid example is seen of the warmer effects of northern lati-

tudes, for while in the southern district now described, the White Box is chiefly found below an elevation of 1,300 feet above sea-level, on the northern part of New England it is not uncommon at altitudes exceeding 2,000 feet.

From Wagga Wagga to Tumbarumba, viâ Kyamba, is a distance south-easterly of about 70 miles, and along the first part of the road the country has been considerably cleared, many plants having probably disappeared altogether; and it seems quite possible there may be numerous tracts of cleared country denuded of plants, without any record of their existence in the locality ever having been noted. For about 30 miles the ascent is slight, and the trees belong for the most part to the forms usually found in the low country, but gradually give place to those which occupy areas on the western slopes, and these again are replaced, in many instances on the higher altitudes near Tumbarumba, by the high cold-country flora.

During the first 10 miles the only trees noticed from the road were:—*Eucalyptus rostrata*, Schl. (River Red Gum), *E. melliodora*, A. Cunn. (Yellow Box), *E. Woollsiana*, R. T. Baker (Black or Narrow-leaved Box), *E. hemiphloia*, var. *albens*, Miq. (White Box), *Casuarina quadrivalvis*, Labill. (She-oak or Mountain Oak), *C. Cunninghamiana*, Miq. (River Oak), *Acacia decora*, Reichb., and *Callitris robusta*, R. Br. (White or Murrumbidgee Pine).

From the 10-mile post to about the 30-mile post near Kyamba the following were noted:—*Eucalyptus melliodora*, *E. hemiphloia* var. *albens*, *E. rostrata* (along the creeks), *E. Bridgesiana*, R. T. Baker (Apple; recognised as *E. Stuartiana*, F.v.M., by Deane & Maiden), *E. Woollsiana*, *E. polyanthemos*, Schau. (Red Box), *E. tereticornis*, Sm. (Forest Red Gum), *E. macrorrhyncha*, F.v.M. (Stringybark), and a few trees of *Acacia dealbata*, Link (Silver Wattle).

It was only near Kyamba that the Red Box and Stringybark began to make their appearance. The trees of *E. polyanthemos* had box bark on the trunk and branches, and in this respect exactly resembled the Victorian trees of this species, though the leaves of the Kyamba Red Box were less glaucous and scarcely

so orbicular. A few were found growing on the flat land, but their home seemed to be on the hills. Some were 50 feet high, with a diameter of 4 feet in a few instances.

In comparing these trees with the Victorian and Bathurst Red Box, they appear to more nearly resemble the former, but this is chiefly owing to their having box bark covering the trunk and limbs. The fruit might belong to either, while, from a cursory examination, the red timber of all three appears the same. In foliage, however, the Kyamba trees closely resemble the Bathurst Red Box, which has been described by R. T. Baker under the name *E. ovalifolia* (these Proceedings, 1900, p. 680). The line of demarcation, which may readily be noted in the field, between the Victorian and Bathurst Red Box, is that the former has in general fairly large, orbicular, somewhat coriaceous leaves, and a box bark on trunk and branches; while the latter has oval to lanceolate leaves, and a smooth gum-tree bark except for a few feet near the base where it is flaky and somewhat of the nature of box bark. But in investigating the Red Box from Kyamba towards Tumbarumba, and again at Tumut, it was often found impossible to satisfactorily determine where a particular form should be placed, for while the former had the Victorian bark and the Bathurst foliage, those on the Gilmore side of Tumut were not constant as regards the bark, some having box bark all over the trunk, while that of others was chiefly smooth, but all had the foliage of the Bathurst trees rather than that of the Victorian. On the north side of Tumut, however, they were for the most part typical Bathurst Red Box both in bark and foliage, and the species throughout the district was known as Round-leaf Box or Round-leaf Gum. It would be a work of very great botanical interest to study any changes that may take place in these trees over the area extending from Tumut to Albury, having in view the question as to whether there are two distinct species in this locality or only one. For previous remarks concerning this species, see these Proceedings, 1902, p. 571.

After leaving Kyamba the ascent is considerable, and the change of vegetation is immediately noticed. A stunted form of

Eucalyptus tereticornis at once appears on the granite hills. It is apparently var. *dealbata*, but the fruits, though truncate, are more pedicellate than usual for this form.

E. hemiphloia, var. *albens*, continues for a few miles, but soon finds the elevation too cold.

Other Eucalypts noticed at intervals along the roadside were:—*E. macrorrhyncha*, *E. polyanthemos*, *E. Cambagei*, Deane & Maiden (Mountain Apple), *E. hæmastoma*, var. *micrantha*, Benth. (resembling *E. Rossii*, Baker & Smith; Brittle Gum), one small patch of *E. sideroxylon*, A. Cunn. (Ironbark, on sedimentary formation above Kyamba), *E. camphora*, R. T. Baker (*E. Gunnii*, var. *ovata*, Deane & Maiden), *E. Bridgesiana*, *E. melliodora*, *E. rubida*, Deane & Maiden (*E. Gunnii*, var. *rubida*, Maiden, White Gum), *E. coriacea*, A. Cunn. (Cabbage Gum), *E. amygdalina*, Labill. (Peppermint, the first being seen near the 22-mile post from Tumbarumba), *E. maculosa*, R. T. Baker (*E. Gunnii*, var. *maculosa*, Maiden, White Gum), *E. stellulata*, Sieb. (Sally or Sallow, the first being near 13-mile post), and *E. dives*, Schauer (Messmate, at about 2 miles from Tumbarumba).

Seedling plants of *E. rubida* were noticed growing among those of *E. Bridgesiana*; and presented considerable similarity through both having orbicularly shaped glaucous leaves. By a little inspection it was found that in plants of equal height (about two to three feet), the former were paler in colour, had opposite and larger leaves as well as smooth stems; while the latter had rough stems, leaves rarely strictly opposite, and often slightly crenulate.

Other trees and shrubs noticed along this road were:—*Sterculia diversifolia*, G. Don (Currajong), *Leptospermum scoparium*, Forst. (10 feet high, with pointed leaves), *Xanthorrhœa* sp. (Grass Tree), *Exocarpus cupressiformis*, Labill. (Native Cherry), *Acacia dealbata* and *A. implexa*, Benth.

The Currajong all through looked healthy and green, and in this district, as well as elsewhere, fully demonstrated its drought-resisting qualities.

The most of the Eucalypts seen within about 30 to 40 miles of Tumbarumba are those which might be found in a similar zone

in the Bathurst to Goulburn district, the condition of temperature evidently being an important factor in regulating the distribution.

E. camphora, R. T. Baker (*E. Gunnii* var. *ovata*, Deane and Maiden, these Proceedings, 1901, p. 136), which is known as Swamp Gum or Broad-leaved Sally, was found only along the banks of creeks or extending out on the damp flats. It has a thick, hard, flaky bark for 6 or 8 feet near the butt, then thin strips toning off into smooth of a greenish or slaty colour. Usually the trees may be said to average from 30 to 40 feet high with a diameter from one to two feet. The timber is considered to be of little value, but lasts fairly well in damp places as compared with other local timber. The foliage of this species in the Tumbarumba district is of a dark healthy-looking green colour; the young leaves are often nearly orbicular, while the mature ones, though generally more elongated, are broad and mucronate. The fruits throughout this district are short and conical, with exserted valves. This species is often associated with *E. stellulata*, and shows considerable affinity to *E. acervula*, Miq. (*E. Gunnii* var. *acervula*, Deane and Maiden; *E. paludosa*, Baker), but is generally separable from it both by fruits and foliage. No trees of the latter were seen in the Tumbarumba or Tumut districts, but *E. camphora* was common along most of the creeks on the higher parts.

A tree growing in the Tumbarumba district, though not noticed close to the road travelled, is *E. globulus*, Labill., the Tasmanian Blue Gum, locally known as Eurabbie. It is locally considered one of the best of these cold-country timbers, but those who are acquainted with timbers of other districts look upon it as very variable in quality and of doubtful value. Tumbarumba is one of the few spots in which it is indigenous in New South Wales.

From Tumbarumba to Laurel Hill (also known as Bago) is northerly about 15 miles, and for the most part a gradual ascent. The Eucalypts to be found near the road are:—*E. dives* (only near Tumbarumba), *E. camphora*, *E. Bridgesiana*, *E. amygdalina*, *E. stellulata*, *E. rubida*, *E. coriacea*, *E. viminalis*, Labill., and *E. delegatensis*, R. T. Baker (Mountain Ash).

E. globulus may be found a few miles above the road near Back Creek, and *E. viminalis*, growing as large white gum trees, occurs on the basalt tableland all around Laurel Hill. The latter species is confused locally with *E. rubida*, and except for the round "sucker" leaves of *E. rubida* and its patches of reddish bark often noticeable towards the end of summer, the general difference between these two trees is not pronounced.

E. delegatensis frequents the heads of most of the gullies throughout the Bago forest reserve, extending thence across towards Kiandra, and occurring, among other places, on the Delegate Mountain, near the little township of Delegate, as its botanical name suggests. It is the most valuable timber tree in the neighbourhood of Bago, being cut in sawmills for transport to adjacent towns. The trees are large, being commonly 150 feet high with a diameter of 5 feet. The bark for half-way up the barrel is fibrous, approaching a stringybark, but the upper part of the trunk and the branches are smooth, except for the long ribbons or streamers of bark which are often suspended therefrom. The leaves are large and fairly coarse, especially those on seedling plants about 10 or 12 feet high, where measurements up to 8 or 9 inches long by half that in width are common. A favourite spot for the germinating of the seeds is where the earth has been disturbed by the burrowing of the Wombats (*Phascolomys* sp.), which are common in this locality. Seedling plants of this species appear to pass out of the opposite-leaved stage at a very early period, more so than is the case in the majority of species of this genus. The "sucker" leaves appeared to be less frequent on Mountain Ash than on any other in the locality, and those noticed had no marked characteristics, and were much smaller than the leaves of seedling plants a few feet high. The fruits somewhat resemble those of *E. Sieberiana*, F.v.M., the Mountain Ash of the coastal area, but appear to be regularly more constricted at the rim. The venation of the leaves of these two trees also shows considerable similarity, and this, together with the resemblance of the fruits, suggested the thought that *E. delegatensis* might only be a variety of *E. Sieberiana*.

The differences, however, between these two trees, especially in the bark, seem sufficient to warrant their being considered specifically distinct. Some general characters, however, such as bark (partly), foliage, and in some cases the fruits, suggest a considerable affinity with *E. obliqua*, L'Héritier.

The timber of *E. delegatensis* is fissile, easily worked, and used for all kinds of structures, but is not considered very durable in the ground. Although it is used in the framework of buildings, the blocks upon which it stands are selected in the Bago district from healthy trees of Peppermint (*E. amygdalina*), though in no other part of this State have I known the latter species to be specially recommended for its durability under ground, and am inclined to think that its value here is of a comparative nature. This Mountain Ash evidently produces a timber which requires to be well seasoned, otherwise it shrinks very much. The floors of verandahs and balconies in the towns of Adelong and Tumut give evidence of the shrinkage which takes place in the flooring boards, the cracks between them in many instances being more than a quarter of an inch across.

In the Tumbarumba to Laurel Hill district it is *E. amygdalina*, which is known as Peppermint, and *E. dives* as Messmate, though this order is reversed in other parts of the State. No trees of the latter species were seen near Laurel Hill, but it was noticed that some bushmen called all the small trees of *E. amygdalina* Peppermint, while some of the large ones were pointed out as Messmate, thus showing that even local knowledge must sometimes be received with caution.

One resident of Laurel Hill informed me that goats would eat the "sucker" leaves of all the local Eucalypts except those of *E. amygdalina*, and some trees which he ringbarked near his residence were kept "suckered" in this way till they died, but the Peppermints were allowed to remain untouched.

A feature in connection with the vegetation of Laurel Hill, which is about 3,300 feet above sea-level, is its resemblance to that of parts of Tasmania, and this is owing for the most part to the similarity of climate. The geological formation of the locality

is chiefly granitic, covered in places with basalt flows, underneath which mining for alluvial gold is being carried on.

Among the various plants which may be found in the neighbourhood are:—*Clematis aristata*, R.Br., *Hibbertia linearis*, R.Br., var. *obtusifolia*, *Drimys aromatica*, F.v.M. (Pepper Bush), *Oxylobium ellipticum*, R.Br., var. *alpinum*, Maiden & Betche, *Daviesia latifolia*, R.Br. (Hop Scrub), *D. ulicina*, Sm., *Pultenæa mucronata*, F.v.M., *Platylobium formosum*, Sm., *Acacia siculiformis*, A. Cunn., *A. dealbata*, Link (Silver Wattle), *A. melanoxylon*, R.Br., *A. lunata*, Sieb., *Bœckea Gunniana*, Schau., *Leptospermum lanigerum*, Sm., *Callistemon pithyoides*, Miq., a much divided, narrow-leaved form of *Panax sambucifolius*, Sieb., *Loranthus* sp., *Coprosma Billardieri*, J. Hk., *C. hirtella*, Labill., *Olearia myrsinoides*, Labill., *O. floribunda*, Benth., *Cassinia aculeata*, R.Br., *Bedfordia salicina*, DC., *Wahlenbergia gracilis*, Schrad. (Blue Bell), *Epacris heteronema*, Labill., *Veronica Derwentia*, Andr. (erroneously called Wild Tobacco), *Prostanthera lasianthos*, Labill., *Persoonia Chamæpeuce*, Lhotsky (Geebung), *Hakea microcarpa*, R.Br., *Lomatia longifolia*, R.Br., *Pimelea ligustrina*, Labill., var. *glabra*, Maiden & Betche, *Exocarpus cupressiformis*, Labill. (Native Cherry), *E. stricta*, R.Br., *Lomaria discolor*, Willd., *L. alpina*, Spreng., *L. Capensis*, Willd., and *Aspidium aculeatum*, Sw.

The last four species mentioned do not comprise the whole of the ferns found in this locality.

Acacia melanoxylon, with its dense foliage, is conspicuous in the heads of the gullies and near the streams, being known locally as Hickory.

During a limited search no species of Grevillea was noticed throughout the Tumbarumba district. The genus is one which apparently does not favour a cold climate, as only one species, *G. australis*, R.Br., is recorded for Tasmania. This species is also recorded from the elevated parts of Victoria and from Mount Kosciusko.

In driving from Laurel Hill to Batlow the following trees and shrubs were noticed on the roadside:—*Eucalyptus viminalis*, *E.*

rubida, *E. amygdalina*, *E. coriacea*, *E. camphora*, *Cassinia aculeata*, *Daviesia latifolia*, *Acacia implexa*, Benth., *A. dealbata*, *A. melanoxylon*, *Exocarpus cupressiformis*, *E. stricta*, *Leptospermum lanigerum*, *L. scoparium*, *Platylobium formosum*, *Indigofera* sp., *Cassytha* sp., *Loranthus* sp., *Bedfordia salicina*, and *Prostanthera lasianthos*.

Undoubtedly this last-named shrub is well worthy of cultivation in a cool climate, for towards midsummer it becomes covered with a profusion of beautiful flowers of a whitish hue often tinged with blue. It blooms luxuriantly in Tasmania and the cooler parts of Victoria, coming up along the south coast and highlands of this State. At Ulladulla it is sometimes called White Christmas-bush, to differentiate it from *Ceratopetalum gummiferum*, Sm., the well known Pink Christmas-bush.

Between Batlow and Adelong the country falls considerably, and it may be noticed that the same zone of trees is passed through that was found away to the south-west when ascending to Tumbarumba from Kyamba, and which exists along the greater part of the western slopes, forming a connecting link between the flora of the lowlands and that of the mountain ranges. The Eucalypts noticed were :—*E. camphora*, *E. amygdalina*, *E. rubida*, *E. viminalis* (these were seen only on the higher part of the road near Batlow), *E. Bridgesiana*, *E. macrorrhyncha*, *E. Cambagei*, *E. coriacea* (a few trees only, at a comparatively low level for this species), *E. dives*, *E. tereticornis* and var. *dealbata*, *E. hemiphloia* var. *albens*, and *E. melliodora*, the last two being only noticed towards Adelong.

E. polyanthemos was not seen along this road, although it is common in similar situations to the north and south. Possibly its absence may be accounted for by the fact that the geological formation between Batlow and Adelong is granitic, while this species usually prefers a formation of sedimentary origin. It occurs considerably, however, below Adelong near Mount Horeb, and scarcely differs from the Red Box of Bathurst.

Various shrubs and small trees growing by the roadside are:—*Bœckea* sp., *Hibbertia linearis*, *Acacia melanoxylon*, *A. dealbata*,

Leptospermum scoparium, *Daviesia ulicina*, *D. latifolia*, *Cassinia aculeata*, *Bursaria spinosa*, Cav., *Exocarpus cupressiformis*, *E. stricta*, *Loranthus* sp., *Banksia marginata*, Cav., *Sterculia diversifolia*, and *Discaria australis*, Hook. This last-mentioned plant may be found among the rocks in clear fields, its sharp spines protecting it from being devoured by stock.

On the hillside south-westerly from Mount Horeb railway station, at about 8 miles from Adelong, are some trees of *Eucalyptus hæmastoma* var. *micrantha* (White or Brittle Gum), and judging from the white stems visible, they appear also to be distributed among the hills to the northward.

Between Adelong and Tumut the country is generally cleared, and the remaining species therefore comparatively few. The following Eucalypts, however, were noticed:—*E. Bridgesiana*, *E. melliodora*, *E. hemiphloia* var. *albens*, *E. tereticornis*, *E. macrorrhyncha*, *E. dives*, *E. rostrata* (on Gilmore Creek), and *E. polyanthemos*.

Desmodium varians, Endl., and *Glycine tabacina*, Benth., were found near Tumut. *Eucalyptus pulverulenta*, Sims, the Argyle Apple, may be found a few miles south-easterly from Tumut.

In going from Tumut towards Wyangle for a distance north-easterly of about 15 miles, the Eucalypts noticed were:—*E. rostrata* (near the Tumut River), *E. Bridgesiana*, *E. hemiphloia* var. *albens*, *E. melliodora*, *E. macrorrhyncha*, *E. polyanthemos* (chiefly known as Round-leaf Gum), *E. tereticornis*, *E. Cambagei* (some with very large flowers and fruits), *E. dives*, *E. amygdalina*, *E. rubida*, *E. viminalis*, *E. coriacea*, and *E. camphora*.

A casual glance over this list will at once reveal the fact that the country passed over must be rising from Tumut to Wyangle, as the species mentioned from *E. dives* onward are all cold-country trees, and are very rarely found growing among such as *E. rostrata* or var. *albens*. At the same time the connecting links between the warm- and cold-climate floras may be found represented by *E. polyanthemos*, *E. macrorrhyncha*, and *E. Cambagei*. This climatic influence is a feature worthy of great consideration in connection with questions of forestry.

Other trees and shrubs noted towards Wyangle were *Hibbertia linearis, Bursaria spinosa, Sterculia diversifolia, Pomaderris* sp., *Acacia implexa, A. melanoxylon, A. dealbata, A. pravissima*, F.v.M., *Leptospermum scoparium, Banksia marginata, Casuarina quadrivalvis, Exocarpus cupressiformis*, and *Xanthorrhœa* sp. (Grass Tree).

Between Tumut and Gundagai the country is naturally an open forest, much of which has been cleared, consequently the flora is very sparse. Among the species seen from the coach were :— *Eucalyptus rostrata, E. Bridgesiana, E. melliodora, E. macrorrhyncha, E. hemiphloia* var. *albens, E. polyanthemos, E. Cambagei, E. tereticornis, Xanthorrhœa* sp., *Sterculia diversifolia, Bursaria spinosa, Wahlenbergia gracilis*, and *Casuarina Cunninghamiana* (River Oak).

The last-mentioned species was found only on the Murrumbidgee at Gundagai (though is probably on unobserved portions of the Tumut River as well), and although near the town most of the trees have been destroyed, it may be seen lining both banks of the river a few miles up stream. This species is common along the upper portions of most of our rivers, growing close to the water's edge, thereby outlining the course of the stream, and while its roots serve to preserve the banks from erosion during floods, its conspicuous dark green foliage contributes materially towards the general beauty of the landscape.

The complete list of Eucalypts seen between Wagga, Tumbarumba, and Tumut gives a total of twenty-one, viz.:— *E. rostrata, E. melliodora, E. Woollsiana, E. hemiphloia* var. *albens, E. Bridgesiana, E. polyanthemos, E. tereticornis* and var. *dealbata, E. macrorrhyncha, E. Cambagei, E. hæmastoma* var. *micrantha, E. sideroxylon, E. camphora, E. rubida, E. coriacea, E. amygdalina, E. maculosa, E. stellulata, E. dives, E. globulus, E. delegatensis*, and *E. pulverulenta*.

I have to acknowledge assistance from Mr. J. H. Maiden, F.L.S., in identifying some of the plants mentioned.

NOTES AND EXHIBITS.

Mr. Maiden exhibited a specimen of *Loranthus* upon *Melaleuca* sp., from Kangaroo Island, and contributed the following Note thereon :—"The late Prof. Ralph Tate makes the statement* that 'both bird [mistletoe bird, *Dicæum*] and mistletoe are absent from the large adjacent insular lands of Tasmania and Kangaroo Island.' For some time past I have been making enquiries on the subject through the kindness of Mr. Walter Gill, Conservator of Forests, Adelaide. In June, 1903, he reported that a Mr. Wells had seen Mistletoe growing on Gums (Eucalypts) at Duck Lagoon, Cygnet River, 12 miles from Queenscliffe, Kangaroo Island, but no specimens were available. Since then specimens have been received from Mounted Constable Thorpe, who obtained them from White Lagoon. They show the Mistletoe (?*Loranthus pendulus*, Sieb., var. *parviflorus*) in leaf only, *in situ* on *Melaleuca* sp. It remains to further test the truth of the dictum as regards Tasmania."

Mr. Cheel exhibited herbarium specimens of two apparently very different forms of what is usually regarded as *Helichrysum bracteatum*, Willd., (N.O. Compositæ), collected near Eden, Twofold Bay, December, 1903, one of them a rather tall, not viscid plant, with broad leaves, such as is commonly seen in the Illawarra district; the other a dwarf, viscid plant, from 9-12 inches high, with narrow leaves, which are also viscid. He also showed fresh flowering specimens raised from seed of each of the above forms, showing the characteristics of the respective parents. The exhibits suggested doubts as to the correctness of Mr. Bentham's views upon the synonymy of *H. bracteatum* (Fl. Austr. iii. 620); but the discussion of the point could not be carried further at present for lack of opportunity for comparison with specimens from Sieber's and other collections not available to a botanist in Australia.

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* Proc. Aust. Assoc. Adv. Sci. vii., 556.

Messrs. Waterhouse and Turner called attention to the fact that they had had the opportunity of examining a collection of butterflies recently made on Lord Howe Island, which contained three species not previously recorded from the Island [the Society's Proceedings, 1897, p. 285)—*Melanitis leda*, Linn., the first record of a Satyrid Butterfly; *Appias ega*, Boisd. (♂♀); and *Terias libythea*, Fabr.

Dr. Goding and Mr. Froggatt exhibited a portion of the extensive collection of the Australian Cicadidæ studied by them, in illustration of their paper.

Mr. Froggatt showed the type-specimens of the remarkable Neuropterous insects described in his paper.

Mr. Fletcher exhibited examples of the male amenta of the Bunya Bunya (*Araucaria Bidwilli*, Hook.), some of them exceeding 5 inches in length, from a tree just now in full flower in a garden at Hunter's Hill. In the original description, Sir William Hooker gave the length of the male amenta as "about 4 inches." By Mr. Bentham in the 'Flora Australiensis,' as also by Mr. Bailey in the 'Queensland Flora,' they are said to be "2 to 3 in. long." The question was asked whether a tendency to an increase in the length of the amenta was a variation characteristic of trees in cultivation.

WEDNESDAY, OCTOBER 26TH, 1904.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, July 27th, 1904.

Dr. T. Storie Dixson, President, in the Chair.

The President announced that the Council had decided to offer, forthwith, three Linnean Macleay Fellowships, each of the annual

value of £400, and tenable for one year, with the prospect of subsequent reappointments. Applications by qualified persons desiring to hold these Fellowships must be made in writing on or before 1st December, 1904. Candidates must be Members of the Linnean Society of New South Wales; must have taken the Degree of Bachelor of Science or Doctor of Science in the University of Sydney; and must furnish satisfactory evidence of their qualifications for undertaking scientific research. Having regard to the value of the Fellowships, they would not be surprised to hear that the standard for successful competitors might be expected to be high, as it was not incumbent upon the Council to fill up all or any of the Fellowships at any time vacant, if not satisfied as to the eligibility of applicants. Candidates were invited to apply for appointment in one of the following eleven branches:—(1) Animal and Vegetable Physiology and Pathology; (2) Anthropology; (3) Botany; (4) Comparative Anatomy and Embryology; (5) General Biology; (6) Geography; (7) Geology; (8) Meteorology; (9) Organic Chemistry as applied to Biology; (10) Palæontology; (11) Zoology. Fellows would be expected to begin work on 1st April, 1905, and to devote their time to research in the selected branches of Natural Science. Before sending in their applications, Candidates were recommended to communicate with the Secretary, who would furnish all needful information.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 2 Vols., 51 Parts or Nos., 5 Bulletins, 3 Reports, 1 Pamphlet, and 1 Miscellanea, received from 36 Societies, &c., and 1 Author, were laid upon the table.

REVISIONAL NOTES ON AUSTRALIAN *CARABIDÆ*.

By Thomas G. Sloane.

Part I.

Tribes *Carabini, Pamborini, Pseudozænini, Clivini;* and the Genus *Nebriosoma*.

Subfamily **CARABINÆ**.

Middle coxal cavities not entirely enclosed by the sterna, the epimeron of the mesosternum attaining the coxa.

The following table will enable the tribes found in Australia to be recognised:—

i. Body not pedunculate, bases of prothorax and elytra in contact.
Prosternum with anterior coxal cavities open behind.
Anterior tibiæ with spurs terminal, outer apical angle not prolonged. Mandibles edentate, transversely rugose.....Tribe i. Carabini.
Anterior tibiæ with inner spur above outer, outer apical angle prolonged. Mandibles dentate, smooth..... .....Tribe ii. Pamborini.
Prosternum with anterior coxal cavities closed behind.
Elytra striate on disc, reflexed lateral border entire. Posterior coxæ contiguous..... Tribe iii.? (Genus *Nebriosoma*).
Elytra costate, reflexed lateral border interrupted near middle of length. Posterior coxæ separated... .....Tribe iv. Pseudozænini.
ii. Body pedunculate, bases of prothorax and elytra remote. (Anterior tibiæ with outer apical angle prolonged).. .....*BIPARTITI.*
Ligula small and prolonged, the tip narrow and bisetose; paraglossæ free, small, narrow, pointed. Base of maxillæ not covered by mentum. ....Tribe v. Clivinini.
Ligula broad, membraneous; paraglossæ corneous, ciliate at apex. Mentum broad and concealing at sides base of maxillæ... ..Tribe vi. Scaritini.

Tribe i.—**Carabini.**

Genus CALOSOMA.

Weber, Obs. Ent. i. 1801, p. 20.

Table of Australian Species.

Under surface with at least the sternal parts and sides of anterior ventral segments viridescent; prothorax and elytra bright green	*C. schayeri*, Erichs.
Under surface nigro-piceous; elytra nigro-æneous (*fide* Hope)	*C. australe*, Hope.
Under surface bright green; elytra cupreous with narrow green margin	*C. walkeri*, Waterh.

Note.—*C. schayeri*, = *C. curtisi*, Hope, = *C. grandipenne*, Casteln., is widely spread throughout Australia, and also occurs in Tasmania; I have seen it from Central Australia (Finke River), New South Wales, and Victoria; de Castelnau records that (amongst other localities) he had it from Queensland (Flinders River), South Australia (Adelaide) and Swan River.* *C. australe* is unknown to me; according to Castelnau it is very rare, and is found "towards Cooper's Creek in the central part of the continent"; Mr. Masters gives the habitat as "Duaringa, Gayndah and Cooper's Creek, Queensland." *C. walkeri* is a distinct species. I have a specimen ticketed King's Sound; Mr. Waterhouse's localities are Roebuck Bay and Swan River. It may be noted that Horn has said that the prothorax of the members of the tribe Carabini has two marginal setæ on each side,† but I have not found any marginal setæ in the specimens of Australian *Calosoma* which I have examined.

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* Trans. Roy. Soc. Vict. 1868, viii. p. 99. Mr. Masters in his Catalogue does not record it from Western Australia, so that I doubt whether it is found on the Swan River.

† Trans. Am. Ent. Soc. 1881, ix. p. 108.

Tribe ii.—**Pamborini.**

Genus PAMBORUS.

Latreille, Règn. Anim. iii. 1817, p. 198; Monogr., Gory, Mag. Zool. 1836; Notes, Chaudoir, Rev. & Mag. Zool. 1869.

Callimosoma, Hope.*

When defining the tribe Pamborini Dr. Horn said the prothorax has "a setigerous puncture at middle of sides and another near the hind angle."† This observation is accurate for the posterior puncture, but otherwise only applies to *P. guerini*, *P. brisbanensis*, and *P. pradieri*; *P. guerini* has sometimes a second setigerous puncture about half-way between the one at widest part and the anterior angle. In *P. macleayi* the number of marginal setæ on the anterior part of the sides varies; four specimens are before me (all from Dunoon on the Richmond River, N.S.W.); one of these (♀) has only one setigerous puncture at the widest part on each side; the other three (♀ 2, ♂ 1) have the anterior part of the prothorax with two widely placed setigerous punctures on one side and three on the other (the distance between these punctures shows that the presence of the extra punctures is not due to the duplication of the ordinary single puncture, though the duplication of such punctures is common throughout the family Carabidæ). *P. alternans*, *P. morbillosus*, *P. viridis* and *P. opacus* have always a puncture at the widest part, and in addition several others forward from it. In *Pamborus* the apex of the abdomen is truncate in the ♂ and rounded in the ♀; the sexes are thus readily distinguished from one another. The species of *Pamborus* are found in the coastal districts of Eastern Australia, from about the Shoalhaven River in the south to Cairns in the north; *P. viridis* extends inland in New South Wales to the Canoblas Mountains near Orange, and to Coonabarabran.

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* *Callimosoma*, gen. ined., was proposed by Hope for *Pamborus guerini*, but has not been adopted.

† Trans. Am. Ent. Soc. ix. 1881, p. 109.

Table of Species.

A. Elytra with eight large costiform interstices on each.
  B. Prothorax with marginal channel and lateral basal impression uniting in a concavity at each posterior angle.
    c. Elytra with eighth interstice wide, its summit even in middle of length.
      d. Elytra with fifth and seventh interstices more or less catenulate (seventh greatly interrupted)..... *P. alternans*, Latr. / *P. morbillosus*, Boisd.
      dd. Elytra with seventh interstice not interrupted....*P. viridis*, Gory.
    cc. Elytra with eighth interstice narrow, its summit crenulate or serrate.....**P. opacus*, Gehin.
  BB. Prothorax with lateral basal impressions separated posteriorly from marginal channel by a convex space.
    E. Elytra with intercostal spaces sulciform, third, fifth, and seventh costa interrupted (catenulate)..... .....*P. macleayi*, Casteln.
    EE. Elytra with intercostal spaces lightly raised and forming narrow ridges with a closely set row of punctures on each side (prothorax with sides 2-setose).. . .....*P. brisbanensis*, Casteln.
AA. Elytra with fifteen narrow carinate interstices on each.
  F. Prothorax long (hardly broader than long), elytra with edge of reflexed border even..... .....†*P. pradieri*, Chaud.
  FF. Prothorax short, elytra with reflexed border bearing a few widely placed raised serrations. . .....*P. guerini*, Gory.

Pamborus alternans, Latreille.

Enc. Méth. viii. p. 678; Déj., Spec. ii. p. 19; Chaud., Rev. Mag. Zool. 1869, p. 65.

P. elongatus Gory, Mag. Zool. 1836, p. 166.

P. viridiaureus, Macl., Proc. Linn. Soc. N.S.W. 1893, viii. p. 409.

Chaudoir (with Gory's type in his possession) united *P. elongatus* with *P. alternans*. I place *P. viridiaureus*, Macl., under *P. alternans*, for though it may be regarded as a subspecies, I cannot differentiate it from *P. alternans*. Macleay seems to have relied particularly on the elongate prothorax to characterise *P.*

* *Hab.*—Queensland: Cairns (Froggatt), Herbert River and Cairns (Dodd; Coll. Sloane). I have identified *P. opacus* from Gehin's description.

† *Hab.*—N.S.W.: Bellinger River; one specimen given to me by Mr. W. W. Froggatt. The exact habitat has not been previously recorded.

viridiaureus, but the shape of the prothorax is variable in *P. alternans*. The specimen in my collection with the most elongate prothorax is from Ourimbah, south of Newcastle; in this characteristic it surpasses specimens sent to me from Brisbane by Mr. R. Illidge under the name of *P. viridiaureus*, Macl., and identified by me as that species by comparison with the type in the Macleay Museum.

PAMBORUS MORBILLOSUS, Boisd.

Voy. Astrol., Zool. ii. 1835, p. 27; Gory, Mag. Zool. 1836, p. 167. *P. cunninghami*, Casteln., Etud. Ent. 1835, p. 156; Chaud., Rev. Mag. Zool. 1869, p. 65.

When dealing with this species Chaudoir had in his possession Gory's collection, including the type of *P. cunninghami*, Casteln., which he placed as a synonym of *P. morbillosus*. I translate his remarks as follows:—The type of *morbillosus* which I possess is closely allied to, and perhaps only a variety [of *P. alternans*]; however, I must note that it is smaller, the prothorax more rounded on the sides, which makes it appear more narrowed behind, the elytra are shorter, more convex, and my specimens are of a bronzy-copper colour which I have never seen in *P. alternans* or *P. elongatus*.

Chaudoir's remarks apply to specimens in my collection given to me by Mr. R. Illidge as from Dalveen, Queensland (near the New South Wales border), and also to another specimen given to me by Mr. Froggatt as from the Bellinger River, N.S.W.

Tribe iii.—?

Genus NEBRIOSOMA.

NEBRIOSOMA FALLAX, Castelnau.

Trans. Roy. Soc. Vict. 1868, viii. p. 179.

I have seen the type (the only specimen as yet recorded) of *N. fallax* in the Howitt Collection, and have the following insufficient note on it. Mesepimeron reaching coxa, head with one supraorbital puncture, prothorax with no lateral seta near basal

angles, elytra with reflexed border not interrupted, posterior coxæ contiguous. These features evidently prevent its being placed in the tribe Pseudozænini, and I hesitate to refer it to the tribe Migadopini—thereby bringing a new tribe into the Australian fauna, an action which would be unwarranted on such doubtful data. I therefore leave it as a genus of uncertain position.

Tribe iv.—**Pseudozænini.**

Mystropomini, Horn, Trans. Am. Ent. Soc. ix. 1881, p. 116.

The genus *Pseudozæna* from New Guinea and the Malayan Archipelago must be referred to Horn's tribe Mystropomini, and being the oldest genus of the tribe, should give the tribal name. In his definition of the tribe Horn has said, "thorax without marginal setæ"; this is erroneous; *Mystropomus* has the prothorax with the lateral channel plurisetose, the setæ extending from near the anterior angle to the basal angle. In regard to the supra-orbital setæ of the head, Horn said that in *Mystropomus* there are two, but this seems to be misleading, for there are several setæ rising from pores on each side of the head above the eyes. I note that in *Mystropomus* the male has the anterior femora armed beneath at about the basal third with a small dentiform prominence. A somewhat similar feature may be noticed in the male in the genera *Lychnus*, *Chlænius* (some species), *Rhœbolestes* and *Ænigma*. *Mystropomus subcostatus*, Chaud., ejects an acrid and explosive fluid like the bombardier beetles (*Pheropsophus*) and the Paussidæ (*Cerapterus*).

BIPARTITI.

Latreille, Fam. Nat. 1825.

The Latreillian name Bipartiti may be revived with advantage for that division of the Carabidæ to which Dr. Horn, following modern usage, attributed the tribal name of Scaritini, but which seems to me to contain material for two tribes of a value equivalent to that of most of the recognised tribes among the Carabidæ.*

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* *Vide supra*, Table of Australian Tribes.

Note on the striation of the elytra.—Among the Bipartiti the species with striated elytra have seven striæ and a lateral furrow; while in the Carabidæ generally the normal number of striæ is eight and a lateral furrow. In the Bipartiti the lateral channel is wide, and it is evident that the usual eighth stria and ninth interstice are lost in it. This is a character of the highest importance, which I believe to be peculiar to the Bipartiti.

PHYLOGENY (*with special reference to the Australian Pasimachides*).

There seem sufficient reasons (*e.g.*, form of buccal fissure, intermediate tibiæ, concavities of lower side of peduncle) for placing the subtribe Scaritides between the tribe Clivinini and the subtribe Pasimachides; but, whether each of these latter groups represents a departure in a different direction from a central Scaritid stock, or whether the line of descent is rather *Clivina-Scarites-Pasimachus*, is a question on which the insufficiency of my knowledge of many varied component parts of the Bipartiti prevents an opinion being offered here.

In regard, however, to the Australian Pasimachides, there seem to be grounds for supposing them to be descended from a Scaritid ancestral form. The following evidence is offered in support of this hypothesis:—(1) The point of contact between the submentum and the paragenæ is indicated by a line, more or less distinct, which shows the division of these parts (as in the Scaritides) to be more primitive than the unified form. (2) The Australian Pasimachides are all apterous, and it seems certain that in the Carabidæ such apterous forms must have had winged ancestors (winged forms are common among the Scaritini). I cannot imagine it possible for the descendants of an apterous beetle with connate elytra to vary in the direction of acquiring wings. It is evident that the submentum and paragenæ had become contiguous, and the wings had been lost before the origin of any of the present Australian *Pasimachides*.

I believe that the primitive form from which the Carenums are derived had the elytra punctate-striate. This is shown by

some forms still being striate (*e.g., Carenarchus*),* or with the elytra punctate (*Laccoscaphus*);* while in the smoothest Carenums faint, but distinct, rows of punctures may be brought out on the elytra by a lengthened immersion in alcohol. If the elytra of one of these smooth Carenums be detached and looked at towards the light the presence of hidden honeycombed lines beneath the smooth dorsal derm is disclosed. There is also reason to suppose that the ancestors of the Carenums had many setigerous pores along the lateral margins of the prothorax (*e.g.*, *Trichocarenum*), and on the elytra (*e.g.*, the submarginal setigerous punctures in some *Scaraphites*, *Neocarenum* and *Trichocarenum*).

CHÆTOTAXY (*with special reference to the Australian Pasimachides*).

In his 'Monograph of the Carabidæ of the Hawaiian Islands,' Dr. Sharp has attributed such a high importance to chætotaxy† for taxonomic purposes that some observations I have made on this subject in the group Carenides may not be without interest. In the first place it may be noted that in Dr. G. H. Horn's monumental memoir on the Carabidæ published in the year 1881, the following setæ are noticed as worthy of attention among the Carabidæ:—(1) The supraorbital setæ of the head, (2) a seta near the tip of the basal joint of the antennæ on the upper side, (3) the lateral setæ of the clypeus, (4) the setæ of the anterior margin of the labrum, and also (5) of the ligula, (6) a seta in the outer scrobe of the mandibles, (7) the "post-dental" setæ of the mentum, (8) the setæ of the penultimate joint of the labial palps, (9) the lateral setæ of the prothorax, (10) the dorsal setæ of the

* The generic names *Laccopterum* and *Epilectus* now in use among the Australian Pasimachides are preoccupied; *Laccoscaphus* and *Carenarchus* are, therefore, proposed to replace them.

† "From the chitinous skeleton there stand out hairs that in some cases penetrate the chitin and are connected with a special nerve, thus forming a simple but effective set of sense-organs. The description of the ways in which these hairs are arranged is called chætotaxy." Dr. D. Sharp in 'Fauna Hawaiensis,' Coleoptera Caraboidea, Vol. iii. Pt. iii. p. 182. (Cambridge, 1903).

elytra, (11) the lateral ocellate setigerous punctures of the elytra, (12) the ambulatorial setæ of the ventral segments, (13) the setæ at apex of the last ventral segment. The only other setæ, as far as I know, which had previously been recognised as of classificatory importance, but which are not noted above, are the setæ of the prosternal and mesosternal declivities.

Among the Carenides the number, position, or absence of the following setæ is of considerable classificatory importance :— (1) The setæ of the penultimate joint of the labial palps; (2) a seta at basal angles of prothorax (some species of *Scaraphites* only); (3) the ocellate punctures at base of elytra (present throughout the Carenides except in the genus *Scaraphites*); (4) the subapical seta of the lower edge of the posterior side of the anterior femora (present in the typical Carenums, but absent in *Neocarenum*, *Neoscaphus*, and *Carenidium*)—this last character loses its value to a great extent in the genera *Scaraphites* and *Euryscaphus*; (5) the seta near the anterior margin of the posterior coxæ (the presence or absence of this seta has some value in the Carenides). I give below some remarks on the setigerous punctures of the posterior face of the anterior femora and of the posterior coxæ; these characters seem to have received attention first from me;* they evidently have an importance that cannot be overlooked.

I would draw attention to the fact that most of these sense-setæ are subject to duplication, when a normally single seta is replaced by two (each in a separate pit) placed close together. It should be noted here that in *Carenum subcyaneum*, Macl., all my specimens have (on each side) the anterior femora with two closely placed subapical setigerous punctures on the lower margin of the posterior face, being the only case known to me where such duplicate setæ are evidently the normal form.

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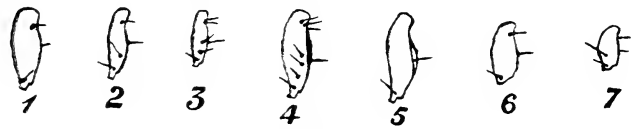
* These Proceedings, iii. (2), 1888, p. 1102.

Chaudoir in his description of *Monocentrum grandiceps* (Ann. Soc. Ent. Belg. 1869, p. 147) says, "aux cuisses antérieures on remarque quelques points pilifères," but he seems to have attached no importance to these punctures.

With my slight knowledge on the subject of chætotaxy I feel unable to place upon the different tactile setæ any fixed taxonomic value, nor can I attribute to any of them among the *Bipartiti* the extreme importance which Dr. Sharp has given to the thoracic setæ among the Hawaiian Carabidæ.

The Setigerous Punctures of the Anterior Femora and Posterior Coxæ.

(1) *The anterior femoral setæ.*—The normal number of setigerous punctures on the posterior face of the anterior femora in the Bipartiti must be taken to be three, placed as follows: one very near the trochanter on the middle of the posterior face of the femora (*basal seta*); one near the lower edge varying in position from about basal third to middle of length of femur (*median seta*) —this seta would often be more accurately described as being on the posterior edge of the lower face of the femur; and one towards the apex near lower edge, about the middle of the apical sinuosity of the lower side of the femur (*subapical seta of lower edge*). When all three setæ are present the femur may be said to be 3-setose; this is the case in *Scarites*, *Geoscaptus*, and *Clivina*. The median and basal setæ seem to be of universal occurrence throughout the tribe (though I have not been able to distinguish either of them in my unique specimens of *Neocarenum elongatum* and *N. blackburni*). The presence or absence of the subapical seta has an important taxonomic value in the typical Carenums; I have never found it in a species of *Neocarenum*, *Carenidium*, or *Neoscaphus*, nor have I ever found it absent (except in *Carenum*



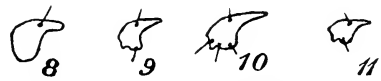
Figs. 1-7.—Anterior Femora to show Setæ of Posterior Face.—1. *Carenum interruptum*; 2. *C. dispar*; 3. *C. subcyaneum*; 4. *C. tibiale*; 5. *C. tumidipes*; 6. *Geoscaptus lævissimus*; 7. *Clivina procera*.

tumidipes) in *Carenum*, *Eutoma*, *Philoscaphus*, *Laccoscaphus*, and *Teratidium*. The above figures indicate the normal position

of these anterior femoral punctures and some variations which I have noted.

(2) *The posterior coxal setæ.*—The primitive form in the Carabidæ is probably to have the posterior coxæ with three setæ, viz., one near the anterior margin in a line behind the centre of the middle coxal cavity (*anterior seta*); one placed longitudinally behind the anterior seta towards the apex of the coxa (*posterior seta*); and one near the inner margin of the coxa between the insertion of the trochanter and the point at which the two coxæ approximate (*inner marginal seta*). Among the Australian Bipartiti the posterior coxæ are 3-setose in the genus *Geoscaphus* only; the anterior and posterior setæ always occur in the Clivinides; while in the Carenides the posterior seta is lost, though in *Trichocarenum*,* *Teratidium* and *Monocentrum* a punctiform scar is found in its position, but the seta is wanting (only in a single specimen of *Scaraphites lenæus* have I found the posterior seta present in a Carenid). Often among the Carenides the posterior coxæ are without setæ (*e.g.*, *Neocarenum*, *Neoscaphus*, *Carenarchus*, *Carenidium gagatinum* and closely allied species.

The subjoined figures show the setigerous punctures of the posterior coxæ in the three divisions of the Australian Bipartiti.



Figs. 8-11.—Posterior Coxæ.—8. *Carenum interruptum*; 9. *Geoscaptus lævissimus*; 10. *G. crassus*; 11. *Clivina procera*.

Probably some use could be made of other tactile setæ of the legs among the Carenides, *e.g.*, those of the trochanters, middle and posterior femora, &c.; but any attempts I have made to utilise these have yielded only negative results, though the presence or absence of a setigerous puncture on the posterior trochanters seems not unimportant in the genus *Carenum*.

* In *Trichocarenum castelnaui*, Sloane, alone among the *Carenides* have I noted the presence of the inner marginal seta.

Tribe v.—Clivinini.

Table of Australian Genera.

Peduncle without lateral concavities beneath.....Clivinarchus.
Peduncle with a concavity on each side.
Prothorax not globose.
Intermediate tibiæ very wide, outer edge crenulate, strongly bidentate towards apex; posterior tibiæ stout, outer edge strongly and unevenly crenulate..... Platysphyrus.
Intermediate tibiæ with a sharp spine externally above (rarely at) apex; posterior tibiæ slender, external side even..... Clivina.
Prothorax globose.....Dyschirius.

Platysphyrus, n.g.

Head short, convex; front strongly biimpressed; eyes hemispherical; two supraorbital setigerous punctures on each side. *Antennæ* short, reaching to about middle of prothorax, rather slender; two basal joints cylindrical, long, equal, glabrous, first stout, second slender, about length of third with half fourth; joints 3-11 porose, hardly pubescent, short, third and fourth subcylindrical, 5-11 slightly compressed. *Mentum* large, longitudinally raised in middle, apex of raised median part forming a short wide emarginate prominence at bottom of sinus, this shallow; lobes short, rounded, sides not concealing base of maxillæ. *Labium* short, widely rounded at apex. Maxillæ with inner lobe short, strongly hooked at apex; inner side with two strong prominent teeth. *Palpi*: maxillary stout; penultimate joint long, incrassate; apical joint oval, hardly more than half length of penultimate: labial thick; penultimate joint not short, bisetigerous in front; apical joint elongate-oval, hardly as long as penultimate. *Clypeus* with "wings" lightly advanced on each side of labrum, narrow, obtuse at apex; median part truncate between "wings." *Mandibles* short, not toothed on inner side; outer side roundly arcuate; upper surface striolate. *Prothorax* convex, widest at posterior angles; border reaching base; two marginal setigerous punctures on each side as in *Clivina*. *Peduncle* with lateral concavities of lower side deep, impunctate; scutellum wide, triangular. *Elytra* oval, strongly convex, striate

as in *Clivina*, fourth and fifth striæ confluent at base; third interstice 4-punctate. *Ventral segments* transversely sulcate. *Legs* stout, fossorial.

Differs from *Clivina* by maxillæ short, toothed on inner side (not densely hirsute); mentum convex, bottom of sinus distant from base, sinus shallow; labium wide at apex; form of tibiæ, &c. It has no resemblance or apparent close affinity to the genus *Clivinarchus*.

PLATYSPHYRUS TIBIALIS, n.sp.

Robust, elongate, black.

Head rather large (4 mm. across eyes); frontal impressions deep, elongate, rugulose; space between them wide, convex; orbits lightly enclosing eyes at base, their postocular part small, not nearly as protuberant as eyes, rising abruptly from head. Prothorax broader than long (6·3 × 7 mm.), widest at posterior angles, roundly narrowed to apex (4 mm.), convex (lightly so longidinally, strongly so transversely), lightly declivous to sides, strongly declivous along basal curve; anterior margin truncate behind head, with anterior angles slightly advanced, wide, obtuse; basal curve short; lateral border thick, reflexed; lateral channel wide, widest and not interrupted at posterior angles, very narrow near base; basal margin entire, not reflexed nor divided from pronotum by a channel; posterior marginal puncture at posterior angle on inner side of lateral channel; median line lightly impressed, reaching base; lateral basal impressions short, strongly impressed, placed above basal declivity in front of basal angles. Elytra oval (14·5 × 7·7 mm.), convex, strongly declivous to peduncle, truncate at base, widely rounded at apex; striæ lightly impressed, finely crenulate, first and second confluent at base and rising from an umbilicate puncture at base of first interstice, seventh entire, hardly lighter than others; interstices depressed, lightly convex on apical declivity, eighth narrow, roundly convex (not carinate) near apex; lateral border narrow, reflexed on basal half, becoming very wide and thick posteriorly, reaching to apex and to base of fourth interstice. Prosternum convex, declivous to anterior margin, transversely striolate; intercoxal part very

wide, its declivity vertical, rounded—but becoming wide and flat near base. Mesosternum with epimera very wide and reaching coxæ. Metasternum small, very short between intermediate and posterior coxæ; episterna short, narrowed posteriorly, a strongly impressed reniform longitudinal fovea on middle of posterior half. Femora stout; anterior compressed, lower and anterior sides flattened, posterior side convex, upper side almost semicircular; posterior femora with lower side strongly dilatate at apex of trochanters. Anterior tibiæ stout, wide; apical prolongation wide with apex obliquely truncate; outer edge deeply trisinuate with a wide explanate projection above the two anterior sinuosities; inner apical spur long, slender, acute; upper internal spur long, slender, curved: intermediate tibiæ wide, with two strong compressed external teeth towards apex; margin explanate and strongly crenulate above upper tooth; posterior tibiæ stout, incrassate; an external tooth at apex; outer edge unequally and shortly denticulate: anterior tarsi narrow; basal joint longer than four succeeding joints together, reaching beyond apical prolongation and paronychium of tibiæ; joints 2-4 small, subequal; middle and posterior tarsi similar, but joints 2-4 more elongate—in middle tarsi as long as, in posterior longer than first joint. Length 24·5, breadth 7·7 mm.

This remarkable species is quite isolated among the Australian Clivinides, but seems more related to *Clivina procera*, Putz., than to any other species known to me. The elytra are essentially those of a *Clivina* allied to *C. procera* (each elytron is 7-striate with a wide marginal channel closely set with umbilicate punctures). *C. procera* has somewhat similar maxillæ, with closely set strong bristles on inner side, but without the teeth of *Platysphyrus*.

Genus Clivina.

Latreille, Consid. Génér. 1810, p. 156; (Revision), Putzeys, Ann. Soc. Ent. Belg. x. 1866; (Supplement), Putzeys, *ibid.* xi. 1868; (Australian Species), Sloane, Proc. Linn. Soc. N.S.W. xxi. 1896.

It is proposed now to review the Australian species of the genus *Clivina* on the basis of my former "Revision," merely indicating any alterations which seem to me needful in their classification or nomenclature, and recording such new species as have come into my possession.

In July, 1896, (the date of my "Revision") the number of recognised Australian species of the genus *Clivina* (using the genus in the wide sense which I have adopted) was eighty-five, and three varieties. Since 1896, the Rev. Thos. Blackburn has described one species, *C. eyrensis*, which, however, he now regards as a synonym of *C. denticollis*, Sl.;* and he has reduced *C. adelaidæ*, Blkb., to a synonym of *C. obliquata*, Putz. I now regard *C. sulcicollis*, Sl., as a species distinct from *C. punctaticeps*, Putz., so that the number of species stands as eighty-five, and two varieties. It is now suggested that six of these must be regarded as synonyms, the number being thus reduced to seventy-nine species, to which I have to add eleven new specific and one varietal names. The total number of species in the Australian list at the present date may be taken to be ninety species and three named varieties.

In this connection I wish to place on record the following opinions :—

C. suturalis, Putz.—It is my belief that *C. verticalis*, Putz., was founded on an immature specimen of *C. suturalis*, Putz.; also that *C. discoidalis*, Blkb., is conspecific with *C. suturalis*. Putzeys placed *C. suturalis* and *C. verticalis* in such positions in his different notes on them as seem to necessitate their being species with the fourth and fifth striæ of the elytra united at the base, but he never recorded this as actually occurring in these species, and he originally placed *C. planiceps*, Putz., similarly, so that this evidence being useless in the one case, may be equally so in the other (*vide* Sloane, these Proceedings, 1896, pp. 169, 204 and 205).

C. dimidiata, Putz., seems to me as if it might have been founded on *C. melanopyga*, Putz. (*vide* Sloane, *ibid.* p. 205).

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* Trans. Roy. Soc. South Aust. 1901, p. 113.

C. microdon, Putz., is in my opinion founded on an immature specimen of *C. basalis*, Chaud. (*vide* Sloane, *ibid.* p. 216).

Heterogena-Group.

In my Revision of 1896 separate groups were suggested for *Clivina punctaticeps*, Putz. (and allied species), *C. blackburni*, Sl., *C. olliffi*, Sl., *C. heterogena*, Putz. (and allied species), and *C. bovillæ*, Blkb. This was done with doubt, and, when treating of the *bovillæ*-group the opinion was expressed that all these groups might with advantage be united and treated as merely sections of one large group. This view is now upheld, and the following table of the species known to me as belonging to this more widely extended group is offered.

Table of Species.

A. Head wide across occiput, eyes not prominent.
  B. Size large (8 mm.); prothorax broader than long (1·8 × 1·9 mm.).....
  ....*C. olliffi*, Sl.
  BB. Size small (5·3 mm.); prothorax longer than broad (1·4 × 1 mm.) .....
  ....*C. blackburni*, Sl.
AA. Head narrow behind the prominent eyes.
  C. Lower side of anterior femora swollen.
    d. Prothorax broader than long (punctate on disc).....*C. lobipes*, Sl.
    dd. Prothorax longer than broad.
      e. Form cylindrical, prothorax impunctate.
        f. Prothorax with basal marginal channel wide . ...*C. sulcicollis*, Sl.
        ff. Prothorax with marginal channel narrow { *C. punctaticeps*, Putz. / *C. tumidipes*, Sl.
      ee. Upper surface subdepressed; prothorax finely punctate.
        g. Size moderate (6·5 mm.); colour black; head coarsely but not densely punctate between eyes, clypeus with median part hardly separated from its wings.....*C. doddi*, Sl.
        gg. Size small (3·8 mm.); colour ferruginous; head densely punctate between eyes, clypeus with median part distinctly divided from wings ....*C. cribrifrons*, Sl.
  CC. Lower side of anterior femora with a short triangular tooth about anterior third.....*C. odontomera*, Putz.
  CCC. Lower side of anterior femora not swollen or toothed.
    h. Head with vertex decidedly punctate.
      i. Prothorax longer than broad (prothorax punctate) .....
      .....*C. heterogena*, Putz.

ii. Prothorax broader than long.
j. Head wide and rounded on sides before eyes, supra-antennal plates wide, depressed; prothorax impunctate.
k. Wings of clypeus rounded, feebly divided from supra-antennal plates; intercoxal part of prosternum narrow, bordered on each side ..... *C. borillæ*, Blkb.
kk. Wings of clypeus with angles rounded but marked, strongly divided from supra-antennal plates; intercoxal part of prosternum attenuate anteriorly..... *C. oodnadattæ*, Blkb.
jj. Head rather narrow and oblique before eyes, supra-antennal plates narrow, convex; prothorax convex on disc..... *C. flava*, Putz.
hh. Head with vertex finely and sparsely punctate.
l. Colour ferruginous..... *C. australica*, Sl.
ll. Bicolorous (elytra black and red)..... *C. atridorsis*, Sl.

Clivina doddi, n.sp.

Elongate, parallel, subdepressed. Piceous-black; under side piceous; legs and antennæ ferruginous. Head coarsely punctate; clypeus with median part widely emarginate, its lateral angles hardly advanced beyond its wings; prothorax longer than broad, parallel on sides, finely punctate on disc; elytra parallel, fourth and fifth striæ confluent at base; anterior femora with posterior margin of lower side decidedly but widely and roundly dilatate; anterior tibiæ 4-dentate, the upper external tooth merely a triangular prominence.

Head moderate; clypeal elevation smooth; front coarsely punctate (not rough) between the wide lateral foveæ; vertex and occiput sparsely punctate; clypeus with median part hardly divided from wings, rather deeply emarginate, the emargination widely truncate in middle and sloping obliquely upwards on each side; wings concave, anterior margin subtruncate, external angle rounded, outer side almost straight; supra-antennal plates rather long, convex, projecting sharply from beyond the clypeal wings in front; facial sulci lightly recurved; eyes prominent, Prothorax subdepressed, longer than broad ($1{\cdot}65 \times 1{\cdot}4$ mm.), not perceptibly narrowed anteriorly; disc finely punctate in middle from basal declivity to near apex, smooth near suture and on lateral declivities; anterior margin truncate. Elytra sub-

depressed, long (3·4 × 1·6 mm.), parallel on sides; abbreviate stria at base of first interstice obsolete (not perceptible behind basal declivity); seventh and eighth interstices at base forming a short posthumeral carina; seventh stria entire. Length 6·5, breadth 1·6 mm.

Hab.—Q.: Townsville (Dodd; in August).

In general appearance closely resembling *C. obliquata*, Putz., but allied to *C. heterogena*, Putz., and *C. punctaticeps*, Putz. The form of the clypeus (intermediate angles much less prominent) and the dilatate lower side of the anterior femora readily separate it from *C. heterogena*. From *C. punctaticeps*, *C. tumidipes*, Sl., and *C. sulcicollis*, Sl., it is differentiated by form more depressed, frontal part of head not closely punctate, anterior femora less strongly lobed beneath (the lower side is more roundly and evenly inflated). From *C. lobipes*, Sl., it differs (apart from colour) by form more elongate; head narrower and less convex, less closely punctate on anterior part; prothorax longer; anterior femora less swollen on lower side. I do not think it can be *C. emarginata*, Putz., because it differs from Putzey's description by colour, vertex not "*antice et dense punctatis*," prothorax not "*lævis*," elytra not "cylindrica."

CLIVINA CRIBRIFRONS, n.sp.

Narrow, elongate, subcylindrical, ferruginous. Head with upper surface closely and finely punctulate, median part of clypeus more prominent than and divided from its wings; prothorax not perceptibly narrowed to apex, upper surface minutely shagreened, finely punctulate; elytra with fourth stria joining fifth at base; eighth interstice finely carinate at base and apex; prosternum with intercoxal part small, attenuate anteriorly; anterior femora with posterior margin of lower side lightly and roundly protuberant in middle; anterior tibiæ 4-dentate.

Clypeus with median part bordered, lightly emarginate; its angles lightly but sharply advanced beyond wings, these truncate with outer angles rounded but marked, a small triangular notch between clypeal wings and supra-antennal plates. Pro-

thorax subquadrate (1 × 0·8 mm.), lightly and widely convex (subdepressed on disc). Elytra truncate-oval (2 × 0·9 mm.), parallel on sides, lightly convex; striæ entire, not deep, finely punctate, seventh strongly impressed for whole length. Length 3·8, breadth 0·9 mm.

Hab.—Q.: Townsville (Dodd).

The anterior femora with the posterior margin of the lower side swollen, indicates that the affinity of this species is to *C. punctaticeps*, Putz., from which, and from *C. tumidipes*, its very much smaller size, inter alia, at once distinguishes it. Comparing it with *C. odontomera*, Putz., it is distinguished by size smaller; colour less dark; head less convex, more densely punctate, supra-antennal plates depressed; anterior femora not dentate beneath; prothorax less convex. Mr. Dodd informs me that this small species emits a most powerful and offensive odour.

Clivina odontomera, Putzeys.

Ann. Soc. Ent. Belg. 1868, xi. p. 18.

C. odontomera is allied to *C. punctaticeps*, Putz., and not to *C. heterogena*, Putz., as I formerly thought.* It exactly resembles small specimens of *C. heterogena*, Putz., but may be distinguished at once from that species by the presence of a well-marked striole at base of first elytral interstice, and by the presence of a small sharp triangular tooth on the lower side of the anterior femora a little before the middle. From small specimens of *C. tumidipes*, Sl., it may be separated readily by the anterior femora with the lower side not roundly dilatate but furnished with the small sharp tooth mentioned above. It is the species alluded to in my notes on the varieties of *C. angustula* under "(4)" (*l.c.* p. 190). Length 4·5-5, breadth 1·15-1·3 mm.

Hab.—Q.: Rockhampton (*fide* Castelnau)—N.S.W.: Young District (Sloane; a number of specimens washed out of the muddy margins of a tank dug for watering sheep).

* These Proceedings, xxi. p. 195.

Clivina heterogena, Putzeys.

Stett. Ent. Zeit. 1866, xxvii. p. 41; Ann. Soc. Ent. Belg. x. p. 189: *C. angustula*, Putz., Stett. Ent. Zeit. 1866, xxvii. p. 42; Ann. Soc. Ent. Belg. x. p. 190; Sloane, Proc. Linn. Soc. N. S. Wales, 1896, xxi. p. 189: (?) *C. deplanata*, Putz., Ann. Soc. Ent. Belg. x. p. 190.

I now consider *C. angustula*, Putz., synonymous with *C. heterogena*, Putz.; and also think *C. deplanata* must be considered a synonym of *C. angustula*. As showing the variation of colour in *C. heterogena*, specimens taken at Benalla, Victoria, in the flood waters of the Broken River (Aug. 31st, 1901) included a specimen of a uniform piceous black on upper surface, and another coloured like *C. felix*, Sl., (elytra reddish with a large black dorsal plaga on posterior part—this plaga narrowly separated from margin at apex and sides).

Hab.—N.S.W.: Clarence River and Windsor (Lea), Young, Carrathool and Mulwala (Sloane)—Vic.: Lillydale, Ferntree Gully, and Benalla (Sloane).

Clivina flava, Putzeys.

Ann. Soc. Ent. Belg. xi. 1868, p. 16.

A single specimen which I refer to *C. flava* has been sent to me by Mr. F. P. Dodd from Townsville, Q. This species has been fully described by Putzeys, and, in my "Revision," I have given a translation of all that is essential in Putzeys' description, so that there is no need to further describe it. The specimen before me is wholly testaceous and apparently immature. Length 5·3, breadth 1·5, prothorax 1·3 × 1·4 mm.

Clivina atridorsis, n.sp.

Rather robust. Piceous red, elytra with five inner interstices black, except towards apex.

Head lævigate, a few fine punctures between eyes; clypeus with median part very lightly emarginate, its angles not marked, hardly advanced or separated from wings, these rounded; supra-

antennal plates convex, bordered externally, divided from clypeal wings by a light sinuosity; eyes prominent. Prothorax convex, as long as broad (1·3 × 1·3 mm.), evidently narrower towards apex, impunctate. Elytra convex (2·9 × 1·5 mm.), widest a little behind middle, strongly punctate-striate; fourth stria joining fifth at base, seventh interrupted before apical curve, deeply impressed near apex; interstices convex, eighth carinate near base. Prosternum with intercoxal part attenuate anteriorly. Anterior femora not swollen on lower side; anterior tibiæ tridentate with a slight triangular prominence above upper tooth. Length 5·5-6·2, breadth 1·3-1·5 mm.

Hab.—Q. : Townsville (Dodd).

This species has the clypeus almost intermediate in form between the species of the *australasiæ-* and *heterogena*-groups. It resembles *C. vittata*, Sl., from which it is differentiated by colour (the black of the dorsal surface of the elytra not attaining the apex, and the elytral margins red, not black); head narrower, eyes more prominent; prothorax not finely punctate, &c. From *C. heterogena*, Putz., it differs by head narrow, smooth, with only a few sparse punctures, clypeal "wings" smaller, not straight on outer side, hardly at all divided from the supra-antennal plates; prothorax more convex, impunctate, &c.

Australasiæ-Group.

In my "Revision" of 1896, probably too much importance was attributed to slight differences in the width of the intercoxal part of the prosternum when forming the chief divisions of this group. I now offer a table treating of the *australasiæ*-group as a whole :

A. Prosternum with episterna more or less rugulose-striolate, not punctate.
  B. Elytra with fourth stria outturned at base and uniting with fifth.
    C. Anterior tibiæ 4-dentate externally. (Intercoxal part of prosternum very narrow or attenuate anteriorly).
      d. Anterior femora wide, posterior margin of lower side rounded.
        e. Elytra wholly black, or striped with red on sides....*C. vittata*, Sl.
        ee. Elytra red with a black discoidal plaga.....*C. sellata*, Putz.
        eee. Elytra wholly testaceous .. ..*C. inconspicua* Sl.

dd. Anterior tibiæ with posterior margin of lower side straight.....
.....*C. ferruginea*, Putz.

CC. Anterior tibiæ 3-dentate externally.

F. Intercoxal part of prosternum attenuate anteriorly.

g. Black, convex; interstices of elytra convex.... ... *C. nigra*, Sl. / *C. occulta*, Sl.

gg. Testaceous, depressed; interstices of elytra flat.....*C. nana*, Sl.

FF. Intercoxal part of prosternum wide or moderately wide anteriorly.

H. Unicolorous species (black).

i. ♂ with anterior tibiæ strongly toothed externally, third tooth projecting decidedly from edge of tibiæ, sometimes a slight protuberance above the third tooth.

j. ♂ with paronychium (inner apical spine) of anterior tibiæ slender, not incrassate.

k. Size large (8-10·5 mm.)..... ..... *C. australasiæ*, Bohem. / *C. lepida*, Putz. / *C. dingo*, Sl.

kk. Size small (6·2-7·5 mm.)

l. Head wide, front punctulate; anterior tibiæ wide, strongly dentate.....*C. queenslandica*, Sl.

ll. Head narrow (obliquely angustate before eyes), front smooth, impunctate; anterior tibiæ narrow, external teeth not strongly prominent.....*C. angustipes*, Putz.

jj. ♂ with paronychium stout, obtuse at apex.

m. Prosternum without pectoral nodules, intercoxal declivity not transversely sulcate..... .....*C. simulans*, Sl.

mm. Prosternum with a pectoral ridge, ending at anterior extremity in a nodule, on each side of intercoxal part, basal declivity transversely sulcate....*C. pectonoda*, Sl.

ii. ♂ with anterior tibiæ obtusely 3-dentate without any trace of a fourth tooth, third tooth not projecting decidedly beyond edge of tibia; paronychium stout, incrassate.

n. Prosternum with lateral pectoral ridges well developed, nodulose at anterior extremity (basal declivity transversely sulcate)... .....*C. dilutipes*, Putz.

nn. Prosternum without nodulose pectoral ridges.

o. Intercoxal basal declivity transversely sulcate.....
....*C. vagans*, Putz.

oo. Intercoxal basal declivity not transversely sulcate.....
....*C. misella*, Sl.

HH. Bicolorous species.

p. Head black.

q. Elytra black with apex red.....*C. leai*, Sl.

qq. Elytra with basal part reddish.

r. Elytra with black part reaching apex and lateral margins ..... *C. basalis*, Chaud.

rr. Elytra with black part forming a large discoidal plaga ..... { *C. felix*, Sl. / *C. eximia*, Sl.

pp. Head testaceous (piceous near eyes)..... *C. pallidiceps*, Sl.

BB. Elytra with fourth stria free at base.

Black, size large (9·5 mm.)..... *C. obliterata*, Sl.

Reddish, size small (6 mm.)..... *C. cylindripennis*, Sl.

AA. Prosternum with episterna punctate..... *C. pectoralis*, Putz.

Clivina vittata, Sloane.

Proc. Linn. Soc. N. S. Wales, xxi. 1896, p. 211.

On the 25th April, 1903, seven specimens of this species occurred to me, eighteen miles north-west from the town of Young. These were found in floated débris at the sides of a depression in the ground filled with storm-water after unusually heavy rain, at a place where there was no permanent water within a mile. These specimens (all ♀) varied in colour, four showing the colour of the type, viz., black with a reddish stripe along each side of the elytra (the red lateral vitta includes interstices 5-7, towards the base it extends on to the 4th interstice, and posteriorly reaches the posterior puncture of the 3rd interstice, where it terminates), while the other three had the upper surface wholly deep black. It is very like *C. sellata*, Putz., but besides having the intercoxal part of the prosternum wider (with other differences noted in the original description) has the eyes much less convex. The prothorax has the upper surface covered with a fine puncturation quite noticeable under an ordinary lens. Length 4·3-5·8, breadth 1·2-1·6 mm.

Colour varieties.

Typical var.—Black, elytra with a reddish stripe on each side. *Loc.* Young district, N.S.W. (Sloane).

A.—As type, only prothorax piceous-red. *Loc.*—Victoria (Blackburn).

B.—Upper surface wholly black. *Loc.*—Young District, N.S.W. (Sloane).

C.—Black, elytra with a faint reddish macula above apical declivity. *Loc.*—Grenfell, N.S.W. (Sloane).

CLIVINA NIGRA, n.sp.

Robust. Clypeus with anterior margin lightly emarginate (median part not divided from wings); elytra with fourth stria outturned and joining fifth at base, submarginal humeral carina short, eighth interstice carinate near apex; prosternum with episterna finely rugulose-striolate, intercoxal part attenuate anteriorly, transversely sulcate on posterior declivity; anterior tibiæ wide, strongly 3-dentate with a small prominence above upper tooth. Black, legs and antennæ yellowish-piceous.

Head wide, rugulose; supra-antennal plates and wings of clypeus wide; clypeus with anterior margin subtruncate (very lightly and widely emarginate), median part in no way divided from wings; supra-antennal plates strongly rounded and bordered laterally; a decided sinuosity at their point of junction with wings of clypeus; eyes very convex and prominent. Prothorax convex, hardly broader than long (1·7 × 1·8 mm.), widest towards base, decidedly narrowed to apex; anterior angles obtuse but marked; anterior margin truncate. Elytra truncate-oval (3·1 × 2 mm.), convex, strongly striate; striæ deep and coarsely punctate near base, becoming lighter and more finely punctate posteriorly, obsolescent and simple on apical declivity, seventh obsolete at beginning of apical curve; interstices convex near base, depressed posteriorly, eighth very narrow and rather carinate at apex. Length 6·2-6·7, breadth 1·85-2 mm.

Hab.—N.S.W.: Mulwala (several specimens washed from the margin of a sand bank on the Murray River, December 8th, 1896; Sloane).

An isolated species readily distinguished from all other Australian species by its small size in combination with the characters noted in the preliminary paragraph of the description above. Evidently most closely allied to *C. occulta*, Sl., a species not now available for reference; but from the description of that species differing by having the anterior margin of the clypeus more evenly emarginate—less truncate in the middle. In appearance it resembles *C. queenslandica*, Sl., and *C. misella*, Sl., but

is at once distinguished from those species by the intercoxal part of the prosternum attenuate anteriorly. It is more robust and convex than *C. queenslandica*, the prothorax shorter, more convex and more strongly narrowed to apex. With *C. misella* it agrees very closely in facies, but the head is more rugulose and much wider before the eyes (similar to that of *C. sellata*, Putz.), the clypeus wider and less deeply and evenly emarginate, the anterior tibiæ much more strongly palmate, &c.

Clivina nana, Sloane.

Proc. Linn. Soc. N.S. Wales xxi. 1896, p. 202.

Hab.—N.S.W. : Tamworth (Lea); Young (*C. nana* occurred to me on the banks of the Burrangong Creek, near Young, amongst débris left after floods, in the months of June and October)—Q. : Townsville (Dodd).

Clivina lepida, Putzeys.

Stett. Ent. Zeit. xxvii. 1866, p. 38; Ann. Soc. Ent. Belg. x. 1866, p. 184 : *C. juvenis*, Putzeys, Stett. Ent. Zeit. xxvii. 1866, p. 37.

It seems certainly the case that I was wrong in my identification of *C. lepida*, Putz., in my "Revision" of 1896. I now believe that *C. lepida* is a Victorian species very closely allied to *C. australasiæ*, Bohem., with which I have hitherto confused it. *C. lepida* has the intercoxal part of the prosternum exactly as in *C. australasiæ*, but the anterior tibiæ are lighter, with the external teeth shorter and more obtuse—the upper (third) tooth far less noticeable. In the male the anterior tibiæ have the inner apical spine longer and less pointed at apex. The variation and distribution of *C. australasiæ* and *C. lepida* will require careful study before the certainty of their distinctness is established. (I now feel little doubt but that *C. juvenis*, Putz., was founded on an immature specimen of *C. lepida*). Length 9-10, breadth 2·4-2·6 mm.

Hab.—Vic. : Carrum (French).

Clivina dingo, n.sp.

Allied to *C. australasiæ*, Bohem., by facies, form of head, prosternum and legs. Black, under surface reddish-piceous, antennæ and legs reddish.

Head with front sparsely and finely punctate; occiput transversely punctate between posterior extremities of facial carinæ. Prothorax longer than broad (2·3 × 2·2 mm.), narrowed to apex, convex; a well developed tubercle closing lateral channel at posterior angle. Elytra convex (4·9 × 2·5 mm.); fourth stria outturned and joining fifth at base; seventh impressed for whole length; interstices convex near base, eighth carinate near base. Length 8-9, breadth 2·25-2·5 mm.

Hab.—Q. : Cairns (Dodd).

Closely allied to *C. australasiæ*, Bohem., of which it seems the northern form, but appearing to me entitled to rank as a distinct species differing by longer prothorax, with a more prominent nodule at each posterior angle; elytra more strongly striate, the sixth and seventh striæ more deeply impressed, and the interstices—particularly the lateral ones—more convex; the prosternal episterna more strongly rugose. From *C. pectonoda*, Sl., which is of similar appearance and size, it may be distinguished by occiput more strongly punctate; prothorax longer; elytral striæ deeper, especially the sixth and seventh for their whole length. I believe, too, that the male is without pectoral nodules.

Clivina pectonoda, n.sp.

♂. Robust, parallel. Head wide, opaque; front opaque, minutely punctulate; occiput with a punctulate subfoveiform impression on each side just within posterior extremity of facial carinæ; clypeus with anterior margin subtruncate (hardly emarginate). Prothorax convex, hardly broader than long (2·1 × 2·2 mm.), a little narrowed to apex (1·7 mm.); anterior angles marked and distant from head. Elytra a little wider than prothorax (4·8 × 2·4 mm.); eighth interstice strongly carinate at humeral angle (the carina extending back behind the free base of the seventh interstice). Prosternum with pectoral part pro-

tuberant, bituberculate (a well developed flattened nodule at anterior extremity of each pectoral ridge); pectoral ridges strongly developed; intercoxal part wide anteriorly, lightly sulcate on base. Anterior tibiæ rather narrow, strongly 3-dentate; inner apical spine long, curved, obtuse (not incrassate) at apex. Black; base of mandibles, labrum and legs piceous-red; anterior tibiæ darker than others. [The type (♂) is from Townsville.] Length 8-9·5, breadth 2·2-2·5 mm.

Hab.—Q.: Townsville (Dodd)—N.S.W.: Clarence River (Lea) —N.W. Australia (Macleay Coll.).

Intermediate between *C. australasiæ*, Bohem., and *C. lepida*, Putz., but rather allied to *C. lepida*, from which it differs by its head wider, more depressed, supra-antennal plates more strongly rounded externally, clypeus less deeply emarginate; prothorax more subquadrate, less narrowed to apex, anterior angles more strongly marked; elytra with humeral carina far more strongly developed and formed from the eighth interstice only without support from seventh; the pectoral nodules nearer together; anterior tibiæ with external teeth more strongly developed, especially the upper one, which is surmounted by a very small prominence, the inner apical spine of male more slender and less obtuse at apex. From *C. australasiæ* it differs by the presence of the pectoral nodules in the male; prothorax with sides more rounded, anterior angles more marked; anterior tibiæ more slender and less strongly dentate and with inner apical spine longer and less pointed at apex; clypeus less strongly emarginate, &c. From *C. isogona*, Putz., a species I do not know, *C. pectonoda* should differ by colour, and by more strongly dentate anterior tibiæ.

Note.—*C. pectonoda* is the species I have mentioned as *C. australasiæ* var.* I seem to have confused two species under this heading, with the result that my remark in regard to the variation in the depth of the emargination of the clypeus is misleading. Four of the specimens (♂ and ♀) from N.W. Australia

* Proc. Linn. Soc. N.S. Wales, 1896, xxi. p. 277.

now before me have the clypeus as in *C. pectonoda*, and one (apparently ♂) has the clypeus deeply and widely emarginate, the "wings" more rounded and more strongly divided from the supra-antennal plates; the intercoxal part of the prosternum without pectoral ridges or nodules and non-sulcate on posterior declivity; anterior tibiæ wider and more strongly 3-dentate than in *C. pectonoda* ♀. I believe it to be an undescribed species, but am not prepared to deal with it from the unique specimen I possess.

CLIVINA DILUTIPES, Putzeys.

Ann Soc. Ent. Belg. 1868, xi. p. 12: *C. lepida*, Sloane (not Putzeys), Proc. Linn. Soc. N. S. Wales, 1896, xxi. p. 221: *C. sydneyensis*, Sloane, *l.c.* p. 222.

I now feel confident that the species treated of under the name of *C. lepida*, Putz., in my "Revision" of 1896, is not that species, but is *C. dilutipes*, Putz. I have received specimens of this species from the Rev. Thos. Blackburn under the name of *C. dilutipes*, Putz., and now support his identification. The *Clivina* referred to at the end of my description of *C. vagans*,* as found at Swan Hill, Victoria (on the Murray River), should, I believe, be referred to *C. dilutipes*. I now place *C. sydneyensis*, Sl., under *C. dilutipes*; it is a slightly differentiated form, but I doubt if it is sufficiently distinct to be recognised as a named variety.

Hab.—New South Wales and Victoria.

Var. *C. victoriæ*, var.nov, (= *C. vayans*, Sloane, these Proceedings, xxi. 1896, p. 219). This is the form of *C. dilutipes* found about Melbourne; it is distinguished by the dark colour of the legs, and seems to merit a varietal name.

Hab.—Vic.: Lillydale.

Note.—All the forms treated of above under *C. dilutipes* have in the male a strongly developed ridge on each side of the pectoral part of the prosternum ending at anterior extremity in a small tubercle.

* These Proceedings, xxi. 1896, p. 221.

CLIVINA VAGANS, Putzeys.

Stett. Ent. Zeit. 1866, xxvii. p. 38; Ann. Soc. Belg. 1867, x. p. 185.

C. vagans, from Putzeys' description, in comparison with *C. australasiæ*, Bohem., has eyes less prominent; prothorax longer, more rounded on sides, basal curve shorter; elytra more narrowed to base, more ampliate behind the middle, punctures of striæ more marked, interstices flatter; external teeth of anterior tibiæ very small and obtuse. Length 6·5 mm. (Prothorax 1·25 × 1·2 mm.; elytra 3·65 × 1·7 mm.).

Hab.—Tasmania.

A specimen (♂) with these characters has been sent to me by the Rev. Thos. Blackburn as from Tasmania* which, compared with *C. dilutipes*, Putz., var. *victoriæ*, Sl. (♂) (= *C. vagans* of Sloane's "Revision") presents differences as under:—Size smaller; head smaller, eyes less prominent, clypeus more deeply emarginate; prosternum not bituberculate (pectoral ridges short, not ending in front in small tubercles). The ♂ of *C. vagans* can at once be distinguished from the ♀ of *C. victoriæ* (which is without the pectoral tubercles) by the long obtuse inner terminal spur and much smaller external teeth of the anterior tibiæ.

Note.—*C. lepida* var. *tasmaniensis*, Sl., (these Proceedings, xxi. 1896, p. 222) is evidently conspecific with *C. vagans*, Putzeys. I have said (*l.c.*) that H. W. Bates considered a Tasmanian species to be *C. vagans*, Putz. This is an error resulting from quoting from memory. Bates does not attribute a name to the *Clivina* he mentions as probably a small form of *C. australasiæ*.†

CLIVINA MISELLA, n.sp.

C. dilutipes, Sloane (non Putzeys), Proc. Linn. Soc. N.S. Wales, 1896, xxi. p. 216.

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* This is the specimen referred to by me under *C. vagans* (these Proceedings, xxi. 1896, p. 220).

† Cist. Ent. ii. 1878, p. 325.

The species to which I formerly applied the name *C. dilutipes*, Putz., is evidently not that species; it requires a name, and *C. misella* is now suggested, my former description being sufficient.

From *C. vagans*, Putz., (as identified by me in the present paper) it differs by head larger, eyes more prominent, elytra more strongly striate, prosternum with intercoxal declivity not sulcate on base, &c. From *C. dilutipes* var. *victoriæ*, (*vide supra*) it differs by prosternum without pectoral ridges, intercoxal declivity not sulcate, &c.

CLIVINA PALLIDICEPS, n.sp.

Clypeus with anterior margin lightly, widely and evenly emarginate; elytra with fourth stria joining fifth at base; prosternum with episterna rugulose-striolate, intercoxal part wide anteriorly, not transversely sulcate on base; anterior tibiæ wide, strongly tridentate, with a rather strong prominence above the upper tooth. Head testaceous-red, becoming piceous near eyes; prothorax black; elytra black with a wide testaceous vitta on each lateral declivity (the four inner interstices, the marginal channel and border—except at humeral angle—black; interstices 6-8 testaceous, fifth testaceous at base, becoming black posteriorly, basal declivity testaceous on each side, black only at base of two inner interstices of each elytron); inflexed margin black, testaceous near humeral angles; under surface of prothorax piceous, of body black; legs—four posterior pale yellow, anterior pair yellow, coxæ and apex of femora rather piceous, tibiæ darker than femora.

Head wide, depressed between facial sulci; eyes large, convex, prominent. Prothorax transversely rugulose-striolate (a few punctures among the striolæ), broader than long (1·2 × 1·4 mm.); sides subparallel, decidedly and roundly narrowed to apex before anterior marginal puncture; anterior angles widely obtuse; posterior angles marked; border wide on sides, very narrow on basal curve; posterior marginal puncture foveiform; basal curve short. Elytra truncate-oval (2·7 × 1·65 mm.), subdepressed (convexity of disc wide and even); base wide, truncate; striæ deep, punctate. Length 5·3, breadth 1·65 mm.

Hab.—N.S.W.: Mulwala (one specimen occurred to me washed from the margin of the Murray River, December 5th, 1896).

A distinct species, differentiated at once from all other Australian members of the genus by its colour; it is allied to *C. vittata*, Sl., but differs by colour; facies less convex; eyes more prominent; prothorax less convex, shorter, more parallel on sides, &c.

CLIVINA CYLINDRIPENNIS, n.sp.

Narrow, elongate, cylindrical. Head convex, punctulate, clypeus with median part not divided from wings; prothorax longer than broad (1·7 × 1·35 mm); elytra cylindrical, coarsely punctate-striate, posthumeral submarginal carina obsolete, fourth stria free at base; prosternum with intercoxal part narrow anteriorly, sulcate on base; anterior tibiæ 4-dentate. Ferruginous (prothorax subpiceous, elytra reddish).

Head convex; upper surface nitid; vertex with a punctulate fovea between eyes; occiput punctate between posterior extremities of facial carinæ; clypeus smooth, anterior margin widely emarginate in middle, not divided from "wings"—these subtruncate; supra-antennal plates subdepressed, projecting sharply in front from clypeal wings, external margin rather explanate and reflexed; eyes convex, not prominent. Prothorax nitid (one specimen with derm minutely punctate), convex, lightly narrowed anteriorly; anterior margin truncate, angles distant from head, marked; median line strongly impressed. Elytra narrow (3·25 × 1·65 mm.), very convex; base strongly and abruptly declivous; striæ deep and coarsely punctate towards base, shallow and finely punctate towards apex, seventh strongly impressed; interstices convex between the coarsely punctate part of striæ. Anterior femora wide, posterior margin of lower side rounded as in *C. sellata*, Putz. Length 6, breadth 1·65 mm.

Hab.—N.W.A.: Carnot Bay (Colls. French and Sloane). Numerous specimens were sent to me by Mr. French as from Carnot Bay, North-West Australia.

An isolated species, which, amongst the Australian species known to me, most resembles *C. sellata*, Putz., from which it

differs decidedly by its larger size; more elongate parallel and convex form; elytra with fourth stria not joining fifth at base, posthumeral carina obsolete, interstices more convex, striæ deeper and more strongly punctate. It is the most strongly punctate of the *australasiæ*-group known to me. From *C. nigra*, Sl., it differs greatly by colour, smaller size, narrower and more convex form, prothorax longer than broad, elytra narrower, far more cylindrical, eyes less protuberant, head less rugulose and more punctate, upper tooth (fourth) of anterior tibiæ more strongly developed. Judging by the description of *C. æqualis*, Blkb., it cannot be that species owing to its prothorax longer than broad, elytra with fourth stria free at base, no abbreviate striole at base of first interstice.

CLIVINA PROCERA, Putzeys.

Stett. Ent. Zeit. xxvii. 1866, p. 34; Ann. Soc. Ent. Belg. x. 1866, p. 180; Sloane, Proc. Linn. Soc. N. S. Wales, xxi. 1896, p. 228: *Scolyptus procerus*, Putzeys, Ann. Soc. Ent. Belg. xi. p. 7.

I think the name *C. procera* must be applied to the southern form, while the form from tropical Australia should receive the name *C. obscuripes*, Blkb. I have confused these two in the list of localities given in my "Revision," but my description applies to *C. procera*, being founded on specimens from near Urana, N.S.W. *C. prominens*, Putz., remains still unidentified by me.

CLIVINA OBSCURIPES, Blkb.

Scolyptus obscuripes, Blackburn, Proc. Linn. Soc. N.S. Wales (2) iv. 1889, p. 1247.

This is a tropical species closely allied to *C. procera*, Putz., but differing by facies a little more robust; prothorax more quadrate (sides less rounded and less narrowed in front); striæ of elytra a little more strongly impressed and the interstices a little more convex; metathorax a little shorter (but longer than posterior coxæ), its episterna a little shorter and proportionately a little wider behind; the mentum seems more rugulose, more rounded laterally, sinus more oblique, median tooth more prominent.

Hab.—Northern Territory: Burrundie (Dr. Bovill; Coll. Blackburn)—Q.: Burketown District and Dawson River (Coll. Sloane); Port Darwin (large form or variety; Colls. Macleay and Sloane).

Note.—*C. obscuripes* is wrongly entered in Mr. Masters' Catalogue, Supplement, Part i. 1895, as *Scolyptus obscuripennis*.

Clivina elegans, Putzeys.

Mém. Liège, 1853, xviii. p. 44; Stett. Ent. Zeit. 1866; xxvii. p. 36; Ann. Soc. Ent. Belg. x. p. 179; Sloane, Proc. Linn. Soc. N.S. Wales, 1896, xxi. p. 231 : *Ceratoglossa foveiceps*, Macleay, Trans. Ent. Soc. N.S. Wales, 1863, i. p. 73 : *Scolyptus oblongus*, Putz., Ann. Soc. Ent. Belg. 1873, xvi. p. 10.

I now think *C. elegans*, Putz., must be taken to include *Ceratoglossa foveiceps*, Macl., and *Scolyptus oblongus*, Putz.

Clivina robusta, n.sp.

Robust, convex. Black; legs piceous, tibiæ and tarsi reddish-piceous; antennæ reddish. Head, striation of elytra, prosternum, metasternum with episterna, and legs as in *C. elegans*, Putzeys.

♂. Prothorax hardly longer than broad (4·4 × 4·3 mm.), widest behind middle, strongly narrowed to apex (3·2 mm.), lightly convex; apex emarginate; anterior angles distant from head, marked but obtuse. Elytra oval (9·5 × 5 mm.), convex; sides rounded; striæ narrow, crenulate at bottom; interstices convex near base, hardly convex near apex, third 5- or 6-punctate—posterior puncture near apex of third striæ. Length 17, breadth 5 mm.

Hab.—N.S.W.: Gosford (H. J. Carter; Colls. Carter and Sloane).

This may prove to be a form or variety of *C. elegans*, Putzeys, but, unless further knowledge proves this to be the case, it seems to require a separate name. It has the head transversely impressed behind eyes, and the metasternal episterna short as in *C. elegans*, but differs conspicuously from that species by size larger, form more robust and convex; prothorax wider and more convex, much more strongly ampliate on each side of peduncle

and more strongly narrowed to apex; elytra wider and more convex. The anterior tibiæ are stout, 3-dentate; the upper internal spur slender and spiniform, the inner apical spur very thick, long and obtuse at apex.

Clivina obliquicollis, n.sp.

Robust; piceous-black, under surface reddish-piceous, legs and antennæ reddish. Mandibles short, clypeus as in *C. procera*, Putz. Peduncle not punctate on lower side or in lateral cavities.

Head with eyes hemispherical, very prominent; clypeus with median part deeply truncate-emarginate, its wings foveate and obtusely advanced. Prothorax smooth, of equal length and breadth (3·2 mm.), widest about one-fourth before posterior angles, roundly narrowed to apex (2·3 mm.); posterior angles distinctly tuberculate; median line well marked; an elongate linear distinct basal impression on each side of disc between median line and posterior angles. Elytra truncate-oval (7·5 × 3·75 mm.), strongly striate; striæ narrow, crenulate, fourth outturned and joining fifth at base, seventh lightly impressed; interstices convex near base, depressed towards apex, seventh and eighth uniting at base to form a short upturned carina. Prosternum with intercoxal part very wide and bordered on each side anteriorly, transversely sulcate on base; episterna nitid, with faint transverse wavy striole. Metasternum shorter than in *C. procera*, but longer between coxæ than the length of the posterior coxæ; episterna of moderate length, a little shorter than in *C. procera*, and longer than in *C. nyctosyloides*, Putz. Legs as in *C. procera*, but intermediate tibiæ narrow and with spur of outer side smaller and nearer apex. Length 12-13, breadth 3·35-4 mm.

Hab.—N.W.A.: Carnot Bay (Colls. French and Sloane).

Given to me by Mr. C. French.

The position of this species is between *C. procera* and *C. nyctosyloides*, Putz.; the head and smooth lateral concavities of the peduncle resemble those of *C. nyctosyloides*, but the prothorax is much less strongly narrowed to apex and the elytral striæ are much finer and less coarsely punctate; it resembles *C.*

abbreviata, Putz., but the metathorax is longer between the coxæ and has much more elongate episterna. From *C. procera* and *C. obscuripes*, Blkb., it differs by head narrower between the more prominent eyes; prothorax strongly narrowed to apex; elytra more convex, more strongly declivous to apex, posterior puncture further from apex; puncturation of under side of peduncle obsolete; prosternum—with episterna—more convex and less rugulose, intercoxal declivity transversely sulcate, &c.

Note.—The description I have given is founded on the male. The female is broader, with prothorax wider and more strongly narrowed to apex (3·1 × 3·3 mm.), elytra wider. Length 13, breadth 4 mm.

CLIVINA NYCTOSYLOIDES, Putzeys.

Ann. Soc. Ent. Belg. xi. 1868, p. 10; var.? *C. interstitialis*, Sl., Proc. Linn. Soc. N.S. Wales, xxi. 1896, p. 241.

C. interstitialis, Sl., I now think must be taken to be not more than a variety of *C. nyctosyloides*; this name was preoccupied in the genus *Clivina* when I used it;* but I do not now propose to distinguish my *C. interstitialis* by a distinctive name.

Hab.—Q.: Rockhampton (*fide* Putzeys), Townsville (Dodd).

Var. A. (= *C. interstitialis*, Sl.). *Hab.*—Q.: Cooktown (*fide* French).

CLIVINA OVALIPENNIS, n.sp.

C. ovipennis, Sl., Proc. Linn. Soc. N.S. Wales, xxi. 1896, p. 244.

When I used the name *C. ovipennis* for an Australian species I did not notice that it was already in use for a species from the Caspian Sea, viz., *C. ovipennis*, Chaudoir. My description under the preoccupied name *C. ovipennis* is sufficient.

* *C. interstitialis*, Kolbe, Berl. Ent. Zeit. xxvii. p. 18 (1883); Mexico.

NOTES FROM THE BOTANIC GARDENS, SYDNEY.

No. 10.

By J. H. Maiden and E. Betche.

RUTACEÆ.

Zieria aspalathoides, A. Cunn., with pink flowers.

Pinnacle Mount, 30 miles south of Forbes (R. H. Cambage; September, 1900); The Rock, near Wagga Wagga (Mrs. A. R. Phillips; September, 1904).

All species of *Zieria* have white flowers, as far as we know, except *Z. aspalathoides*, which seems to have always pale to deep pink flowers. The specimens from The Rock are very pretty, with a striking colour-combination in the individual flowers; the petals have the colour of our Native Rose, *Boronia serrulata;* the anthers are brick-red, and the prominent glands of the disc are of a dark blue, almost black colour. The brick-red colour of the anthers is due to the pollen and not to the cells; therefore the anthers appear white in the young flowers, but red when they are ready to burst and shed the ripe pollen. *Zieria lævigata*, Sm., and *Z. Smithii*, Andr., have the same bright red pollen, but we cannot say whether that character goes through the whole genus; the colour of the pollen is so transitory that it can never be observed in herbarium specimens. Further observations in the field are wanted to settle that question.

Boronia mollis, A. Cunn.

Coff's Harbour to Grafton (J. H. Maiden and J. L. Boorman; November, 1903).

Boronia mollis is a very variable plant. The leaflets vary in number from 3 to 11 (Pittwater specimens); they vary greatly in

size and shape, and are sometimes densely white-tomentose underneath, and sometimes loosely tomentose and barely paler underneath.

Boronia Fraseri, Hook., varies little in all the stations from which we have seen it, from Menangle to the Hawkesbury River, and is really only the extreme glabrous form of *B. mollis;* the Coff's Harbour specimens are a connecting link between the two species; they have almost as perfectly glabrous leaves as *B. Fraseri* and resemble this species in habit, but they have the tomentose branches of *B. mollis*. We do not propose to unite *B. Fraseri* with *B. mollis*, because if all species were to be united between which isolated connecting links could be found, extensive changes would have to be made in Australian botanical nomenclature. We, however, desire to draw attention to the very close relationship of the two species.

BORONIA LEDIFOLIA, J. Gay, var. REPANDA, F.v.M. in Herb.

Stanthorpe, Queensland, on the borders of New South Wales (J. L. Boorman; July, 1904).

This well-marked variety is distinguished from the typical simple-leaved form by the leaves having a slightly undulate recurved margin, much similar to that in *Eriostemon difformis* or *E. hispidulus*, only less repand and tuberculate than in the former and more so than in the latter. It is an erect shrub about two feet high. Leaves 3 to 4 lines long, always simple in the specimens seen, not white underneath, but sparingly stellate-hairy. Flowers like the type. Our specimens from Stanthorpe are identical with specimens in the Melbourne Herbarium from Maryland, between New South Wales and Queensland, collected by E. Hickey (no date) and labelled by Mueller "*B. ledifolia*, var. *repanda*." The variety has not been published previously, as far as we are aware, and we recommend the adoption of Mueller's manuscript name for it.

BORONIA FALCIFOLIA, A. Cunn.

Stanthorpe, Queensland, near New South Wales border (J. L. Boorman; July, 1904).

These inland specimens are very different-looking from the specimens of the Northern Coast district from the Hastings River to Byron Bay, but cannot be separated even as a variety. In the coast specimens from the Hastings River to Byron Bay the flowers are mostly crowded in the axils of the upper leaves, so as to appear almost terminal, and the leaves are strictly 3-foliolate; while the Stanthorpe specimens are more sparsely flowered, the flowers extending down sometimes nearly to the base of the branches, and the leaflets are frequently again trifoliolate, all 3 or the upper ones only. It is an erect shrub, about 2 feet high.

PHILOTHECA AUSTRALIS, Rudge, var. REICHENBACHIANA, F.v.M (*P. Reichenbachiana*, Sieb.).

Gungal, near Merriwa (J. L. Boorman; September, 1904).

A bushy shrub of compact habit, attaining 6 feet in this locality.

GEIJERA PARVIFLORA, Lindl.

Minembah, Whittingham, near Singleton (Denis Browne; August, 1904).

A western plant, hitherto only recorded in the east from the Page River.

STERCULIACEÆ.

RULINGIA PANNOSA, R.Br.

Mt. Warning, near Murwillumbah (W. Forsyth; November, 1898, and October, 1900); Murwillumbah (R. A. Campbell; January, 1904).

The leaves in these specimens are linear-lanceolate or broader and deeply 3-lobed, very obscurely serrate or occasionally quite entire, densely and closely white tomentose underneath. They come evidently near *R. salvifolia*, Benth., a species recorded from Southern Queensland, but not from this State, and connect the two species with each other.

RHAMNACEÆ.

CRYPTANDRA AMARA, Sm., var. FLORIBUNDA, var.nov.

Howell, New England; also Stanthorpe, Queensland, on the border of New South Wales (both, J. L. Boorman; July, 1904).

A very handsome, erect shrub, with slightly tomentose young branches, about 2 to 3 feet high. Leaves linear, with closely revolute margins concealing the underside, glabrous, nearly 2 lines long. Flowers very numerous, almost sessile in leafy clusters, forming spike-like racemes on the ends of the branches, sometimes exceeding $\frac{1}{2}$ inch in length.

This new variety seems to stand almost intermediate between *C. amara* and *C. lanosiflora*; it has the flowers of the former, but the leaves of the latter. It is the handsomest of all the Cryptandras we know, and is distinguished from the normal form by the comparatively long Erica-like leaves.

POMADERRIS PHYLICIFOLIA, Lodd., var. ERICOIDES, var.nov.

Tantawanglo Mountain (J. H. Maiden; December, 1896); Barber's Creek (H. J. Rumsey; October, 1898); Mongarlowe, near Braidwood (W. Bäuerlen; November, 1898); Mt. Kosciusko (J. H. Maiden and W. Forsyth; January, 1899); Jenolan Caves (W. F. Blakely; November, 1899); Mt. Wilson (J. Gregson; October, 1900).

There are two very distinct forms of *P. phylicifolia* common in mountainous districts of this State. One has narrow leaves with the margins so much recurved that the underside is quite concealed; the other form has broader leaves, with less recurved margins, leaving the white underside exposed. The latter form is Loddiges' type, as figured in his 'Botanical Cabinet' (t. 120); the former is Hooker's *P. ericifolia*, united by both Bentham and Mueller with *P. phylicifolia*. Though no sharp line can be drawn between the two forms, their extremes look very distinct; and as Bentham omitted to give a name to the narrow-leaved form, we propose now to name it var. *ericoides*.

Bentham mentions under *P. ledifolia* a doubtful plant collected by Mueller on the Macalister River, in fruit only, as *P. ledifolia*, A. Cunn., var. ? *angustifolia*; this is a mistake. One of Mueller's fruiting specimens from the Macalister River, which we obtained through Mr. Luehmann's kindness, agrees exactly with flowering specimens of a form of *P. phylicifolia*, with Leda-like leaves,

from the Warrumbungle Ranges; *P. phylicifolia* belongs to the group of species with apetalous flowers, and *P. ledifolia* has petals; therefore the two species cannot be mistaken when seen in flower.

SAPINDACEÆ.

DODONÆA FILIFOLIA, Hook.

Howell, about 15 miles east of Inverell (J. L. Boorman; June, 1904).

A new locality for a plant rare in this State.

DODONÆA TRUNCATIALES, F.v.M., var. HETEROPHYLLA var.nov.

Herb. Rev. Dr. Woolls, without locality or date; Bidden Road, Gilgandra, and Mudgee Road, 4 miles from Dubbo (R. H. Cambage; October, 1904).

Leaves from linear to linear-lanceolate, 2 to 3 inches long, entire or irregularly pinnate with 1 to 7 leaflets. In none of the specimens we have seen are the leaves regularly and constantly pinnate, as in Bentham's Series v. *Pinnatæ*. The leaves are generally simple, but occasionally more or less completely pinnate; the rhachis in the pinnate leaves is always winged, and the leaflets are articulate on the rhachis, very much like the irregularly compound leaves seen in *Atalaya*.

Perhaps we can hardly call this form a good variety, but it is interesting because it shows the tendency innate in Dodonæas to revert to the ancestral pinnate-leaved form. In experiments on the germination of Dodonæas, we have found that all those simple-leaved species, of which we could procure seeds, have pinnatifid first stem-leaves and gradually assume the adult foliage, just as the Acacias have first bipinnate leaves and gradually assume their characteristic phyllodia.

LEGUMINOSÆ (PAPILIONACEÆ.)

KENNEDYA PROCURRENS, Benth.

Mount Dangar, Gungal, near Merriwa (J. L. Boorman; September, 1904).

A very handsome tall climber, with stems fully 1 inch in diameter. The largest leaves in our specimens are $4\frac{1}{2}$ inches long by $3\frac{1}{2}$ inches wide; the flowers are about $\frac{1}{2}$ to $\frac{3}{4}$ of an inch long, and of a rich purple colour, drying to a pure mauve.

Bentham describes the plant in the 'Flora Australiensis' as prostrate, but this is doubtless a mistake caused by imperfect notes. Major Mitchell writes in his 'Journal of an Expedition into Tropical Australia' (p. 364): "I took a ride with Mr. Kennedy to the summit to which I had attached his name [Mt. Kennedy on the Maranoa] . . . a single specimen of a new *Kennedya* was gathered there." This single specimen is all the material Bentham had at his disposal when he described the plant, and Major Mitchell gives no information about its habit. The fruits and seeds are unknown to the present day.*

According to the collector's notes it is a much taller climber than *K. rubicunda*, and seems to resemble in habit the *Hardenbergia retusa* of tropical Queensland, which overruns tall shrubs and small trees on the edges of forests, almost smothering them under its mass of dense foliage and flowers. It is an extremely prolific flowerer, producing a stiff erect flowering-stalk at almost every leaf-axil for a distance of perhaps 20 or 30 feet from the top of the vine.

It seems to be a very rare plant. F. M. Bailey gives no additional locality to the original one (Mt. Kennedy) in his 'Queensland Flora'; and in the National Herbarium, Melbourne, only one locality is preserved, *i.e.*, Cungelella, probably a local name, which we cannot trace. Mr. Boorman states that on Mt. Dangar it grows on one spot only, and runs for a considerable length up the sides of a steep incline.

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*Postscript (*added 16 : xii. : '04*).—Pods mostly 2-2½ inches long and about ⅜ inch broad, symmetrical, straight and flattish, the valves slightly convex. The valves densely hairy with white hairs, silky-pubescent inside. Seeds kidney-shaped, longitudinal, laterally attached to a funicle protruding into the cavity.

LEGUMINOSÆ (MIMOSEÆ.)

ACACIA DOROTHEA, Maiden.

Abundant at Leura, Blue Mountains (R. H. Cambage and J. H. Maiden; December, 1903, and October, 1904).

ACACIA SALICINA, Lindl.

Minembah, Whittingham, near Singleton (Sylvester Browne; August, 1904).

A western plant, hitherto only recorded in the east from the Page River.

MYRTACEÆ.

EUGENIA CYANOCARPA, F.v.M., Fragm. ix. p. 146 (1875).

Hastings River (H. Beckler, ex Herb. Mueller, no date; E. Betche, February, 1882; G. R. Brown, December, 1893); Richmond River (W. Bäuerlen; December, 1891, January, 1895); Tweed River (W. Bäuerlen; April, 1897); Brunswick River (J. H. Maiden and J. L. Boorman; December, 1903); Port Hacking (J. H. Camfield, 1900; J. L. Boorman, July, 1904).

Amongst some of Mueller's type-specimens of *Eugenia*, which we had recently an opportunity of examining through the kindness of Mr. Luehmann, we found two New South Wales specimens of *Eugenia*, labelled respectively *E. cyanocarpa* and *E. oleosa*, var. *cyanocarpa*. Mueller gives, in the 'Fragmenta' quoted above, a provisional description of the plant, but does not include the name in his 'Census of Australian Plants.' These specimens are identical with specimens that had puzzled us for some years, and which were labelled provisionally in the Sydney Herbarium "*E. Coolminiana*? var." We now propose Mueller's name for the species.

E. cyanocarpa is not uncommon in brush forests from Port Hacking to the Tweed River, perhaps extending into Queensland, though Mr. F. M. Bailey does not mention a blue-fruited *Eugenia* in his recently published 'Queensland Flora.' Mueller gives the following localities: Botany Bay ("*fide* collectionis Gulliveri"), Hastings River (Henderson), and New England (Stuart). The

locality "Botany Bay" is incredible; the poor sandhills and swamps of Botany Bay are a very unlikely locality for it, but the rich semitropical brush-forests of the National Park are within a few miles' distance of Botany Bay, so that the mistake is of easy explanation. The chief characteristics of the plant are the blue, or rather purplish-blue, fruits and the acuminate leaves. The leaves vary from narrow-lanceolate to ovate, and from deep to pale green, but they are always distinctly acuminate ("folia e forma anguste lanceolata in late ovatam vergunt, sed semper in acumen acutum exeunt, nunc saturatius nunc pallidius virescunt" (Mueller). It is a rather small white-barked tree flowering in a very youthful state, so that it may be at times mistaken for a shrub.

E. Coolminiana, C. Moore, is probably a form of *E. cyanocarpa*, but the trees, both of which have been cultivated for many years in the Sydney Botanic Gardens, are very different in habit and horticulturally quite distinct, though we cannot point out a difference of specific value. *E. Coolminiana* is a shy-fruiting tree with a dense heavy foliage; the leaves are thick, ovate and shortly or scarcely acuminate. *E. cyanocarpa* is a graceful loose-foliaged tree with thinner, narrower and much more acuminate leaves.

In the same volume of the 'Fragmenta' (ix. p. 146) Mueller described another Eugenia from the Tweed River (Carron) and from Rockingham Bay (Dallachy), and provisionally named it *E. papilionum* (from Dallachy's note that he saw numerous butterflies swarming round the flowers), but, as in *E. cyanocarpa*, he remained in doubt whether the name should stand as a species, or a variety of *E. oleosa*. The native name of the tree is given as "Coolmin," which suggests identity with C. Moore's *E. Coolminiana*, but the leaves are described as imperforate ("foliis crassioribus igitur imperforatis": Mueller), a character irreconcilable with *E. Coolminiana*. Of course native names are not by any means reliable guides; the aborigines, who doubtless eat the fruits of most Eugenias, may apply the name to several species with similar fruits; or the individual who imparts the information may not differentiate between similar species, especially when the

tree is not in fruit. The fruits of *E. papilionum* are not yet known.

Mueller's opinion that *E. cyanocarpa* and *E. papilionum* may be varieties of *E. oleosa*, F.v.M., seems to be unlikely; the narrow turbinate calyx of *E. oleosa* points to a fruit different in shape from the globular fruits of *E. cyanocarpa* and *E. Coolminiana*. To sum up, we think: All the blue-fruited Eugenias in New South Wales known at present are *E. cyanocarpa*, F.v.M. *E. Coolminiana*, C. Moore, is a variety of the same, with thicker, broader and less acuminate leaves, and is probably identical with Mueller's *E. papilionum*, in spite of the contradictory statement "foliis imperforatis."

MELALEUCA LINARIIFOLIA, Sm., var. ALTERNIFOLIA, var.nov.

Coff's Harbour to Grafton (J. H. Maiden and J. L. Boorman; November, 1903).

Leaves alternate, much narrower and usually shorter than the type. The whole plant is glabrous, and the flowers are loosely scattered in an interrupted spike. This form is rather common in the northern coast districts, and seems to extend from Stroud to the Richmond River. It is so well distinguished from the form with broader opposite leaves and dense spikes, which grows so abundantly in the sandstone country in the Port Jackson district, that it should be separated from it as a named variety.

DARWINIA TAXIFOLIA, A. Cunn.

Howell, about 15 miles east of Inverell (J. L. Boorman; June, 1904).

Common in the Port Jackson district and the Blue Mountains, extending southward to Victoria, but not previously recorded from north of the Hunter River.

UMBELLIFERÆ.

HYDROCOTYLE PTEROCARPA, F.v.M. New for New South Wales.

Tuggerah Lakes (J. L. Boorman; February, 1904).

Previously recorded from Tasmania, Victoria and S. Australia.

COMPOSITÆ.

SOLIVA SESSILIS, Ruiz et Pav.

Newcastle (J. Gregson; September, 1903).

Reported first as naturalised in Moore Park, near Sydney, in these Proceedings for 1899 (p. 646); about a year later it was reported from Parramatta.

HEDYPNOIS CRETICA, Willd. (*Rhagadiolus Hedypnois*, All.).

Adelaide, South Australia (Max Koch; November, 1902); Norwood, S.A. (J. M. Black; November, 1903); Victoria (without special locality; H. St. Eloy D'Alton; 1903); and numerous localities from New South Wales.

This is a common introduced weed in this State, but is frequently mistaken for *Arnoseris pusilla*, Gaertn., a mistake assisted by the wrong inclusion of this plant in the list of naturalised plants published in the 'Handbook of the Flora of N.S. Wales.' *A. pusilla* is recorded by Bentham from Tasmania, but has never been found outside that State as far as we know. *Hedypnois cretica*, Willd., seems to be common also in Victoria and South Australia, but is not recorded for these States.

We have to thank Mons. G. Beauverd, of the Herbarium Boissier, Geneva, for confirming our determination of this plant. According to M. Beauverd, the Australian specimens are remarkable for their long, often branching, and glabrous flower-stalks.

CASSINIA DENTICULATA, R.Br.

The range of this species is given in the 'Handbook of the Flora of N.S. Wales' "from Clyde River to Port Jackson"; our most northern locality in the Herbarium is now Berowra, near Sydney, south of the Hawkesbury River; but F. M. Bailey records it in the 'Appendix to his Queensland Flora' (Vol. vi. p. 2007, 1902) from Killarney, so that the range for New South Wales should read "from Clyde River to Queensland."

OLEACEÆ.

JASMINUM SIMPLICIFOLIUM, Forst.

Grafton to Dalmorton (J. H. Maiden and J. L. Boorman; November, 1903).

Forms of transition between two recognised species are of rather common experience in the flora of New South Wales. This form of *Jasminum* is a striking case in point; it stands almost intermediate between *J. simplicifolium* and *J. suavissimum*, Lindl. The leaves are much narrower and the calyx-teeth longer than in all forms of *J. simplicifolium* we have previously seen, but, on the other hand, the leaves are broader and the calyx-teeth much shorter than in the typical *J. suavissimum*. On the whole, taking habit and all minor characters into consideration, we think it should be placed with *J. simplicifolium*, as an extreme narrow-leaved form.

ASCLEPIADACEÆ.

PARSONSIA ROTATA, sp.nov.

Hastings River (Forester G. R. Brown; no date; about 1890); Lismore (W. Bäuerlen; February, 1891); Burringbar, between Tweed and Richmond Rivers (E. Betche; April, 1896); Port Macquarie (J. H. Maiden; November, 1897).

A tall glabrous climber. Leaves from elliptical to lanceolate, nearly equally rounded at both ends and abruptly drawn out to a point, or gradually narrowed at the apex and almost truncate at the base, rarely narrowed at the base, dark green above, paler underneath, the largest seen $4\frac{1}{2}$ inches long and $2\frac{1}{2}$ inches broad. Petiole $\frac{1}{4}$ to above $\frac{1}{2}$ inch long. Flowers axillary and terminal, few in the inflorescence (not above 8 in all specimens seen), in an almost umbel-like contracted cyme, the common peduncle about $\frac{1}{2}$ inch long, the pedicels shorter. Calyx-lobes about 1 line long, rather unequal. Corolla rotate, cream-coloured, perfectly glabrous outside, the tube as long as the calyx, the spreading lobes oblong, fully twice as long, with a dense fringe of hairs at the base, extending in a ring round the top of the tube. Stamens inserted near the base of the corolla, with long filaments spirally twisted

together, the anther-cone and parts of the filaments exserted from the corolla-tube. Hypogynous glands somewhat united at the base. Fruits not seen.

The great variability in the shape of the leaves doubtless depends much on the locality, and probably a great deal on the part of the plant from which the leaves are taken. The Burring-bar specimens, with uniform leaves of an almost mathematically correct elliptical shape, were collected from the lower part of the stem in a high forest; while the Hastings River specimens, with variable leaves, were taken from the tops of the vines, probably on the edges of brush. It is only natural to expect that the shaded lower leaves of tall forest vines, scrambling up to the tops of the trees in search of light, should be different from the upper leaves enjoying the full light of the sun.

In affinity this new species is nearest allied to *P. lanceolata*, R.Br., but is sharply distinguished from it chiefly by the shape, size and indumentum of the corolla, and, above all, by the dense ring of hairs in the throat of the corolla.

In working at this species, we carefully compared it with Mr. R. T. Baker's *P. Paddisoni*, described and figured in these Proceedings (Vol. xxiv., 1899, p. 385), and we are forced to the conclusion that *P. Paddisoni* is identical with *P. lanceolata*. Mr. Baker writes (p. 386): "*P. Paddisoni* differs from *P. lanceolata*, R.Br., in its axillary cymes, shape of leaves, and calyx-lobes being equal." These distinctions are all trivial. Terminal and axillary inflorescences occur commonly together in *Parsonsia*, and Bentham describes the inflorescence of *P. lanceolata* in the following words:—"Cymes terminal or on short axillary branches," a description which agrees well with Mr. Baker's plate of his species. The shape of the leaves of *P. Paddisoni* is described by Mr. Baker as: "obovate, elliptical-lanceolate, abruptly acuminate." Bentham describes the leaves of *P. lanceolata* as: "elliptical-oblong or lanceolate, more rarely oval or almost orbicular, obtuse mucronate or shortly acuminate, not cordate, the margins usually recurved." Mueller, in his 'Fragmenta' (Vol. v., p. 126), describes the leaves of *P. lanceolata* (as *P.*

glaucescens) as "ovato- v. oblongo-lanceolatis vel fere ovatis obtusis et brevissime acuminatis v. apiculatis." Surely there is no essential difference in Mr. Baker's description of the leaves of *P. Paddisoni* and Bentham and Mueller's description of the leaves of *P. lanceolata*, especially as both are glabrous and both are paler underneath.

There remains only the difference of the "equal calyx-lobes." R. Brown says nothing about "unequal calyx-lobes" in his very short original description of *P. lanceolata*; Mueller also says nothing about "unequal calyx-lobes" in his very detailed description of *P. lanceolata* (as *P. glaucescens*) in the 'Fragmenta.' Bentham alone adds this character to the description of the species.

The calyx-lobes in our specimens of *P. lanceolata* are long and narrow, exactly as figured in *P. Paddisoni*; they are mostly, but not always, rather unequal in length, but the character is not by any means conspicuous nor of importance.

The six Australian species of *Parsonsia* are distinguished chiefly by the shape of the corolla, and by the absence or presence of variously disposed reversed hairs or bunches of hairs in the corolla-tube or throat; by the anther-cone being enclosed in or exserted from the corolla-tube; and by the filaments being short and free in some species, or long and united and generally spirally twisted in others. If two plants agree in all these essential characters, as *P. lanceolata* and *P. Paddisoni* do, surely a new species should not be established on such trivial grounds as advanced in support of *P. Paddisoni*; we cannot even admit it as a variety; it is simply the western form of *P. lanceolata*.

R. Brown's description of *P. lanceolata* in his 'Prodromus' (p. 466) is a striking instance of the confusion that may be caused by too short and superficial descriptions of new species. His whole description is comprised in the six words: "cymis bifidis, foliis lanceolatis acuminatis glabris," without a word about the flowers. In Brown's time this description was sufficient to distinguish the few Australian species known, but at the present day it would be quite inadequate without access to his types.

PARSONSIA LANCEOLATA, R.Br., var. MOLLIS, F.v.M.

Townsville, Queensland (E. Betche; August, 1901).

This seems to be identical with R. Brown's *P. mollis*, united by both Bentham and Mueller with *P. lanceolata* as a tomentose variety. The flowers of our Townsville specimens differ from the flowers of the typical *P. lanceolata* in the following characters: the calyx-lobes are shorter and more obtuse, the corolla-lobes are more obtuse, the anther-cone is shorter and more obtuse, and the filaments are not twisted in the flowers we have examined, though they are united in the upper part.

PARSONSIA LEICHHARDTII, F.v.M.

Blue Mountains (E. Betche; July, 1888: J. H. Maiden; April, 1899: J. Gregson; February, 1903).

This species seems to be common in the Blue Mountains, but it is not often collected, probably because of its usual winter-flowering habit. The Blue Mountain specimens differ in some points from the type-specimen collected by Dr. Leichhardt at Wide Bay, Queensland, the only specimen which was at Bentham's disposal when he drew up the description for the 'Flora Australiensis.' The corolla of the Wide Bay specimens is described as "densely bearded in the throat," while in the Blue Mountain specimens the throat of the corolla is only slightly hairy, with short reversed hairs; further, the hypogynous glands are described by Bentham as "emarginate" and by Mueller as "two-lobed," while they are quite entire in our specimens. There is no other essential difference between the Queensland and New South Wales specimens; the latter are always quite glabrous, with narrower leaves, hardly cordate at the base, but the plants are not sufficiently distinguished to separate them as varieties.

SOLANACEÆ.

SOLANUM VIOLACEUM, R.Br., var. ALBUM, var.nov.

Mt. Dangar, Gungal, near Merriwa, also Wallsend (both J. L. Boorman; September, 1904).

The white-flowering form of this handsome Solanum seems to be by no means uncommon, but it has never been recorded, as far as we know. The specimens of the two localities are very sparingly prickly, in fact one has to look carefully to find an occasional prickle; and the calyx-teeth are hardly acuminate. Bentham's character of this species, "calyx-teeth acuminate," is deceptive; the calyx-teeth are generally drawn out into a point, but sometimes so shortly that they are almost or quite obtuse in the bud or young flower, though they change in fruit.

Solanum nemophilum, F.v.M.

Drake (J. L. Boorman; October, 1901); Grafton district, near Railway Survey Camp between Grafton and Glenreagh (J. H. Maiden and J. L. Boorman; November, 1903). New for New South Wales.

Previously recorded from Queensland only. Brisbane River is the most southern locality recorded by F. M. Bailey in his 'Queensland Flora.'

SCROPHULARIACEÆ.

Veronica perfoliata, R.Br.

The range of this species in New South Wales is recorded at present as coast district to tablelands, from Victoria to Mudgee; and we have no evidence in the Herbarium of a more northern locality. F. M. Bailey gives in the 'Appendix to his Queensland Flora' (1902) "Charlotte Plains" as a new locality, so that the range of this species extends now from south to north right through New South Wales, though common in the south and evidently rare in the north.

ACANTHACEÆ.

Hygrophila angustifolia, R.Br.

Casino, in swampy ground (E. Betche; April, 1896). New for New South Wales.

Previously recorded from Queensland, extending from Moreton Bay to the farthest north, and beyond Australia to tropical Asia. There seems to be a doubt about the colour of the flowers of the

Australian form. The Asiatic specimens have pale purple flowers, according to C. B. Clarke; Bentham describes the flowers of the Australian specimens as "purple or pale blue (or yellow according to Dallachy)." Our Casino specimens, as well as Queensland specimens from Cairns, have all yellow flowers.

PROTEACEÆ.

ISOPOGON DAWSONI, R. T. Baker.

Mt. Dangar, Gungal, near Merriwa (J. L. Boorman; September, 1904).

Mr. Baker's type-specimens were found in 1893 in the Murrumbo Ranges, Goulburn River. Six years later Mr. Forsyth discovered it on the Nepean River; and now we record a third locality for this rare plant.

According to Mr. Boorman's notes it is a tree with a single stem, 3 to 6 inches in diameter, about 8 to 12 feet high (it attains 20 feet in height according to Mr. Baker); the leaf-segments in our specimens are generally rather narrower and shorter than in the figure of the plant.*

GREVILLEA GAUDICHAUDI, R.Br.

Wentworth Falls (J. H. Camfield; October, 1896); Katoomba (W. Forsyth; November, 1904). (Brown's type, in Gaudichaud, came from "Vallée de Jamieson.")

"This plant was found near the town of Katoomba growing in juxtaposition with plants of *Grevillea laurifolia*, Sieb. It has entirely the same habit as the latter species. The flowers in the field are also of the same colour, and the plant might easily be passed by for *Grevillea laurifolia*.

"The plant seems to be very local in its distribution, no specimens being found outside a radius of about 50 yards, and not more than half a dozen plants seen altogether" (W. Forsyth).

R. Brown described the species first in Gaudich., Freyc. Voy. Bot. 443. We have also R.Br.'s description in 'Proteaceæ Novæ' (1830), p.22, and this description agrees word for word with our

* These Proceedings, (2), Vol. ix. 1894, pl. xiv.

specimens. R. Brown says nothing about the habit of the plant in either of these works, nor does the figure help us in this respect; and as Bentham had only seen herbarium specimens, he seems to assume too much when he writes: "An erect shrub with the habit, inflorescence and flowers of *G. acanthifolia*."

Cunningham describes it as "*G. acanthifolia*, var. *quercifolia*" (Cunningham MSS.); this may have misled Bentham, or possibly the species may be variable in habit and not always so prostrate as in our specimens.

EUPHORBIACEÆ.

RICINOCARPUS BOWMANI, F.v.M.

The Rock, near Wagga Wagga (Mrs. A. R. Phillips; September, 1904).

The specimens sent by Mrs. Phillips are remarkably beautiful, with larger flowers and broader leaves than ever recorded. The leaves are $\frac{1}{2}$ to $\frac{3}{4}$ inch long, linear-oblong with recurved margins, dark green above, white-tomentose underneath (in the typical form the margins of the leaves are revolute, generally completely concealing the under surface); the flowers attain fully $1\frac{1}{8}$ inches in diameter, and are of bright rose colour bleaching to white as they fade away. The exceptional size of the flowers may perhaps be attributed to the favourableness of the season.

CASUARINACEÆ.

CASUARINA LUEHMANNI, R. T. Baker.

Minembah, Whittingham, near Singleton (Roderick Browne; August, 1904).

Most eastern locality recorded.

CYPERACEÆ.

SCHŒNUS SCULPTUS, Bœck.

Mt. Dangar, Gungal, near Merriwa (J. L. Boorman; September, 1904).

Recorded by us as new for New South Wales in these Proceedings for 1903 (p. 922); we now add a third locality to the two New South Wales localities previously recorded.

MISCELLANEOUS NOTES (CHIEFLY TAXONOMIC) ON EUCALYPTUS. i.

By J. H. Maiden, Government Botanist and Director of the Botanic Gardens, Sydney.

1. E. amygdalina, Labill.

De Candolle figured the Prodromus specimen of *E. radiata*, Sieb., in DC., Mem. Myrt. t. 7.

Bentham (B.Fl. iii. 203), quoting the Prodromus and Mem. Myrt., names this plant *E. amygdalina*, Labill., var. *radiata*. He, however, quotes Sieber's number as 475. A specimen of Sieber's No. 475 I received from the Bot. Museum, Berlin (labelled *E. pauciflora*, Sieb., by the way) is *E. radiata*, Sieb., and probably De Candolle's quotation of 425 is a mere slip of the pen.

I have also an original specimen of Sieber's Fl. mixta, No. 604 [there are, of course, two series, "plant exs" (plantæ exoticæ) and Fl. mixta], which is obviously similar to De Candolle's drawing of *E. radiata*, Sieb., in Mem. Myrt. t. 7. I am, therefore, in a position to speak with authority as to the identification of *E. radiata*, Sieb. Under *E. viminalis*, Bentham (B.Fl. iii. 240) refers Sieber's Fl. Mixt. 604 to *E. viminalis;* there has been some confusion of numbers here which I do not pretend to be able to unravel and which is of no particular consequence.

E. radiata, Sieb., appears to be nothing more or less than a form of *E. amygdalina* very common in New South Wales, and I see nothing distinctive enough to warrant its being called a variety. The typical *amygdalina* from Tasmania, with its linear-lanceolate, often thickish leaves, with hemispherical opercula and hemispherical, usually broad-rimmed fruit, doubtless appeared to

Sieber or De Candolle to be sufficiently different from the New South Wales form. Sieber's type probably came from the higher parts of the Blue Mountains (I have matched it completely therefrom). It is also common in some northern localities. The specimens distributed by Sieber have fruits not dead ripe; when they are quite ripe the tips of the valves are slightly exserted.

Much confusion has gathered round *E. radiata*, Sieb.

Hooker (Fl. Tas.) attributed four forms to *E. radiata*, which I will later on show to belong partly to *E. Risdoni*, Hook. f. var. *elata*, Benth.; and partly to *E. amygdalina*, Labill.

Then Bentham (B.Fl. iii. 203) described a var. *radiata* of *E. amygdalina*, which is a combination of (a) *E. radiata*, Sieb., of (b) Hooker's Tasmanian supposed forms of *radiata*, and of (c) the "White Gum" of Bent's Basin and the Nepean River, N.S.W. (Woolls). The "White Gum" of Bent's Basin I will proceed to deal with.

2. E. AMYGDALINA, Labill., var. NUMEROSA, var.nov. (vel *E. numerosa*, sp.nov.), in allusion to the very large number of flowers in the umbel.

Syn.: *E. amygdalina*, Labill., var. *radiata*, Benth.

In the 'Catalogue of Indigenous Woods of the Southern Districts of N.S.W.,' prepared by the late Sir Willian Macarthur for the Paris Exhibition, 1855, we have under No. 109 "Eucalyptus radiata (?)" "Kayer-ro," "River Gum of Camden." "A small quick-growing species, very elegant when in blossom; is found only on the immediate sandy banks of rivers; the wood of no value; the inner bark used for tying grafts and other similar common purposes. Height 30 to 50 feet, diameter 12 to 18 inches." The name was supplied by Kew, and it will be observed that it was doubtfully referred to *E. radiata*.

In the 'Flora Australiensis,' as I have already pointed out, Bentham included it with some other trees under his var. *radiata* of *amygdalina*.

It is the tree included by Mueller under *E. amygdalina* in 'Eucalyptographia,' where, quoting Howitt, he speaks of the

"Wang-ngara" of Gippsland. Subsequently Howitt refers to the tree* in some detail.

It was figured and described by Deane and Maiden† as var. *radiata*, Benth.

So that, as far as aboriginal and vernacular names are concerned, it is the "Kayer-ro" of Sir William Macarthur; the "White Gum" of Bent's Basin and the Nepean (Woolls; see B.Fl. iii. 203); and the "Wang-ngara" of Mr. Howitt.

It goes under the names of "River White Gum," "Ribbon Gum," and also "Narrow-leaved Peppermint."

Its favourite habitat is on the sides of gullies, or on the steep banks of rivers, often some distance from the bed of the river or creek, but usually on a well-drained slope leading to a watercourse. It sometimes occurs on flats.

It is often seen as a graceful sapling, but may attain the dignity of a large tree; in this State I have seen it up to 3 feet in diameter and more, with a height of 150 feet. It has rather sparse, drooping foliage, which gives it, at times, something of a willow-like aspect.

Bark.—It is nearly a White Gum when very young, but afterwards the bark of the upper part falls off in thin, long ribbons (hence the name Ribbon Gum), and the lower part of the trunk becomes covered, to a varying height, with fibrous bark of the character known to many as Peppermint-bark. In its most marked form the bark of the butt is more rugged than that of *amygdalina* usually is. Sir William Macarthur spoke of the fibrous bark; and subsequently Mr. Howitt pointed out that the aborigines of Gippsland similarly used the bark for tying and lashing, hence their name for the tree, "Wang-ngara," which signifies "bark-string."

Juvenile leaves.—The young stems have a rusty, glandular appearance, and the leaves are very narrow. I do not note any difference between them and the leaves of the normal species.

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* "The Eucalypts of Gippsland." Trans. Roy. Soc. Vic. Vol. ii. Pt. i. p. 86, Pl. x., figs. 1-5.

† Proc. Linn. Soc. N.S. Wales, 1895, p. 606, Pl. lvi.

Mature leaves.—Thin; though usually narrow, up to 14 lines broad, often from 4 to 7 inches long. Although the leaves of this form are very thin, specimens from Bateman's Bay to Wagonga are especially thin. These specimens also have unusually narrow leaves.

Fruits.—Large in number (commonly 20 or more); Mueller counted as many as 43 in the umbel (see 'Eucalyptographia' under *E. amygdalina*). I have often counted them with 40 in an umbel, borne on rather long, often filiform pedicels. They have a very regular umbellate appearance. Mostly pale-coloured when dry. Very uniform in size, 2 to 2½ lines (barely) in diameter and pilular or nearly pear-shaped. Sometimes they tend to close at the orifice. The rim varies in width. In some specimens it is comparatively broad, well-defined and reddish.

Timber.—White, fissile, rather tough when freshly cut, but afterwards of inferior strength. It is easily worked, but not durable on exposure.

4. E. AMYGDALINA, Labill., var. NITIDA, Benth.

In 1901* Mr. Deane and I described under the name of *E. hæmastoma*, Sm., var. *montana*, a shrubby plant, only two or three feet high, from Mt. Victoria, N.S.W., collected by myself. The bark of so small a shrub was no guide, and the blood-red rims decided us to place it with *E. hæmastoma*, a pardonable error, as it obviously strongly resembles that species.

Since then, however, I have obtained typical *amygdalina*, var. *nitida*, and I find that these specimens precisely match Gunn's No. 808, *e.g.*, Currie's River, Tasmania. The pale brown fruits with the dark red-brown rims arrest attention. The only point in which I can distinguish the Mt. Victoria specimens from those of Currie's River consists in the more obvious oil-glands of those from Mt. Victoria; but this may be in a measure owing to the age (over 60 years) of the Tasmanian specimens. The similarity of the specimens is remarkable when it is borne in mind that the

* These Proceedings, 1901, p. 125.

Tasmanian specimens are mostly from the seacoast, while Mt. Victoria is an inland locality. In a paper* I have given very definite evidence of the absolute similarity of many Tasmanian and New South Wales plant forms, and this is an additional example.

5. E. RISDONI, Hook. f. var. ELATA, Benth., and E. OBLIQUA, L'Hérit. var. ALPINA, Maiden (*E. delegatensis*, R. T. Baker).

I propose to enquire into the position of a "Gum-top Stringybark,"† called also, at least in New South Wales, "Mountain Ash."

The botanical names for it are synonyms.

(1) *Eucalyptus obliqua*, L'Hérit., var. *alpina*, Maiden, Report Austr. Assoc. Adv. Science, Vol. ix., 369, footnote.

(2) *E. gigantea*, Hook. f., Fl. Tas., as regards Plate xxviii.; also as regards part of the text.

(3) *E. radiata*, Hook. f., Fl. Tas. i. 137 (non Sieb.) var. 4 (partim).

(4) *E. delegatensis*, R. T. Baker, Proc. Linn. Soc. N.S. Wales, 1900, p. 305.

The receipt of a large number of Gunn's specimens used by Hooker in the preparation of the 'Flora Tasmaniæ' has enabled me to clear up some hitherto doubtful points.

E. gigantea, Hook. f., Lond. Journ. Bot. vi. 479, is "Stringybark colonorum." It is in Fl. Tas. (i. 136) described in practically the same words, and it is called "Stringy-bark Gum." The specimens quoted are Gunn 1095, 1104, 1106, 1965, 1966.

In Part ii. (p. 59) of my "Critical Revision," under *E. obliqua*, I have quoted the remarks of Hook. f. about Gunn's 1095 from Lake St. Clair. The specimens labelled 1095 which have been seen by me are, however, nearly typical *obliqua* from Lake St. Clair. It will be observed that Hook. f. looked upon these specimens as a variety of his *E. gigantea*.

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* "A Second Contribution towards the Flora of Mt. Kosciusko." Agric. Gaz. N.S. Wales, 1899.

† See Part ii. p. 68 of my "Critical Revision of the genus Eucalyptus."

Hooker says, "in some varieties the young branches have a fine glaucous bloom upon them . . . Lake St. Clair." While Gunn's 1095 from that locality is non-glaucous, some of Gunn's 1100, collected by Hooker himself from Marlborough, (on the Upper Derwent near Lake St. Clair) and which are *E. radiata*, Hook. f. (non Sieb.) No. 4 (partim) are glaucous and are doubtless the specimens he had in mind.

The loose branch of fruits of "*E. giganteus*" figured at fig. 4, Plate 7, of Part 2, of my "Critical Revision," were depicted from the same Kew herbarium sheet that contained the foliage-specimens indicated, and are *E. obliqua* var. *alpina*.

Gunn's 1104 came from Black River, Circular Head, and is typical *E. obliqua*.

Gunn's 1106 came from Sassafras Valley, and is typical *E. obliqua*.

Gunn's 1965 and 1966 came from Arthur's Lakes and are my variety *alpina* of *E. obliqua*. In other words, they are *E. radiata*, Hook. f., No. 4 (partim). They are doubtless the originals of the drawing of Plate xxviii. of Hooker's Fl. Tas.!

Of these four synonyms, therefore, *E. gigantea*, Hook. f., really belongs to *E. obliqua*, in spite of Hook. f. including two trees under that name in Fl. Tas.

E. radiata, Hook. f., is founded on error, and the name should be dropped.

It is a question whether the "Stringybark Gum" or "Mountain Ash" is a variety or a distinct species. Hooker, most Tasmanians whom I have consulted, and I look upon it as a form of *E. obliqua*. Mr. Baker considers it to be a distinct species (*E. delegatensis*). I am well acquainted with the tree in the field, have a very large series of specimens, and I have an open mind on the subject. It is probably a hybrid, *E. obliqua* and *E. coriacea* being the parents.

The affinity of this form to *E. Risdoni*, Hook. f. var. *elata*, Benth., is undoubtedly close, and Hooker's confusion of specimens is readily accounted for. Indeed, at one time I held the view that *E. Risdoni*, its var. *elata*, and my *E. obliqua* var. *alpina*

(*delegatensis*) formed one grand trimorphic species. The strong sweet odour of the trees of *E. Risdoni* var. *elata* in the forest very closely resembles that of *E. obliqua* var. *alpina*. Some Gum-top Stringybarks are undoubtedly near typical *E. obliqua*, and this variation is consistent with the hybridisation theory, since in a series of hybrids the influence of one or other of the parents may predominate.

This form *alpina* of *obliqua* is found in alpine situations in Tasmania, Victoria and southern New South Wales.

6. E. Planchoniana, F.v.M.

Glen Elgin, about 30 miles north-easterly from Glen Innes, or about 20 miles easterly from Deepwater and on the eastern watershed (E. C. Andrews).

7. E. obliqua, L'Hérit.

Woollooma Mountain, Parish of Chalmers, County of Durham, Land District of Scone (H. L. White). This locality is interesting as connecting the southern localities with the northern ones. See my "Crit. Revision of genus Eucalyptus," Part 2, p. 66.

8. E. diversifolia, Bonpl.

Described in Pl. Jard. Malm. 35, t. 13 (1813).

Synonyms—(1) *E. santalifolia*, F.v.M., Trans. Vict. Inst. i. 35 (1855); also ex Miq. Ned. Kruidk. Arch. iv. 133 (1856).

(2) *E. viminalis*, Labill., var. *diversifolia*, Benth.

I have seen Bonpland's exceedingly rare work, and the illustration and description are satisfactory. Mueller (in 'Eucalyptographia,' under *E. santalifolia*) gave the one as a synonym of the other, yet he suppressed Bonpland's species, which had a priority of 42 years over his own. I cannot understand his action, but I am aware of other instances of his arbitrariness in dealing with the laws of priority; he sometimes suppressed a species at his own will. In the 'Eucalyptographia' he speaks of Bonpland's figure, but apparently at second-hand, for the plate contains juvenile foliage (a very rare thing in the earlier figures of Euca-

lyptus), bud, fruits, &c. In other words, it is one of the amplest early figures of a species.

E. viminalis, Labill., var. *diversifolia*, Benth. Herb. (B.Fl. iii. 240) is another synonym. Bentham says "*E. viminalis* varies very much in the size and number of flowers and the shape of the operculum. In the original Tasmanian form, common also in Victoria, the peduncles are mostly 3-flowered, although occasionally many-flowered specimens occur. In the S. Australian* *E. diversifolia* the flowers are rather numerous in the umbel and the fruit large." I have seen Bentham's specimens, which are really *E. diversifolia*, in immature fruit.

9. E. ACMENIOIDES, Schauer; and E. UMBRA, R. T. Baker, these Proceedings, 1900, p. 687.

These species may be at once separated if sucker-leaves be available. Those of *E. acmenioides* are thin and *Eugenia Smithii*-(Acmena-) like, while those of *E. umbra* are thick, broad and coarse, much thicker and coarser than those of *E. acmenioides*. They are indeed as thick and coarse as those of *E. capitellata* ever are. The statement in the original description of *E. umbra* that the sucker-leaves are "thin" must be modified.

These two species have been so long confused and are, indeed, so closely related, that it is desirable to endeavour to contrast them.

Where the two species grow in the same district, *E. acmenioides* often grows on the flats or halfway up the hills. It may hence be termed "Flat White Mahogany." It is a Stringybark, the inner bark being white, while that of *E. eugenioides* is yellow. The timber is very like Tallow Wood, and is often substituted for that timber. It is a valuable timber. I have given instances of its durability on other occasions, and would add that there is an old wharf made of this timber at Woy Woy. The tide ebbs

* *E. diversifolia* is a South and West Australian plant, and since the above was written I have recorded it (Vict. Nat. xxi. 116) from Portland, Victoria, also.

and flows over it, yet it is nearly sound after 47 years. The tree grows up to 5 feet in diameter.

E. umbra grows in drier situations, and even on the tops of hills. It may therefore be termed "Mountain White Mahogany." It is not long in the bole, for it soon branches out. Like *E. acmenioides*, it grows up to 5 feet in diameter, and has a white inner bark. It has an inlocked, wavy timber of a valuable character. The differences between the timbers of *E. acmenioides* and *E. umbra* require to be worked out. *E. umbra*, long looked upon as a coast variety of *E. acmenioides*, has a flat-rimmed fruit and is the form which connects with *E. pilularis*, as pointed out by Bentham. The leaves and buds also support that affinity.

Usually the flat-rimmed fruit is accompanied by thick foliage, indicating *umbra*. But sometimes this coarse foliage accompanies thin-rimmed fruits which one has hitherto assigned to *E. acmenioides* without hesitation. Such, for example, is the "Messmate" of Awaba, which grows on foot-hills, moist places, not swamps. These specimens certainly show a transit between *E. umbra* and *E. acmenioides*, and in the present state of our knowledge I doubt if we can always separate the two species in the absence of juvenile foliage.

10. E. Sieberiana, F.v.M.

Copy of original label of Mr. C. S. Wilkinson, late New South Wales Government Geologist. "No. 6. 'Stringybark,' 'Messmate.' Trees up to 4 feet in diameter growing straight and lofty, the trunk covered with deeply furrowed fibrous bark of dark brown colour, resembling that on Ironbark, but not so hard. Branches and boughs smooth and white. Dromedary Ranges, 1,500 feet above sea-level. Formation Silurian, 2nd November, 1878" (National Herbarium, Melbourne).

Mueller originally labelled this *E. hæmastoma*, and then cancelled it for *virgata* and *Sieberiana*. The specimens are typical *E. Sieberiana*, F.v.M., and the reasonableness of the confusion with *E. hæmastoma* and *E. virgata* a quarter of a century ago is quite obvious and has often been explained by me.

In describing *E. Wilkinsoniana* (a very different plant whose position I shall refer to in my next paper), Mr. R. T. Baker does not even mention *E. Sieberiana*, and makes certain observations in regard to *E. hæmastoma*, Sm., which species-name had been introduced by Mueller into a discarded label as already shown, and into a note in Part ii. (1879) of the 'Eucalyptographia' under *E. hæmastoma*.

11. E. SIDEROPHLOIA, Benth., var. GLAUCA, Deane and Maiden.

These Proceedings, 1899, p. 461.

"On the sides of hills and out of the crevices of rock, all over the district, not perhaps plentiful, but widely scattered over the hills." A stunted tree, Gungal, near Merriwa (J. L. Boorman).

This perhaps may be confused with *E. sideroxylon*, A. Cunn., var. *pallens*, Benth., in the absence of fruits. It is perhaps identical with the "Silver-leaved Ironbark" of New England, W. Woolls, of Part 13 of my 'Forest Flora of New South Wales.' I have not fruits of the latter.

12. E. BAUERIANA, Schauer.

See these Proceedings, 1902, p. 214.

Thirteen miles from Stanthorpe, Queensland (A. Murphy; March, 1904). "A box-tree with bark like *hemiphloia* and continuing rough out to the young limbs; timber very hard." Fruits very large.

Other localities not previously enumerated are: "Tingha, 2800 feet, on granite (R. H. Cambage);" Bolivia, near Tenterfield, "bark persistent to the smallest branches" (H. Deane, 1885).

With reference to p. 219 (*op. cit.*) I have also seen var. *conica* n Queensland, near Wallangarra.

13. E. HEMIPHLOIA, F.v.M., var. ALBENS, F.v.M.

A White Box from Gulgong (J. L. Boorman), "plentiful all over the lowlands of this district," adds another to forms of *E. hemiphloia*. Compared with typical var. *albens* its fruits are smaller, its pedicels are absent, and it is markedly constricted at

the orifice, giving the fruits a distinctly ovoid appearance. Specimens from other districts connect absolutely with the type.

14. E. ODORATA, Behr. E. CAJUPUTEA, F.v.M.
E. ACACIOIDES, A. Cunn. E. WOOLLSIANA, R. T. Baker.

In Trans. Roy. Soc. S. Austr. 1903 (pp. 240-252) I published a paper on *E. odorata*, Behr. Examination of some type-specimens which have come into my hands since 1902 (the year the above paper was written); recognition of the fact that under *E. odorata* two series of plants,—those with broadish and those with narrow suckers—have for many years been included; and acceptance of the fact of hybridisation in the genus, have all contributed to modification of some of the views expressed in that paper.

E. odorata is usually a tree, the "Peppermint" of South Australia. It may be also a Mallee. The narrow-suckered forms may be Mallees, or less commonly trees. The hybrids are usually trees.

Let me arrange certain trees in the following ways:—

A.—RED TIMBERS.

1. *E. odorata*, Behr.
2. The Ironbark Boxes.
3. *E. cajuputea*, F.v.M.
4. *E. acacioides*, A. Cunn.

B.—PALE OR BROWN TIMBERS.

1. *E. Woollsiana*, R. T. Baker.
2. *E. hemiphloia*, F.v.M., var. *microcarpa*, Maiden.

A[1].—PLANTS WITH BROADISH SUCKERS.

a. *E. odorata*, Behr (typica), Syn. *E. calcicultrix*, F.v.M.
b. *E. hemiphloia*, F.v.M., var. *microcarpa*, Maiden.
c. The Ironbark Boxes.

B[1].—PLANTS WITH NARROW SUCKERS.

a. *E. cajuputea*, F.v.M., Syn. *E. polybractea*, R. T. Baker.
b. *E. acacioides*, A. Cunn., Syn. *E. viridis*, R. T. Baker; *E. odorata*, Behr, var. *linearis*, Maiden.
c. *E. Woollsiana*, R. T. Baker.

The width of the juvenile foliage and the colour of timber are of course variable, within certain limits, in Eucalyptus.

E. odorata, Behr (*E. calcicultrix*, F.v.M.), "Peppermint der Kolonisten" of Behr. Broadish ovate juvenile leaves. Well-marked (*E. loxophleba*-like) venation, intramarginal vein at a considerable distance from the edge. Colour bright, often sap-green. Buds scarcely angular, but showing angularity somewhat. Rim of fruit often accentuated, like that of *E. leucoxylon* and *E. melliodora*. Runs imperceptibly into *E. porosa*, F.v.M., which it includes.

E. cajuputea, F.v.M., in Miq., Ned. Kruidk. Arch. iv. 126 (1856).

Type from Flinders Range, S.A.

Rather narrow juvenile foliage; rather narrow leaves, but variable in width. Angular calyces and buds. Fruits sub-cylindrical or hemispherical, spreading at the mouth. More or less angular, sometimes nearly sessile as regards the pedicels. The filaments of the anthers often dry reddish.

This form has sometimes purple filaments when fresh (hence var. *erythrandra*) and the normal species has sometimes filaments of that colour also.

It appears to me identical with *E. odorata*, var. *erythrostoma*, Miq., and var. *erythrandra*, F.v.M.; also *E. perforata*, F.v.M.

In the original description of *E. perforata* we have "Cortex ramorum juniorum interdum nigrescit," hence the "Black Mallee" of Adelaide (referred to *E. calcicultrix* in my paper through inadvertence) and other localities.

E. odorata, "forma *angustifolia*," Miq., from Port Lincoln district (Dombey Bay) is identical with the preceding. It requires care to distinguish *E. cajuputea* from *E. odorata*. With sucker-leaves it is easy enough.

E. acacioides, A. Cunn.—This has been distributed amongst many first-class herbaria labelled in Cunningham's handwriting, but its identity was not established until I drew attention to it in my paper on *E. odorata*. While most commonly a Mallee, it

is sometimes a small tree. It is identical with Mr. Baker's *E. viridis*.

In the latter species we have greener and usually less glaucous leaves than in *E. polybractea*, but in juvenile and mature leaves or fruits they seem to run into each other. Typical *viridis* from Girilambone has not only broadish leaves, but a glaucous cast on the young leaves. Indeed both it and *cajuputea* (*polybractea*) are closely related, and both have close affinity to *E. odorata*.

The leaves have often a dull and bluish type of green, and often have a channelled appearance as if a depression on the upper surface was caused by the midrib.

The Ironbark-Boxes.—These seem to me to be indubitable hybrids. Mr. R. H. Cambage* has pointed out the probability of an Ironbark-Box of the Lachlan† being a hybrid between *E. sideroxylon* and *E. Woollsiana*. He has also suggested the hybrid character of the Ironbark-Box or Bastard Ironbark of Nymagee, and the White Ironbark or Ironbark-Box of Barmedman; and I would add the Cooburn or Black Box of Narrabri. I only mention these forms because they have been referred to at some length in my paper on *E. odorata*, a species they closely resemble in bark, timber, buds, &c.

The foliage of the Ironbark-boxes is duller than that of *E. odorata*, and the venation less marked.

Mr. Cambage's observations as to the evolution of these forms are interesting, and must be borne in mind in considering the relations of the western "Boxes." I confine myself at this moment to emphasising the resemblance of these forms to *E. odorata*.

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* These Proceedings, 1900, p. 715.

† Mr. R. H. Cambage writes to me:—"I should say that the Nymagee and Condobolin trees are associated with the narrow-leaved form of *E. Woollsiana*, and even the Barmedman ones are rather more the narrow forms than the broad, but it is getting difficult in the latter place." The "Narrow-leaved form of *E. Woollsiana*" is the form that, I recommend presently, should be known as *E. Woollsiana*, the broader-leaved forms really belonging, in my opinion, to *E. hemiphloia*.

It is not desirable to name these forms until after further enquiries as to their relationship.

E. Woollsiana, R. T. Baker.

We now come to some interesting forms included under the above name. For the sake of making my observations clear, I will call Mr. Baker's type-specimens *Woollsiana* No. 1 and *Woollsiana* No. 2.

1. *Woollsiana* No. 1 (Girilambone to Condobolin, W. Baeuerlen, Sept. 1900).

This form is common in Western New South Wales, where it is often known as "Narrow-leaved Box." For example, it is common from Dubbo to the N.S.W. railway line and further west, *e.g.*, Mt. Boppy. It also extends to the vicinity of the coast in Northern New South Wales and Queensland.

The juvenile foliage is narrow; the mature leaves are rather narrow, but they vary somewhat in width. The leaves are often shiny, but they may be dull. The fruits are quite small, and the rim is sometimes well-defined.

It is to this form that I think the name *E. Woollsiana*, R. T. Baker, should, to save confusion, be restricted.

2. *Woollsiana* No. 2 (Condobolin, W. Baeuerlen, 26th March, 1901). Leaves coarser and broader than the preceding; near to the *hemiphloia* type. Fruits rather larger and duller. Sometimes the fruits are not smaller than those of typical *hemiphloia*. The juvenile foliage broadish. This is my *E. hemiphloia* var. *microcarpa*. I adhere to the opinion that it is simply a form of *E. hemiphloia*, which it resembles in juvenile foliage, bark, timber and other characters. Collectively the two forms include much of the "small-fruited Box" of the west with pale or brown-coloured timber in contradistinction to the red-timbered Boxes.

Woollsiana No. 2 is very common in the west, particularly the south-west. It occurs also in Victoria and South Australia.

As compared with *E. odorata*, the fruits are smaller, the leaves less markedly veined, while the timber of *E. odorata* is of course red or reddish-brown.

Woollsiana No. 2 can no more be included with *Woollsiana* No. 1 than can *E. dives* and *E. Cambagei* with *amygdalina* and *goniocalyx* respectively.

The term "Mallee Box" is not always applicable to forms included under *E. Woollsiana*, while other species or varieties are also termed "Mallee Box."

Of the identity of *E. cajuputea* and *E. polybractea* I have little or no doubt. Of the identity of *E. acacioides* and *E. viridis* I have little or no doubt. Of the identity of *E. cajuputea* and *E. acacioides* I am not absolutely certain, and therefore keep them separate for the present. Perhaps one is a variety of the other. That there is transit from *E. cajuputea* and *E. acacioides* to *E. Woollsiana* No. 1 I have no doubt.

I make the above remarks partly in contemplation of the following specimens :—

(1) At Minore, N.S.W., (J. L. Boorman) we have normal *acacioides* and also a coarser form with fruits more spreading at the orifice. It is near *E. cajuputea*; it is near *E. Woollsiana* No. 1. Both are Mallees.

(2) Mr. Baker's type-specimens of *E. viridis* from Girilambone are rather coarse-foliaged, with leaves up to $\frac{1}{2}$ in. diameter. My *odorata* var. *linearis* specimens have narrower and perhaps thicker leaves. The "Green Mallee" is indeed variable.

(3) *E. cajuputea* is very near *E. acacioides*. For example, Dombey Bay, S.A., specimens show the very great difficulty, perhaps the impossibility, of separating *E. cajuputea* from the Green Mallee (*viridis*) and from the Blue Mallee (*polybractea*).

Much collecting yet requires to be done. We particularly require juvenile foliage, and axe-cuts of the timber of as many forms as possible. It is far from my thoughts that I have settled the affinities of the "Western Boxes." But I have carefully studied the types, and have travelled much amongst them in the bush; and I hope that this contribution will tend to finality amongst these bewildering forms.

15. E. ALPINA, Lindl.

Leaves usually broader and thicker than those of *E. capitellata*, Sm., though the latter is sometimes very similar to *E. alpina* in this respect.

Buds.—The buds are as rugose as possible. While in most specimens the rugosity is irregular, in others it is more or less disposed in parallel ridges. Rugosity of the buds is also seen in *E. capitellata*, although I am not aware that attention has been previously drawn to it. Thus we have it in a marked manner in specimens from the Grampians, Victoria, 2,000 ft. (H. B. Williamson. Specimens from this locality, cultivated in South Africa, lose much of their rugosity). Specimens showing less rugosity are Darlimurla, South Gippsland (H. Deane); and also tops of the Blue Mountains, N.S.W., and other high elevations.

Anthers.—Let us examine some anthers.

(1) *Eucalyptus capitellata*, Sm., (typical) from Kogarah, Sydney. Anther cells divergent, rather broader than long, opening in slits.

(2) *E. capitellata*, Sm., from Grampians, 2,000 ft., Victoria (H. B. Williamson, Jan. 1901). Anther cells divergent, hardly broader than long, opening in slits.

(3) *E. alpina*, Lindl., from Grampians, Victoria (C. Walter, Dec. 1887). Anther cells parallel, decidedly longer than broad, opening in parallel slits.

The structure of the anthers is the same in the three specimens, *i.e.*, two cells opening in longitudinal slits, and attached to the filament near the top. In No. 3 the cells are long and parallel; in No. 2 they are shorter and more spreading; and in No. 1 still more spreading. We have, indeed, a continuous series.

Fruit (of *alpina*) very variable both as regards size, shape and sculpture. Those figured in the 'Eucalyptographia' may be taken as one pattern. Then I have specimens from Mt. Abrupt (H. B. Williamson) almost 1 inch in diameter!, valves 7, the calyx hardly rugose, the rim broadish and truncate (horizontal). A second specimen from Mt. Zero (D'Alton) has the fruits $\frac{5}{8}$ in. in diameter, valves 5, the calyx very warted, the rim domed, and

the valves as exserted as possible. A third specimen exhibits minor differences.

I have seen two of Lindley's type-specimens of *E. alpina* :—

(*a*) "No. 243. Summit of Mt. William, Major Mitchell's Expedition, 1836," with the addition in Lindley's handwriting, "*Eucalyptus alpina*, m" [mihi]. In bud only. Herb. Cant. ex herb. Lindley.

(*b*) "No. 243 of Major Mitchell's Expedition, *Eucalyptus alpina*. Interior of New South Wales" [Victoria had not then been separated. J.H.M.]. In fruit only. Herb. Cant. ex herb. Lemann.

These specimens have rugose buds, but comparatively small, nearly smooth fruits. They are very close to the specimens of *E. capitellata* already referred to as Grampians (H. B. Williamson).

Lindley's original description says :—"Ramulis brevibus rigidis angulatis, foliis alternis petiolatis ovato-oblongis viscosis basi obliquis, umbellis axillaribus pauciflоris petiolis brevioribus, operculo hemisphærico verrucoso inæquali tubo calycis turbinato verrucoso breviore" (Mitchell's 'Three Expeditions,' ii. 175). Mitchell himself simply says, "Near the highest parts of the plateau I found a new species of Eucalyptus with short broad viscid leaves and rough-warted branches." So that although the specimens from the top of the mountain are intended to be the type, the specimens distributed have included some specimens of *E. capitellata*, Sm.

Affinities.—Bentham ('Flora Australiensis') places *E. alpina* between *E. globulus* and *E. cosmophylla*. Mueller ('Census') places it between *E. preissiana* and *E. globulus* and near *E. cosmophylla*.

The determination of affinities of species of Eucalyptus is, however, very complex, and can only be ascertained by judicial consideration of a number of factors, *e.g.*, shape of juvenile leaves, shape and venation of the mature leaves, principal constituents of oil, anthers, fruit, bark, timber, kino, habit, &c., and not one or two of them solely. But I think I have shown that the relations of *E. alpina*, Lindl., and *E. capitellata*, Sm., are very

close; and doubtless additional evidence will be forthcoming as to juvenile foliage, oil, bark, timber, &c. My observations as to the transition forms of anthers may cause botanists to give more attention to this aspect of variation.

16. E. CLADOCALYX, F.v.M., Linnea, xxv. 388 (1852).

Syn. *E. corynocalyx*, F.v.M., Fragm. ii. 43 (1860); *E. Cooperiana*, F.v.M., Fragm. xi. 83 (1880).

In the 'Eucalyptographia,' under *E. corynocalyx*, Mueller himself quotes *E. cladocalyx* as a synonym, but he offers no explanation of his action in suppressing a name in favour of one given eight years later. I have turned to the original description of *E. cladocalyx*, and find that it is quite in order. The type came from the Marble Range (near Port Lincoln, S.A.), and it was originally described as a shrub. The name must be restored, and this should have been done years ago, before *corynocalyx* came so extensively into use. The laws of nomenclature cannot be set aside at the will of any man, however eminent.

I have examined the type of *E. Cooperiana*, F.v.M., from King George's Sound (Maxwell), and cannot see that it differs in any essential character from *E. cladocalyx*, F.v.M. The peduncles and pedicels of *E. Cooperiana* are broader than those of *E. corynocalyx*. The range of this species therefore extends to Western Australia. Bentham included *E. Cooperiana* under *E. decurva*, F.v.M.

17. E. PATENS, Benth.

(1) *E. pachyloma*, Benth. (B.Fl. iii. 237), a synonym.

Preiss, under No. 252, distributed both flowering and fruiting specimens. They (or at least the flowers) were obtained "in arenosis silvæ ad fl. Swan River. Oct. 1839 florens." The flowering specimens belong to *E. rudis*, Endl., while the fruiting specimens belong to *E. patens*, Benth. Bentham, indeed, first pointed this out, for he says "The fruiting specimens distributed by Preiss (not described by Schauer*)belong to *E. patens*, which has much

* Nor did Endlicher describe the fruits in Enum. Pl. Hügel, No. 157, p. 49. The type came from "King George's Sound." It is obvious that the whole trouble has been caused through the erroneous matching (by Preiss) of flowering and fruiting twigs under his No. 252.

resemblance to *E. rudis* in foliage, but differs in inflorescence, flowers and fruit."

I have seen several fruiting twigs of Preiss' No. 252, and concur in Bentham's determination. One of the specimens, however, bears the label in Bentham's handwriting "*E. platyloma*, Benth.," doubtless a slip of the pen for *E. pachyloma*. Therefore *E. pachyloma*, Benth., is a synonym of *E. patens*, Benth. Mueller, however, suggested that *E. pachyloma* might be looked upon as a synonym of *E. santalifolia*, F.v.M. (*E. diversifolia*, Bonpl.) as will be seen from a passage in 'Eucalyptographia' under *E. Oldfieldii*.

(2) *E. Todtiana*, F.v.M., is perhaps a synonym also.

I am of opinion that *E. patens*, Benth., and *E. Todtiana*, F.v.M., may not be specifically distinct. The juvenile foliage and the timber of both species should be compared by local botanists to see if there are more fundamental differences than those disclosed by flowering and fruiting twigs. *E. pachyloma*, Benth., comes nearer to the *Todtiana*-form than to typical *patens*; and if my suggestion that *Todtiana* is a mere form of *patens* be agreed to, it and *E. pachyloma* might be included under *patens* under the varietal name of *pachyloma*.

18. E. PULVIGERA, A. Cunn., in Field's Geog. Mem. N.S. Wales, 1825.

See these Proceedings, 1899, 465; also 1900, 110 (recorded by Deane and Maiden under *E. pulverulenta*, Sims), and 1901, 126 (recorded by the same under *E. cordata*, Labill.); Mr. R. T. Baker (Rept. Austr. Assoc. Adv. Science, ix. 345, 1902) looks upon it as *E. pulverulenta*, Sims.

I have recently (in company with Mr. R. H. Cambage) paid a visit to Allan Cunningham's type-locality for *E. pulvigera*, viz., Cox's River. The plant there is identical with that collected by Mr. Cambage at Cow Flat near Bathurst.

It has a somewhat Mallee-like growth, though without the root-stockiness of a Mallee. It may be quite prostrate, quite erect, or spreading and rambling. It has long weak stems of

pretty uniform diameter of say two inches, with an average height of say eight feet. At the same time I have seen it three inches in diameter, with a height of fifteen feet. Its trunk is smooth, with ribbons, and its timber white.

As to the nomenclature of Cunningham's plant, it has, as already stated, been suggested that it is the *E. pulverulenta* of Sims' Bot. Mag. When I was in England I ascertained that an absolutely authentic specimen of Sims' plant was not in existence, and I see no reason for disturbing the generally accepted view that the Argyle Apple is *E. pulverulenta*.

A portion of Mr. Baker's argument (*loc. cit.* p. 346) is based on inference connected with the difficulty of getting seed to England in time for flowering in 1819 (date of Sims' plate). Mr. Deane and I have already (these Proceedings, 1901, p. 550) dealt with this objection. Nevertheless it may be shown that George Caley, Sir Joseph Banks' seed and plant collector, was in *E. pulverulenta* country at least as early as 1804.

I feel very strongly that priority of a species may not be disturbed on deductive evidence of that kind which does not amount to absolute certainty. The destruction of the so-long undisturbed application of the name *E. pulverulenta* to the Argyle Apple can only be permitted on the clearest evidence. At the same time I think that the differences between *E. pulvigera*, A. Cunn., and *E. cordata*, Labill., may be sufficient for us to keep them apart for the present. I therefore, though with diffidence, recommend that Allan Cunningham's name of *E. pulvigera* be allowed to stand for the Cox's River and Cow Flat plant. The species is undoubtedly very close to *E. cordata*, Labill. Compared with that species it is a slenderer tree, has smaller leaves, which are more coriaceous and which are entire (not frequently crenulate as in *E. cordata*). The valves of *E. cordata* are more sunk, those of *E. pulvigera* being exserted and the rim being grooved (there is some grooving in a type-specimen of Labillardière). The shape of the fruit of *E. pulvigera* tends to be urceolate, while that of *E. cordata* is more hemispherical.

E. pulvigera is a rare and a disappearing species. It is confined to dry, rocky situations, and is what may be termed a "hardy" form. While it and *E. cordata* have doubtless sprung from a common stock, their foci of occurrence (Cox's River, &c., and Tasmania) have been so long separated that the two forms have acquired characters which possess a certain amount of stability.

19. E. PULVERULENTA, Sm., and E. NOVA-ANGLICA, Deane and Maiden.

In these Proceedings, 1901, pp. 547-555, I included *E. nova-anglica* under *E. pulverulenta*. I propose to re-examine the position.

Typical *E. pulverulenta*, the "Argyle Apple," has the fruits in 3's and rather coarse, broad thickish foliage, and thick reddish fibrous bark, grey on the outside, and reddish timber.

Incidentally I may mention, in regard to *E. pulverulenta* (though the observations are of wider application), that this glaucous species varies in glaucousness according to the season. Thus specimens collected in the Tumut district (*a*) by me in August, have scarcely a trace of glaucousness; (*b*) by Mr. Froggatt, in October, are more glaucous; and (*c*) by Mr. Betche, in January, are as glaucous as they can be.

Typical *nova-anglica* has the fruits numerous (more than 3's) and smaller than those of *E. pulverulenta*. It is common in New England and also in Victoria, being one of two trees (the other being *E. Gunnii*, var. *acervula*), formerly named *E. Stuartiana*. The situation is explained in these Proceedings, 1902, p. 569.

E. nova-anglica has leaves more commonly lanceolate than *E. pulverulenta*, but of course lanceolate leaves in typical *pulverulenta* are frequent; the juvenile leaves are not really different; bark and timber are identical.

It has been stated that the fruits of *E. pulverulenta* are always in 3's. This is not, however, the case. Specimens from T. O'Rourke, Buchan, Gippsland (A. W. Howitt) "Red Stringy-

bark with whitish blue leaf; grows on swampy ground," are in every respect similar to typical *E. pulverulenta*, except that the flowers are in more than 3's.

The same remarks apply to Mr. Howitt's specimens from Moe, Gippsland, with flowers up to 8 in the head. Some of the specimens have the normal *pulverulenta* foliage, while others are lanceolate. So that, while I would like to accept the simple arrangement of looking upon *E. pulverulenta* as with flowers in 3's, and *E. nova-anglica* as with flowers in more than 3's, specimens like these aggravatingly break down such classification.

Then take the specimens from Beechworth, Vic. (Falck), quoted also in my former paper. This tree has thick reddish fibrous bark; the leaves are all lanceolar, and the flowers are in 3's.

Then again we have—"Small tree, with a bark like the Mahogany (*e.g.*, soft, red, and fibrous, J.H.M.) thirty feet high and a foot in diameter, grows in swampy heathy flats between Narrabarba and Eden and Cape Howe. Wood dark red" (J. S. Allan). These have flowers in more than 3's, but otherwise I cannot tell the difference from the Beechworth specimens.

I have only referred to a small number of the very abundant specimens in the National Herbarium, but, having again reviewed the evidence with an open mind, I think that my view of looking upon *E. pulverulenta* and *E. nova-anglica* as one species is a correct one. I have tried to separate them, and these intermediate specimens persist in spoiling such an arrangement. At the same time I cannot find fault with those who cling to the desire to keep the species apart. I will, indeed, seek for further evidence to keep them apart.

20. E. ACACIÆFORMIS, Deane and Maiden.

The bark and timber are similar to those of *E. nova-anglica*. I cannot indicate any difference between them. The species grows amongst *E. nova-anglica*; and the affinities of the two species are closer than between *E. acaciæformis* and *E. Stuartiana*, F.v.M.

21. E. AMPLIFOLIA, Naudin, 2nd Mém. p. 28; these Proceedings, 1903, p. 893.

E. tereticornis, Sm., non var. *latifolia*, Benth., B.Fl. iii. 242. Suggested that it might perhaps be a form of var. *latifolia*, Benth., by Maiden in Bull. Herb. Boissier, 1902, p. 571; Forest Flora, N.S. Wales, Part xi. p. 7.

I am satisfied that this "Swamp Gum" or "Broad-leaf Blue Gum" is a distinct species. In its commonest form it is a small or medium-sized tree, inclined to a crooked stem and scrambling branches, with long, narrow, horned or tapering opercula (the arrangement of the buds is usually stellate) and small fruit, the valves well exserted and numerous in the head. It is common in damp situations in Western New South Wales and Queensland, but may occur in dry rocky places. The juvenile foliage is always broad and often with the venation very marked. The mature foliage may be broad or lanceolate; its texture varies, but it is usually coriaceous. Its transit to normal *tereticornis* appears (in one direction) to be through *E. angulosa*, Naudin, a form I cannot recognise as of specific value.

I hope to make some observations concerning *E. cimicina*, R.Br.; and *E. tereticornis*, Sm., var. *latifolia*, Benth., in my next paper.

22. E. TERETICORNIS, Sm., var. DEALBATA, Deane and Maiden.

In these Proceedings for 1901 (p. 204) Mr. R. H. Cambage has drawn attention to the occurrence of this variety in Mallee-like form at Wirlong near Nymagee. Mr. J. L. Boorman has recently found the same variety in Mallee-form at Gungal near Merriwa. He has two forms which in the National Herbarium are called A and B respectively. A is not so robust as B, and with rather narrower leaves. The fruits of B are larger and more urceolate than those of A.

23. E. ROSTRATA, Schlecht.

It is sometimes difficult to discriminate between this species and *E. tereticornis*, Sm. The seedling leaves of the former species are narrow, while those of the latter are much broader.

E. longirostris, Cordier (according to Naudin's specimens No. 15), and *E. ambigua*, Trottier, (?) (Naudin No. 4) cannot be separated by me from *E. rostrata*.

24. E. EXSERTA, F.v.M.

Journ. Linn. Soc. iii. 85 (1859); Maiden's Forest Flora of New South Wales, Part xi., Vol. ii., p. 11; compare also *E. Morrisi*, R. T. Baker, these Proceedings, 1900, 312.

Having examined herbarium specimens, bark and timber of these two species, I am unable to point out any essential difference between them. Typical specimens of *E. exserta* occur in Coastal Central Queensland. Typical specimens of *E. Morrisi* are found in Western New South Wales. It is well known that the Eremæan flora which in New South Wales is far to the west, in Queensland approaches the coast. At the same time more intermediate localities (I have some) for the two species than are at present known should be ascertained, and on their collection it can be decided whether the species are really identical.

25. E. PLEUROCARPA, Schauer, in Lehmann's Plantæ Preissianæ, i. 132 (1845); *E. tetragona*, F.v.M., Fragm. iv. 51 (1864).

Bentham (B.Fl. iii. 259) and Mueller ('Eucalyptographia') both accept this synonymy, and yet adopt Mueller's name as against Schauer's, which has a priority of 19 years. Schauer's description is in order, and his specimens (which I have seen) are well authenticated. His name must be restored; and it was, indeed, only suppressed through inadvertence consequent on lax ideas in regard to the suppression of names.

I take this opportunity of pointing out that this species has some affinity to the large-fruited forms of *E. incrassata*, Labill.

26. EUCALYPTUS BANKSII, sp.nov.

A very large tree up to 100 ft., reminding one of *E. goniocalyx* in habit. Quite glabrous or the twigs a little glaucous. It has clean stems without ribbons and no rough bark.

It is locally known as "Woolly Butt" because the bark is fuzzy to cut.

Juvenile leaves nearly orbicular or oblong, cordate at the base and stem-clasping, strictly opposite, gradually becoming broadly lanceolate and finally lanceolate; texture thickish, glabrous, slightly paler underneath. The midrib prominent, the main lateral veins also conspicuous and making approximately an angle of 45° with the midrib. The ends of these lateral veins connected by loops (brachydodromous), said loops at a considerable distance from the edge. Besides these, there are a large number of fine anastomosing veins. Twigs nearly terete, reddish.

Mature leaves rather large, 9 inches long by 1½ broad not being an uncommon size. Equally green on both sides, falcate, venation rather prominent, intramarginal vein at some distance from the edge, venation spreading.

Buds sessile, the head of 4 to 7 either on a short strap-shaped peduncle or this may be absent. The buds more or less angular by mutual compression. The operculum blunt conical or hemispherical.

Flowers.—Anthers opening in parallel slits.

Fruits small, under ¼ inch in diameter, conoid or nearly hemispherical, rim narrow and slightly domed, valves (only three in the specimens seen) well exserted.

Bark of a dull uniform grey; woolly or fuzzy to cut. Not as soft and as Box-like as in *E. Stuartiana*. Branches smooth, not ribbony. The uniformity of the smooth bark of this species (intermediate between that of a gum and a box, and somewhat resembling that of a Grey Gum, *E. punctata* or *E. propinqua*) is notable.

Timber.—A good hard timber, not soft like that of *Stuartiana*. Pale-coloured, a timber of promise, but data not available in regard to its economic merits.

Hab.—On the sides of hills at an elevation of about 3,500 feet in the Wallangarra (New South Wales-Queensland border) district (J. L. Boorman, August, 1904); Emmaville (J. L. Boorman, October, 1901).

Affinities.—This species has been rarely collected, but has hitherto been looked upon as conspecific with *E. Stuartiana* or *E. viminalis.*

1. *E. Stuartiana*, F.v.M.

Two specimens collected by Charles Stuart are in the Melbourne Herbarium and are labelled as follows :—

(*a*) "*E. Stuartiana.*—Bark rather rough and fibrous. New England" [an old label of Mueller's to this specimen is "*E. viminalis* var. *capitata*"]. This specimen has leaves and immature fruits. It may be the new species or *E. Stuartiana.*

(*b*) "Termed here 'Peppermint Gum.' A large tree of 40-50 ft., with a wide spreading head. The bark rugose on trunk but smooth on upper branches."

Mr. Henry Deane collected it near Tenterfield in September, 1885, and his label is "*E. Stuartiana* (?). Seems to approach *E. goniocalyx.* Has long leaves and sessile flowers."

All the above specimens are sessile alike as regards pedicel and peduncle.

Another specimen "White Gum, Glen Innes, *E. viminalis*" (H. Deane) in leaf and fruit only, has a common peduncle and is referable, I think, to the new species.

Wherever this new species occurs in the same district as *E. Stuartiana*, the former occurs on the hills and slopes, and the latter (as is usual) on flats. It differs also from *E. Stuartiana* in bark and timber, also in the foliage. The new species has rarely glaucous juvenile foliage; it is coarser, and more pedunculate. The mature foliage is much larger and more pendulous than *E. Stuartiana.* As a rule the buds of *E. Stuartiana* are not angular, while the shape of the fruit is different. Its closest affinity appears, however, to be *E. Stuartiana*, and it appears to come between that species and *E. Cambagei.*

(2) *E. Cambagei*, Deane and Maiden. The difference between this species (with which *E. goniocalyx* was formerly united) is in the absence of ribbons in the bark of the new species; it is also white in the inner bark, not yellow like *E. Cambagei.* The

bark of the latter is also much rougher than that of the new species. It is also a larger tree than *E. Cambagei*. As regards the fruits, they are always smaller and less cylindrical than those of *E. Cambagei*.

(3) *E. quadrangulata*, Deane and Maiden. The juvenile foliage sharply separates it from this species. The fruits and bark also are very different, but there is a general resemblance between the two species.

I dedicate this interesting species in honour of the great Sir Joseph Banks.

EUCALYPTUS SCOPARIA, sp.nov.

A slender tree of 30 or 40 ft., with narrow pendulous shiny foliage, and an entirely smooth white bark.

Juvenile leaves lanceolate, symmetrical, tapering to a very short petiole and to a fine-pointed apex. Equally green on both sides. Strictly opposite; penniveined, the lateral veins very fine and anastomosing, the principal lateral veins making an angle of about forty-five degrees to the midrib. Entirely glabrous, and the twigs reddish and terete.

The opposite-leaved character is retained for a considerable period, the leaves becoming thicker, narrower and longer. I have leaves, still in the opposite stage, 3 inches long and $\frac{1}{5}$ inch wide. In this stage the foliage resembles that of *E. amygdalina* (particularly the type Tasmanian form) or of *E. linearis* a good deal. It is seen to have a translucent margin and to be full of oil dots, emitting a peppermint odour when crushed in the warm hand.

Mature leaves up to 6 inches long and $\frac{1}{2}$ inch broad, tapering very gradually into a fine apex. At the base it tapers less gradually into a petiole of perhaps 1 inch. Texture thickish, the midrib alone conspicuous.

Buds nearly ovoid when ripe, with a hemispherical or slightly pointed operculum. Calyx tapering into a short pedicel which may be absent. Peduncle may be $\frac{1}{4}$ inch. Usually three to seven in a head.

Flowers opening in longitudinal parallel cells.

Fruits smooth, usually barely $\frac{3}{16}$ inch in diameter, subcylindrical, rim rather prominent, domed, the valves (indifferently 3 or 4) moderately well exserted.

Bark very smooth and white.

Timber pale-coloured, fissile, probably of no special merit.

Hab.—On the tops of the highest hills (circa 4000 ft.) in fissures of granite rocks around Wallangarra, occurring on both sides of the New South Wales-Queensland border (J. L. Boorman; July, 1904).

Affinities—This tree belongs to the *viminalis-Gunnii* series. From *E. Gunnii* and its forms it is separated by the broadish juvenile leaves of the latter. At the same time some specimens of var. *maculosa* of the latter have juvenile leaves intermediate in width. From *E. viminalis* it is separated by its uniformly multi-flowered character, the absence of ribbons on the bark, the narrower juvenile foliage and other characters.

Its nearest affinity appears to be *E. Smithii*, R. T. Baker, from which it appears to be sharply separated by the markedly smooth bark of the new species. I separate the two trees mainly on that ground, the bark of *E. Smithii* being almost an Ironbark. The timber also of *E. Smithii* appears to be darker.

I add to the species of the *Gunnii-viminalis* group with diffidence, but I believe that the naming of this form will be of practical convenience because of its narrow leaves, multiform flowers and smooth bark. Many Queensland and Northern New South Wales trees far away from the *viminalis* and *Gunnii* type localities (which are Tasmanian), and that of *E. Smithii* (which is Southern New South Wales) belong to a group which, for purposes of nomenclature, may, in my opinion, be usefully typified in the present species. It, however, belongs to a series which is capable of so much variation that it does not appear to be a strong species.

In its narrow pendulous juvenile leaves and smooth bark it reminds one of *E. Seeana*, Maiden. The two species differ, however, in almost every other respect.

I think *E. Smithii*, R. T. Baker, is a good species, and later on I will endeavour to distinguish between it and the multiflowered form of *E. viminalis*, which is difficult.

Eucalyptus Rudderi, sp.nov.

"A Red Box, 120 ft. high, 2-3 ft. in diameter" (A. Rudder, formerly Forester, July, 1885). Mr. District Forester Hardiman also calls it "Red Box." It may perhaps be known as the "North Coast Red Box" by way of distinction.

Juvenile leaves not seen in the youngest stage, but seen when still opposite. Medium lanceolate and acuminate, 4-5 inches long and 1½ broad, with petiole of ½ inch. The midrib often pink. Intramarginal vein at some distance from the edge, the lateral veins roughly parallel and forming part of a delicate anastomosing arrangement. Texture thin; margin undulate. I have seen no sign of glaucousness so far. Twigs angular.

Mature leaves.—These do not appear to differ in any important character from the juvenile ones save in losing their opposite character.

Buds.—Arrangement paniculate, the umbels usually 3 to 6 in number, the peduncles rather long, the pedicels short and the calyx-tube tapering gradually into the pedicel; the operculum conoid. When fresh the buds clavate; the operculum dries to a point.

Flowers small; anthers small, opening in terminal pores, like *E. polyanthemos* and *E. melliodora*.

Fruits small, conoid to subcylindrical, rim thin and the indentations and fissures (common in *E. polyanthemos*) absent or rare. Valves sessile and 5 in number in the specimens seen.

Bark.—"Persistent and like that on the trunk of Grey Box, *E. hemiphloia* (A. Rudder)." The rough bark resembles that of "Brush Box (*Tristania conferta*), but is slightly darker in colour, and extends up to the small branches, further than that of White Box (*E. hemiphloia*)" (J. Hardiman).

Timber.—Wood dark red. Timber durable, of a red colour (A. Rudder). The timber is hard and durable underground. It is used

for sleepers and fencing posts (J. Hardiman). Sap wood white, rest of wood red. I cannot perceive any difference between its wood and that of *E. polyanthemos*.

Hab.—Cundletown, near Taree (A. Rudder). This tree is by no means plentiful, but occurs in all the forests adjacent to the coast, especially in the Counties of Gloucester and Macquarie. The best I have seen are in the parish of Bohnock, a few miles from Taree. It appears to favour stony ridges (J. Hardiman).

This is a tree that Mr. Augustus Rudder brought under my notice many years ago.* I have had it doubtfully under *E. polyanthemos*, to which species it is obviously closely related, but it seems to me distinct.

The juvenile foliage being a character of fundamental importance, I feel I have no option in separating the coast Red Box from *E. polyanthemos*. It seems to stand in the same relation to *E. polyanthemos* that *E. cnoica* does to *E. Baueriana*, and whether it should be looked upon as a variety of *E. polyanthemos* or a distinct species is a matter of opinion. While I propose the name *E. Rudderi* for it, in honour of Mr. Augustus Rudder, others may be inclined to call it var. *Rudderi* of *E. polyanthemos*.

The principal differences are indicated as follows :—

E. Rudderi.	*E. polyanthemos.*
Trunk with fibrous bark somewhat like the ordinary Grey Box (*E. hemiphloia*).	Trunk with flaky bark (like *E. tereticornis*) or nearly smooth like a Gum.
Juvenile foliage lanceolar. Mature foliage thinner and more uniformily lanceolar.	Juvenile foliage broader, even tending to orbicular.

* Recorded by me under *E. polyanthemos*, Schauer, these Proceedings, 1903, p. 536.

NOTES ON THE NATIVE FLORA OF NEW SOUTH WALES.

By R. H. Cambage.

Part ii. Western Slopes of New England.

(Plates xxii., xxiv., and xxv.)

When passing through Narrabri and Moree to Inverell and Tingha in October, 1903, notes were kept of the conspicuous members of the flora distributed over these districts. These notes have since been amplified from the examination of specimens collected in the last-named localities, and are now made available as a contribution to the botanical survey of this State. The notes referring to the country extending from Boggabri to Warialda were taken from the train, consequently only the larger and well known trees are mentioned, and it must not be inferred that any particular species is absent from the district though unnoticed by me. This portion of the area traversed consists for the most part of black soil plains, luxuriant with the flowers of herbs and grasses in a good season, but one long stretch of bare ground, often dust, during a drought. Without having had some experience of areas such as our western and north-western plains, no one can conceive what great quantities of charming blooms are produced under favourable circumstances, or what desolation exists when the conditions are reversed.

From Boggabri to Narrabri is a distance north-westerly of 33 miles, the elevation above sea-level being 823 feet at the former and about 700 feet at the latter place. The following Eucalypts were noticed near the railway line:—*E. populifolia*, Hook. (Bimble or Shiny-leaved Box), *E. melanophloia*, F.v.M. (Silver-leaved Ironbark), *E. Woollsiana*, R. T. Baker (Narrow-leaved Box), *E. tereticornis*, Sm., var. *dealbata*, Deane & Maiden (Gum), *E.*

crebra, F.v.M. (Narrow-leaved Ironbark), *E. trachyphloia*, F.v.M. (Bloodwood), and *E. rostrata*, Schl. (River Red Gum), the latter being seen along the banks of the Namoi River near Narrabri.

The Bloodwood trees were noticed on sandstone formation between Turrawan and Tibberena, but the species could not be identified with certainty from the train, and may possibly be *E. corymbosa*, Sm., though as the first of these has already been recorded from Narrabri, and also occurs near Coonabarabran, it seems probable the tree referred to above is *E. trachyphloia*. This area of sandstone came rather as a surprise in the locality, and was made further interesting by the fact that on it was growing a quantity of *Angophora lanceolata*, Cav., the smooth-barked Apple, or so-called Red Gum of the Sydney district, the latter name being adopted because of the reddish exudation which commonly stains the otherwise dull whitish bark. The occurrence of the species in this and other isolated spots so far west is marked evidence that the geological formation at times undoubtedly affects the distribution of species. The home of this tree is on the Hawkesbury and Permo-Carboniferous sandstones around Sydney and Newcastle, but it occurs in various localities, though usually on similar formations, to the north and north-west.

Among other trees and large shrubs noticed between Boggabri and Narrabri were: *Callitris robusta*, R.Br. (White or Cypress Pine), *C. calcarata*, R.Br. (Green or Black Pine), *Dodonæa* sp., *Eremophila Mitchelli*, Benth. (Sandalwood or Budtha), *Cassia* sp., *Casuarina Cambagei*, R. T. Baker (Belah), *C. Luehmanni*, Baker (Bull Oak), *C. Cunninghamiana*, Miq. (River Oak), *Geijera parviflora*, Lindl. (Wilga), *Heterodendron oleæfolium*, Desf. (Rosewood, a very hard timber), *Acacia harpophylla*, F.v.M. (Brigalow), *A homalophylla*, A. Cunn. (Yarran), *Canthium oleifolium*, Hook. (Wild Lemon), *Exocarpus cupressiformis*, Labill. (the so-called Native Cherry), *Xanthorrhœa* sp. (Grass Tree), and *Santalum lanceolatum*, R.Br.

The only trees seen of *Casuarina Cunninghamiana*, the River Oak, were growing along the banks of the Namoi at Narrabri,

and it would be interesting to know how far they continue down the river, as although this species is common on the higher parts of our large streams, it gradually disappears as the western levels are reached.

Callitris calcarata, the Black or Green Pine, so called from the colour of the bark and foliage respectively, was noticed only on the sandstone area previously mentioned. This species is generally found occupying elevated land, often somewhat rocky ridges, and it is not usually found on the low land with *C. robusta*, the White Pine.

In writing of these two species (Lectures on the Vegetable Kingdom, p.73), the Rev. Dr. Woolls says:—"These fine trees differ in habit, for whilst the black pine has a pyramidical appearance, branches somewhat upright, and branchlets rather close, the white pine is a larger tree, with a lighter bark and branches deflected, and turning up again from their ends," (Pls.xxiv.-xxv.).

Between Narrabri and Moree the following Eucalypts were passed:—*E. rostrata*, *E. tesselaris*, F.v.M. (Moreton Bay Ash or Carbeen), *E. Woollsiana*, *E. populifolia*, *E. melanophloia*, and a few trees near Tycannah of what appeared to be *E. largiflorens*, F.v.M. (River Box), but their identification is doubtful.

E. Woollsiana was not seen during the last 40 miles, or scarcely north of Edgeroi, but although it grows on flat land it is not a typical tree on any of the black soil plains. It was noted again, however, at about 15 miles east of Moree. In different localities its leaves were noticed to be remarkably narrow.

It may be observed that the species of Eucalyptus are not numerous between Narrabri and Moree, and although these places are sixty miles apart the intervening country is really one vast plain, long stretches at intervals being naturally destitute of trees of any description. The difference in levels between the two railway stations is only 11 feet, while the highest point between them is about 100 feet above the terminals.

Other trees and shrubs observed between these towns were:—*Argemone mexicana* (an introduced rather pretty flowering, so-

called thistle or Mexican Poppy), *Capparis Mitchelli*, Lindl. (Wild Orange), *Apophyllum anomalum*, F.v.M. (Currant, Emu, or Warrior-bush), *Pittosporum phillyræoides*, DC., *Lavatera* sp. (Mallow), *Sterculia diversifolia*, G. Don (Currajong), *Geijera parviflora*, *Ventilago viminalis*, Hook. (Supple Jack, seen only near Tycannah and east of Moree), *Atalaya hemiglauca*, F.v.M. (Whitewood, seen only near Tycannah), *Heterodendron oleæfolium*, *Dodonæa* sp., *Swainsona* sp., *Acacia pendula*, A. Cunn. (Myall), *A. harpophylla*, *A. Oswaldi*, F.v.M., *A. stenophylla*, A. Cunn. (with very long narrow leaves, and growing along the banks of streams), *Angophora intermedia*, DC. (Apple Tree, seen only near Narrabri), *Loranthus* sp. (growing on *Acacia pendula*), *Canthium oleifolium*, *Helipterum anthemoides*, DC., *Alstonia constricta*, F.v.M. (Quinine or Bitter Bark), *Lyonsia* sp., *Eremophila Mitchelli*, *Grevillea striata*, R.Br. (Beefwood), *Casuarina Luehmanni*, *C. Cambagei*, *Santalum lanceolatum* (?), *Exocarpus aphylla*, R.Br. (?), and *Callitris robusta*.

Grevillea striata is the well-known Beefwood of the Upper Darling country, and is distinct from the Beefwood (*Stenocarpus salignus*, R.Br.) of the coastal area, though both belong to the same natural order, viz., Proteaceæ. A peculiarity of this order, though not actually confined to it, is that many of its genera produce plants with conspicuous medullary rays in the wood. In both the coastal and interior Beefwoods this feature is pronounced, giving to the timber a very pretty grain, and it is this streaked marking, together with the colour of the wood, that has suggested the vernacular name in each case. In the north-western districts the timber of *Hakea leucoptera*, R.Br. (Needlewood), is very similar in appearance to that of *Grevillea striata*, and when the bark (which would afford a ready means of identification) is removed from billets cut from trees of equal size, it is a matter of extreme difficulty from observation alone to separate the species.

The genus Grevillea, though numerically rich in species, is usually represented by shrubs, but *G. striata* is one of the exceptions, and in New South Wales is commonly a tree from 30 to

40 feet high and one foot in diameter. The timber of this species is easily split, and in the Bourke district is used for fence posts. It is a favourite with surveyors' axemen in the back country, being used for corner pegs, as it lasts very well in the ground. The tree is easily recognised by its long pendulous narrow leaves, often a foot in length, and its rough furrowed bark. In its young stage it throws out branches freely, but many of the lower ones apparently die off, as old trees are generally found with bare stems. This species is recorded from places throughout the extreme length of Queensland, and is distributed all over the north-western portion of this State. Mr. W. M. Thomas, L.S., informs me that the aboriginal name for this species on the Macquarie is Mombra.

From Moree to Warialda is a distance easterly of about 50 miles. After passing Yagobie at about half-way, where the elevation above sea-level is about 800 feet, the plains are left behind, and the country gradually rises till at Warialda the elevation is 1230 feet. Chiefly owing to this change in altitude, and, in this locality, its attendant increased rainfall, and partly to that of the geological formation, the flora of Moree is distinct from that of Warialda, although many western plants are found at the latter place, but the difference becomes more marked as the hills to the eastward are ascended. East of Hadleigh, between Yagobie and Warialda, the country is considerably cleared, and the forest has given place to wheat fields.

The Eucalypts noticed along this part of the railway line were:—*E. populifolia*, *E. melanophloia*, *E. rostrata*, *E. Woollsiana*, *E. tesselaris*, and *E. melliodora*, A. Cunn.

E. tesselaris is chiefly a Queensland species with roughish tesselated bark on the lower part of its trunk, the upper part and branches being clean and smooth. It was first noticed near Narrabri, and was not seen east of Yagobie, at which place the change in the flora begins to be noticeable.

E. melliodora, the Yellow Box or Yellow Jacket, first appeared on the flats close to Warialda. It may be mentioned that this species apparently does not frequent the black soil plains in the

west and north of this State, excepting near the rivers, but it continues along the higher country into Queensland, and in the south spreads across through Victoria. Several trees were seen near Warialda which much resembled *E. hemiphloia*, F.v.M., var. *albens*, the White Box, and the climatic conditions are favourable in this locality to their growth, but from the train their identification could not be decided with certainty.

E. melanophloia is very common east of Yagobie, its silvery leaves being conspicuous over the hillsides in every direction. Ghinghit is the aboriginal name for this tree on the Macquarie, according to Mr. W. M. Thomas.

E. microtheca, F.v.M., the Coolabah of the Darling River north of Bourke, was not identified within the area under discussion, and its absence seemed remarkable over the very similar country around Moree. It has, however, been recorded by Mr. Baker from near Narrabri (these Proceedings, 1902, p.226).

Angophora intermedia grows on the flats near Warialda, and on a sandstone hill to the eastward is *A. lanceolata* also.

Other trees and small plants identified between Moree and Warialda were:—*Argemone mexicana*, *Capparis Mitchelli*, *Apophyllum anomalum*, *Sterculia diversifolia*, *Geijera parviflora*, *Ventilago viminalis*, *Heterodendron oleæfolium*, *Dodonæa* sp. (Hopbush), *Swainsona* sp., *Acacia excelsa*, Benth. (Ironwood, only seen near Moree), *A. harpophylla*, *A. pendula*, *A. Oswaldi*, *Canthium oleifolium*, *Helipterum anthemoides*, *H. polyphyllum*, F.v.M., *Senecio lautus*, Forst., *Wahlenbergia gracilis*, DC. (Blue Bell), *Lyonsia* sp., *Solanum* sp., *Eremophila Mitchelli*, *Grevillea striata* (only near Moree), *Casuarina Cambagei*, *C. Luehmanni*, and *Callitris robusta*.

Casuarina Luehmanni, Bull Oak, was not noticed east of Yagobie, but it has since been collected near Emmaville by Mr. E. C. Andrews.

It was noticed that *Acacia homalophylla* (Yarran) was not seen much north of Boggabri, and it is concluded therefore that the species becomes rare towards that portion of the north of this State, which lies immediately west of New England, though in

the central and southern parts of the western area it is very common.

Acacia Cambagei, R. T. Baker, (the Gidgea of the Bourke district), was not seen at all, even the country around Moree evidently being too far east for the species, though it is known to continue northward from Bourke well into Queensland.

A. aneura, F.v.M. (Mulga), *Flindersia maculosa*, F.v.M. (Leopardwood), and *Hakea leucoptera*, R.Br. (Needlewood), were not observed on any part of the journey, and although the latter might easily escape notice, the former two usually grow in large clumps and are readily recognised, so that they are undoubtedly rare in the district described.

Another feature of the landscape, as compared with the western and south-western areas, was the absence of every species of Mallee; but although these stunted forms of Eucalyptus are common in the west, they do not usually occur on the black soil plains, which are in reality old flood plains, but either on slight elevations or levels formed by gradual erosion of earlier formations.

Acacia harpophylla (Brigalow) is very common, and in places east of Moree forms large scrubs in company with *Casuarina Cambagei* (Belah). Owing to its long sickle-shaped silvery leaves, which suggested its botanical name, it is a very conspicuous tree about the plains and easily recognised. It was noticed that in many places it grew perfectly straight to a height of perhaps 40 or 50 feet, the branchless bole, covered with a fairly rough bark, maintaining much the same size for a considerable distance and rarely exceeding one foot in diameter. It would again be seen assuming quite a different form, the stem throwing out branches almost from the ground, thus giving the tree a dome-shaped appearance, and imparting a very pleasing effect to the landscape. It is well known that this straight or spreading habit in our trees is regulated by the surroundings. Where seedlings grow up in thick clusters or are well protected by adjacent vegetation, as in the thick pine scrubs of the interior, or the brushes and gullies along the coastal area, the result is elongated straight

stems, while those growing in the open are more spreading and not so tall. A further feature observed was that an old Brigalow tree would often be surrounded by a cluster of smaller ones which had the appearance of seedlings, though some may possibly have been suckers, the groups having quite a homely significance. Brigalow is common in Queensland, and as well as crossing the Liverpool Range to the Upper Hunter, extends south-westerly from Narrabri past Coonamble to the Nyngan and Cobar district, where it becomes rare and occurs only in small patches, while an isolated clump south of the Lachlan River near Marsden marks the most southern point recorded for the species (*vide* these Proceedings, 1901, p.696).

Just to the east of Warialda the country rises fast, the formation being sandstone, in places forming slight escarpments. Darkness, however, soon terminated further observation, but during the few miles travelled in daylight the following trees and shrubs were noted :—*Eucalyptus melliodora*, *E. melanophloia*, *E. tereticornis*, Sm. (Forest Red Gum), *E. hemiphloia* var. *albens* (?), *E. sideroxylon*, A. Cunn. (?) (Ironbark), *Angophora intermedia*, *A. lanceolata*, *Callitris robusta*, *C. calcarata*, *Dodonæa* sp., *Lyonsia* sp., *Swainsona* sp., *Jacksonia scoparia*, R.Br. (Dogwood), *Hibbertia* sp., *Xanthorrhœa* sp., and *Brachyloma* sp.

Inverell is situated 47 miles by rail easterly from Warialda, between which places there is a break in the continuity of these notes owing to the greater part of this road having been travelled in darkness. The next tract of country to be discussed is that extending from Inverell to Tingha, which is situated on what may be termed the western margin of New England. Tingha, which lies 16 miles south-easterly from Inverell, is about 2600 feet above sea-level, the elevation of Inverell railway station being 1912 feet, though surrounding hills exceed 2000 feet. From the notes which follow it may be seen that a very great difference exists between the flora of this elevated country and that of the lower levels to the westward.

On the roadside going to Tingha the following Eucalypts were passed :—*E. melliodora*, *E. viminalis*, Labill. (White Gum, along

the flats near Inverell), *E. tereticornis*, *E. hemiphloia* var. *albens* (White Box), *E. Bridgesiana*, R. T. Baker (White Peppermint of New England, and one of the trees identified by Baron von Mueller as *E. Stuartiana*, F.v.M.), *E. macrorrhyncha*, F.v.M. (Red Stringybark), *E. sideroxylon*, A. Cunn. (Ironbark), *E. eugenioides*, Sieb. (White Stringybark), and a species not then identified, but locally known as Blackbutt.

The following plants were collected around Tingha at an average elevation of about 2800 feet above sea-level, chiefly on granite formation, and for the most part in a northerly direction towards Ponds Creek :—

RANUNCULACEÆ: *Clematis glycinoides*, DC.—DILLENIACEÆ: *Hibbertia stricta*, R.Br., *H. acicularis*, F.v.M., *H. linearis*, R.Br. —VIOLARIEÆ: *Viola betonicæfolia*, Sm., *Ionidium filiforme*, F.v.M. —PITTOSPOREÆ: *Bursaria spinosa*, Cav., *Marianthus procumbens*, Benth., *Billardiera scandens*, Sm.—CARYOPHYLLEÆ: *Stellaria palustris*, Retz.—RUTACEÆ: *Correa speciosa*, Andr.—STACKHOUSIEÆ: *Stackhousia linarifolia*, A. Cunn.—RHAMNEÆ: *Cryptandra amara*, Sm., var. *longiflora*, F.v.M. (a very attractive flower), *Discaria australis*, Hk. (a plant covered with sharp spines and bearing flowers with a somewhat strong sickly perfume).—SAPINDACEÆ: *Dodonæa viscosa*, L. (one of the plants known as Hopbush).—LEGUMINOSÆ: (Suborder i. Papilionaceæ). *Gompholobium grandiflorum*, Sm., *Daviesia corymbosa*, Sm. (a form with purely racemose inflorescence, and sometimes known as Hopbush), *D. acicularis*, Sm. *D. genistifolia*, A. Cunn., *Aotus villosa*, Sm., *Dillwynia ericifolia*, Sm., *Bossiæa prostrata*, R.Br., *Hovea linearis*, R.Br., *H. longifolia*, R.Br., *Indigofera australis*, Willd., *Swainsona* sp., *Glycine sericea*, Benth., *Hardenbergia* (*Kennedya*) *monophylla*, Benth. (False Sarsaparilla): (Suborder iii. Mimoseæ). *Acacia undulifolia*, Fraser (north-east of Inverell-Tingha road near 10-mile post), *A. obtusata* (?), Sieb., on red hill about 3 miles north of Tingha), *A. viscidula*, A. Cunn. (on Inverell road), *A. venulosa*, Benth. (north-east of 10-mile post Inverell-Tingha road), *A. implexa*, Benth. (on red hill 3 miles north of Tingha), *A. spectabilis*, A. Cunn. (east of Tingha), *A. dealbata*, Link (Silver

Wattle), *A. leptoclada* A. Cunn. (small "Wattle" with yellowish-green foliage somewhat resembling that of *A. pubescens*, R.Br., which grows on the Wianamatta Shale formation around Parramatta; found north-east of 10-mile post, and at creek near 13-mile post Inverell-Tingha road).—DROSERACEÆ: *Drosera* sp.—MYRTACEÆ: *Bœckea* sp., *Leptospermum flavescens*, Sm., *L. scoparium*, Forst. (Tea Tree, with sharp pointed leaves), *L. attenuatum* (?), Sm.,* *Kunzea parviflora*, Schl., *Angophora subvelutina*, F.v.M. (Apple), *A. intermedia* (Apple), *Eucalyptus macrorrhyncha*, *E. melliodora*, *E. tereticornis* and a variety near *brevifolia*, *E. Bridgesiana*, *E. eugenioides*, *E. sideroxylon*, *E. conica*, Deane and Maiden, and the new species locally known as Blackbutt.—LORANTHACEÆ: *Loranthus* sp.—RUBIACEÆ: *Asperula oligantha*, F.v.M.—COMPOSITÆ: *Olearia ramulosa*, Labill., *Brachycome* sp., *Craspedia Richea*, Cass.—CAMPANULACEÆ: *Wahlenbergia gracilis*? DC. (Blue Bells).—EPACRIDEÆ: *Melichrus rotatus*, R.Br., *Brachyloma daphnoides*, Benth., *Lissanthe strigosa*, R.Br., *Leucopogon melaleucoides*, A. Cunn., *L. muticus*, R.Br., *Epacris microphylla*, R.Br.—SCROPHULARINEÆ: *Veronica Derwentia*, Andr.—LABIATÆ: *Ajuga australis*, R.Br.—PROTEACEÆ: *Isopogon petiolaris*, A. Cunn. (about 8 inches high, near Ponds Creek), *Persoonia cornifolia*, A. Cunn., *P. Mitchelli*, Meissn., *Grevillea floribunda*, R.Br., *Hakea microcarpa*, R.Br. (plentiful), *Lomatia silaifolia*, R.Br.—THYMELEÆ: *Pimelea glauca*, R.Br., *P. collina*, R.Br.—URTICEÆ: *Urtica incisa*, Poir.—CASUARINEÆ: *Casuarina suberosa*, Ott. & Dietr. (Forest Oak), *C. Cunninghamiana*, Miq. (on banks of river at Inverell).—SANTALACEÆ: *Exocarpus cupressiformis*, Labill.—CONIFERÆ: *Callitris calcarata*, R.Br.—CYCADEÆ: *Macrozamia secunda*, C. Moore (near Ponds Creek).—ORCHIDEÆ: *Calochilus* sp., *Diuris aura*, Sm., *D. elongata*, Swartz, *Pterostylis mutica*, R.Br., *Caladenia carnea*, R.Br.—LILIACEÆ: *Burchardia*

* In the absence of full material, the identification of *L. attenuatum* is not satisfactory. Around Sydney and on the Blue Mountains this species has a loose brown flaky bark, but the Tingha plant has firm grey bark somewhat similar to that of *L. flavescens*.

umbellata, R.Br., *Stypandra glauca*, R.Br., *Arthropodium paniculatum*, R.Br.

An interesting Eucalypt was found between Inverell and Tingha, first between the 6- and 7-mile posts, and again between the 9- and 10-, extending easterly from the latter point. It has since been described by Mr. J. H. Maiden under the name of *E. Andrewsi* (these Proceedings, 1904, p.472). This tree certainly belongs to the Peppermint group, although the local name is Blackbutt, but this is partly accounted for by the fact that the former name is otherwise employed in New England, *E. Bridgesiana* being known as White Peppermint, and *E. nova-anglica*, Deane & Maiden, as Red or Black Peppermint, while the coast Blackbutt, *E. pilularis*, Sm., does not grow near Tingha, thereby leaving that name available. In general appearance *E. Andrewsi* presents considerable similarity to *E. piperita*, Sm., the Peppermint which is common around Sydney, but the fruits of the two species are quite dissimilar, those of the former approaching very nearly to the medium-sized form of *E. hæmastoma*, Sm., the White or Brittle Gum, which it may be mentioned was not seen on the area described in this paper. The "sucker" foliage is scarcely ever opposite, passing at once into the alternate stage, a feature which clearly separates the species from such Peppermints as *E. amagdalina*, Labill., and *E. dives*, Schau., to which trees there is otherwise some resemblance.

The seedling plants are erect, having fairly large bluish-grey leaves, soon alternate, and in general habit and appearance showing considerable likeness to seedlings of *E. delegatensis*, R. T. Baker, (the Mountain Ash of Tumbarumba) on a small scale.

The species was noticed at several points between Tingha and Guyra, and occurs in many localities on New England.

E. sideroxylon, A. Cunn., (the Mugga of the western districts) was noticed between the 11- and 12-mile posts on the Inverell-Tingha road at an altitude above sea-level of about 2700 feet. South of the Macquarie I have never found this tree at an elevation exceeding 2000 feet and usually below 1200 feet, but the influence of northern latitudes is evident in the present instance.

This species extends throughout the whole length of this State, and in coming southwards from the northern end of New England climatic influences soon drive it on to the western slopes, and before reaching the Lachlan it has spread westerly to Nymagee and Mount Hope, continuing southwards at least to Chiltern in Victoria. Just south of New England, however, where the Liverpool Range is lower than most parts of the Great Dividing Range, it apparently crosses to the eastern slopes and continues southerly, though sparingly, along the greater part of the south coast. The question whether the depression at the Liverpool Range wholly accounts for the occurrence of this species on both sides of the Great Dividing Range, or whether it may not have extended over a more general level between east and west prior to uplifts in late Tertiary times, requires investigation from a geological as well as a botanical standpoint.

There are few western Eucalypts which show a more decided preference for sedimentary formations than this Ironbark. West of the Dividing Range it usually occupies the Silurian and sometimes the Devonian areas, while on the eastern side it seems to be just as happily placed on the newer sedimentary formations such as Permo-Carboniferous, and the Wianamatta Shales of the Triassic, though so far as my observations go it does not favour the Hawkesbury Sandstone of the latter period. Although it usually avoids all igneous rocks, especially basalt, there are exceptions to this rule, as for instance at Wyalong and south-westerly from Dubbo, where it is found on decomposed granite formation. Doubtless there are other instances of its growth on various types of igneous rock, though probably plutonic.

Both the coastal and interior trees have the characteristic black deeply furrowed bark and red timber, but the former often has red flowers, that being the colour of the filaments, while those of the latter are generally creamy-white, the red-flowering tree, according to my observations, being more uncommon in the west.

Eucalyptus conica, Deane & Maiden, a Box tree, was found half-a-mile south-westerly from Tingha at an altitude above sea-

level of about 2700 feet. This tree had been carefully looked for near Narrabri, Moree, and towards Warialda, as those places approximate the altitudes at which it is usually found in the Macquarie to Lachlan districts. It was not noticed, however, but may occur between Warialda and Inverell.

This species is exceedingly interesting as indicating the effect of climatic influence in regulating its habitat. In the Lachlan country it is usually found below an elevation of 1100 feet above sea-level, a common altitude being about 800 feet. Near Attunga, north of Tamworth, it may be seen at about 1400 feet, while at Tingha, considerably to the north, it is growing at 2700 feet. It also occurs at much the same altitude around Bolivia, and is recorded by Maiden and Betche from Wallangarra, near the Queensland border, which is slightly higher. It will thus be seen that this species, which occurs so far south as the Murrumbidgee district, is in its northerly course driven easterly on to higher levels as though trying to find an even temperature. In the reverse manner, there are species such as *E. macrorrhyncha* and *E. Cambagei* around Orange which push out much to the westward, and will grow on lower levels as they proceed southerly towards Albury.

A close study of the feature reveals many interesting points, of which the following is an example. *Elæodendron australe*, F.v.M., and *Alphitonia excelsa*, Reiss. (Red Ash), are both found on the coast south of Sydney, continuing northwards, and are associated with what is known as brush or jungle, though perhaps not in its thickest form. In going northerly it is found that at Tamworth the latter has already crossed the Main Divide at the Liverpool Range, and may be found at an altitude of about 1800 feet. On the other hand, *Acacia harpophylla*, F.v.M., (Brigalow) belongs to the interior of this State, and grows in country the exact antithesis of Illawarra, but it comes easterly as northern latitudes are approached until in Queensland, as recorded by the Rev. J. E. Tenison Woods, all these three species associate, and may be found growing in the Brigalow scrubs (these Proceedings, 1882, pp.139 and 146).

In connection with this matter, the effect of the Great Dividing Range is evident, this forming, especially towards the south, a cold barrier between the eastern and western floras, but it is interesting to note that these floras mingle on the highlands towards Queensland, where the heat of the northern latitudes is tempered by the increased elevation over coastal and western areas.

Owing to this influence, *Eucalyptus melanophloia* (the Silver-leaved Ironbark), whose most southern locality known to me is near Narromine, finds its way past Bingara and Warialda right across the tableland on to the Upper Clarence, as well as extending into Queensland.

These examples will be sufficient to show that it would be instructive to select any typical northern tree and study it throughout its southerly extension, especially with a view to noting any variation that might take place throughout its range.

Our ornithologists and ichthyologists would also find an interest in this feature, as I have seen several of the western birds on the Upper Clarence nearly 20 years ago, and before the influence of civilization and drought had disturbed them, among others being the black and white butcher bird, *Cracticus nigrigularis*, Gould. There is also a fish in the upper Clarence and Richmond waters which appears to be identical with the Murray Cod (*Oligorus* sp.), and which does not, so far as I know, occur in any coastal rivers south of the Clarence.

Sterculia diversifolia, G. Don, the Currajong, so well known as a fodder tree, was not noticed between Inverell, Tingha and Guyra, so is evidently scarce in the locality. This is probably owing to the altitude of those places, as the Currajong thrives better at levels below 2000 feet.

From Tingha to Guyra is a distance south-easterly of 40 miles, the country rising from about 2600 feet to 4300 feet above sea-level. The intervening country is chiefly made up of granite and basalt, the latter in many cases forming part of the high tableland, and not being too prolific in botanical specimens. The mile-posts mentioned for purposes of reference start from Inverell, number 16 being at Tingha.

After passing the 20-mile post, from which point onwards the elevation exceeds 3000 feet, the following Eucalypts were noticed: *E. tereticornis*, *E. macrorrhyncha*, *E. Bridgesiana*, *E. melliodora*, and *E. Andrewsi*, all before the 21-mile post was reached, the latter occurring again near the 34- and 38-mile posts. On the basaltic formation near the 25-mile post, *E. viminalis* appears and continues the whole way to Guyra.

In the vicinity of the 36-mile post three fresh Eucalypts are seen, viz., *E. coriacea*, A. Cunn., White Gum or White Ash, *E. stellulata*, Sieb., Black Sally or Black Ash, and *E. nova-anglica*, Deane & Maiden, Red or Black Peppermint, all of which are typical of the high country and continue right to Guyra.

Between the 41- and 42-mile posts, *E. eugenioides*, Sieb., White Stringybark, is passed, the elevation being about 3800 feet above sea-level. This species is not plentiful along this road.

Near the 50-mile post and at intervals onwards towards Guyra *E. rubida*, Deane & Maiden, a White Gum, may be found.

During the last 10 miles no trees were seen of either *E. tereticornis*, *E. melliodora*, *E. Bridgesiana*, or *E. macrorrhyncha*, the altitude, which exceeds 4000 feet, being usually too great for them; and there is no better indicator of an extensive alteration in elevation than is afforded by the consequent change in the vegetation.

Eucalyptus nova-anglica, the Black or Red Peppermint of New England, occurs in fairly large quantities on the flats. Its bark is somewhat dark-coloured and in texture between fibrous and flaky. It has reminded me of *E. aggregata*, Deane & Maiden, in the field, partly from a resemblance in the bark and also because both species are found in similar situations, often near water-courses. The great difference in seedling and "sucker" foliage, however, not to mention other distinctive characters, sharply separates the two species. The "sucker" leaves of *E. nova-anglica* are cordate, acuminate or orbicular and glaucous, and are very striking when viewed with the mature lanceolate foliage. Although it has affinities with the Argyle Apple of the Goulburn district, which for so long has been recognised as *E. pulverulenta*,

Sims, I am disposed to regard it as a separate species. The difference in the texture of the bark of the two trees is one feature which causes hesitation before uniting them.

The formation around Guyra is chiefly basaltic, and it was noticed that trees of *E. viminalis* and *E. rubida* were much more difficult to separate than is the case in southern latitudes, where the two species often grow on Silurian slate areas. In the latter the foliage of *E. rubida* is very often glaucous, which usually affords a ready distinction in the forest. Whenever the seedling or "sucker" foliage is available, there is no difficulty in identification, the round leaves of *E. rubida* being very distinct from the narrow ones of *E. viminalis*. It was noticed around Guyra that the multi-flowered forms of both species were common, more so than is usually the case in the south. Near Ollera (45-mile post), trees of the latter were examined for a distance of about a quarter of a mile, and scarcely any were found with the flowers arranged in threes, which is generally the form in the Bathurst and Orange districts.

Among the various plants noted from the coach, and in some instances collected by the roadside, between the 20-mile post and Guyra were:—*Clematis glycinoides*, *Hibbertia linearis*, *Viola betonicæfolia*, *Discaria australis*, *Dodonæa viscosa*, *Daviesia corymbosa*, *Dillwynia juniperina*, Sieb. (between 27- and 28-mile posts), *Indigofera australis*, *Hardenbergia* (*Kennedya*) *monophylla*, *Acacia linifolia*, Willd. (between 27- and 28-mile posts), *A. obtusata* (?), *A. dealbata*, *A. leptoclada* (plentiful between 22- and 23-mile posts), *A. spectabilis*, *A. implexa*, *A. melanoxylon*, R.Br. (between 46- and 47-mile posts), *Angophora subvelutina*, *A. intermedia*, *Loranthus* sp., *Craspedia Richea*, *Wahlenbergia gracilis*, *Melichrus rotatus*, *Leucopogon lanceolatus*, R.Br. (near 42-mile post), *Persoonia* sp., *Hakea microcarpa*, *Pimelea glauca*, *Exocarpus cupressiformis*, *Callitris calcarata* (only between 20- and 21-mile posts), and *Diuris* sp.

The complete list of Eucalypts noticed between Narrabri, Moree and Warialda is as follows:—*E. populifolia*, *E. melanophloia*, *E. Woollsiana*, *E. tereticornis* var. *dealbata*, *E. crebra*, *E.*

trachyphloia (?), *E. rostrata*, *E. tesselaris*, *E. largiflorens* (?), *E. melliodora*, and *E. hemiphloia* var. *albens* (?).

Between Inverell, Tingha and Guyra there were:—*E. viminalis*, *E. melliodora*, *E. tereticornis* and var. near *brevifolia*, *E. hemiphloia* var. *albens*, *E. Bridgesiana*, *E. macrorrhyncha*, *E. sideroxylon*, *E. eugenioides*, *E. Andrewsi*, *E. conica*, *E. coriacea*, *E. stellulata*, *E. nova-anglica*, and *E. rubida*.

The Acacias noted between Narrabri, Moree and Warialda were:—*A. harpophylla*, *A. homalophylla*, *A. pendula*, *A. Oswaldi*, *A. stenophylla* and *A. excelsa*.

Between Inverell, Tingha and Guyra there were:—*A. undulifolia*, *A. obtusata* (?), *A. viscidula*, *A. implexa*, *A. spectabilis*, *A. dealbata*, *A. leptoclada*, *A. linifolia* and *A. melanoxylon*.

I am indebted to Mr. J. H. Maiden, F.L.S., who has assisted me in identifying some of the plants.

EXPLANATION OF PLATES XXII., XXIV., AND XXV.

Plate xxii.

Casuarina Cunninghamiana, Miq. (River Oak), Burragorang, Wollondilly River; Triassic and Permo-Carboniferous Cliffs in the background. (*Vide* p.695).

Plate xxiv.

Callitris calcarata, R.Br. (Black Pine), Tingha, N.S.W. (*Vide* p.783).

Plate xxv.

Callitris robusta, R.Br. (While Pine), Dubbo, N.S.W. (*Vide* p.783).

NOTES ON AUSTRALIAN *RHOPALOCERA*: *LYCÆNIDÆ*. Part iv.

By G. A. Waterhouse, B.Sc., B.E., F.E.S., and R. E. Turner.

[It is with very great pleasure, I have to announce that my friend, Mr. R. E. Turner, has consented to join with me in my studies on the Australian *Rhopalocera*; and that in future papers on this group will appear over our joint signatures. I must here express my thanks to my friend for the generous help he has given me in the past, both by the gift of specimens and by his opinion on many difficult questions.—G.A.W.]

Since the revisional part of the Australian *Lycænidæ* appeared last year, we have had further opportunity of studying this family, and are now able to offer further evidence in confirmation of some of our views and also correct a few errors.

Mr. H. H. Druce has kindly examined a number of specimens forwarded to him, and in many cases has compared these with the types. He has forwarded us critical notes thereupon, and these he has allowed us to publish.

One of us has been able to examine the de Nicéville collection in Calcutta, and this has enabled us to correct one or two errors.

In the revisional paper in these Proceedings (for 1903) 115 species are recognised as Australian. Of these *Miletus eucletus*, Feld., is not Australian; Mr. Druce writes that the specimens (3♀) recorded by him from Thursday Island are referable to *M. narcissus*, Fabr. We have also decided to omit *Lycænesthes emolus*, Godt., as we feel confident that the specimen forwarded by Mr. Lower, labelled Mackay, is really an Indian specimen.

The following species we are inclined to regard as rarely occurring in Australia, or as possible aberrations :— *Danis syrius*,

Misk., *Miletus rex*, Boisd., *Miletus euclides*, Misk., *Hypolycaena noctula*, Staud., *Deudorix epirus*, Feld.

As the result of an examination of the typical species of certain genera, we find it necessary to characterise several new genera in this present part.

Cyaniris tenella, Miskin.

Mr. Druce considers our form closer to *C. ceyx* than to *C. dilectissima*, Druce. The late Mr. de Nicéville, who had seen only a female *C. tenella*, considered it very close to, if not identical with his *C. ceyx*. It is also allied to *C.* ————, of which we have a male from the Khasi Hills, Assam.

Danis macleayi, Semper.

Mr. Druce writes "the types are in very perfect condition, and the checquered cilia are very marked." We have received two males and one female from Cape York which fulfil these requirements.

Lampides cœlestis, Miskin.

We have now no doubt that this is the species recorded by Semper as *D. aleuas*, Feld., of which it is the Australian form.

Lampides hylas, Cramer, var.

L. aleuas, Waterhouse (nec Felder), Proc. Linn. Soc. N. S. Wales, 1903, p. 156.

[Both Mr. Druce and Mr. Turner have pointed out to me that I was in error in using *L. aleuas* for this species, which is the Australian form of the "*Papilio hylas*" of Cramer.—G.A.W.]

As our material is insufficient and not in the best of condition, we refrain from applying any definite name to the Australian form. It is perhaps identical with that found in Southern New Guinea.

Miletus meleagris, Waterhouse.

Proc. Linn. Soc. N. S. Wales, 1903, p. 270 (♂).

We are now enabled to supply a description of the female, having received, through the kindness of Mr. A. B. Bell, a pair from the Cairns District.

♀. *Forewings* shaped much as in the male, with the outer margin slightly more convex; hindwings with three short blunt tooth-like projections to the submedian and first and second median branches, the central one being the longest.

Upperside.—*Forewings* black, with lower half of cell and extending to inner margin glossy blue. *Hindwings* black, with cell and somewhat beyond glossy blue.

Underside as in the male, but somewhat more brilliantly marked.

Type (♀) in Coll. Waterhouse.

This is the finest of the *ignita* group of *Miletus* we have seen.

MILETUS NARCISSUS, Fabricius.

Mr. Druce writes: "I have compared the specimen you sent with the type in the Banksian Collection and found it identical. I have also closely examined the 3 ♀♀ from Thursday Island, and have come to the conclusion that your opinion as to their being *M. narcissus* (♀) is quite correct. When I wrote my monograph nothing was known of the female of *M. narcissus*." These three specimens (♀) from Thursday Island were caught by Mr. G. F. Mathew and recorded by Mr. Druce as *M. eucletus*,* Felder, which must now be struck off our lists.

CANDALIDES ERINUS, Fabricius.

Mr. Druce† has pointed out that I was quite correct in keeping *C. erinus* and *C. hyacinthina* distinct; specimens of *C. hyacinthina* in the British Museum bore the label of *C. erinus*, but on reference to the type in the Banksian Collection this was found to be incorrect.

CANDALIDES ACASTA, Cox.

Mr. Druce writes: "I fear your evidence for sinking *C. anita* under *C. acasta* is rather weak." There is some uncertainty, indeed, in this course, but we know of no other South Australian species to which the description of *acasta* could apply.

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* Trans. Ent. Soc. Lond. 1891, p. 188.

† Ann. Mag. Nat. Hist. 1903.

NESOLYCÆNA, gen.nov.

Forewings with costa nearly straight, slightly arched at base and apex; outer margin somewhat convex; inner margin straight; costal nervure ending on costa just before end of cell; subcostal nervure with three branches, the first ending on costa just beyond end of cell, subcostal nervure ending on costa above apex; discocellulars not in a straight line, lower, much bent; first median branch convex to inner margin. *Hindwings* with the outer margin forming an arc of a circle and without a tail. Antennæ short, much less than half the length of costa, and ending in a short spatulate club. Terminal joint of palpi short. Eyes smooth.

Type, "*Holochila*" *albocericea*, Miskin.

This genus is allied to *Candalides*, Hübner, (tpye *C. xanthospilos*), but has much shorter antennæ and palpi. In *Candalides* also the discocellulars of the forewings are in a straight line, and the first median branch is straight. In facies the type species is very different from any known Australian Lycænid, the upperside reminding us of the Pierid genus *Elodina*.

LYCÆNESTHES AFFINIS, nom.nov.

Lyc. modestus, Waterhouse, Proc. Linn. Soc. N. S. Wales, 1903, p. 198.

Mr. Druce writes, that Staudinger* described a species from Palawan as *Pseudodipsas modesta*, which is synonymous with *Lycænesthes emolus*; therefore our form requires a new name. The specimen referred to by Semper as ? *L. balliston*, Hüb., which is now in Mr. Druce's Collection, is identical with *Lyc. affinis*.

CATOCHRYSOPS PLATISSA, Herrich-Schäffer.

Mr. Druce writes: "The specimens referred by Semper to *L. kandarpa*, and which are now in our collection, are the typical lilac-blue *C. strabo*, Fabr.,—exactly like specimens from India,

* Deut. Ent. Zeit. Lep. 1889, p. 104, pl. 1, fig. 7.

Ceylon, &c. They are labelled Rockhampton, Dämel." As we know that some at least of Dämel's localities are erroneous, and amongst our series of *C. platissa* from Queensland we have never yet seen a typical *C. strabo*, we prefer for the present not to include this latter species in our fauna.

PARALUCIA gen.nov.

Forewing with costa gently arched; outer margin nearly straight in the male, somewhat convex in the female; inner margin straight. Costal nervure ending on costa before end of cell; subcostal three-branched; upper discoidal given off from subcostal well beyond the end of cell. *Hindwing* with the outer margin drawn out in the male into a blunt tooth-like projection at the submedian, in the female rounded and slightly waved.

Type *Lucia pyrodiscus*, Rosenstock.

This genus is somewhat allied to *Lucia*, but the blunt tail in the male readily distinguishes it.

Mr. Druce writes: "I have compared the specimens of *L. ænea* you send with the type of *L. pyrodiscus* in the British Museum, and find that it is identical. In the British Museum, the species you call *L. aurifer*, Blanch., stands under the name of *L. lucanus*, Fabr., and your *L. lucanus*, Fabr., under the name *L. limbaria*, Swainson. The Fabrician type is not in the Banksian Collection, but the Fabrician description appears to me to rather favour your views."

Even if these two species are incorrectly determined, the names of the genera will not be affected, but only the species included under them.

The species figured by Blanchard as *aurifer* will also come into the genus *Paralucia*.

CHILADES PUTLI, Kollar.

Hügel's Kaschmir, iv. pt. 2, p. 422, 1848.

Mr. Druce points out that this is the name by which the Australian form of *C. trochilus* should be known.

ZIZERA KARSANDRA, Moore.

P.Z.S. 1865, p. 505, pl. xxxi., fig. 7.

Butler* has shown that true *Z. lysimon*, Hübn., is confined to S. Europe. In a recent letter Mr. F. A. Heron writes: "*Lycæna conformis*, Butler [from C. York] was sunk by the author himself as a synonym of *Zizera karsandra*, Moore." Mr. Druce also considers *Z. karsandra* the better name to use for the Australian species usually called *Z. lysimon*, Hübn.

[In my former paper I considered *L. conformis*, Butler, as a synonym of *Z. gaika*, as Butler speaks of a spot *in* the cell of forewing below. This description is faulty, and should read, "a spot *at the end of* cell." These points are recognition marks to distinguish the forms of *gaika* and *lysimon*.—G.A.W.]

NACADUBA FLORINDA, Butler.

Ann. Mag. Nat. Hist. (4) xx. p. 354, 1877.

Mr. Druce considers that this species should be kept separate from *N. ancyra*, being much whiter than typical *N. ancyra*.

NEOLUCIA, gen.nov.

Una, Waterhouse, (nec de Nicéville), Proc. Linn. Soc. N.S. Wales, 1903, p. 233.

Subcostal three-branched, first branch entirely anastomosed with costal, except a very short, free basal portion.

Type, "*Lycæna*" *agricola*, Westwood.

My previous figure of the neuration of *agricola* will give the details of this genus, which will include all the species previously placed by me in *Una*. Having lately received a specimen of *Una usta*, Distant, we are able to say that our species have little in common with that species.

* P.Z.S. 1900, p. 108.

BINDAHARA ISABELLA, Felder.

Sitzb. Ak. Wiss. Wien, Nat. Cl. xi., p. 451, n. 10, 1860; *B. sugriva*, (nec Horsf.) Miskin, Syn. Cat. Rhop. Aust. 1891, p. 69; Waterhouse, Proc. Linn. Soc. N. S. Wales, 1903, p. 267.

We have lately received specimens of typical *B. sugriva*, from Ceylon, and Mr. Druce has forwarded us sketches of the various forms of this genus, and pointed out that the Australian subspecies is nearest to *B. isabella* from Amboina.

LIPHYRA BRASSOLIS, Westwood.

We notice that the Queensland form has been separated by Rothschild* as *L. brassolis, major*. Until we can consistently apply a trinomial system of nomenclature to the Australian Lycænidæ, we prefer not to make a partial attempt. Our collection of Indo- and Austro-Malayan Lycænidæ, though increasing considerably, is not yet extensive enough to permit us to make this study complete.

* Novitates, 1898.

NOTES AND EXHIBITS.

Mr. Maiden exhibited many of the plants referred to in Papers Nos. 4 and 5 respectively.

Also specimens of the Northern Territory Cypress Pine (*Frenela intratropica*, F.v.M.; probably also *F. microcarpa*, A. Cunn.). It is very close to *Callitris columellaris*, F.v.M., as type specimens of the latter exhibited show. At the same time the characteristic elongated columella of *C. columellaris* is almost wanting in the Northern Territory plant, while the timber of the latter is reputed more resistant to white ant. If considered to be distinct, the name *Callitris intratropica*, or the alternative one *C. columellaris*, F.v.M., var. *intratropica*, is proposed for it.

Likewise a flower of *Helicodiceros muscivorus*, Engl. (*Arum crinitum*, Ait.), a remarkable Aroid from Corsica, flowered by Mr. W. Forsyth, Centennial Park.

Mr. D. G. Stead mentioned instances of recognisable variations in shape and colouration in Australian freshwater and estuarine fishes according as they frequented running streams or normally saline waters, or were isolated in stagnant lagoons or the waters were unduly saline during a period of drought.

Dr. Greig Smith exhibited the carcases of three bush mice affected with a skin disease about the head, forwarded from Tamworth by Mr. W. W. Froggatt; also a preparation under the microscope showing the growths to be of a fungoid character, possibly a case of Mouse-Favus. Many deaths were reported as due to the disease.

Mr. Palmer stated that the female of a pair of Chestnut-eared Finches (*Taeniopygia castanotis*, Gould) in his aviary, which were caught at Lawson, laid altogether 17 eggs last year; and that this year she had reared a brood of six young ones, and subsequently had laid three eggs.

Mr. Fred Turner exhibited and offered some observations on a collection of Grasses from Northern Queensland, and Northern and Central Australia, the economic value, geographical distribution and special characteristics of each species being pointed out. The following species were represented :—

Andropogon exaltatus, R.Br.; Cooper's Creek.
,, *sericeus*, R.Br., var. *polystachyus*; Port Denison.
Anthistiria frondosa, R.Br.; Port Darwin.
Centotheca lappacea, Desv.; Johnstone River.
Chloris divaricata, R.Br.; west of Rockhampton.
,, *scariosa*, F.v.M.; Bowen Downs.
Dimeria tenera, Trin.; Port Darwin.
Eriachne armitii, F.v.M.; Gilbert River.
,, *glauca*, R.Br.; Gulf of Carpentaria.
,, *squarrosa*, R.Br.; Endeavour River.
,, *stipacea*, F.v.M.; Cape York.
Heterachne brownii, Benth.; Port Darwin.
Heteropogon insignis, Thw.; Port Darwin.
Panicum argenteum, R.Br.; Gulf of Carpentaria.
,, *prenticeanum*, Bail.; Russell River.
,, sp. nov.; south of Port Darwin.
,, *trichoides*, Sw.; Mulgrave River.
Poa nodosa, Nees; near Cooper's Creek.
Pogonatherum saccharoides, Beauv.; Johnstone River.
Rottboellia exaltata, Linn.; Gulf of Carpentaria.
,, *ophiuroides*, Benth.; Port Darwin.
Sorghum intrans, F.v.M.; Port Darwin.
Spinifex longifolius, R.Br.; Port Darwin.
Sporobolus virginicus, Kunth, var. *pallida*; near Cooper's Creek.
Triodia pungens, R.Br.; north-west of Cooper's Creek.

Triodia pungens, R.Br., is one of the "porcupine" grasses which cover large tracts of desert country in the interior of Australia. These prickly grasses are now called "Spinifex" (though they must not be confounded with the botanical genus *Spinifex*), and some explorers and experienced bushmen hold the opinion

that Leichhardt and his comrades perished in "Spinifex" country. When these grasses are old and dry they are highly inflammable, and when on fire give out terrific heat. It is supposed that a "Spinifex" fire may have entirely destroyed all traces of these illfated explorers.

Panicum prenticeanum, Bail.—This remarkable grass attains a height of fifteen or more feet when growing on rich land. It is common in some parts of Northern Queensland, and is said to be found in New Guinea also.

Heteropogon insignis, Thw., is the giant "spear" grass of North Australia. The spear-like bases of the matured flowering glumes have been known to penetrate the skin and enter the vital parts of cattle and cause death. It is a capital forage plant before the flowering period.

Andropogon sericeus, R.Br., var. *polystachyus*.—The typical species has rarely more than three spikes, which are sessile at the summit of a slender peduncle, but the variety has from ten to thirty or more spikes all closely sessile in a terminal head. It usually grows from 4-5 feet high, and is an excellent forage plant.

Rottboellia excelsa, Linn., is a remarkable species from tropical Queensland, often growing more than 10 feet high.

Sorghum intrans, F.v.M., is an exceedingly ornamental species when in flower. It is fairly common in some parts of North Australia.

Panicum argenteum, R.Br.—The spikelets of this grass are covered with long, silvery hairs, which give it quite an ornamental appearance.

Eriachne armitii, F.v.M.—The spikelets of this species are covered with tubercles surmounted with spreading hairs.

Anthistiria frondosa, R.Br., is one of the famous "Kangaroo" grasses of North Australia.

WEDNESDAY, NOVEMBER 30TH, 1904.

A Special General Meeting and the concluding Ordinary Monthly Meeting of the current Session were held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, November 30th, 1904.

SPECIAL GENERAL MEETING.

Dr. T. Storie Dixson, President, in the Chair.

Business:—To consider a recommendation from the Council, in the matter of Members officially engaged in research work under the Society's auspices, and elections to the Council; and the desirability of making provision for an addition to the Society's Rules at present in force, with reference thereto.

The Council's original recommendation as announced in the circular issued to Members was moved *pro formâ* to allow of an amended substitutive recommendation being brought forward as an amendment.

On being put to the Meeting the amendment—

That the following addition to the Society's Rules at present in force, be adopted:—

Rule xi. *bis*.—It shall not be competent for an Ordinary Member of the Society to hold office on the Council, and as Macleay Bacteriologist or Linnean Macleay Fellow, simultaneously.

—was agreed to on the voices.

On being put as a substantive motion the resolution was agreed to on the voices.

ORDINARY MONTHLY MEETING.

Dr. T. Storie Dixson, President, in the Chair.

Miss Marian Harris, B.A., B.Sc., Ultimo, was elected an Associate Member of the Society.

The President reminded Candidates for Fellowships that December 1st, 1904, would be the last day for the receipt of applications.

The President also gave Notice of a Special General Meeting to be held on 29th March, 1905, at 8 o'clock, to take precedence of the Annual General Meeting on the same date. *Business:* to confirm the addition of a new Rule, No. xi. *bis*, enacting that Ordinary Members of the Society at the same time may not fill the positions of Member of the Council, and Macleay Bacteriologist to the Society or Linnean Macleay Fellow.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 24 Vols., 88 Parts or Nos., 69 Bulletins, 8 Reports, 7 Pamphlets, and 2 Miscellanea, received from 71 Societies, &c., and 1 Individual, were laid upon the table.

CONTRIBUTIONS TO A KNOWLEDGE OF AUSTRALIAN FORAMINIFERA. Part I.

By H. I. Jensen, B.Sc.

(Plate xxiii.)

The present paper is in the main a compilation of species which I have identified in sands and other materials obtained from various quarters. It is the result of over four years' intermittent work on, and study of, our foraminiferal fauna. Very few new species have been discovered, thanks to the very thorough work of previous workers, especially Brady, who described and figured those dredged on the voyage of the 'Challenger.' Many varieties differing in minor details from those already known and figured were found in the present research, but as the custom of creating new species on trivial differences is objectionable, I have assigned them to the species to which they exhibited most affinity, making a special note where the difference was somewhat marked. The work has been done in the Biological and Geological Departments of the Sydney University, to which I wish to express my gratitude for courtesy shown.

Sands from Wollongong, Byron Bay, Sydney Heads, Lizard Island, the Palm Islands, New Guinea, and Lord Howe Island, as well as dust from a specimen of Turritella limestone and sections of Pokolbin limestone have been examined for Foraminifera.

1. *Foraminiferal sand dredged sixteen miles east of Wollongong at a depth of 100 fathoms by Messrs. Chas. Hedley and G. H. Halligan.*

For this material I am indebted to the above-mentioned gentlemen, and the mollusca in the same material have been fully

investigated by Mr. C. Hedley.* The material which is here investigated is a somewhat fine-grained sand, many of the particles of which, both organic and inorganic, were of a reddish colour owing to iron oxide staining. The ferruginous matter has probably been derived from the decomposition of basalt, similar to the adjoining Kiama basalt, which probably forms the sea-floor in this area.

No distinctly new species were distinguished in this material.

The species identified in each subfamily are here divided into two series, (*a*) those which also occur in Port Jackson and which are enumerated in Whitelegge's List,† and (*b*) those which have not been mentioned by Whitelegge as occurring in Port Jackson.

References to figures are given in the same way as in Whitelegge's List; but no references are given for species mentioned therein. Mr. Whitelegge's abbreviation C.R. for "Challenger Report" is used in this paper.

Family NUBECULARIDÆ.

Subfamily **MILIOLININÆ**.

(*a*) 1. SPIROLOCULINA IMPRESSA.
2. S. LIMBATA.
(*b*) 3. PLANISPIRINA EXIGUA, Brady, C.R., pl.xii. f.1-4.
4. P. SIGMOIDEA, Brady, C.R., pl.ii. f.1.
5. SPIROLOCULINA ARENARIA, Brady, C.R., pl.viii. f.12.
6. S. FRAGILISSIMA, Brady, C.R., pl.ix. f.12.
7. S. EXCAVATA, d'Orb.; C.R., pl.ix. f.5-6.
8. MILIOLINA ALVEOLIFORMIS, Brady, C.R., pl.viii. f.15-20.

Subfamily **PENEROPLIDINÆ**.

(*b*) 9. CORNUSPIRA INVOLVENS, Reuss; C.R., pl.xi. f.3.

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* Studies on Australian Mollusca. Part viii. Proc. Linn. Soc. N. S. Wales, 1904, xxix. 82.

† "List of the Marine and Fresh-water Invertebrate Fauna of Port Jackson and Neighbourhood." Journ. Proc. Roy. Soc. N. S. Wales, xxviii. 1889.

Family ASTRORHIZIDÆ.

Subfamily **ASTRORHIZINÆ**.

(*b*) 10. PELOSINA ROTUNDATA, Brady, C.R., pl.xxv. f.18-20.

Family LITUOLIDÆ.

Subfamily **LITUOLINÆ**.

(*b*) 11. HAPLOPHRAGMIUM FOLIACEUM, Brady, C.R., pl.xxxiii.f.23.

Subfamily **TROCHAMMININÆ**.

(*a*) 12. WEBBINA CLAVATA.
(*b*) 13. TROCHAMMINA PAUCILO-CULATA, Brady, C.R., pl.xli. f.1-2.

Family TEXTULARIDÆ.

Subfamily **TEXTULARINÆ**.

(*a*) 14. TEXTULARIA AGGLUTINANS.
(*b*) 15. SPIROPLECTA BIFORMIS, Parker&Jones; C.R., pl.xlv. f.26-27.
16. S. AMERICANA, Ehrenberg; C.R., pl.xlv. f.24-25.
17. PAVONIA FLABELLIFORMIS, d'Orb.; C.R., pl.xlv. f.18.
18. GAUDRYINA FILIFORMIS, Berthelin; C.R., pl.xlvi. f.12,*a*,*b*,*c*.
19. G. SUBROTUNDATA, Schwager; C.R., pl.xlvi. f.13,*a*,*b*,*c*.

Subfamily **BULIMININÆ**.

(*a*) 20. BULIMINA BUCHIANA.
21. B. PYRULA.
(*b*) 22. BULIMINA MARGINATA, d'Orb.; C.R., pl.li. f.3.
23. BOLIVINA DILATATA, Reuss; C.R., pl.lii. f.20-21.
24. B. HANTKENIANA, Brady, C.R., pl.liii. f.16-18.
25. B. NITIDA, Brady, C.R., pl.lii. f.30.
26. B. PYGMÆA, Brady, C.R., pl.liii. f.5, 6.

Subfamily **CASSIDULININÆ**.

(*b*) 27. EHRENBERGIA PUPA, d'Orb.; C.R., pl.lv. f.1.

Family CHILOSTOMELLIDÆ.

(*a*) 28. CHILOSTOMELLA OVOIDEA.

Family LAGENIDÆ.

Subfamily **LAGENINÆ**.

(*a*) 29. LAGENA SULCATA.
30. L. STRIATOPUNCTATA.
(*b*) 31. L. GLOBOSA, Montagu; C.R., pl.lvi. f.1-3.
32. L. HISPIDA, Reuss; C.R., pl.lvii. f.4.
33. L. LÆVIS, Montagu; C.R., pl.lvi. f.30, and pl.i. f.2.
34. L. STRIATA, d'Orb.; C.R., pl.lvii. f.28.
35. L. SULCATA* var. HISPIDA; bottom species.
36. L. SULCATA,* Walker & Jacob; apiculate varieties; C.R., pl.lviii. f.4, 17, 18.
37. RAMULINA sp.

Subfamily **NODOSARINÆ**.

(*a*) 38. NODOSARIA SCALARIS,† pl.xxvi. f.1.
39. N. HISPIDA.
(*b*) 40. NODOSARIA (DENTALINA) FILIFORMIS, d'Orb.; C.R., pl.lxiii. f.4.
41. N. PYRULA, d'Orb.; C.R., pl.lxii. f.10-11.
42. N. VERTEBRALIS, Batsch; C.R., pl.xliii. f.35; diminutive or young two-chambered specimen.
43. LINGULINA CARINATA, d'Orb.; C.R., pl.lxv. f.16; diminutive specimen.
44. CRISTELLARIA CREPIDULA, Fichtel & Moll.; C.R., pl.lxviii. f.1, and pl.lxvii. f.17.

Subfamily **POLYMORPHININÆ**.

45. POLYMORPHINA SORORIA, Reuss; var. pl.xxvi. f.3, and C R., pl.lxxi. f.15; see p.817.
46. SAGRINA ANNULATA, Brady, C.R., pl.lxxvi. f.20.

Family GLOBIGERINIDÆ.

(*a*) 47. GLOBIGERINA BULLOIDES.
48. G. SACCULIFERA.

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* See Notes on Wollongong Foraminifera. *Postea*, p.815.
† See Notes on Wollongong Foraminifera.

49. Orbulina universa.
50. Pullenia obliquiloculata.
51. Sphæroidina dehiscens.

(*b*) 52. Globigerina cretacea, d'Orb.; C.R., pl.lxxxii. f.10.
53. G. æquilateralis, Brady, C.R., pl.lxxx. f.18-20.
54. Candeina nitida, d'Orb.; C.R., pl.lxxxii. f.13-20.
55. Globigerina linnæana, d'Orb.; C.R., pl.lxxxii. f.12.
56. Hastigerina pelagica, d'Orb.; C.R., pl.lxxxiii.

Family ROTALIDÆ.

Subfamily **SPIRILLININÆ.**

(*b*) 57. Spirillina vivipara, Ehrenberg; C.R., pl.lxxxv. f.1-5.

Subfamily **ROTALINÆ.**

(*a*) 58. Discorbina allomorphinoides.
59. D. biconcava.
60. D. opercularis.
61. Truncatulina haidingerii.
62. T. wuellerstorfii.
63. Pulvinulina crassa.
64. P. menardi.

(*b*) 65. Discorbina bertheloti, d'Orb.; C.R., pl.lxxxix. f.10-11.
66. D. globularis, d'Orb.; C.R., pl.lxxxvi. f.13.
67. D. patelliformis, Brady, C.R., pl.lxxxviii. f.3, *a*, *b*, *c*.
68. D. parisiensis, d'Orb.; C.R., pl.xc. f.5, 6, 9-12.
69. D. vilardeboana, d'Orb.; C.R., pl.lxxxvi. f.9.
70. D. rugosa, d'Orb.; C.R., pl.lxxxvii. f.3.
71. Anomalina ammonoides, Reuss; C.R., pl.xciv. f.2 and 3.
72. Planorbulina (Truncatulina) akneriana, d'Orb.; C.R., pl.xciv. f.8, *a*, *b*, *c*.
73. Truncatulina humilis, Brady, C.R., pl.xciv. f.7.
74. T. pygmæa, Hantken; C.R., pl.xcv. f.9-10.
75. T. robertsoniana, Brady, C.R., pl.xcv. f.46.
76. T. tumidula, Brady, C.R., pl.xcv. f.8.
77. T. ungueriana, d'Orb.; C.R., pl.xciv. f.9.
78. Pulvinulina elegans, d'Orb.; C.R., pl.cv. f.3-6.

79. P. OBLONGA, var. SCABRA, Williamson; Brady, C.R., pl.cvi. f.8*c*.
80. P. PATAGONICA, d'Orb.; C.R., pl.ciii. f.7.
81. TRUNCATULINA VARIABILIS, d'Orb.; C.R., pl.xciii. f.6 and 7.
82. ANOMALINA ARIMIENSIS, d'Orb.; C.R., pl.xciii. f.10, *b*.
83. ROTALIA VENUSTA, Brady, C.R., pl.cviii. f.2.

Subfamily **TINOPORINÆ**.

(*b*) 84. CARPENTARIA UTRICULARIS, Carter; C.R., pl.c. f.1.
85. POLYTREMA sp. (fragments).

Family NUMMULINIDÆ.

Subfamily **POLYSTOMELLINÆ**.

(*a*) 86. NONIONINA UMBILICATA.
(*b*) 87. NONIONINA SCAPHA, Fichtel & Moll.; C.R., pl.cix. f.16.
88. POLYSTOMELLA CRISPA, Linné; C.R., pl.cx. f.6-7.
89. P. SUBNODOSA, Münster; C.R., pl. cx. f.1.
90. P. MACELLA, Fichtel & Moll.; C.R., pl.cx. f.8, 9, 11; and pl.xxvi. f.4. See also p.817.

Notes on the Wollongong Foraminifera.

It is an interesting fact that most of the *Miliolinæ* in the Wollongong material were micromorphs. The natural habitat of this family seems to be the shallow water near the shore; possibly micromorphism has resulted from unfavourable conditions.

Lageninæ were very numerous, and the species merge into one another. *Lagena striata* was found sometimes with one, or several apical spines, sometimes without any at all, merging into corresponding forms of *L. sulcata*. Forms like *L. hispida* frequently have their necks ringed after the manner of *L. sulcata*, and *L. sulcata* frequently has a neck like that of *L. hispida;* some specimens of *L. sulcata* were provided with one or more apical spines, and had their necks ringed with parallel ring-like ridges (cp. C.R., pl.lviii. f.4) instead of the usual spiral ridge. There does not seem to me to be any marked division line between these species of *Lagena*, but they merge into one another

by imperceptible gradations. Indeed there seems to be no reason why they should not be considered merely as large varieties of *L. sulcata*, which, according to Messrs. Parker and Jones, is the type-species of the genus. The species *acuticostata*, *exsculpta*, and *striata* also merge into *L. sulcata*.

The genus *Lagena* being such a large genus, it is desirable to maintain for convenience the present species, although many may possibly be merely varieties, variation in the lower orders of life being exceedingly frequent and well-marked. The creation of new species, on any but very extraordinary points of difference, seems to me to be undesirable, particularly in the genus *Lagena*, which is already almost overcrowded with species, and in which species could be almost indefinitely multiplied if minor variations from type are made to constitute specific differences.

Many of the Lagena-like forms are possibly young specimens of *Nodosaria*. In its early stages *Nodosaria scalaris* is a *Lagena sulcata*, provided with an apical spine and a neck like *L. hispida*. The specimens of *L. sulcata* answering to the above description are indistinguishable from *N. scalaris* except for containing only one chamber instead of two.

Nodosaria scalaris (Pl.xxiii., fig.1) is very abundant, but differs very remarkably from the type, as figured in the Challenger Report. The ribs are fewer and more strongly marked. The chambers are seldom more than two in number, and the size of the organism is diminutive. Many specimens have dentate processes or spines at the initial (apical) end like the apiculate varieties of *L. sulcata* and *L. striata;* sometimes these are very strongly marked as in *N. abyssorum*, Brady (C.R., pl.lxiii. f.9), or *L. striata*, d'Orb. (C.R., pl.lvii. f.29-30).

Perhaps on account of the remarkable micromorphism and variability of this organism, and its relation to some forms of *L. sulcata*, it would have been permissible to make a new species of it.

Specimens of *Lagena lævis* (pl.xxvi. f.2) differ slightly from the type. Some are provided with apical spines.

Polymorphina sororia (Pl.xxiii., f.3) is rare in the Wollongong material, and is somewhat different from the type figured in the Challenger Report. The test is frail and of similar composition to that of *Lagena*, and the aperture is polymorphine. There are only two chambers, one of which is enclosed in the other as in *Chilostomella ovoidea*. The forms found in the Wollongong material were either young or micromorphic. The diameter was 0·25 mm.

The Polystomella specimen figured (Pl.xxiii., f.4) and enlisted as *P. macella* differs from the type of the species by possessing a marked umbilicus on either side in which the inner whorls are clearly visible. It is thus biconcave. Perhaps it also deserves to be ranked as a new species.

Micromorphism was most marked in the following species of *Miliolinæ*:—*Spiroloculina seminulum*, *S. fragilissima*, *S. excavata*, *S. limbata* (diam. up to 0·3 mm.), *S. impressa*, and also in many of the *Lagenidæ*, *Rotalidæ* and others, such as *Nodosaria scalaris*, *N. vertebralis*, *Truncatulina ungueriana*, *Anomalina arimiensis* (diam. 0·25 mm,), *Gaudryina subrotundata*, &c.

The depth at which the dredgings were made (100 fathoms) and the distance from land (16 miles) were evidently not the optimum for these forms. *Globigerina* was by far the most abundant organism in the material, which might almost be termed a Globigerina ooze. Only twenty-four of the ninety species enumerated here occur also in Mr. Whitelegge's List of the Port Jackson forms.

2. *Foraminiferal Sand dredged at Byron Bay at a depth of 111 fathoms.*

For this material I am indebted to Mr. G. H. Halligan, through Mr. C. Hedley. As yet only the coarser shell-sands from this locality have been examined. In this list and in the list of forms identified in sands from other localities forming the rest of this paper, the species mentioned by Whitelegge as occurring in Port Jackson are denoted by an asterisk.

Family MILIOLIDÆ.

Subfamily **MILIOLINÆ**.

1. Biloculina bulloides, d'Orb.; C.R., pl.ii. f.5-6.
2. B. elongata, d'Orb.; C.R., pl.ii. f.9.
3. B. ringens,* Lamk.
4. B. sphæra, d'Orb.; C.R., pl.ii. f.4.
5. B. tubulosa, Costa; C.R., pl.iii. f.6.
6. Miliolina boueana, d'Orb.; C.R., pl.vii. f.13.
7. M. (Triloculina) bucculenta, Brady, C.R., pl.iv. f.1-2.
8. M. crassatina,* Brady, C.R., pl.viii. f.5.
9. M. labiosa, d'Orb.; C.R., pl.vi. f.3-5.
10. M. linnæana, d'Orb.; C.R., pl.vi. f.15-20.
11. M. secans, d'Orb.; C.R., pl.vi. f.1-2.
12. M. seminulum,* Linné; C.R., pl.v. f.6.
13. M. separans, Brady, C.R., pl.vii. f.1-4.
14. M. trigonula, Lamk.; C.R., pl.iii. f.14-16.
15. M. valvularis, Reuss; C.R., pl.iv. f.4-5.
16. Spiroloculina asperula, Karrer; C.R., pl.viii. f.11, 12, 13.
17. S. excavata, d'Orb.; pl.ix. f.5-6.
18. S. limbata,* d'Orb.
19. S. tenuiseptata, Brady, C.R., pl.x. f.5-6.

Subfamily **HAUERININÆ**.

20. Planispirina sigmoidea, Brady, C.R., pl.ii. f.5-6.

Subfamily **PENEROPLIDINÆ**.

21. Peneroplis pertusus,* Forskäl; C.R., pl.xiii. f.12-15 and 20-25.

Family ASTRORHIZIDÆ.

Subfamily **RHABDAMMININÆ**.

22. Jaculella acuta, Brady, C.R., pl.xxii. f.14-18.

Family LITUOLIDÆ.

Subfamily **TROCHAMMININÆ**.

23. Thurammina papillata, Brady, C.R., pl.xxxvi. f.7-18.
24. Hippocrepina sp.

25. Ammodiscus tenuis, Brady, C.R., pl.xxxviii. f.4-6.
26. Hormosina monile, Brady, C.R., pl.xxxix. f.10-13.
27. Trochammina squamata, Jones & Parker; C.R., pl.xli. f.3.

Subfamily **LITUOLINÆ**.

28. Rheophax euneta, n.sp., Pl.xxiii., figs.1-4; see p.821.

Family TEXTULARIDÆ.

Subfamily **TEXTULARINÆ**.

29. Textularia agglutinans,* d'Orb.
30. T. luculenta,* Brady.
31. T. turris, d'Orb.; pl.xliv. f.4-5.
32. Gaudryina subrotundata, Schwager; C.R., pl.xlvi. f.13.
33. G. scabra, Brady, C.R., pl.xlvi. f.7.

Subfamily **CASSIDULININÆ**.

34. Cassidulina crassa,* d'Orb.
35. C. parkeriana, Brady, C.R., pl.liv. f.11-16.

Family CHILOSTOMELLIDÆ.

36. Chilostomella ovoidea,* Reuss.
37. Allomorphina sp.

Family LAGENIDÆ.

Subfamily **LAGENINÆ**.

38. Lagena acuticostata,* Reuss.

Subfamily **NODOSARINÆ**.

39. Nodosaria communis,* d'Orb.
40. N. consobrina, var. emaciata, Reuss; C.R., pl.lxii. f.25-26.
41. N. costulata, Reuss; C.R., pl.lxiii. f.23-26.
42. N. obliqua,* Linné.
43. N. perversa, Schwager; C.R., pl.lxiv. f.25-27.
44. N. roemeri, Neugeboren; C.R., pl.lxiii. f.1.
45. N. soluta,* Reuss.
46. N. vertebralis, Batsch; C.R., pl.lxiv. f.11-13.
47. N. (Dentalina) filiformis, d'Orb ; C.R., pl.lxiii. f.3-5.

48. Cristellaria crepidula, Fichtel & Moll; C.R., pl.lxvii f.17, 19, 20.
49. C. nitida, d'Orb.; C.R., pl.lxx. f.2.
50. C. orbicularis,* d'Orb.
51. C. rotulata,* Lamk.
52. C. cultrata, Montfort; C.R., pl.lxx. f.4-6.
53. C. italica,* Defrance.
54. C. lata, Cornuel; C.R., pl.lxvii. f.18.
55. C. vortex, Fichtel & Moll; C.R., pl.lxix. f.14-16.
56. Lingulina sp.
57. Lingulina carinata, var. seminuda, Hantken; C.R., pl.lxv. f.14-15 (see also p.822, and Pl.xxiii., fig.1).
58. Frondicularia inæqualis, Costa; C.R., pl.lxvi. f.8-12.

Subfamily **POLYMORPHININÆ.**

59. Polymorphina elegantissima,* Parker & Jones.
60. P. problema, d'Orb.; C.R., pl.lxxii. f.20.
61. P. alveoliniformis, n.sp.; see p.822, and Pl.xxiii., figs.1-6.
62. Ramulina globulifera, Brady, pl.lxxvi. f.22-28.
63. Ramulina sp.

Family GLOBIGERINIDÆ.

64. Orbulina universa,* d'Orb.
65. Globigerina (wild-growing monstrous bottom forms), cp. C.R., pl.lxxxi. f.6 and 7.
66. G. bulloides,* d'Orb.
67. G. conglobata,* Brady.

Family ROTALIDÆ.

Subfamily **ROTALINÆ.**

68. Truncatulina lobulata,* Walker & Jacob.
69. T. haidingerii,* d'Orb.
70. Pulvinulina elegans, d'Orb.
71. Carpentaria proteiformis, Goës; C.R., pl.xcvii. f.8-14.
72. C. balaniformis, Gray; C.R., pl.xcviii. f.14-17.
73. C. monticularis (young sp.); C.R., pl.xcviii. f.13, 15, 16.
74. Rupertia stabilis, Wallich; C.R., pl.xcviii. f.1-12.
75. Rotalia calcar, d'Orb ; C.R., pl.cviii. f.3.

Subfamily **TINOPORINÆ.**

76. TINOPORUS BACULATUS, Carpenter; C.R., pl.ci. f.4-7; very rare.
77. POLYTREMA MINIACEUM, Linné.

New Species and Notes.

RHEOPHAX EUNETA,* n.sp. (Pl.xxiii., figs.5-7*a* and *b*).

Only three fair specimens were obtained. The tests being very frail had been demolished through crushing. The test consists of a closely matted network of spicules which, being insoluble in hydrochloric acid, somewhat boomerang-shaped, and containing axial canals, seem to be siliceous spicules of monactinellid sponges (fig.6). The tests of the specimens described were of a light brown colour and were made up of three or four chambers placed in a straight line, the first (or initial) chamber sometimes being the largest (fig.5). The chambers are hollow and connected with one another by wide openings. The total length of the test varies from 3-4 mm., and the width is about 1 mm. The specimen shown in fig.5 measured 4 mm. in length. The closed initial chamber was $1\frac{2}{7}$ mm. long, the second $\frac{5}{7}$, the third $\frac{5}{7}$, and the fourth $1\frac{1}{7}$ mm. The chambers are barrel-shaped. The organism differs from the genus *Technitella* in the reddish colour of the material cementing the spicules of the test, and in possessing more than one chamber. In these points it agrees with the genus *Rheophax*, as well as in building up its test with foreign particles. The close matting of the spicules is, however, as beautiful and perfect as in *Technitella*.

POLYMORPHINA ALVEOLINIFORMIS, n.sp. (Pl.xxiii.. figs.8-12.)

Length 3-6 mm.; width about 1 mm. Colour yellowish-white like that of some large Cristellarias with which it is associated; aperture polymorphine (multiradiate), in some specimens triangular or circular and not showing the radiating grooves distinctly; generally three chambers show on the surface, sometimes

*εὔνητος, well spun.

two or four; suture-lines only faintly marked on the shell-surface; surface smooth and shiny; shape of test elongate-ovate. The shell is composed of carbonate of lime and an organic material which is left after treatment with acid. In minute structure, colour and composition the test is like that of *Cristellaria;* but the arrangement of the chambers recalls that of *Miliolina alveoliniformis*, though it is more variable. Longitudinal sections show that the earlier chambers sometimes have parts of their walls resorbed when enclosed in larger ones, so that small apertures open communication between them (see fig. 11). A transverse section (see figs. 12*a* and 12*b*) shows a close resemblance to that of *Miliolina agglutinans.*

The shell is made up of fibrous prisms of calcite placed at right angles to the external surface, and is of much greater thickness than is usual in the family, the thickness of shell recalling *Nubecularia.* It seems that where the walls of two chambers adjoin they coalesce, greatly increasing the thickness at that point (see fig. 10).

Fig. 13 shows a specimen allied to *Lingulina carinata*, Hantken. This is the largest foraminifer obtained in the Byron Bay material, the length being equal to that of *Polymorphina alveoliformis.* It is a much more swollen variety than the typical *L. carinata*, and seems to have affinities with the genus *Gonatosphæra* of Guppy. The final chamber is often broken off, leaving a ridge (*r.* fig. 13) as in *Gonotosphæra prolata*, Guppy.*

Of the seventy-seven species identified in the Byron Bay material twenty-four were found by Mr. Whitelegge to be present in Port Jackson, and are enumerated in his List.

3. *Foraminifera in beach sand from Lord Howe Island.*

This material was given to me by Mr. C. Hedley, F.L.S., of the Australian Museum. It was very fragmentary; and contained only a few forms, here enumerated.

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* See Geol. Mag. for June, 1904.

1. Tinoporus baculatus, Carpenter; C.R., pl.ci. f.4-7.
2. Orbitolites complanata, Lamk.; C.R., pl.xvi. f.1-6.
3. Heterostegina depressa, d'Orb.; C.R., pl.cxii. f.14-18.
4. Polytrema miniaceum.*
5. Cornuspira foliacea, Philippi; C.R., pl.xi. f.5-9.
6. Carpentaria sp. (fragments).

4. *Coarse Foraminiferal sand dredged off Sydney Heads.*

I am indebted for this material to Messrs. C. Hedley and H. L. Kesteven, of the Australian Museum. It contains numerous species hitherto unrecorded for the vicinity of Sydney.

Family MILIOLIDÆ.

Subfamily **MILIOLINÆ**.

1. Biloculina ringens,* Lamk.
2. B. comata,* Brady.
3. Miliolina bucculenta, Brady, C.R., pl.iv. f.1-2.
4. M. insignis, Brady, C.R., pl.iv f.8 and 10.
5. M linnæana, d'Orb.; C.R., pl.vi. f.15-20.
6. M. seminulum,* Linné.
7. M. separans, Brady, C.R., pl.vii. f.1-4.
8. M. trigonula, Lamk.; C.R., pl.iii. f.14-16.
9. Spiroloculina excavata, d'Orb.; C.R., pl.ix. f.5 and 6.

Subfamily **HAUERININÆ**.

10. Hauerina ornatissima, Karrer; C.R., pl.vii. f.15-22.

Subfamily **PENEROPLIDINÆ**.

11. Cornuspira sp.

Family ASTRORHIZIDÆ.

Subfamily **ASTRORHIZINÆ**.

12. Astrorhiza granulosa, Brady, C.R., pl.xx. f.14-23.
13. A. crassatina, Brady, C.R., pl.xx. f.1-9.

Subfamily **RHABDAMMININÆ**.

14. Aschemonella sp.
15. Jaculella sp.

16. Rhabdammina sp.
17. Botellina labyrinthica, Brady, C.R., pl.xxix. f.8-18.
18. Rhizammina algæformis, Brady, C.R., pl.xxviii. f.1-11.
19. R. indivisa, Brady, C.R., pl.xxix. f.5-7.
20. R. discreta, Brady, C.R., pl.xxii. f.7-10.
21. Hyperammina arborescens, Normann; C.R., pl.xxviii. f.12-13.

Family LITUOLIDÆ.

Subfamily **LITUOLINÆ.**

22. Rheophax nodulosa,* Brady.
23. R. bacillaris, Brady, C.R., pl.xxx. f.23-24.
24. R. difflugiformis, Brady.

Subfamily **THURAMMININÆ.**

25. Thurammina papillata, Brady, C.R., pl.xxxvi. f.7-18.
26. Ammodiscus sp.

Family TEXTULARIDÆ.

Subfamily **TEXTULARINÆ.**

27. Textularia agglutinans,* d'Orb.
28. T. gramen, d'Orb.; C.R., pl.xliii. f.9 and 10.

Family LAGENIDÆ.

Subfamily **LAGENINÆ.**

29. Lagena oviformis, Terquem; syn. *L. globosa*, Montagu; C.R., pl.lvi. f.1-3.

Subfamily **NODOSARINÆ.**

30. Cristellaria aculeata, d'Orb.; C.R., pl.lxxi. f.4 and 5.
31. C. gibba,* d'Orb.
32. C. rotulata,* Lamk.
33. Frondicularia interrupta, Karrer; C.R., pl.lxvi. f.6 and 7.
34. Cristellaria orbicularis, d'Orb.

Family GLOBIGERINIDÆ.

35. Globigerina sp.

Family ROTALIDÆ.

Subfamily **ROTALINÆ**.

35. Discorbina rosacea, Terquem; C.R., pl.lxxxvii. f.1-4.
36. Truncatulina rosea, d'Orb.; C.R., pl.xcvi. f.1.
37. T. ungueriana, d'Orb.; C.R., pl.xciv. f.9.

Family NUMMULINIDÆ.

Subfamily **POLYSTOMELLINÆ**.

38. Polystomella imperatrix,* Brady.

5. *Foraminifera in beach sands from Lizard Island, Great Barrier Reef, Queensland.*

The material was presented to me, for examination, by Mr. A. E. Finckh, of the Sydney University, and was of the usual type of coral reef sand. On sorting the material by stirring in water and removing the lighter portions, about 1 % of it was found to be of a fine nature, and was specially examined under the microscope.

In the coarse material the following species were abundantly represented.

Family MILIOLIDÆ.

Subfamily **PENEROPLIDINÆ**.

1. Orbitolites complanata, Lamk., var. laciniata, Brady, C.R., pl.xvi. f.1-6 and 8-11.

Family ROTALIDÆ.

Subfamily **ROTALINÆ**.

2. Calcarina spengleri, Linné; C.R., pl.cviii. f.5-7.

Subfamily **TINOPORINÆ**.

3. Tinoporus baculatus, Carpenter; C.R., pl.ci. f.4-7.
4. Gypsina globulus, Reuss; C.R., pl.ci. f.8.
5. G. vesicularis, Parker & Jones; C.R., pl.ci. f.9-12.

Family NUMMULINIDÆ.

Subfamily **NUMMULITINÆ**.

6. Amphistegina lessonii, d'Orb.; C.R., pl.cxi. f.1-7.

The finer portion contained the following species :—

Family MILIOLIDÆ.

Subfamily **PENEROPLIDINÆ.**

7. CORNUSPIRA FOLIACEA, Philippi; C.R., pl.xi. f.5-9.

Subfamily **MILIOLININÆ.**

8. TRILOCULINA sp.
9. SPIROLOCULINA GRATA, Terquem; C.R., pl.ix. f.16 and 17

Family GLOBIGERINIDÆ.

10. GLOBIGERINA sp. (fragmentary).

Family LAGENIDÆ.

Subfamily **LAGENINÆ.**

11. LAGENA BOTELLIFORMIS, Brady, C.R., pl.lvi. f.6.

Family ROTALIDÆ.

Subfamily **ROTALINÆ.**

12. PATELLINA CORRUGATA, Williamson; C.R., pl.lxxxvi. f.1-7.
13. DISCORBINA PARISIENSIS, d'Orb.; C.R., pl.xc. f.5, 6 and 9-12.
14. D. ROSACEA, d'Orb.; C.R., pl.lxxxvii. f.1-4.
15. CYMBALOPORA TABELLÆFORMIS, Brady; C.R., pl.cii. f.15-18.
16. C. POEYI, d'Orb.; C.R., pl.cii. f.13 and 14; plentiful.
17. ANOMALINA AMMONOIDES, Reuss; C.R., pl.xciv. f.2 and 3.
18. PLANORBULINA LARVATA, Parker & Jones; C.R., pl.xcii. f.5 and 6.
19. PULVINULINA AURICULA, Fichtel & Moll; C.R., pl.cvi. f.5.
20. P. FAVUS, Brady, C.R., pl.civ. f.12-16.
21. TRUNCATULINA LOBULATA,* Walker & Jacob.
22. T. VARIABILIS, d'Orb.; C.R., pl.xciii. f.6 and 7.
23. ROTALIA VENUSTA, Brady, C.R., pl.cviii. f.2.
24. R. PAPILLOSA, Brady, C.R., pl.cvi. f.9.
25. CARPENTARIA PROTEIFORMIS, Goës; C.R., pl.xcvii. f.8-14; both old and young specimens.

Family NUMMULINIDÆ.

Subfamily **POLYSTOMELLINÆ**.

26. POLYSTOMELLA CRISPA, Linné; C.R., pl.cx. f.6-7; plentiful.
27. P. VERRICULATA, Brady, C.R., pl.cx. f.12.
28. NONIONINA BOUEANA, d'Orb.; C.R., pl.cix. f.12 and 13.
29. Other fragmentary Nonionina specimens.

With the exception of the forms recorded as plentiful, most of the above species were only represented by one or two specimens in the sand at my disposal.

6. *Raised Coral Reef Sand from the South of the New Guinea Coast*

Was examined and found to be very similar to the Lizard Island material. It contains chiefly :—

1. ORBITOLITES COMPLANATA, Lamk.
2. TINOPORUS BACULATUS, Carpenter.
3. CALCARINA SPENGLERI, Linné.
4. AMPHISTEGINA LESSONII, d'Orb.

7. *Dredgings made at Palm Island, near Townsville.*

I owe this material to the kindness of Mr. C. Hedley, who made the dredging. It was obtained at a depth of 15 fathoms. So far only the coarser material has been examined.

Family MILIOLIDÆ.

Subfamily **MILIOLINÆ**.

1. BILOCULINA sp.
2. MILIOLINA CULTRATA, Brady, C.R., pl.v. f.1 and 2.
3. M. PARKERI, Brady, C.R., pl.vii. f.14.
4. M. RETICULATA, d'Orb.; C.R., pl.ix. f.2-4.
5. M. VENUSTA, Karrer; C.R., pl.v. f.5 and 7.
6. SPIROLOCULINA LIMBATA,* d'Orb.

Subfamily **ALVEOLININÆ**.

7. ALVEOLINA BOSCII, Defrance; C.R., pl.xvii. f.7-12.

Family ROTALIDÆ.

Subfamily **ROTALINÆ**.

8. TRUNCATULINA PRÆCINCTA, Karrer; C.R., pl.xcv. f.1-3.
9. T. HUMILIS, Brady, C.R., pl.xciv. f.7.
10. ANOMALINA FOVEOLATA, Brady, C.R., pl.xciv. f.1.

Family NUMMULINIDÆ.

Subfamily **POLYSTOMELLINÆ.**

11. POLYSTOMELLA CRISPA, Linné; C.R., pl.cx. f.6-7.
12. P. CRATICULATA, Fichtel & Moll; C.R., pl.cx. f.16-17.
13. P. MACELLA, Fichtel & Moll; C.R., pl.cx. f.8, 9, 11.
14. P. STRIATOPUNCTATA, Fichtel & Moll; Flint, "Recent Foraminifera," pl.80.
15. P. HEDLEYI, n.sp., Pl.xxvi., fig 14 (see "Notes" *infra*).
16. NONIONINA sp.

Subfamily **NUMMULITINÆ**.

17. AMPHISTEGINA LESSONII, d'Orb.
18. OPERCULINA COMPLANATA, Defrance, var. GRANULOSA, Leymerie, C.R., pl.cxii. f.6, 7, 9, 10.

POLYSTOMELLA HEDLEYI, n.sp. (Plate xxiii., fig. 14).

Has affinities with *P. crispa* and *P. macella*. It resembles the former in possessing a well-developed callus of supplementary skeleton infilling the umbilicus on either side, and the latter in being very thin and flat, *P. crispa* being rather inflated. It is variable in size, but is usually considerably much larger than *P. macella*. As the figure shows, it differs from both the above-mentioned genera in possessing a set of very minute skeletal bars of a third order which join the secondary. These show as a beautiful striation under the microscope. It often seems to be of a bluish colour. The striation and flatness of the form constitute the main specific characteristics. The average diameter is about 1 mm.

Named after Mr. Hedley, of the Australian Museum.

It is an interesting point that the genera most abundantly represented in this material have beautiful latticed tests, *e.g.*,

Miliolina reticulata, *Polystomella hedleyi*, &c. *M. reticulata* is by far the most abundant of the *Miliolidæ* present, and the *Polystomellinæ* are well represented. One member of this latter genus, *P. craticulata*, Fichtel & Moll, reaches such extraordinary dimensions (over $\frac{1}{4}$ in. in diam.) that it was found necessary to section it to make sure of its identity. The section showed that the specimen under consideration was in reality *P. craticulata*, answering in every particular with Carpenter's description.*

The Orbitolites specimens obtained were also of unusual size, approaching $\frac{3}{4}$ of an inch in diameter, and belong to the smooth variety, thus differing considerably from most of the coral reef forms which belong to var. *laciniata*.

8. *Foraminifera in a specimen of Eocene limestone, with Turritella, Flabellum, and Bryozoa.*

Locality uncertain; probably Table Cape, Tasmania, or Muddy Creek, South Australia.

Family MILIOLIDÆ.

Subfamily **MILIOLININÆ**.

1. MILIOLINA TRIGONULA, Lamk.; C.R., pl.iii. f.14-16.
2. M. TRICARINATA,* d'Orb.
3. M. AUBERIANA, d'Orb.; C.R., pl.v. f.8 and 9.
4. M. CIRCULARIS,* Bornemann.
5. M. BUCCULENTA, Brady, C.R., pl.cxiv. f.3.
6. M. OBLONGA,* Montagu.
7. TRILOCULINA CUNEATA, Karrer; biloculine variety; C.R., pl.i. f.19 and 20.
8. SPIROCULINA sp.
9. BILOCULINA RINGENS,* Lamk.; very plentiful.
10. PLANISPIRINA SIGMOIDEA, Brady, C.R., pl.ii. f.1-3.

Subfamily **PENEROPLIDINÆ**.

11. CORNUSPIRA INVOLVENS, Reuss; C.R., pl.xi. f.1-3.

* Phil. Trans., 1860, pp.538-540, pl.xvii. and xviii.

Family ASTRORHIZIDÆ.

Subfamily **RHABDAMMININÆ**.

12. RHIZAMMINA ALGÆFORMIS, Brady, C.R., pl.xxviii. f.1-11.

Family TEXTULARIDÆ.

Subfamily **TEXTULARINÆ**.

13. TRITAXIA TRICARINATA, Reuss; Chapman, "The Foraminifera," pl.9; and "Verstein. böhm. Kreideform," Pt.1, 1845, p.39, pl.viii. f.60.

Family CHILOSTOMELLIDÆ.

14. CHILOSTOMELLA OVOIDEA,* Reuss.

15. ALLOMORPHINA TRIGONULA, Reuss; C.R., pl.lv. f.24-26.

Family NUMMULINIDÆ.

Subfamily **NUMMULITINÆ**.

16. OPERCULINA COMPLANATA, var., LEYMERIE and DEFRANCE.

This list shows that very many forms still living, some of which, marked *, occurring in Port Jackson to-day, already existed in profusion in Eocene time in more southerly latitudes. Only dust from the specimen, which is kept in the Geological Laboratory at the University, was examined, and the Foraminifera in it were perfect. It is unfortunate that the locality label has been lost.

9. In connection with some work done on the Polyzoa in the Pokolbin Permo-Carboniferous limestone I sectioned a number of rocks, which proved to be rich in Foraminifera. The following genera were represented in the thin slides :—

1. *Nubecularia* (very abundant).
2. *Nodosaria* (very abundant).
3. *Vaginulina* (?)
4. *Haplophragmium* (rare).
5. *Rotalia* (?).
6. *Sphæroidina* or *Globigerina* (?).
7. *Cornuspira* (*involvens*, Reuss ?).

The genera *Nubecularia*, *Nodosaria* and *Cornuspira* have already been identified in Australian Permo-Carboniferous rocks by Mr. W. Howchin, F.G.S. Mr. Howchin describes them in

rocks from the Piper River in north-eastern Tasmania; they are associated here, as at Pokolbin, with *Stenopora*, various Fenestellidæ and other Bryozoa; with marine gastropods and corals.

Conclusion.

In this investigation it was noticed that the classification of Foraminifera into species is a matter of extreme difficulty, especially in the larger genera. In such the species become scarcely more than large varieties, a fact which bears out the doctrines enunciated by Darwin in "Origin of Species."

More work is needed on the distribution of our Foraminifera both as regards depth and latitude. This kind of work is especially interesting, as it shows how variable and deformed a species becomes on leaving its normal habitat. Littoral species partake of the characters of abyssmal forms on leaving shallow water. Variability is very great in most species of Foraminifera, as one would expect in such a lowly organised group.

The Eocene and Permo-Carboniferous forms enumerated here are only intended to supplement known records by the addition of new localities. Most of these forms have already been recorded by Mr. Howchin.*

EXPLANATION OF PLATE XXIII.

Fig. 1.—*Nodosaria scalaris*, Batsch (× 100).
Fig. 2.—*Lagena lævis*, Montagu (× 80).
Fig. 3.—*Polymorphina sororia*, Reuss (× 80).
Fig. 4.—*Polystomella macella*, Fichtel & Moll. (× 40).
Fig. 5.—*Rheophax euneta*, n.sp. (× 16).
Fig. 6.— ,, ,, single chamber (× 20).
Fig. 7*a*.— ,, ,, (× 16).
Fig. 7*b*.— ,, ,, (× 16).
Fig. 8.—*Polymorphina alveoliniformis*, n.sp. (× 10).
Fig. 9.— ,, ,, (× 10).
Fig. 10.— ,, ,, a specimen ground down on one side (× 10).
Fig. 11.— ,, ,, a specimen partly ground down on one side (× 10).
Fig. 12*a-b*.— ,, ,, transverse sections (× 10).
Fig. 13.—*Lingulina carinata*, Hantken, var. (× 10).
Fig. 14.—*Polystomella hedleyi*, n.sp. (× 40).

* Report Aust. Assoc. Adv. Sc. 1893, v. pp. 355, 365.

REVISION OF AUSTRALIAN LEPIDOPTERA, II.

By A. J. Turner, M.D., F.E.S.

Fam. NOTODONTIDÆ.

I have a few notes to add to my revision (Proc. Linn. Soc. N. S. Wales, 1903, p.42).

In a recent paper* Mr. Bethune-Baker has described twenty new species of this family from New Guinea, and a few of these appear to me to be Australian species.

Hyleora inclyta.

Hyleora lacerta, Druce, Ann. Mag. Nat. Hist. (7) vii. p.78, from W.A., is apparently a synonym of this species.

Neola semiaurata.

N.S.W. : Sydney (Waterhouse).

Spatalia argentifera.

♂. *Allata argentifera*, Wlk., Journ. Linn. Soc. vi. p.140.
Celeia plusiata, Wlk., Brit. Mus. Cat. xxxii. p.463.
Celeia sikkima, Moore, Lep. Atk. p.63.
Spatalia argentifera, Hmps., Moths Ind. i. p.169.
♀. *Spatalia costalis*, Moore, Lep. Atk. p.69.
Spatalia costalis, Hmps., Moths Ind. i. p.170.

♂. 47 mm. Head, palpi, and thorax fuscous-brown. Antennæ fuscous-brown; pectinations moderate (3), dull ochreous, apical $\frac{1}{3}$ simple. Abdomen grey. Legs fuscous, irrorated, and tarsi annulated with ochreous-whitish. Forewings shaped as in ♀; grey with some dark fuscous and brownish irroration; two dark fuscous spots beneath costa just before, and after $\frac{1}{4}$; a snow-white

* Nov. Zool. 1904, p.367.

spot with silvery lustre in disc at $\frac{1}{4}$ beneath cell, triangular with a slight prolongation towards base; this is succeeded by two similarly white short streaks along veins 3 and 4, broadly confluent in middle; a dark fuscous streak runs between base and first spot, which is preceded and followed by a brown spot; two dark fuscous dots followed by ochreous-whitish on costa near apex; a fuscous patch at apex; an oblique dark fuscous shade in mid-disc at about $\frac{1}{3}$; a short pale ochreous area on termen beneath apical patch representing the costal streak of ♀; cilia gray, above mid-termen mixed with brownish-fuscous and whitish-ochreous. Hindwings as in ♀.

The ♀ I have already described. The two sexes are very dissimilar, and I would not have suspected their relationship if Mr. F. P. Dodd had not bred both from the same larvæ, feeding on *Pongamia glabra*.

N.Q.: Townsville. Also from Borneo, Malay Peninsula, and India.

CERURA AUSTRALIS.

Cerura multipunctata, Bak., (Nov. Zool. 1904, p.381) from New Guinea, is I suspect only a local form of this species. Intermediate varieties may be expected to be discovered on the Queensland coast.

ŒNOSANDA BOISDUVALII.

♀. *Lomatosticha nigrostriata*, Motschulsky, Stett. Ent. Zeit. xxxiii. p.359 (1872).

Sir George Hampson kindly forwarded me a copy of Motschulsky's description.

DANIMA BANKSIÆ.

N.Q.: Townsville; from larvæ feeding on *Grevillea striata* (Dodd).

THEMERASTIS AMALOPA,* n.sp.

♀. 46 mm. Head and palpi dark brown. Thorax pale brownish; collar dark brown. Abdomen grey. Legs brownish. Forewings elongate, costa strongly arched, apex rounded, termen

* ἁμαλωπος, soft-looking.

obliquely rounded; pale brownish mixed with whitish; markings blackish; a fine outwardly-curved transverse line near base, followed by a dark suffusion containing two or three similar lines more or less developed; two fine parallel outwardly-curved lines from $\frac{1}{4}$ costa to $\frac{2}{3}$ dorsum; these are followed by a vague pale suffusion; a discal dot at end of cell; two very fine parallel wavy lines from $\frac{2}{3}$ costa to before tornus, above mid-disc the anterior of these lines is thickened to form a second discal dot; a small blackish suffusion at tornus surmounted by some dark brown scales; a series of black pale-edged dots forming a subterminal line; a series of very indistinct terminal dots; cilia pale brown. Hindwings with termen rounded; pale brownish-fuscous; cilia concolorous.

Type in Coll. Turner.

N.Q.: Mulgrave River near Cairns; one specimen.

Osica glauca.

Osica turneri, Bak., (Nov. Zool. 1904, p.374, pl.vi. f.31) exactly corresponds to some Australian examples of this rather variable species, and *Osica funerea*, Bak., (*op. cit.* p.374) is doubtless another synonym. This species, therefore, ranges as far as New Guinea.

Cascera muscosa.

N.Q.: Kuranda, in March (Dodd). One ♂ with antennal pectinations $2\frac{1}{2}$, apical $\frac{2}{3}$ simple. This example corresponds exactly with *Cascera bella*, Bak., (*op. cit.* p.374) from New Guinea.

Unrecognised species.

Stauropis (?) *euryscia*, Low., Trans. Roy. Soc. S. Austr. 1903, p.28. N.S.W.: Broken Hill.

Fam. SYNTOMIDÆ.

Tongue usually well-developed. Tibiæ with the spurs short. Forewings with 1^c absent, 5 approximated to 4 at origin, 7, 8, 9 stalked. Hindwings small; 1^a often absent, 1^c absent, 8 absent

(or in exotic genera rarely rudimentary and not reaching costa); frenulum present; retinaculum bar-shaped.

A family derived from the *Arctiadæ*, usually easily distinguished by the absence of vein 8 of the hindwings, but some of the exotic genera are not so easily separated. With the *Zygænidæ*, with which it was formerly confused, it has no near relationship, the resemblance being only analogical, or probably, in some instances, mimetic. The Australian species give little idea of its extent; there are some twelve hundred known species, which form the subject of the first volume of Sir Geo. Hampson's great work on the Lepidoptera Phalænæ. These may be divided into two groups, one comprising three-fourths of the species, being confined to the Neotropical region, with the exception of a few which range into North America, and of the single genus *Euchromia*. The other is restricted to the Eastern hemisphere, being mainly developed in the tropical and subtropical zones, with stragglers into the temperate zone.

Mr. Edw. Meyrick has published a valuable paper on the Australian species;* but considerable fresh material has come to hand since that date, and the group, which is one of special difficulty, needs fresh revision. Neither this writer nor Sir Geo. Hampson had an adequate amount of Australian material to work with.

The Australian species probably form a relatively inedible group, acquiring protection either from conspicuously brilliant coloration as in *Euchromia*, or in close adherence to a common and simple pattern of coloration (synaposematic) in the case of the other genera. To this pattern are also assimilated the species of the genera *Thyrassia* and *Monoschalis* among the *Zygænidæ*, and *Asura*, and perhaps also *Eutane* among the *Arctiadæ*.

A. Hindwings with vein 7 absent.
  B. Hindwings with 3 and 4 absent..... 1. Ceryx.
  BB. Hindwings with 3 present, 4 absent.
    C. Hindwings with 3 and 5 connate..... 2. Syntomis.
    CC. Hindwings with 3 and 5 separate..... 3. Eressa.
AA. Hindwings with 7 present..... 4. Euchromia.

* These Proceedings, 1886, p.773.

Gen. 1. Ceryx.

Ceryx, Wlgrn., Wien. Ent. Mon. vii. p.140 (1863); Hmps., Cat. Lep. Phal. i. p.35.

Agaphthora, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.774.

Tongue well-developed. Palpi short, porrect. Antennæ of ♂ shortly pectinate, serrate, or simple. Posterior tibiæ with one or two pairs of minute spurs. Forewings with 7, 8, 9, 10, 11 stalked. Hindwings with 3, 4, and 7 absent.

Type, *C. anthraciformis*, Wlgrn., from South Africa.

A genus of about thirty known species developed in the Indo-Malayan and African regions. The section of the genus (*Agaphthora*) to which the Australian species belong is characteristic of New Guinea and the adjacent islands. In it the ♂ antennæ are simple or nearly so, and the fore tibiæ and tarsi of this sex are densely clothed with long hairs and scales.

1. Abdomen with six orange rings..... *sphenodes.*
Abdomen black, with orange lateral spots..... *guttulosa.*

1. Ceryx sphenodes.

Agaphthora sphenodes, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.774.

Ceryx sphenodes, Hmps., Cat. Lep. Phal. i. p.38, pl.i. f.6.

Type in Macleay Museum, Sydney.

N.Q.: Cairns, Kuranda. Probably also from New Guinea, but in this form the crown of head is orange.

2. Ceryx guttulosa.

Syntomis guttulosa, Wlk., Brit. Mus. Cat. xxxi. p.73.

Agaphthora melanora, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.774.

Ceryx guttulosa, Hmps., Cat. Lep. Phal. i. p.39, pl.i. f.8.

Type in British Museum.

N.Q.: Cape York. Also from Aru and Kei Island.

Gen. 2. Syntomis.

Syntomis, Ochs., Eur. Schmett. ii. p.103; Hmps., Cat. Lep. Phal. i. p.59.

Hydrusa, Wlk., Brit. Mus. Cat. i. p.255; Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.774.

Tongue well-developed. Palpi short, drooping, loose-haired. Antennæ in ♂ shortly pectinate, laminate, serrate, or simple. Tibial spurs very short, posterior tibiæ with two pairs. Forewings with 4 and 5 connate, 7, 8, 9, 10, and 11 stalked. Hindwings with 4 absent, 3 and 5 connate or short-stalked, 7 absent.

Type, *S. phegea*, Linn., from Europe.

A large genus widely distributed in the Eastern hemisphere, the species being most numerous in or near the tropics. The Australian species are all closely related, and many of them subject to variation, while the general pattern is the same in nearly all. Their study is therefore a matter of difficulty, and to understand the species rightly good series of examples are necessary. It is very difficult to construct a satisfactory tabulation, some characters being constant in many species, yet variable in others, and that given below may perchance not prove trustworthy in the case of single abnormal specimens.

The following description applies to all the Australian species with very few exceptions.

Head black or orange or yellow-ochreous, in the latter case black between antennæ; face orange or yellow-ochreous. Antennæ black, sometimes white at apex. Thorax black, collar (tegulæ) always orange or yellow-ochreous; sometimes a posterior or more spots of similar colour. Abdomen black, with seven orange or yellow-ochreous rings in ♂, 6 in ♀, of which the first does not extend to ventral surface, and the last one or two may be absent; tuft black or partly or wholly orange or yellow-ochreous. Legs black. Forewings elongate-triangular, costa slightly or moderately arched, apex rounded, termen slightly or moderately rounded, oblique; black often with purplish or greenish lustre; with ochreous or orange-ochreous (rarely colourless) spots, vary-

ing from nearly colourless and translucent to orange and opaque; an oblong or rounded basal spot beneath cell; a more elongate intracellular spot varying between oblong and triangular; an oblique dorsal spot of variable shape between vein 1 and vein 2; a usually elongate apical spot between veins 6 and 7; a rounded terminal spot between veins 3 and 5 bisected into an upper and lower division by vein 4; occasionally there is a small supra-apical spot, an intermediate spot between veins 5 and 6 connecting apical and terminal spots, and a supplementary spot beyond the dorsal spot and separated from it by vein 2. Hindwings small, triangular; coloured similarly to forewings; a basal spot usually large, sometimes divided into two divisions by submedian vein; a discal spot of very variable size, usually rounded, divided into two divisions by vein 3, the upper division sometimes obsolete, sometimes touching or confluent with basal spot.

In the following species this description is to be assumed to apply unless expressly contradicted, and the spots on the wings will for the sake of brevity and clearness be designated by name. It has appeared advisable to redescribe all the species on account of the difficulty of the group, and the more abundant material at my disposal in most instances, than was available for the earlier descriptions.

1. Abdomen orange	3. *xanthosoma.*
Abdomen black, with orange or ochreous rings	2.
2. Forewings with intermediate spot fully developed, at least anteriorly	3.
Forewings with intermediate spot absent, or developed only posteriorly	9.
3. Forewings with basal and dorsal spots separate	4.
Forewings with basal and dorsal spots completely fused	6.
4. Patagia orange at base	4. *chlorometis.*
Patagia black	5.
5. Thorax wholly black	5. *insularis.*
Thorax with a posterior orange spot	6. *pactolina.*
6. Patagia with orange spots	7. *stenozona.*
Patagia black	7.
7. Antennæ white-tipped	13. *choneutospila.*
Antennæ not white-tipped	8.

8. Hindwings with spots large and confluent	8. *marella.*
Hindwings with spots small, touching	9. *lampetis.*
9. Abdomen loosely haired	10.
Abdomen smooth	12.
10. Thorax wholly black	10. *orphnea.*
Thorax with yellow scales or spots	11.
11. Head black	11. *xanthura.*
Head yellow	12. *recedens.*
12. Thorax wholly black or with only a few yellowish scales posteriorly	13.
Thorax with posterior yellow spot	23.
13. Antennæ white-tipped	14.
Antennæ not white-tipped	21.
14. Wings wholly black or with a single spot only	15.
Wings spotted	16.
15. Head reddish-orange	14. *bicolor.*
Head black	15. *phepsalotis* var. *eschatias.*
16. Anal tuft black	5. *insularis* var.
Anal tuft not wholly black	17.
17. Upper division of basal spot of hindwings obsolete	18.
Upper division of basal spot of hindwings not obsolete	20.
18. Spots deep orange, opaque	16. *chromatica.*
Spots not deep orange and opaque	19.
19. Spots moderate, nearly colourless	17. *paradelpha.*
Spots very small, coloured	15. *phepsalotis.*
20. Hindwings with spots touching	18. *magistri.*
Hindwings with spots separate	19. *annulata.*
21. Spots colourless	22. *hyalota.*
Spots not colourless	22.
22. Abdomen with three apical segments black	20. *cyanura.*
Abdomen with apical segment black	21. *antitheta.*
23. Patagia with orange or ochreous spots	24.
Patagia black	29.
24. Spots colourless	23. *huebneri.*
Spots not colourless	25.
25. Spots deep orange, opaque	24. *chroma.*
Spots not deep orange	26.
26. Abdomen with yellow or orange rings	27.
Abdomen with dull brownish-ochreous rings	35. *dyschlæna.*
27. Antennæ of ♂ serrate	25. *attenuata.*
Antennæ of ♂ pectinate	28.
28. Hindwings with spots separate or touching	27. *prosomœa.*

Hindwings with spots partly confluent	26. *humeralis.*
29. Antennæ white-tipped	28. *leucacma.*
Antennæ not white-tipped	30.
30. Abdomen with two apical segments except tuft black	29. *paraula.*
Abdomen with two apical segments not black	31.
31. Forewings with ochreous scales at extreme base	30. *heptaspila.*
Forewings without ochreous scales at extreme base	32.
32. Hindwings with triangular discal spot, tuft of ♂ black at sides	31. *trigonophora.*
Hindwings with discal spot not triangular, tuft of ♂ not black at sides	33.
33. Spots of hindwing confluent	32. *aperta.*
Spots of hindwing separate	34.
34. Wings thinly scaled, without iridescence	33. *melitospila.*
Wings densely scaled, with purplish or greenish iridescence	34. *pyrocoma.*

3. Syntomis xanthosoma.

Hydrusa xanthosoma, Turn., Trans. Roy. Soc. S. Aust. 1898, p.93.
Syntomis cremnotherma, Low., Proc. Linn. Soc. N. S. Wales, 1900, p.29.

Head orange-ochreous, without black spot between antennæ. Antennæ fuscous irrorated with ochreous; in ♂ shortly pectinate. Thorax and abdomen orange-ochreous, the latter without black rings. Legs orange-ochreous; tarsi fuscous. Forewings with orange-ochreous opaque spots; intermediate and supplementary spots usually fully developed; a narrow supra-apical spot; an orange streak above cell from base to $\frac{2}{3}$. Hindwings with spots large and confluent.

Type in Coll. Turner.

Var. *a*. Intermediate spot wholly obsolete. One ♀ in Coll. Lyell.

N.W.A.: Roeburne, Lennard River (100 miles from Derby; Froggatt).—S.A.: Irrapatana (Lower).

4. Syntomis chlorometis.

Hydrusa chlorometis, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.782.
Syntomis chlorometis, Hmps., Cat. Lep. Phal. i. p.68, pl.ii. f.22.

Head yellow-ochreous, with a few fuscous scales between antennæ. Antennæ black to apices; in ♂ shortly pectinate. Thorax black, a posterior spot and bases of patagia yellow-ochreous. Abdomen rather loosely haired; in ♂ with seven yellow-ochreous rings; tuft yellow-ochreous, at sides blackish. Femora and tibiæ with some ochreous irroration. Forewings with intermediate spot fully developed; small supra-apical and supplementary spots. Hindwings with spots large and confluent.

Type in Coll. Meyrick.

Q.: Dalby, Killarney—N.S.W.: Glen Innes.

5. Syntomis insularis.

Hydrusa insularis, Butl., Journ. Linn. Soc. Zool. xii. p.353.
Hydrusa stelotis, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.777.
Syntomis insularis, Hmps., Cat. Lep. Phal. i. p.73, pl.ii. f.20.

Head orange. Antennæ with white apices. Thorax black. Abdomen in ♂ with seven orange rings; tuft in ♂ black. Forewings with rather small orange spots; intermediate spot present. Hindwings with basal spot rather large; discal spot small, touching basal.

Var. *a*. Intermediate spot minute or absent.

Type in British Museum.

I have no examples of this species.

N.A.: Barnard Island—N.Q.: Cooktown.

6. Syntomis pactolina.

Syntomis pactolina, Wlk., Brit. Mus. Cat. xxxi. p.72; Hmps., Cat. Lep. Phal. i. p.71, pl.ii. f.19.
Hydrusa sphenophora, Turn., Trans. Roy. Soc. S. Aust. 1898, p.94.

Head orange-ochreous. Antennæ black to apices; in ♂ serrate. Thorax with a posterior orange-ochreous spot. Abdomen with orange-ochreous rings and in ♂ with similar tuft. Forewings with intermediate spot fully developed. Hindwings with spots large and confluent.

Type in British Museum.

N.A.: —N.W.A.: Lennard River (Froggatt).

7. Syntomis stenozona.

Syntomis stenozona, Hmps., Cat. Lep. Phal. i. p.69, pl.ii. f.21.

Thorax with orange spots on patagia and a posterior spot. Forewing with pale ochreous somewhat hyaline spots; basal and dorsal spots completely confluent; a small supplementary spot; intermediate spot present but shorter than apical and terminal, its posterior portion being obsolete. Hindwing with spots confluent.

One specimen in British Museum labelled Queensland, and two (including the type) from Timor. The Australian locality requires confirmation.

8. Syntomis marella.

Syntomis marella, Butl., Journ. Linn. Soc. 1876, p.350; Hmps., Cat. Lep. Phal. i. p.70, pl.ii. f.26.

Hydrusa ecliptis, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.776.

Head reddish-orange. Antennæ black to apices; in ♂ slightly serrate. Thorax black, with a few reddish-orange scales posteriorly. Abdomen with seven reddish-orange rings in ♂, six in ♀; tuft in ♂ black. Fore-tibiæ with an ochreous tuft of hairs posteriorly in both sexes; mid-tibiæ ochreous on inner surface. Forewings with spots rather large, reddish-tinged, translucent; basal and dorsal spots completely confluent; intermediate spot developed equally with apical and terminal spots; occasionally minute supra-apical and supplementary spots. Hindwings with basal and discal spots large and confluent.

Type in British Museum.

N.Q.: Cooktown, Geraldton, Townsville—Q.: Brisbane.

9. Syntomis lampetis.

Hydrusa lampetis, Turn., Trans. Roy. Soc. S. Aust. 1898, p.94.

Head reddish-orange. Antennæ black to apices. Thorax black. Abdomen with six reddish-orange rings in ♀. Fore-tibiæ with an ochreous tuft of hairs posteriorly. Forewings black with purple lustre; spots small, reddish-tinged, translucent; basal and

dorsal completely confluent; intermediate spot developed equally with apical and terminal. Hindwing with basal spot small; discal very small, triangular, touching basal.

Possibly a variety of the preceding. Type in Queensland Museum.

N.Q. : Bowen.

10. SYNTOMIS ORPHNÆA.

Hydrusa orphnœa, Turn., Trans. Roy. Soc. S. Aust. 1898, p.98.

Head black. Antennæ black to apices; with some fine ochreous irroration; in ♂ shortly pectinate. Thorax black. Abdomen hairy, with pale ochreous rings and tuft; six or seven rings in ♂, the first being sometimes obsolete; six, including the first, in ♀. Forewings rather thinly scaled, without iridescence; spots pale ochreous; intermediate spot absent or slightly developed posteriorly; supra-apical and supplementary spots sometimes present. Hindwings with spots rather large, touching.

Type in Coll. Turner.

Q. : Toowoomba, Dalby, Warwick, Stanthorpe — N.S.W. : Tenterfield.

11. SYNTOMIS XANTHURA,* n.sp.

♂. 39-42 mm. Head black, sometimes with a few ochreous scales. Antennæ whitish-ochreous at apices; in ♂ very shortly pectinate. Thorax with ochreous spots on patagia, and a posterior spot. Abdomen loosely hairy; in ♂ with seven ochreous rings; tuft in ♂ ochreous. Anterior femora ochreous in front; anterior tibiæ with an ochreous posterior tuft. Forewings with pale ochreous spots; a well-developed supra-apical spot. Hindwings with discal spot triangular, touching or confluent with basal.

Distinguished from *S. prosomœa* by the whitish-ochreous antennal apices, from *S. magistri* by the spotted thorax.

Type in Coll. Lyell.

Vic. : Brentwood, in March; two specimens taken by Mr. S. P. Croom.

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* *ξανθουρος*, yellow-tailed.

12. Syntomis recedens.

Hydrusa recedens, Luc., Proc. Linn. Soc. N. S. Wales, 1891, p.281; Turn., Trans. Roy. Soc. S. Aust. 1898, p.99.

Head ochreous-yellow. Antennæ black to apices. Thorax black, with some ochreous-yellow scales posteriorly; patagia black or ochreous-yellow. Abdomen hairy, with seven pale ochreous rings; tuft in ♂ pale ochreous in centre, black laterally. Forewings rather thinly scaled; spots pale ochreous, translucent; a well-developed supplementary and small supra-apical spot. Hindwings with large basal and rather small discal spot.

Smaller than allied species. Type in Coll. Lucas.

♀ : Duaringa.

13. Syntomis choneutospila,* n.sp.

♂. 29-32 mm. Head black. Antennæ white at apex; in ♂ serrate. Thorax black. Abdomen in ♂ with seven orange rings; tuft in ♂ orange in centre, black laterally. Forewings with spots reddish-ochreous, semihyaline, basal and dorsal spots completely confluent; intermediate spot fully developed in anterior part, but shorter than apical and terminal spots. Hindwings with spots small; upper segment of basal spot obsolete; upper segment of discal spot minute or obsolete.

Apparently nearest to *annulata*, *chromatica*, and *phepsalotis*, though very distinct.

Type in Coll. Turner.

♀. : Brisbane, in March; two specimens (H. Tryon).

14. Syntomis bicolor.

Euchromia (*Hydrusa*) *bicolor*, Wlk., Brit. Mus. Cat. i. p.255.
Hydrusa bicolor, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.785.
Syntomis bicolor, Hmps., Cat. Lep. Phal. i. p.75.

Head reddish-orange. Antennæ white at apices; in ♂ serrate. Thorax occasionally with a few orange scales posteriorly. Abdomen with seven reddish-orange rings in ♂, six in ♀; tuft black.

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* χωνευτοσπιλος, with fused spots.

Forelegs of ♂ with a small tuft of ochreous hairs on posterior surface. Fore- and hindwings uniformly black, without spots.

Type in British Museum.

Var. *a.* ♀. Hindwing with a few orange scales representing basal and discal spots.

N.Q.: Cairns, Kuranda—Q.: Brisbane.

15. Syntomis phepsalotis.

Hydrusa phepsalotis, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.784.

Hydrusa eschatias, Meyr., *op. cit.*, 1886, p.785 (var.).

Head black. Antennæ white at apices; in ♂ deeply serrate. Abdomen in ♂ with seven, in ♀ with six reddish-orange rings; tuft in ♂ reddish-orange in centre, black laterally. Fore-tibiæ with a posterior ochreous tuft. Forewings with spots small or dot-like or partly obsolete, ochreous sometimes slightly translucent. Hindwings with spots small or partly or wholly obsolete; upper segments of basal and discal spots obsolete.

Type in Macleay Museum, Sydney.

Var. *eschatias*. Both wings uniformly black, without spots, or with a single spot on fore- or hindwings. Probably every variety between this and the type form will be found.

Q.: Maryborough, Mount Tambourine—N.S.W.: Newcastle, Bulli, Wollongong.

16. Syntomis chromatica, n.sp.

♂♀. 40-42 mm. Head black. Antennæ white at apices; in ♂ serrate. Thorax black. Abdomen in ♂ with seven, in ♀ with six orange rings; tuft in ♂ orange in centre, black laterally. Fore-femora suffused with ochreous anteriorly, fore-tibiæ with a tuft of ochreous hairs posteriorly. Forewings with purplish reflections; spots small, opaque, deep orange; intracellular spot nearly square; rarely a small supra-apical dot. Hindwings with upper division of basal spot completely obsolete; discal spot small, upper division minute or obsolete.

Larger than the preceding species, with the spots deeper orange and apparently not variable.

Type in Coll. Turner.

Q.: Mount Tambourine; in February and March; six specimens.

17. Syntomis paradelpha,* n.sp.

♂♀. 26-29 mm. Head black. Antennæ white at apices; in ♂ serrate. Thorax black. Abdomen in ♂ with seven, in ♀ with six reddish-orange rings; tuft in ♂ reddish-orange in centre, black laterally. Anterior femora irrorated with ochreous anteriorly; anterior tibiæ with tuft of ochreous hairs posteriorly. Forewings with spots translucent, nearly colourless, basal spots slightly reddish-tinged; spots in ♂ usually small, in ♀ moderate. Hindwings with basal spot small, in ♂ very small, upper division obsolete or nearly so; discal spot small, upper division minute or obsolete.

Type in Coll. Turner.

Q.: Killarney, in November; nine specimens, taken by Mr. H. Tryon.

18. Syntomis magistri, nom.nov.

Hydrusa aperta, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.783, *nec* Wlk.

Head black. Antennæ white at apices. Thorax black. Abdomen with orange rings. Forewings with spots orange-ochreous; sometimes small supra-apical and supplementary spots. Hindwings with spots large and touching.

Type in Coll. Meyrick. I have ventured to dedicate this species to Mr. Meyrick, who has been my master in entomology.

N.S.W.: Bathurst.

19. Syntomis annulata.

Zygaena annulata, Fab., Syst. Ent. p.551.
Hydrusa nigriceps, Butl., Journ. Linn. Soc. Zool. xii. p.352.
Hydrusa intensa, Butl., *op. cit.* p.353.

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* παραδελφος, closely akin.

Hydrusa annulata, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.783.

Hydrusa intensa, Meyr., *op. cit.* p.784, *nec* Butl.

Syntomis annulata, Hmps., Cat. Lep. Phal. i. p.72.

Head black. Antennæ white at apices, in ♂ rather deeply laminate. Thorax black. Abdomen in ♂ with seven, in ♀ with six orange or reddish-orange rings; tuft in ♂ orange. Fore-tibiæ with a posterior tuft more or less ochreous. Forewings with spots pale ochreous, semi-hyaline; very rarely a small supra-apical or intermediate dot. Hindwings with spots separate.

Var. *a*. Abdominal tuft in ♂ black at sides. At one time I considered this a distinct species, but after examination of large series from different localities I do not think this can be maintained.

Var. *b*. Basal spots of wings reddish-tinged.

Var. *c*. Upper segment of discal spot of hindwing minute or absent.

Var. *d*. ♀. Forewing with basal and dorsal spots partly confluent. A very rare individual abnormality.

The spots are smaller in ♂ than ♀; in some males this difference is exaggerated. As a general rule the males are larger, but they vary from 28 to 45 mm. Sir Geo. Hampson's synonymy of this species needs revision.

N.Q.: Cooktown (?)—Q.: Rockhampton, Maryborough, Nambour, Brisbane, Stradbroke Island, Mount Tambourine, Toowoomba, Dalby, Killarney, Stanthorpe—N.S.W.: Ballina, Grafton, Tenterfield, Sydney, Bulli, Wollongong—Vic.: Walhalla. I doubt very much whether the species occurs outside Australia.

20. Syntomis cyanura.

Hydrusa cyanura, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.778.

Syntomis cyanura, Hmps., Cat. Lep. Phal. i. p.75.

Head orange. Antennæ black to apices. Thorax black, with a few orange scales posteriorly. Abdomen with three terminal

segments black, lower surface wholly black or with only a few orange scales. Forewings with spots ochreous, semi-hyaline. Hindwing with spots separate.

Type in Coll. Lucas.

N.Q. : Thursday Island.

21. Syntomis antitheta.

Hydrusa antitheta, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.779.
Hydrusa anepsia, Meyr., *op. cit.* p.779 (var.).
Syntomis antitheta, Hmps., Cat. Lep. Phal. i. p.74.

Head orange. Antennæ black to apices. Thorax black, sometimes with a few orange scales posteriorly. Abdomen in ♂ with seven, in ♀ with six reddish-orange rings; tuft in ♂ black. Fore-tibiæ with a few ochreous scales on posterior surface, tuft mostly black. Forewings with spots semi-hyaline, pale ochreous; intermediate and supplementary spots absent or slightly developed. Hindwings with spots separate, touching or confluent.

Var. *anepsia*. Hindwings with spots confluent.

Type in Australian Museum. The type of *anepsia*, which was in the Macleay Museum, is now lost.

N.Q. : Cooktown, Townsville—Q. : Gayndah.

22. Syntomis hyalota.

Hydrusa hyalota, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.777.
Syntomis hyalota, Hmps., Cat. Lep. Phal. i. p.69.

Head orange. Antennæ black to apices. Thorax black. Abdomen in ♂ with seven, in ♀ with six orange rings. Forewings with greenish lustre; spots colourless, transparent. Hindwings with spots small; upper division of basal spot obsolete; upper division of discal spot minute or obsolete.

Type formerly in Macleay Museum, Sydney, now lost. There is one example in the Queensland Museum.

N.Q. : Cape York, Bowen.

23. Syntomis huebneri.

Syntomis huebneri, Bdv., Mon. Zyg. p.127, pl.viii. f.4; Hmps., Cat. Lep. Phal. i. p.69.

Syntomis marsdeni, Moore, Lep. E.I.C. p.323; P.Z.S. 1859, p.197, pl.60, f.3.

Syntomis xanthomela, Wlk., Journ. Linn. Soc. Zool. iii. p.184.

Naclia singulata, Wlgrn., Wien. Ent. Mon. iv. p.39.

Buthisia sangaris, Wlgrn., *op. cit.* vii. p.139.

Syntomis contermina, Wlk., Brit. Mus. Cat. xxxi., p.78.

Hydrusa pyrrhodera, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.777.

Syntomis frustulenta, Swin., Cat. Oxf. Mus. i. p.44.

Head black. Antennæ white at apices; in ♂ serrate. Thorax with orange spots on patagia and a posterior spot. Abdomen in ♂ with seven, in ♀ with six orange rings; tuft in ♂ black. Forewings with spots colourless, translucent; sometimes a supra-apical dot. Hindwings with spots separate; upper segment of discal spot sometimes very small.

N.A.: Adelaide River, Roebuck Bay—N.Q.: Cape York, Lizard Island, Cooktown, Port Douglas, Cairns. Also from Java, Malay Peninsula, and India.

24. Syntomis chroma.

Hydrusa chroma, Swin., Cat. Oxf. Mus. i. p.50.

Syntomis clementsi, Hmps., Ann. Mag. Nat. Hist. (7) viii. p.165 (1901).

Head orange. Antennæ black to apices; in ♂ serrate. Thorax with patagia and a posterior spot orange. Abdomen in ♂ with seven, in ♀ with six broad orange rings; tuft in ♂ with orange centre, black laterally. Legs partly suffused with orange. Forewings with spots deep orange, opaque; usually a narrow supra-apical spot. Hindwings with basal spot large, sometimes confluent with discal.

Type in Oxford Museum.

N.W.A.: Roeburne, Sherlock River.

25. Syntomis attenuata.

Syntomis attenuata, Hmps., Ann. Mag. Nat. Hist. (7), viii. p.167 (1901).

Head orange-yellow. Antennæ black to apices; in ♂ serrate Thorax with orange-yellow spots on patagia and a posterior spot. Abdomen in ♂ with seven orange rings; tuft in ♂ with orange centre, black laterally. Forewings with orange-yellow spots; sometimes a narrow supra-apical spot. Hindwings with basal spot large, confluent with discal.

Type in British Museum.

N.A.: Bathurst Island, Heywood Island, Queen Island.

26. Syntomis humeralis.

Hydrusa humeralis, Butl., Journ. Linn. Soc. Zool. xii. p.352.
Eressa olinda, Swin., Cat. Oxf. Mus. i. p.53.
Syntomis humeralis, Hmps., Cat. Lep. Phal. i. p.63.

Head pale ochreous. Antennæ black to apices; in ♂ shortly pectinate. Thorax with pale ochreous spots on patagia and a posterior spot. Abdomen in ♂ with seven, in ♀ with six pale ochreous rings; tuft in ♂ ochreous in centre, black laterally. Anterior femora with a few ochreous scales anteriorly; anterior tibiæ with an ochreous tuft posteriorly. Forewings relatively broad and very much rounded at apex; rather thinly scaled; spots pale ochreous; a small supplementary spot usually present; rarely a small intermediate or supra-apical spot. Hindwings with basal spot rather large; discal triangular, partly confluent.

Type in British Museum.

N.A.: Port Darwin—N.Q.: Cairns, Geraldton, Townsville—Q.: Rockhampton, Duaringa.

27. Syntomis prosomœa, n.sp.

♂. 28-36 mm. ♀. 26-28 mm. Head blackish mixed with ochreous scales. Antennæ black to apices; in ♂ shortly pectinate. Thorax with ochreous spots on patagia and a posterior spot. Abdomen in ♂ with seven, in ♀ with six ochreous rings; tuft in

♂ ochreous in centre, black laterally. Anterior tibiæ with posterior tuft wholly or partly ochreous. Forewings densely scaled; spots pale ochreous, rather small; occasionally small supra-apical and supplementary spots. Hindwings with discal spot roundish or triangular, usually separate, sometimes touching first.

Var. *a*. Head orange-ochreous.

Var. *b*. Posterior abdominal tuft of ♂ wholly ochreous.

Var. *c*. Discal spot of hindwing with upper segment obsolete.

Var. *d*. Spots on patagia obsolete.

A variable species, yet always distinguishable from *S. humeralis*.

Type in Coll. Turner.

N.Q.: Townsville, Ravenswood—Q.: Rockhampton, Brisbane, Stradbroke Island, Toowoomba.

28. Syntomis leucacma.

Hydrusa leucacma, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.778.

Syntomis leucacma, Hmps., Cat. Lep. Phal. i. p.74.

Head orange. Antennæ white at apices; in ♂ laminate. Thorax with a posterior orange spot. Abdomen in both sexes with five orange rings; terminal segments black, with bluish iridescence; tuft in ♂ black. Anterior tibiæ with a posterior ochreous tuft. Forewings with pale ochreous spots. Hindwings with spots separate; discal spot roundish, its upper division sometimes small.

Type in Macleay Museum, Sydney.

N.Q.: Cairns, Geraldton.

29. Syntomis paraula.

Hydrusa paraula, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.778.

Hydrusa macroplacà, Meyr., *op. cit.* p.781.

Syntomis macroplaca, Hmps., Cat. Lep. Phal. i. p.74, pl.iii. f.1.

Head orange. Antennæ black to apices; in ♂ serrate. Thorax with a posterior orange spot. Abdomen in both sexes with five dull reddish-orange rings; terminal segments black with greenish

iridescence; tuft in ♂ ochreous. Anterior tibiæ with an ochreous posterior spot. Forewings with spots rather large, semi-hyaline, tinged with reddish-ochreous; supplementary spot present, sometimes fairly large; sometimes supra-apical and intermediate dots. Hindwings with spots separate.

Type in Macleay Museum, Sydney.

Var. *a*. Hindwing with basal spot obscured by blackish scales; discal spot very small, its upper segment obsolete. I am disposed to identify this with *macroplaca*, but not being able to compare the type, and having no examples from Sydney, cannot be certain.

Var. *b*. Patagia with small orange spots. Abdomen with a partially developed sixth ring.

N.Q.: Cooktown, Townsville—Q.: Rockhampton, Bundaberg —N.S.W.: Sydney.

30. Syntomis heptaspila,* n.sp.

♂♀. 34-37 mm. Head orange. Antennæ black to apices. Thorax with a posterior orange spot, usually also with a small dot or a few orange scales on patagia. Abdomen in ♂ with seven orange rings, the last two incompletely developed; in ♀ with five rings; tuft in ♂ orange. Anterior tibiæ with an orange posterior tuft. Forewings with pale ochreous spots and a few ochreous scales at extreme base; supplementary spot always present and well-developed; sometimes supra-apical and intermediate dots; an orange dot or some orange scales at base. Hindwings with spots separate or nearly touching; discal spot roundish.

In the seven-spotted forewings this approached *S. paraula*, which is a uniformly dingy-coloured species. Some examples of *S. pyrocoma* resemble it rather nearly; unlike that species the present one is very uniform in the pattern of the wings.

Type in Coll. Turner.

N.Q.: Cairns; Geraldton, in November; Townsville in June; eight specimens.

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* ἑπτασπιλος, seven-spotted.

31. Syntomis trigonophora.

Hydrusa trigonophora, Turn., Trans. Roy. Soc. S. Aust. 1898, p.97.

Head orange. Antennæ black to apices; in ♂ serrate. Thorax with a posterior orange spot. Abdomen in ♂ with seven, in ♀ with six orange rings; tuft in ♂ orange in centre, black laterally. Anterior tibiæ with posterior tuft black, sometimes partly ochreous. Forewings with pale ochreous spots; supra-orbital spot and an intermediate dot sometimes present. Hindwings with discal spot triangular, confluent or nearly touching basal spot on submedian vein.

Type in Coll. Turner.

Q. : Brisbane, Stradbroke Island—N.S.W. : Sydney (Lyell).

32. Syntomis aperta.

Syntomis aperta, Wlk., Brit. Mus. Cat. xxxi. p.72; Hmps., Cat. Lep. Phal. i. p.71.

Hydrusa nesothetis, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.783.

Head orange. Antennæ black to apices. Thorax with a posterior orange-yellow spot. Abdomen in ♂ with seven, in ♀ with six orange-yellow rings; tuft in ♂ orange-yellow. Forewings with spots rather large, ochreous-yellow; small supplementary and supra-apical spots; a broadly crescentic intermediate spot situated posteriorly. Hindwings with spots large and confluent.

Type in British Museum.

Sir Geo. Hampson's synonymy of this species needs revision.

N.S.W. : Hay.

33. Syntomis melitospila,* n.sp.

♂♀. 32-44 mm. Head ochreous-yellow. Antennæ black to apices; in ♂ serrate. Thorax with a posterior ochreous-yellow spot. Abdomen in ♂ with seven, in ♀ with six ochreous-yellow rings; tuft in ♂ ochreous-yellow. Anterior tibiæ with posterior

* μελιτοσπιλος, honey-spotted.

tuft blackish. Forewings thinly scaled, somewhat translucent, wholly without iridescence; spots rather large, pale ochreous; small supplementary and intermediate spots; sometimes a small supra-apical spot. Hindwings with discal spot roundish, separate.

Type in Coll. Turner.

Q.: Dalby, in April; six specimens.

34. SYNTOMIS PYROCOMA.

Hydrusa cingulata, Butl., Journ. Linn. Soc. Zool. xii. p.352, *nom. præocc.*

Hydrusa pyrocoma, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.780.

Hydrusa synedra, Meyr., *op. cit.* p.780.

Hydrusa hesperitis, Meyr., *op. cit.* p.781.

Hydrusa mochlotis, Meyr., *op. cit.* p.782.

Hydrusa aperta, Turn., Trans. Roy. Soc. S. Aust. 1898, p.95, *nec* Wlk.

Head orange. Antennæ black to apices; in ♂ serrate. Thorax with well-developed posterior orange spot. Abdomen in ♂ with seven, in ♀ with six orange rings, the last two in ♂ and the last in ♀ sometimes incompletely developed; tuft in ♂ orange. Fore-tibiæ with posterior tuft wholly black or partly ochreous. Forewings with pale orange-ochreous spots; intermediate spot obsolete, dot-like, or fairly developed posteriorly; supplementary spot occasionally indicated; rarely a supra-apical dot. Hindwings with basal spot well-developed; discal spot oval; separate, its upper division sometimes very small, rarely obsolete.

Varying considerably in the development of the wing-spots, which tend to be smaller in the ♂.

Type in the Macleay Museum, Sydney.

N.Q.: Cape York, Geraldton—Q.: Rockhampton, Brisbane, Stradbroke Island, Helidon, Toowoomba, Stanthorpe—N.S.W.: —S.A.: (?).

Dr. Culpin has given me larvæ of this species reared from the egg. They are clothed with long hairs, uniformly fuscous, and resemble larvæ of a Spilosoma. They were fed on Rumex (a naturalised weed), but are probably polyphagous.

35. Syntomis dyschlæna, n.sp.

♂♀. 28-30 mm. Head dull ochreous. Antennæ blackish to apices; in ♂ serrate. Thorax with a dull brownish-ochreous posterior spot, and some similarly coloured scales in patagia. Abdomen in ♂ with seven, in ♀ with six narrow dull brownish-ochreous rings; tuft in ♂ dull ochreous in centre, black laterally. Anterior tibiæ with posterior tuft partly dull ochreous. Forewings dull blackish, wholly without iridescence; some ochreous scales at base and beneath costa; spots rather small, pale dull brownish-ochreous. Hindwings with spots small, separate; upper division of discal spot small or obsolete.

Type in Coll. Turner.

N.Q.: Magnetic Island near Townsville, in September; three specimens.

Gen. 3. Eressa.

Eressa, Wlk., Brit. Mus. Cat. i. p.149; Hmps., Cat. Lep. Phal. i. p.115.

Choromeles, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.785.

Tongue well-developed or small. Palpi short, porrect. Antennæ in ♂ pectinate or simple. Posterior tibiæ with middle spurs absent. Forewings with 7, 8, 9, 10, 11 stalked. Hindwings with 4 and 7 absent, 3 and 5 widely separate at base.

Type *E. confinis*, Wlk., from India.

An Indo-Malayan genus of nearly thirty known species; the Australian forms are readily divided into two sections.

1.	Hindwings without spots	*furva.*
	Hindwings spotted	2.
2.	Hindwings with basal and discal spots	3.
	Hindwings with basal spot only	4.
3.	Patagia with basal ochreous spot	*strepsimeris.*
	Patagia wholly black	*geographica.*
4.	Face orange	*megatorna,*
	Face black	*angustipenna.*

Section i. *Antennæ of ♂ bipectinate.*

36. Eressa furva.

Eressa furva, Hmps., Cat. Lep. Phal. i. p.115.

Readily distinguished by the absence of spots in the hindwings, which in the ♂ are lobed and folded over on the dorsal margin.

Type in British Museum.

N.A. : Damma Island.

37. Eressa strepsimeris.

Choromeles strepsimeris, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.786.

Eressa xanthostacta, Hmps., Ann. Mag. Nat. Hist. (7), xi. p.339 (1903).

The posterior legs of the ♂ are ochreous, those of the ♀ black.

Type in Macleay Museum, Sydney.

N.Q. : Townsville, Bowen.

E. lutulenta, Snel., an allied species from Celebes and Java, has the antennæ white-tipped according to Hampson, and in Snellen's figure the basal spot of hindwing is absent. A specimen from Port Darwin, N.A., placed in the British Museum under *lutulenta* may possibly be a form of *strepsimeris*.

38. Eressa geographica.

Choromeles geographica, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.785.

Eressa detola, Swin., Cat. Oxf. Mus. i. p.53 (1892).

Eressa geographica, Hmps., Cat. Lep. Phal. i. p.118, pl.iv. f.25.

Type in Coll. Meyrick.

Var. *a*. Discal spot of hindwings larger and divided into three sections by veins 3 and 5.

Q. : Brisbane, Warwick—N.S.W. : Ballina (Richmond River; Waterhouse).

Section ii. *Antennæ of ♂ simple.*

39. Eressa megatorna.

Eressa megatorna, Hmps., Cat. Lep. Phal. i. p.122.

Very similar to *E. angustipenna*, but readily distinguished by the thick tufts of scales on forelegs of ♂.

Type in British Museum.

N.Q. : Mackay.

40. Eressa angustipenna.

Hydrusa angustipenna, Luc., Proc. Linn. Soc. N. S. Wales, 1889, p.1087.

Syntomis angustipenna, Turn., Trans. Roy. Soc. S. Aust., 1898, p.92.

Eressa angustipenna, Hmps., Cat. Lep. Phal. i. p.122.

Type in Coll. Lucas.

Q. : Nambour, Brisbane, Southport.

Gen. 4. Euchromia.

Euchromia, Hb., Verz. p.121; Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.786; Hmps., Cat. Lep. Phal. i. p.293.

Tongue well-developed. Palpi moderate, porrect, or obliquely ascending. Antennæ in both sexes with shaft slightly dilated in middle, and bipectinate, extreme apex simple. Posterior tibiæ with two pairs of short spurs. Forewings with 7, 8, 9, 10 stalked. Hindwings with 2 and 4 connate or stalked, 3 and 5 absent, 6 and 7 connate or stalked.

Type *E. sperchia*, Cram., from Africa.

An Indo-Malayan or African genus containing twenty-five known species. It is not closely allied to the preceding genera, but as Sir Geo. Hampson remarks is the only Old World genus with Neotropical affinities. The species are remarkable for the brilliant colouring of the abdomen.

1.	Wings with the spots yellow	*polymena.*
	Wings with the spots colourless	2.
2.	Abdomen with dorsum of first segment black, with metallic blue scales	*creusa.*
	Abdomen with dorsum of first segment yellowish	3.
3.	Abdomen with two blue and three crimson bands on dorsum.	*iria.*
	Abdomen with four blue and one red band on dorsum	*lurlina.*

41. Euchromia polymena.

Sphinx polymena, Linn., Syst. Nat. i. p.494.
Euchromia polymena, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.787; Hmps., Cat. Lep. Phal. i. p.297.

North Australia: one specimen in Macleay Museum, whose locality requires confirmation. Also from Celebes, Philippines, Ceylon, and India.

42. Euchromia creusa.

Sphinx creusa, Linn., Syst. Nat. i. p.494.
Sphinx thelebas, Cram., Pap. Exot. ii. pl.150D.
Sphinx irus, Stoll, Pap. Exot iv. pl.368A.
Glaucopis ganymede, Dbld., Stokes' Australia, i. p.519, pl.iii. f.3.
Euchromia irus, Meyr., Proc. Linn. Soc. N. S. Wales, 1886, p.787.
Euchromia creusa, Hmps., Cat. Lep. Phal. i. p.304.

N.Q.: Thursday Island, Cape York, Lizard Island. Mr. Rowland Turner informs me that he has taken it at Mackay. Also from New Guinea, Solomons, New Hebrides, Kei Island, Gilolo, Ceram, and Celebes.

43. Euchromia iria.

Glaucopis irius, Bdv., Voy. Astrolabe, Lep. p.192, pl.v. f.8.
Glaucopis boisduvalii, Montr., Ann. Sci. Phys. Lyon (2), viii. p.409.
Hira aruica, Wlk., Brit. Mus. Cat. xxxi. p.98.
Euchromia iria, Hmps., Cat. Lep. Phal. i. p.303.

♂. 42 mm. Differs from *E. creusa* in its smaller size, and in the abdomen being dorsally yellowish on first segment, remaining segments black with moderate metallic blue apical bands on second and third, narrow crimson bands on third, fourth, and fifth, all bands on apices of segments; ventral surface crimson, bases of segments black in centre.

N.Q.: Cape York, in May; one specimen received from Mr. Rowland Turner. Also from New Guinea, Aru, and Moluccas.

44. Euchromia lurlina.

Euchromia lurlina, Butl., Trans. Ent. Soc. 1888, p.110; Hmps., Cat. Lep. Phal. i. p.301, pl.xi. f.19.

Type in British Museum.

N.Q. : Thursday Island; but this locality requires confirmation. Also from Louisiades.

INDEX OF GENERA AND SPECIES OF SYNTOMIDÆ

(Names in Italics are Synonyms.)

A YELLOW RACE OF *BACILLUS PSEUDARABINUS*, FROM THE QUINCE.

By R. Greig Smith, D.Sc., Macleay Bacteriologist to the Society.

Upon examining the bacterial flora of some branches of the Quince, several bacteria were obtained. With one exception these did not appear to be capable of forming slime on glucose-gelatine, levulose-asparagine-tannin-agar, or upon saccharose-potato-agar—three media which generally give indications of slime-formation. The exception was a bacterium which, upon the original plates, was in the great majority. It was an organism which upon certain media, *e.g.*, saccharose-potato-agar, appeared as cocco-bacteria, while in others, such as bouillon, it was seen to be stouter and longer. Upon most media there was evidence of slime-production, and especially was this the case with levulose-asparagine-tannin-agar, upon which *Bact. acaciæ* produces so much slime. The colonies upon glucose-gelatine were suggestive of *Bac. pseudarabinus** which had been isolated from the Sugar-Cane, but as the colonies had a buff tinge on gelatine and a decided yellow colour on agar, it was probably not that organism. An examination of the gum was necessary, however, before anything could be said definitely about it.

The gum was prepared in the manner that I have frequently described. Large plates of levulose-asparagine-tannin-agar were smeared with a culture of the organism, and the slime which grew upon the agar surfaces was removed and coagulated with alcohol. The coagulum was treated with water, warmed to expel the alcohol and then heated in the autoclave at a pressure of three atmospheres. This effected a liquefaction of the gum and at the

* These Proceedings, 1904, p.453.

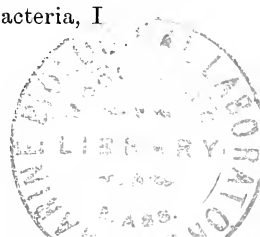
same time a separation of the gum from the bacterial cells and coagulated albuminoids. The filtered solution of the gum was precipitated with alcohol, and the process was repeated until the gum mucilage was free from reducing sugars. The gum formed a thick mucilage with water and gave the reactions for arabin with the usual reagents. During the purification, it was noted that the slime was not so easily coagulated by alcohol as arabin. The mucilage was also thicker and rather more gelatinous than the mucilage made with a similar quantity of arabin and water. So far the gum was identical with that yielded by *Bac. pseud-arabinus.*

The gum was hydrolysed by boiling with 4 % sulphuric acid for eight hours, and the neutral solution of reducing substances was treated with phenylhydrazine-acetic acid mixture on the water-bath. The crude osazone was purified and subsequently recognised by its appearance and melting point as galactosazone. No arabinosazone could be detected. The gum was therefore a galactan.

When the organism was grown side by side with *Bac. pseud-arabinus*, the cultural characters of the two bacteria were seen to be identical, excepting that the cultures of the bacterium from the Sugar-Cane were always white and that from the Quince always yellow, varying from a pale buff on gelatine to a deep yellow on potato.

The bacillus probably has nothing to do with the production of the mucilage of the Quince. I have tested Quince-mucilage, and have found that it is coagulated with most reagents and that it is not hydrolysed when boiled with 5 % sulphuric acid for eight hours. Quince-mucilage is therefore quite different from this arabin-like galactan.

One frequently finds that certain organisms, obtained from natural sources, change colour upon cultivation within a few months. For example, among the water-bacteria many which are white when isolated become yellow under cultivation, and organisms originally producing red or violet colonies lose the power of forming colour. Among the slime or gum bacteria, I



have already shown that *Bac. levaniformans* exists as white and as yellow races, and that the latter change to the former in the laboratory.

Change of colour is therefore not uncommon, but permanent differences in colour production by the same organism are not so frequently found. Perhaps the best known examples are to be found among the micrococci. The pus-forming *Micrococcus pyogenes*, (Rosenberg) Mig., is recognised as probably being a permanently white race of *Micrococcus aureus*, (Rosenberg) Mig. The white and yellow races of *Bac. pseudarabinus* were obtained as such, and they have preserved their respective colours for a year under laboratory conditions.

THE BACTERIAL ORIGIN OF MACROZAMIA GUM.

(*Bacillus macrozamiæ*, n.sp.)

By R. Greig Smith, D.Sc., Macleay Bacteriologist to the Society.

The fruit of a *Macrozamia spiralis*, in the Society's garden, was found to be exuding a transparent, colourless and gelatinous gum. The transparent globules of the dried gum swelled with water but did not dissolve, and in this respect resembled the insoluble gums of the members of the *Rosaceæ* and *Acaciæ*. A film preparation of the fresh gum showed, here and there, thin, short, rod-shaped bacteria and occasionally a *subtilis*-like cell. The swollen gum was soluble in hot dilute acid and alkali, but it dissolved much more readily in the latter than in the former.

Maiden published a paper* upon Macrozamia gum, and in it he showed that the gum consisted of metarabin (72-77 %), with a trace of arabin (1 %), besides sugar (1 %), water and ash.

Plates of glucose-gelatine media, that had been infected with the fresh gum, produced in five days small, punctiform colonies, which slowly increased in size, and appeared as small hemispherical drops of white flour-paste. Microscopically they consisted of fine granules arranged uniformly. Upon saccharose-potato-agar, the growth consisted of a white gravitating slime. The gum, obtained from the slime, gelatinised upon cooling, and was on this account somewhat similar to the natural gum, but further research showed that it was absolutely different and that the organism was *Rhizobium leguminosarum*. This micro-organism will be considered in another paper.

A portion of the stalk, attached to the fruit, was cut off, and with the usual precautions a part was inserted into molten glucose-

* Chem. and Druggist of Australasia, Jan., Feb., 1890.

gelatine which was incubated at 30° for five hours before preparing a plate. On the gelatine there developed colonies of *Bac. levaniformans.* Another portion of the same part of the plant was incubated in glucose-gelatine for two days. The molten medium was then smeared over plates of levulose-asparagine-tannin-agar, upon which a slime formed. From the slime an organism was isolated. It grew as white, nipple-shaped colonies that gave promise of containing gum.

A quantity of the slime formed by the bacterium was obtained by growing the organism upon levulose-asparagine-tannin-agar, and from the slime a gum was prepared by heating an aqueous suspension of the partially purified slime in the autoclave. A strong solution, that is a mucilage, of this gum was tested with the usual reagents, and at the same time there was also tested a mucilage of the natural gum which had been subjected to a similar treatment in the autoclave in order to bring it into a soluble condition. The results are given in the following table.

THE REACTIONS OF THE NATURAL AND THE BACTERIAL GUMS.

	Macrozamia gum.	Bacterial gum.
Basic lead acetate	+	+
Neutral lead acetate	thickened.	0
Barium hydrate	+	+
Fehling's solution	thickened.	0
Ferric chloride	0	0
Copper sulphate	0	0
Alcohol	+	+
	"+"=a clot or a precipitate; "0"=no reaction.	

If we ignore the thickening of the natural gum by the two reagents, we see that the bacterial gum has the same reactions as the natural gum. On this account there is the probability that the organism caused the formation of the natural gum, but before the two can be bracketed together as the cause and the effect, a further examination of the gum was necessary. I do not place much value upon the chemical reactions of the gum-

acids, for in several of my recent papers I have shown that gums such as arabin and galactan, which differ widely in their chemical nature, give identical chemical reactions; furthermore, an organism, *e.g.*, *Bact. pararabinum*, may, when grown at different temperatures, produce gums that differ in these reactions. But, unreliable as they are, we must utilise the reactions, because they are probably as trustworthy as any other chemical feature. The physical properties, such as the solubility and the action upon polarised light, are of no value in comparing a natural with a laboratory product. Perhaps the most reliable feature of the gums is the saccharine product of hydrolysis, for we expect that there can be no variation in the sugar or sugars of which the gum is presumably an anhydride.

The products of hydrolysis of the natural gum were examined. The gum was first of all precipitated from aqueous solution by alcohol and tested for reducing sugars. None being found, the gum-acids were hydrolised by being boiled with 5 % sulphuric acid for eight hours, and the solution, after neutralisation with barium carbonate, was tested for unaltered gum and for reducing sugars. The former test was negative, the latter positive. The osazones were precipitated, and after purification with ether were found to have the usual crystalline appearance, *i.e.*, stellate groups of yellow needles, of the ordinary osazones. In the examination of the osazone, a number of fractions were obtained. These had melting points ranging from 180° to 184° C. They could not be resolved into osazones, melting above 184°, and the impurities, which were soluble in ether and in cold water, gave a non-crystalline deposit upon evaporation.

The osazone was apparently simple, but its melting point did not coincide with or approximate to that of any of the well-known sugars excepting perhaps rhamnose. That the reducing substance was a derivative of galactose was practically certain, for, upon oxidation with dilute nitric acid, the gum yielded mucic and oxalic acids, and during hydrolysis furfural was detected. But on account of the inability to identify the gum by means of the osazone as an anhydride of a known and com-

monly occurring sugar, the investigation was deferred for about six months.

During this interval the examination of the gum from *Hakea saligna* had been undertaken, and the products of hydrolysis had been found to consist of substances that reduced Fehling's solution and that gave osazones which were not those of the sugars ordinarily obtained from the vegetable gums. Hakea gum was, therefore, not peculiar in yielding hydrolytic products which reduced Fehling's solution and at the same time gave no well-known osazone. Having gained this knowledge, I resumed the research.

The bacterial gum was subjected to investigation. The slime was grown upon the levulose medium which had been found so useful, and from it the gum was prepared in the usual manner. Upon being tested with the reagents, it was found to have altered materially. During the six months that the organism had been under cultivation in the laboratory, the physiological activity, as represented by the reactions of the typical product of the microbe, had changed. The gum now gave the reactions of arabin. Formerly, barium hydrate had produced a precipitate, and ferric chloride gave no reaction, while now the former gave no precipitate and the latter produced a brown clot. This was rather unexpected, but was a point to be taken into consideration when comparing the reactions of the natural gum with those of the bacterial product. The slight divergence of the bacterial gum, formed by the organism soon after its isolation from the plant, becomes of little moment, and the only wonder is that the reactions should have agreed so closely. This emphasises another point, which is that such tests ought to be made as soon after the isolation of the organism as is possible if they are to be of any value.

The gum, after being freed from sugars by repeated precipitation of the mucilage with alcohol, was hydrolysed by being boiled with 5 % sulphuric acid for six hours. After neutralisation with barium carbonate, the solution showed the presence of reducing sugars and the absence of unaltered gum. The osazones, ob-

tained by the gradual addition of phenylhydrazine-acetic acid mixture to the solution on the water-bath, were purified by extraction with ether and were separated into fractions by repeated treatment with hot water. The precipitates, thrown out upon cooling the several hot water solutions, melted between 180° and 184°, and these, as in the case of the natural gum, could not be resolved into portions with a higher melting point. As in the former case, and indeed in the case of all vegetable and bacterial gums, the impurity was a non-crystalline tarry substance with a melting point near that of boiling water. Like the natural gum, the bacterial gum yielded mucic and oxalic acids upon oxidation with dilute nitric acid and furfural during hydrolysis.

The bacterial and the natural gums thus gave the same sugar-like body upon hydrolysis, and in view of all the facts there can be no doubt that the bacterium was the producer of the gum exuded from the plant. It appears to be new, and I propose to name it *Bacillus macrozamiæ*.

BACILLUS MACROZAMIÆ, n.sp.

Shape, etc.—The cells vary in size according to the medium in which they are growing. On nutrient agar they appear as cocco-bacteria and as short rods varying from 0·4-0·5 : 1μ. On saccharose-potato-agar they are short rods measuring 0·4 : 0·9-1·2μ, but as a rule are 1μ long. In bouillon they are very variable, ranging from small bacteria 0·4 : 0·7μ to comparatively large cells 0·8 : 2·2μ; in this media thread forms are common, and capsules are sometimes distinct. The cells are motile, and are, as a rule, vacuolated. The motility is due to the presence of numerous peritrichous flagella. Staining by the Gram method is negative.

Relation to temperature, etc.—Slime is formed readily at ordinary temperatures. There is practically no growth under the anaërobic conditions that prevail under the mica-sheet in plate cultivation.

Glucose-gelatine plate.—The colonies grow readily. They appear white and moist-glistening with a raised centre and an indefinite margin. The nipple-shape was not so pronounced

when the cultural characters were examined as when the organism was isolated. Microscopically, the colony consists of a central grey-brown and rather opaque area and a transparent margin. The outer portions of the central area are sometimes mottled and sometimes consist of radiating filaments. The transparent margin has a lacerate-erose edge which becomes smooth, while the broad zonate margin becomes tinged with brown and translucent. The deep colonies are rounded and opaque.

Nutrient agar plate.—The colonies are circular, raised, glistening and translucent white. A zonate or slightly nipple-shaped appearance is given by the centre being raised above and whiter than the broad margin. Microscopically, the colonies are brownish and circular, with a darker brown granular centre. Occasionally the central granules are placed radially. The deep colonies are rounded or lenticular and either wholly granular or with a granular centre.

Glucose-gelatine stroke.—The growth is narrow, raised, white-glistening, and has an erose margin that becomes lobular. The stroke remains narrow and the medium is not liquefied.

Glucose-gelatine stab.—The needle-track develops a rough, white growth. The nail-head spreads out as a thin, slightly undulating, white film with a lacerate-erose margin. It becomes flat, smooth and slightly depressed, but the medium shows no signs of liquefaction. Gas-bubbles are produced in the gelatine.

Nutrient agar stroke.—A broad, raised, translucent white growth with a slightly erose margin and spreading base is formed. The condensed water carries a film.

Saccharose-potato-agar.—A raised white slime is produced and the medium is cleft in all directions from the formation of gas.

Potato.—A dry, dirty-white, flat, glistening growth is formed and the medium is darkened locally.

Bouillon.—The medium becomes turbid and carries floating, broken films. The sediment is loose. The indol reaction is obtained and nitrates are reduced to nitrites.

Milk.—The medium appears to thicken, and the reaction becomes strongly acid to litmus-paper.

ON A NEW SPECIES OF *RHIZOPHYLLUM*, FROM THE UPPER SILURIAN ROCKS OF YASS, N.S.W.

By A. J. Shearsby.

(Communicated by Fred. Turner, F.L.S., &c.)

(Plate xxvi.*)

Rhizophyllum yassense, sp.nov.

The well-known Silurian deposits of the Yass district have been responsible for many forms of fossils new to science; and although the district has been under observation for many years, it is far from being overworked, and would well repay a more detailed geological inspection than it has hitherto received. Among the most interesting corals to be found in this district are the Calceola-like operculate rugose corals, *Rhizophyllum interpunctatum*, De Kon., and *R. australe*, Eth. fil. Both of these forms have been fully described by Mr. R. Etheridge, Junr., in the "Records of the Australian Museum" (Vol. 1, No. 10, Dec., 1891). I have now to record another form of *Rhizophyllum* which I found in Derrengullen Creek between Yass and Bowning, which differs in so many respects from the above-mentioned forms, that I feel justified in referring it to a new species.

The following is a description of this new form:—

Corallum simple, pyramidal, short, widely expanded above, obtusely pointed below, lateral angles rounded and obtuse, section suboval plano-convex; dorsal surface convex; ventral surface flat transversely, but longitudinally the lower two-thirds are flat, and the upper one-third curved inwards towards the calice. Calice of a distinct crescentic shape, deep, extending to a depth of about one-half the height of the corallum, and possessing a well-marked subcentral depression; dorsal margin sharp and

* The Plate lettered Pl. xxvii. should have been Pl. xxvi.

moderately thin, horizontal, with no signs of cardinal septum; ventral margin thick at the centre, but tapering towards the lateral angles, with a fossula on the inner side; a slight depression externally showing the probable position of the counter septum; the septa are present in the form of crenulations. A thick well-marked laminar epitheca covers both dorsal and ventral surfaces. The remains of a few exothecal processes or anchoring stolons are visible on the ventral surface near the lateral angles. The internal structure is vesicular, the vesicles showing faintly at the weathered fractured apex; these vesicles were rendered more distinct by grinding and polishing the apex.

The measurements of the specimen are as follows :—Length of the corallum $\frac{3}{4}$ inch; greatest width across the calice $1\frac{9}{16}$; greatest thickness $\frac{3}{4}$ inch.

Locality and horizon.—Shales in Derrengullen Creek at the junction with Limestone Creek, near Yass; Upper Silurian, probably Wenlock; Coll. A. J. Shearsby.

I propose to call this interesting coral *Rhizophyllum yassense.*

EXPLANATION OF PLATE.

Rhizophyllum yassense, A. J. Shearsby.

Fig. 1.—Dorsal view.

Fig. 2.—Ventral view.

Fig. 3.—Lateral view.

Fig. 4.—View of calice, showing crescentic shape, the thick inturned ventral margin with fossula, the subcentral depression, and the crenulations.

Fig. 5.—Dorsal view showing calice and fossula.

Fig. 6.—View of apex.

Fig. 7.—Weathered section of apex, showing vesicular tissue ($\times 2$).

Note.—Figs. 1 to 6 are drawn natural size. Fig. 7 is twice natural size.

NOTES AND EXHIBITS.

Mr. Froggatt exhibited specimens of the larvæ of the Sheep Nasal or Bot-fly (*Œstrus ovis*, L.) taken from the heads of sheep killed at Megalong last month. Reports have come in from several places on the Blue Mountains showing that this pest has been infesting the sheep of late. Also, two very handsome undetermined grasshoppers (Fam. *Locustidæ*) from Mt. Magnet, Murchison, W.A., lately received from Mr. Mansbridge.

Dr. Chapman exhibited a sample of pure pancreatic juice (saturated with sodium fluoride to preserve it). It was collected through a glass canula inserted into the larger pancreatic duct of a dog. The secretion of juice was excited by the injection into the right jugular vein of 43 c.c. of an extract of the mucous membrane of the intestine of *Echidna hystrix* made with 0·4 % hydrochloric acid. Secretion occurred at the rate of seven drops per minute after a latent period of 90 seconds, and continued for 10 minutes. It then lessened and became slower, ceasing in about 50 minutes. The juice acts upon starches and fats, and therefore contains amylopsin and steapsin. It has no action upon proteids, and thus contains no trypsin. After treatment with enterokinase, it acts energetically upon proteids, since the contained trypsinogen is thereby converted to trypsin. The specimen demonstrates the occurrence of a "secretin" in the mucosa of the intestine of the Echidna; and mention may be here made of similar bodies in the Wallaby, Ibis, and Australian Water-tortoise.

Mr. Jensen exhibited a series of slides of Foraminifera under the microscope, in illustration of his paper.

Dr. Greig Smith, in illustration of his papers, showed cultures and products of the Bacilli procured from the Quince and from

Macrozamia. Also cultures of the mould of Mouse-Favus from the mice from Tamworth, N.S.W., exhibited at last Meeting.

Mr. Petrie exhibited, and offered some remarks upon, samples of kerosene shale and of the natural oil extracted therefrom, the latter being of interest in connection with Bertrand's theory of the algal origin of the shale.

Mr. Brazier exhibited a large miscellaneous collection of objects from New Caledonia, comprising various crustaceans, arachnids (including *Araneus edulis*, *Heteropoda venatoria*, Linn., and *Nephila maculata*, Fabr.), myriapods, dragon-flies, Cicadas, Coleoptera destructive to mangoes and oranges, Hymenoptera and their nests, Mollusca (including the rare *Neritopsis radula*, with operculum; the rare *Pedicularia elegantissima*, Desh., from Lifou, Loyalty Islands, a new record; a sinistral variety of *Placostylus fibratus*, and a dextral distorted form from Mare, Loyalty Islands; *P. Bondeensis*, distorted at the suture above the aperture; a fine series of *Leucocharus porphyrochila* from Houailou, Central Chain of Mountains; a fine series of *Cypræa Bregeriana;* a series of the representatives of 200 species of small molluscs, in tubes, from Lifou, Loyalty Islands; an assortment of pearls; and some very large mother-of-pearl shells (*Meleagrina*), carved and etched); together with geological and botanical specimens.

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Bureau of Animal Industry. Bulletin, Nos.29, 31, 39, Pts. 4-6, 45-47, Pts.1-3, 49, 51, 53, 55, 57 (1901-04): Circular, Nos.41-42(1903): Nineteenth Annual Report for the Year 1902(1903): One Separate, "Duration of the Life of the Tubercle Bacillus in Cheese." By F. C. Harrison.

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BAILEY, F. M., F.L.S., Brisbane—Two Botanical Separates: "Contributions to the Queensland Flora" (Queensland Agricultural Journal, October, 1903, and January, 1904)—Botany Bulletin. No.xvi.(1903)—Pamphlet: "Contributions to the Flora of British New Guinea" (n.d.).

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Paris et sa Banlieue. iv. Le Chemin de Fer de Paris à Orleans," &c. (C.R. Association Française p. l'Avancement des Sciences, 1903).

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SMITH, R. GREIG, D.Sc., Sydney—One Separate: "Bacterial Origin of the Vegetable Gums," Part i. (Journ. Soc Chem. Ind. Sydney, N.S.W., Section (1904); and one Abstract (Central. für Bact. xi., 1904).

WATERS, A. W., Davos Dorf—One Separate: "Bryozoa du Voyage du S. Y. Belgica en 1897-99" (Expédition Antarctique Belge. 4to. Anvers, 1904).

CORRIGENDA.

Page 122, line 6—for *A. sphaerelloides* read *G. sphaerelloides*.
Page 239, line 25—for *Bact. leraniformans* read *Bac. leraniformans*.
Page 239, line 34—for *Bact. pseudarabinum* read *Bac. pseudarabinus*.
Page 491, line 38—for *B. gayndahensis* read *B. gayndahense*.
Page 549, line 25—for ACHRYANTHES read ACHYRANTHES.
Page 555, line 31—for *Achryanthes* read *Achyranthes*.
Page 613, line 30 *after* id., *insert* Fabr.
Page 615, line 4—*after* (White) *add* Penang.
Page 623, line 21
Page 633, line 7
Page 645, line 21
Page 648, line 31
} *for* 1851 *read* 1850.
Page 639, line 28—*add* Queensland.
Page 649, line 12
Page 650, lines 9 and 28
} *for* 1851 *read* 1850.
Page 708—The lowest seta in fig. 1 should have been drawn as projecting to the left.
Page 797, last line—*for* (While Pine) *read* (White Pine).
Page 801, line 14—for *albocericea* read *albosericea*.
Page 814, line 34
Page 817, line 19
Page 825, line 6
} *for* T. UNGUERIANA *read* T. UNGERIANA.
Page 818, line 3
Page 823, line 13
Page 827, line 24
} for *Miliolina* read *Miliolinae*.
Page 822, lines 22-23—for *alveoliformis* read *alveoliniformis*.
Page 822, line 26—for *Gonotosphaera* read *Gonatosphaera*.
Plate xix., Fig. 3—*read*: 1, the front; 2, the clypeus; 3, the rostrum; 4, the eyes.
Fig. 7—The dilatation representing the first apical area in the figure is the end of the postcostal space; the transverse vein separating it from that space should be erased.

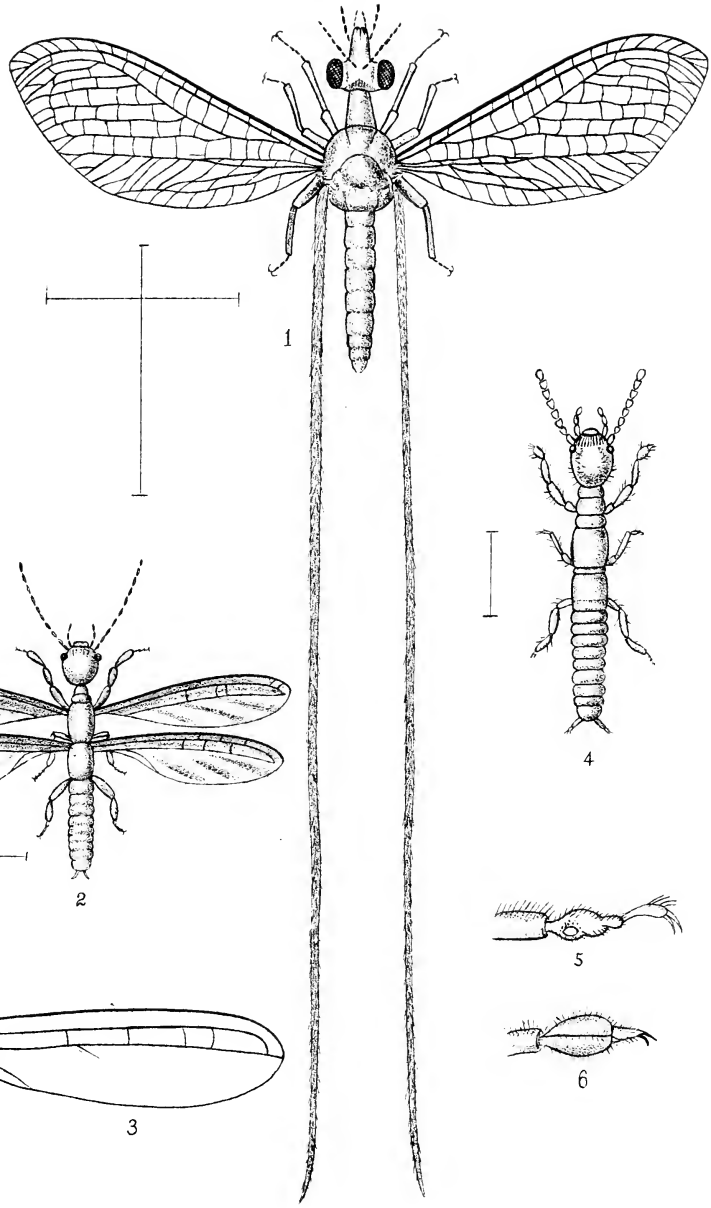
[Printed off April 5th, 1905.]

INDEX.

(1904.)

Names in Italics are Synonyms.

Note.—Pp.147-181 are indexed by Nat. Orders only. The Papers of Mr. Meyrick, "Descriptions of Australian Micro-Lepidoptera" (pp.255-441), Dr. Goding and Mr. Froggatt, "Monograph of the Australian Cicadidæ" (pp.561-668), and Dr. A. J. Turner, "Revision of Australian Lepidoptera [Syntomidæ] ii." (pp.832-859) are not taken into account in the following index; a special index will be found at the end of each of them.



F. del.

Fig. 1, CROCE ATTENUATA. Figs. 2-3, OLIGOTOMA GURNEYI.
Figs. 4-6, O. AGILIS.

MAP
showing distribution of
ABORIGINAL TRIBES
IN
NORTHERN NEW SOUTH WALES
AND
SOUTHERN QUEENSLAND

CASUARINA CUNNINGHAMIANA, MIQ. (RIVER OAK).

4.

3.

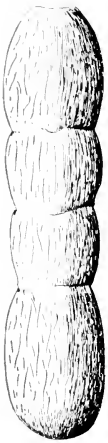
2

1.

6.

b.

7 a



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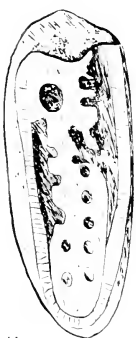

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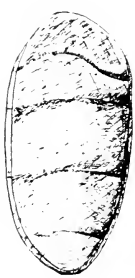
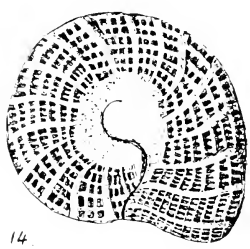


13.

a 12 b

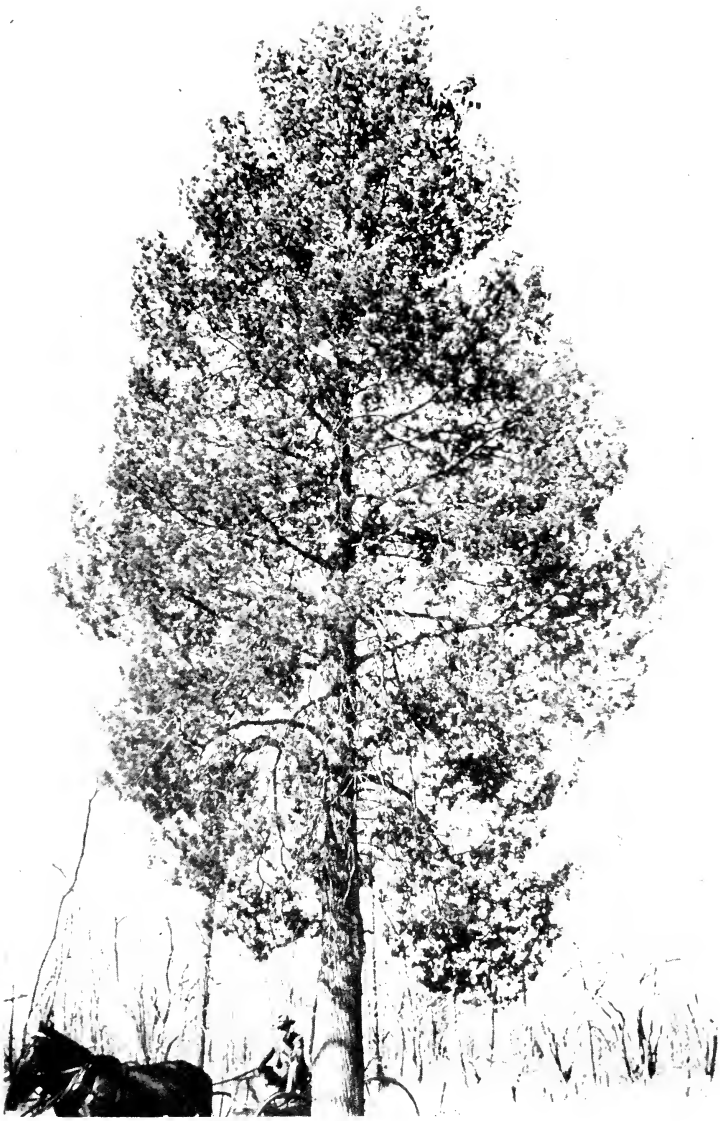


14

H. J. Jensen. del.

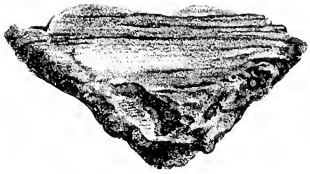
AUSTRALIAN FORAMINIFERA.

CALLITRIS CALCARATA, R.BR. (BLACK PINE).



CALLITRIS ROBUSTA, R.BR. (WHITE PINE).

1



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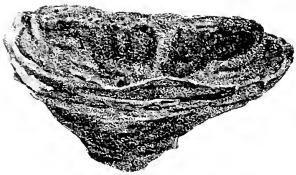

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Issued August 10th, 1904.

Vol. XXIX.
Part 1.

No. 113.

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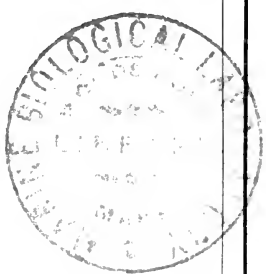

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Note.—Attention is called to the following Corrigenda in Mr. Andrews' paper "Notes on the Geography of the Blue Mountains and Sydney District" in Part 4 of the Proceedings for 1903.

Page 790, line 11—*for* loss *read* loads.
Page 810, line 2—*for* coastal *read* crustal.
Plate xxxix., fig. 1—*for* Tertiary Sandstone *read* Triassic Sandstone.

Issued December 16th, 1904.

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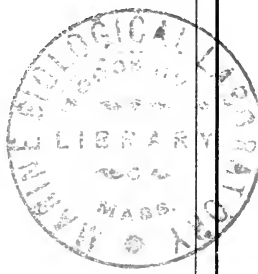

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POSTSCRIPT (*added 25 : xi. : 04*).—While this paper has been passing through the press, two papers have appeared, written by Mr. Distant, containing descriptions of two new Australian species :—

Macrotristria nigrosignata, Dist., Trans. Ent. Soc. Lond. 1904, p. 673, pl. 29, fig. 7.—*Hab.* Cossack, W.A.

Henicopsaltria pygmæa, Dist., Ann. Mag. Nat. Hist. (7), 1904, p. 303. —*Hab.* S.W. Australia.

(Concluded on p. 2 of cover.)

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