ART. II.—*Further Coccid Notes: with Description of New Species from New Zealand, Australia, Sandwich Islands, and elsewhere, and Remarks upon many Species already reported.*

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Plates I.–VII.

I FIND it necessary to make some remarks concerning the principle upon which I have acted for several years with regard to the erection of new species, the comparison of varieties, or the identification of species already known; because, in the course of correspondence with different other students of Coccids, as well as in their published writings, it seems that they accept canons of procedure which do not recommend themselves to me as sufficient. In the first place, I may say that the bent of my inclination is towards the restriction of the number of species rather than towards their extension. Looking upon classification as a means to an end, I consider that the very first, and probably only, requisites for it are clearness and convenience. For this reason, neither the fancied claims of priority, nor the desire to uphold some preconceived theory, nor even the wish to be the publisher to the world of some new-thing, ought to weigh with us at all. Personally, I disclaim any position but that which some people nowadays affect to despise—the position of a classifier, the laying-down of a stratum of facts upon which, some day, when we really do reach the stage of being able to say we know something, theories and doctrines may be built up. Therefore my aim is first at clearness and convenience; and with this object a careful avoidance of needless subdivision seems necessary. It is better, when a specimen is observed, to see how closely it approaches to some known form than to search for points upon which it may be separated—better to look upon a few distinguishable features, if possible, as only variable characters (making the specimen a "variety") than to cumber science with a new "species" as if these features were of real organic importance. I know, and every student of Coccids knows, that external appearance of an insect may alter frequently, from being cramped for room or from having much free space: therefore I would lay small stress upon mere *size*. Take the genus *Lecanium:* there are a number of so-called species which have been set up by different authors almost, if not quite, entirely on account of their varying size: climate,

food-plant, conditions of life, are in this case ignored. Again, we all know how deceptive a thing colour is: what is green to one man may be blue or red to another. Ornithologists and lepidopterists have invented thousands of new "species" on account of some different colour in a feather or in a wing-spot. But many cases are known in Coccid study where, even on the same twig, amongst perhaps a hundred individuals, five different "species" could be so made because there may be five variations in colour. Again, in the case of climate and food-plant: if we were to imagine that an insect in a tropical country on, say, a palm, must necessarily be for that reason a different species from one in a temperate country on a *Fagus*, it would be the simplest thing in the world to bring up the number of Coccid species to that of the Hymenoptera, ransacking every dictionary in every language to find names for them. A friend of mine once wrote that he could not agree to make two *Planchoniæ* identical "because they lived on such widely-separated orders of plants as *Coronilla* and *Bambusa*." But there are dozens of Coccids which are multivorous if not omnivorous: for example—*Aspidiotus nerii*, *A. aurantii*, *Mytilaspis pomorum*, *Ctenochiton viridis*, *Lecanium hesperidum*, *Planchonia fimbriata*, several *Dactylopii*, *Icerya purchasi*, &c. You cannot predicate that an insect living on one plant will not live equally well on another, or in another locality. Taking, therefore, these four points—size, colour, locality or climate, and food-plant—I would very seriously deprecate the notion that any of them (I will go so far as to say that all of them) should be sufficient to induce the erection of a new species. Convenience demands that they should be all mentioned in a description, as a guide to other students or as information to the public, so that anybody could know where at least to search for particular insects. Beyond that I look on them as of little or no value.

The following pages contain notes concerning many species already reported from various parts of the world, and also descriptions of more than twenty insects which, after full consideration, seem to be new. Some, such as the Australian form of *Eriococcus buxi*, or the Sandwich Island form of *Chionaspis biclavis*, I have set down as merely varieties of the original types. The others, although seeming to be quite distinct, do not present such extraordinary and interesting features as those reported in my former papers. But the discovery in Australia of representatives of the genus *Ctenochiton* (hitherto confined to New Zealand) seems to be not entirely unimportant in its bearing on the distribution of animal forms and the connection between the two countries.

With regard to *Ceronema*, the new genus which I am here proposing to establish, it may be remarked that, whilst the

secretion of all Coccids appears to be chemically the same, yet it is sometimes convenient to employ for separation the solidity or the loose texture of the resulting covering. The "wax" of *Ceroplastes*, the cotton of *Dactylopius*, and the fibrous (as it seems at first sight) puparium of *Mytilaspis*, can all, when microscopically examined, be found to be really similar in their essential character. Still, it is convenient to distinguish (for example) *Lichtensia* from *Pulvinaria*, or *Ctenochiton* from *Inglisia*, to some extent by the form, position, or structure of the secretion. I say "to some extent" because if possible the main distinction of a genus or a species ought to rest upon an organic character of the insect itself rather than upon its external covering. *Ceronema* differs from *Ceroplastes* and *Ctenochiton* in the loose texture of the test, and from the latter also in the absence of a fringe; but the secreting pores of the insect itself (in the species known so far) also differ from those of any other Lecaniodiaspid.

The species herein named *Prosopophora prosopidis* is close enough to *P. dendrobii* Douglas to be perhaps hereafter considered as only a variety; but for reasons given in its description I leave it for the present as distinct.

It appears from the synoptical list published in this volume that I am responsible for more than two hundred new species and varieties of Coccids reported from Australasia and the Pacific, besides a large number originally named by other writers and mentioned in my papers. I am sure that future years will produce a very much longer list, for the study of these insects is even yet only in its infancy; but there will be, I hope, no need for any one to make any important or subversive corrections in the work which has been so far accomplished.

Sub-family DIASPIDINÆ.

Genus Aspidiotus.

Aspidiotus cladii, Maskell. N.Z. Trans., vol. xxiii., 1890, p. 3; vol. xxv., 1892, p. 205; vol. xxvi., 1893, p. 67.

The first specimens of this species which have come to me from New South Wales have been sent by Mr. Froggatt, on a sedge, *Xerotes* sp., from Manly, near Sydney. I see no difference between them and the type. The species would thus appear to be found in all parts of Australia.

Aspidiotus longispina, Morgan. Ent. Mo. Mag., Aug., 1889, p. 352.

I have received specimens which, although there are slight differences in the puparium, I cannot separate from Mr. Morgan's species, on "China orange," mango, and other plants in the Sandwich Islands, sent by Mr. Koebele. The charac-

teristic long hairs of the abdominal extremity, partly simple and partly serrated, and the single pair of lobes, are so clear that the identity is manifest. I think, however, that there are six of the long simple hairs on each side, and not four as given by Mr. Morgan.

A minute, bright-red mite (seemingly Gamasid) was very active and numerous amongst these Sandwich Island specimens; and I found many of the *Aspidioti* which appeared to have been partly devoured, whether by this or some other parasite I could not determine.

Aspidiotus camelliæ, Boisduval. *A. rapax,* Comstock.

This insect is still very prevalent in New Zealand on many plants. It has lately attacked *Diosma* in the gardens near Wellington. I have also had specimens sent to me by Mr. Froggatt, from Sydney, on *Melaleuca nodosa,* and by Mr. French, from Melbourne, on *Rhododendron.* The species seems to be omnivorous, and bids fair to be cosmopolitan.

Aspidiotus ficûs (Riley), Comstock. Comstock, Ent. Rep. U.S. Agric. Dept., 1880, p. 296.

This species, which in North America appears to be an injurious pest on orange-trees, has been sent to me during the last year from New South Wales (by Mr. Froggatt) and from Queensland (by Mr. Koebele). The characters by which *A. subrubescens* mihi (1891) differs from it will be found in vol. xxiv. of our Transactions, p. 9. The Australian plants on which my specimens of *A. ficûs* came were not named by the senders; but I imagine them to be various kinds of *Citrus.*

Aspidiotus ceratus, sp. nov. Plate I., fig. 1.

Female puparium snowy-white, circular, convex; diameter about $\frac{1}{22}$in. when separate; but numbers of puparia are usually so massed together that measurement is difficult. Texture solid and waxy; the two pellicles are central and of a faint yellow tinge, covered by a scale of white wax.

Male puparium white, smaller, and more elongated than that of the female.

Adult female orange-coloured, pegtop-shaped; length about $\frac{1}{80}$in. Abdomen ending in two adjacent lobes with rounded emarginate ends; above them are two club-shaped organs. The abdominal margin is serratulate and bears some short spines: of these spines, one on each side, not far from the lobes, is widely forked. No groups of spinnerets.

Adult male unknown.

Hab. In Australia, on *Acacia stenophylla.* Mr. French sent me specimens from the banks of the Murray River, in South Australia.

This species may be distinguished by the white waxy puparia, and by the large forked spines on the abdominal margin.

Aspidiotus vitiensis, sp. nov. Plate I., fig. 2.

Female puparium greyish-white as a rule, but varying somewhat in colour according to the bark of the tree; form probably nearly circular, but so many are usually massed together that it is difficult to make out the outline; slightly convex. Diameter probably about $\frac{1}{25}$in. Pellicles subcentral, yellow.

Male puparium similar in colour to that of the female, but smaller and more elliptical. Length about $\frac{1}{40}$in.

Adult female brown, pegtop-shaped: length about $\frac{1}{16}$in. Abdomen ending in two large median triangular lobes with serrated sides, not adjoining: on each side is a small cylindrical lobe, followed by a forked spine, and, after an interval, two smaller conical lobes and another forked spine: the abdominal margin bears also a few other spines. Four groups of spinnerets: upper groups 6–10 orifices, lower groups about 15.

Hab. In Fiji, on "several different forest-trees." My specimens were sent by Mr. Koebele.

Aspidiotus unilobis, sp. nov. Plate I., fig. 3.

Female puparium really whitish, but generally covered by so much dense black fungus that it seems black, and is very difficult to distinguish. Form circular, slightly convex; pellicles orange, central, forming a minute boss. Diameter about $\frac{1}{20}$in.

Male puparium white, elongated, not carinated. Length about $\frac{1}{25}$in.

Adult female dark-orange, pegtop-shaped; length about $\frac{1}{30}$in. Abdomen ending in one single median dome-shaped lobe, on each side of which are a few fine hairs. No groups of spinnerets. The margin of the abdomen is finely striated and minutely crenulated.

Adult male unknown.

Hab. In Australia, on *Acacia* sp. (tea-tree), Mount Victoria, New South Wales.

The single median lobe sufficiently distinguishes this species. A similar character is seen in *Chionaspis quercûs,* Comstock.

Aspidiotus aurantii, Maskell.

I am constantly receiving specimens of this insect from many widely-separated localities, and on many different trees. It is not at all confined to the orange, and is, seemingly, ubiquitous in warm temperate countries. The colour varies a little, and lately I have had some from Honolulu, on a species

of *Podocarpus* from Japan, which are of a good deal deeper red than the type.

In the United States "Agricultural Bulletin," No. 23, 1891, Mr. Coquillett mentions, under the name of "the yellow scale, *Aspidiotus citrinus*," a form which, from careful examination of specimens sent to me by Mr. Ehrhorn, of Santa Clara County, California, I find are clearly only *A. aurantii*. Mr. Ehrhorn informs me that he and Professor Comstock and several others have come to the same conclusion. I am sorry that a distinction founded on so slight a character as mere colour should be so often suggested. No scientific description of this form has yet appeared, that I know of.

Aspidiotus extensus, sp. nov. Plate I., figs. 4, 5.

Female puparium of a dull dirty-yellow or brown colour, frequently obscured by black fungus, subcircular, convex, and usually somewhat conical; diameter, about $\frac{1}{12}$in. at full development. The larval pellicle is black, situated at the apex of the cone; the second pellicle is very inconspicuous, and it is difficult to make out its dimensions, but close examination shows that it occupies about half the puparium. The surface of the puparium is finely striated.

Male puparium subcircular, of a grey or bluish-grey colour, rather convex, but less so than that of the female. The pellicle is less black than in the female, and is not placed centrally. Diameter of puparium about $\frac{1}{20}$in.

In all the specimens seen the female puparia were on the twigs, the male puparia on the leaves.

Adult female dark-brown, pegtop-shaped, with a distinct prolongation of the abdominal region, by which the abdominal margin is slightly concave. The size varies: specimens seen range in length from $\frac{1}{30}$in. to $\frac{1}{14}$in. The prolongation of the abdomen bears two median lobes, set so closely together as to look like one, their outer margins sloping, and minutely serratulate; beyond these the abdominal margin is irregular, and bears some rather strong spines and cylindrical processes blunt at the tips, and there is a longish spiny hair at the innermost point of the concavity of the margin. There are no groups of spinnerets.

Adult male dark-brown; form rather stout and thick; length (exclusive of spike) about $\frac{1}{35}$in.; the spike is about as long as the abdomen. Antennæ and feet normal. There seem to be two dorsal eyes, two ventral, and two ocelli; but my specimens are not clear as to these.

Hab. In Australia, on *Eucalyptus capitellata*. My specimens were sent by Mr. Froggatt, from Bankstown, near Sydney; and I have also two, which seem to be quite similar, on the same plant from Victoria, sent by Mr. French.

I was for a long time in doubt whether this very distinct species ought not to belong rather to the genus *Aonidia* than to *Aspidiotus*, because I could not detect the limits of the second pellicle in the female puparium. The inside of the puparium is quite dark-coloured, and if the pellicle extended to, or nearly to, the margin it would be much larger than the adult female, and would thus indicate *Aonidia*. I believe, however, that it is rightly placed in *Aspidiotus*. The concavity of the abdomen is a feature noticeable also in *A. articulatus*, Morgan; but in that species there are several terminal lobes, and also a clear groove separating the thoracic from the abdominal region. The concavity in *A. extensus* is, in fact, so near to the posterior extremity that there seems to be almost a "tail."

The separation of the male from the female puparia (the former on the leaves, the latter on the twigs) is not a very common occurrence among Coccids, but it is fairly frequent. I have mentioned it myself in *Fiorinia asteliæ*, *Lecanium baccatum*, &c., and Mr. Newstead has observed it in *Aspidiotus zonatus* (Ent. Mo. Mag., Dec., 1893, p. 279) and others. I have some twigs of *Acacia linifolia*, from Hornsby, New South Wales, on which are great numbers of puparia, seemingly all males of some Diaspid, but I cannot detect any females amongst them.

Aspidiotus extensus seems to be certainly a distinct and new species.

Genus Aonidia, Targioni-Tozzetti.

Signoret (Ann. de la Soc. Entom. de France, March, 1868) states that this genus was established by Targioni to suit a species which had till then been known as "*Coccus aonidum*," Linn. The characters distinguishing it are—1st, "two shields superimposed" (I confess that I do not understand the meaning of this phrase); 2nd, "a larval pellicle occupying the centre of the puparium, and a second pellicle occupying the whole of it." If, by two superimposed shields, Targioni means that the larval pellicle overlies the second, then there is nothing in that to distinguish it from *Aspidiotus;* but the other character, of an abnormally large second pellicle, is a valid one, and, as I remarked in vol. xxiv. of our Transactions, 1891, p. 13, it places *Aonidia* in a similar relation to the other genera with round puparia to that which is occupied by *Fiorinia* in relation to those with elongated puparia.

It would appear from Signoret that, although the insect *Coccus aonidum* has given a base for the genus *Aonidia*, yet there is much doubt as to what it really was. Linnæus himself in his description compares it with *Lecanium hesperidum*, and Olivier (1791) repeats this, and says that it resembles "the

scale of the orange" (which I take to mean also *L. hesperidum*); but Targioni refers the insect to *Aspidiotus lauri*, Bouché, which he first renamed *Aonidia purpurea*, and afterwards *Aonidia lauri*. However, in spite of this confusion and uncertainty, I think that it is quite convenient to accept the genus *Aonidia* on the main, and indeed sole, ground of the comparative size of the second pellicle.

No species of the genus has, I think, been described from 1868 till now; but Mr. Green has an insect in Ceylon which clearly belongs to it, and which he proposes to name *Aonidia corniger*; and I attach to the genus the Australian species which I am now about to describe.

Aonidia fusca, sp. nov. Plate I., figs. 6–9.

Female puparium regularly circular, very dark-brown or dull-black; slightly convex; diameter about $\frac{1}{35}$in. The larval pellicle is very small, central: the second pellicle occupies nearly all the puparium, but is not to be made out until the puparium is overturned; it is larger than the adult female, and also more elongated. Dorsally the whole puparium appears black; but when overturned the second pellicle is seen to be yellow, being covered with a coating of black secretion. The margin of the puparium extends only a small distance beyond the pellicle all round; the pellicle has thus a length of about $\frac{1}{40}$in.

Male puparium, dirty yellowish-grey, irregularly elliptical, the pellicle situated near one end; slightly convex. Length about $\frac{1}{30}$in., being thus larger than that of the female.

Adult female regularly pegtop-shaped, orange-yellow; length about $\frac{1}{65}$in., being therefore much smaller than the second pellicle. Abdomen ending in four lobes, of which the two median are the largest, and are rounded, with a small indentation on the outer margin; they are closely adjacent, and are separated from the two smaller lobes by a narrow rounded incision of the margin. Beyond the lobes are a few short fine hairs. There are no groups of spinnerets, but many small circular scattered single ones.

Adult male unknown. I possess a mounted specimen of a pupa in the puparium, presenting no special features.

Hab. In Australia, on peach (*Persica vulgaris*). Mr. French sent me the specimens, stating that they came from the garden of Mr. Benson, Bulga, New South Wales. I cannot discover any description of a Diaspid attacking peach-trees in Europe or America which answers to this insect. It is not *Aspidiotus niger*, Signoret; and for the present I must consider that it has migrated to Mr. Benson's fruit-trees from some native plants in the vicinity. In "Insect Life," May, 1894, there is a description of *Diaspis lanata*, Morgan and

Cockerell, found on peach-trees in America, and a new importation there. [For reasons unknown to me, the specific name of this insect is given by both Mr. Cockerell and "Insect Life" as "*lanatus*"; but *Diaspis* is surely feminine.] This is entirely different from *Aonidia fusca*; the form of the male puparium and the spinneret-groups of the female are sufficient distinctions.

Genus Diaspis, Costa.

Diaspis pinnulifera, Maskell. N.Z. Trans., 1890, p. 4; 1892, p. 208.

In the "Canadian Entomologist," 1894, p. 127, Mr. T. D. Cockerell observes that the "female of *D. pinnulifera* presents an extraordinary resemblance to *Aspidiotus dictyospermi*, Morgan (Ent. Mo. Mag., August, 1889, p. 352), but the form of the male scale will at once separate it from any *Aspidiotus*."

The only three references to *A. dictyospermi* which I can find are those of Mr. Morgan and Mr. Cockerell just mentioned, and one by Mr. Newstead (Ent. Mo. Mag., August, 1893, p. 185). The two first make no definite mention of the male scale; but the last says, "Scale of the male of the same colour and has the same structure at apex as the female." It is presumable therefore that in *A. dictyospermi* the male puparium is "greyish-white" (Morgan), or "reddish or orange-brown" (Cockerell). But that of *D. pinnulifera* is quite clearly pure-white, and it is not at all like an *Aspidiotus* male, being cylindrical and carinated as in *Diaspis rosæ*, or even as in many species of *Chionaspis*. (See also *D. amygdali*, below.)

According to Mr. Morgan, the two "long plates" on each side of the female abdomen are "serrated" in *A. dictyospermi*. I cannot detect any serrations in the "feathery processes" of *D. pinnulifera*.

Diaspis boisduvalii, Signoret.

Occurs at Adelaide, on hothouse orchids (*Cattleya* and *Dendrobium*). My specimens are from Mr. J. Quinn, Secretary to the South Australian Gardeners' Society. I have already reported it on similar plants in New Zealand; and Mr. Koebele has sent me a leaf of orchid from Honolulu infested rather badly by this insect.

Diaspis amygdali, Tryon. *Diaspis lanata,* Morgan and Cockerell.

I have received from Mr. Koebele a twig of peach-tree from Sydney, and another of the same tree from Brisbane, on both of which are a number of insects, which are certainly of the genus Diaspis; and close examination shows that they are

identical with *D. amygdali*, Tryon ("Report on Insect and Fungus Pests, Queensland," 1889, p. 89). I have very carefully compared these specimens with those of *D. lanata* which were sent to me several months ago by Mr. Cockerell, and with the description and figures of the same insect given in "Insect Life," May, 1894. As the result, I am able to say that in all essential or important characters the two are identical. I have not been able to distinguish the two dorsal "distinct impressed subdorsal lines" mentioned in "Insect Life," nor am I quite clear as to the meaning of the term; and in some of my Australian specimens, though not in all, the median terminal lobes are not as distinctly incised on their margins as in the figure (No. 14) on page 292 of the same work. On the other hand, there are rather more orifices, sometimes, in the two posterior lateral spinneret-groups than in those described by either author; for two specimens observed show thirty-eight orifices in these groups. There is a character mentioned in the descriptions of *D. lanata*—"scale covered with a thin layer of the outer skin of the bark"—which is clearly visible in my Australian specimens, although it is not there as conspicuous as on my specimens of *D. lanata*, probably because these are on *Capsicum*, which seems to have a thicker skin than *Peach:* however, there is no difficulty in recognising it. All the differences which I have just mentioned are of very slight, indeed of no, importance. The male puparium is quite identical.

Mr. Tryon published his report, including a description of *D. amygdali*, in 1889. The description of *D. lanata* appeared in 1892 (I have already remarked, *ante*, on the error of gender in the specific name). The latter must consequently give way to the former.

The common peach is not a native of Australia, and *D. amygdali*, which seems not to occur in that country on any other plant, must be an importation from elsewhere. The authors of "Insect Life" think that it is a West Indian species, and that it has spread from the islands to California, Georgia, and as far north as Washington. If one might judge from the ordinary courses of communication, the insect would seem to have come to Australia either from California or else, *viâ* Panama, from Jamaica, where it is found upon a great variety of plants. I have not yet heard of it on peaches in New Zealand.

Genus MYTILASPIS.

Mytilaspis casuarinæ, Maskell. N.Z. Trans., vol. XXV., 1892, p. 209.

Specimens of this insect on *Casuarina* with very slender twigs (*C. equisetifolia*?) have much narrower puparia than those on

larger twigs; as indeed is usual in many cases. The size of Coccids is subject to much variation according to the food-plant, and cannot be considered as being a character of any importance.

Mytilaspis nivea, sp. nov. Plate I., fig. 10.

Female puparium elongated, usually straight, narrow, snowy-white. Pellicles terminal, yellow. The length may be about $\frac{1}{20}$in.; but the puparia are usually so massed together, forming a snowy heap on the twig, that it is not easy to make them out separately.

Male puparium similar to that of the female, but smaller. Length about $\frac{1}{30}$in. Not carinated.

Adult female brown. Form normal. Abdomen ending with a small median depression, at each side of which is a pointed triangular lobe, and after an interval another similar lobe of the same size. Abdominal margin deeply serrated, and bearing at each side three or four rather strong spines. The groups of spinnerets are five: upper group with 3 or 4 orifices; upper laterals, 10 to 12; lower laterals, 16 to 24.

Adult male yellow; length about $\frac{1}{40}$in. There are no characters specially distinguishing it from others of the genus.

Hab. In Australia, on *Melaleuca nodosa*. Specimens from Mr. Froggatt, from Bankstown, near Sydney.

A species by no means far removed from *M. casuarinæ*, Mask. (1892), but differing principally in the four conical lobes and in the stronger marginal spines. The puparia look exactly like snow on the twigs.

Mytilaspis pallida, Green (var.?).

I have received from Mr. Koebele a *Mytilaspis* on *Podocarpus* sp., imported into Honolulu from Japan, which seems to me to be so close to a species in Ceylon to which Mr. Green proposes to give the name of *M. pallida* that I believe it to be identical. Mr. Green has not yet published a description of his insect. It is possible that it, and mine, may in the end turn out to be varieties of *M. citricola*, Packard, an insect which I find to infest not only *Citrus* but many other plants in warm countries. The puparium of *M. pallida* resembles much that of *M. citricola*, with a rather paler colour; the lobes and spines of the abdominal extremity are also nearly similar, but smaller and finer. I am not clear about the spinneret-groups, and the abdominal extremity seems more truncate than in *M. citricola*. But in any case the Cingalese and the Japanese forms appear to be very closely allied.

Mytilaspis flava, Targioni-Tozzetti, var. **hawaiiensis, var. nov.**

Female puparium really yellowish, but covered with a greyish-white secretion which makes it look grey and like the bark of the tree. Form mussel-shaped; length about $\frac{1}{20}$in.; slightly curved; generally massed together in numbers.

Male puparium similar, but smaller and straighter. Length about $\frac{1}{40}$in.

Adult female yellow, of normal elongate form, the segments usually distinct. Abdomen ending in two large median lobes, which are widely triangular, the outer edges minutely serrulate. Just above them are two club-shaped organs extending a little way within the body. At each side of the lobes are a few spines. Five groups of spinnerets: upper group with 3 orifices; upper laterals with 6; lower laterals, 4 to 6. The abdominal segments anterior to the pygidium seem to bear no spines.

Adult male unknown.

Hab. In the Sandwich Islands, on "bark of trees" at Kauai; plant-names not given. My specimens are from Mr. Koebele.

I can see nothing separating this from the European species (infesting *Olea europæa*) excepting the absence of spines from the anterior abdominal segments, and as to that I am not entirely positive. The club-shaped organs mentioned resemble those of *Chionaspis biclavis*, Comstock.

Mytilaspis striata, sp. nov. Plate I., figs. 11, 12.

Female puparium elongated, mussel-shaped, rather convex; length, about $\frac{1}{23}$in. The secreted portion exhibits many transverse bands of silvery-white colour, separated by narrower bands of dark-grey. Pellicles orange.

Male puparium of similar form, and with similar bands, not carinated. Length, about $\frac{1}{40}$in.

Adult female orange-coloured, darkening with age to brown. Form normal of the genus; the segments not prominent, but exhibiting faint striations which seem to correspond with those of the puparium. Abdomen ending in a semicircular curve broken by small serrations, with four sharply-pointed small triangular lobes rather widely separated. No groups of spinnerets; but a row of oval pores runs round the margin of the abdominal and thoracic regions, and on the abdominal dorsum there are a number of small circular single spinnerets.

Adult male unknown.

Hab. In Australia, on *Casuarina* sp. (very slender twigs). Mr. Froggatt sent me specimens from Sydney.

This species, in the absence of spinneret-groups, ap-

proaches *M. convexa*, Mask., 1893 (on *Acacia*); but the four terminal triangular lobes distinguish it. The transverse bands of the puparium would not, I think, by themselves denote more than a variety.

Mytilaspis lactea, sp. nov. Plate II., figs. 1, 2.

Female puparium of a delicate white colour, but frequently more or less covered by a very thin layer of bark-cells of the plant. Pellicles pale yellow. The puparium is broadly pyriform; length, about $\frac{1}{8}$in.

Male puparium snowy-white, semicylindrical; length, about $\frac{1}{25}$in.; not at all carinated.

Adult female dull-pink in colour, darkening to brown at gestation. Form elongated, segmented; length about $\frac{1}{16}$in. Abdomen ending with a small median depression, the sides of which form two lobes with rounded ends, which are minutely serrulated: separated from these by a spine, on each side, is a smaller rounded lobe followed by a spine, and, after a small interval, two other much smaller lobes. The margin beyond these lobes is irregular, and bears a few spines. Each segment of the body has also a few marginal spines. There are five groups of spinnerets: upper group with 6 to 8 orifices; upper laterals, 20 to 25; lower laterals, 25 to 35. There are also, on each side of the groups, three rows of large oval pores.

Adult male unknown.

Hab. In New Zealand, on bark of *Fuchsia excorticata*. My specimens were mostly collected in the neighbourhood of Wellington, but I have a few from Woodville.

Those who classify species according to colour would probably attach this insect to *Chionaspis*. But the absence of any trace of a keel on the male puparium is much more important, and according to my regular plan I place it in *Mytilaspis*. In the inclusion of bark-cells amongst the secretion of the female puparium it approaches *M. leptospermi*, Mask. (1881); but the characters of the abdomen separate it from that, and, I think, from all other, species: more especially the terminal median depression.

Mytilaspis citricola, Packard.

I have received specimens of this species from Mr. Quinn, on *Croton* sp. from a hothouse at Adelaide. No mention is made in his letter of any orange or other *Citrus* trees growing in the house, and it is stated indeed that the insect is "very destructive, and seems confined to *Croton* chiefly." Specimens have also been sent to me on *Banksia integrifolia* from Melbourne, by Mr. French. These last are intelligible enough, as they might easily have spread from orange-trees; but I am not so

clear about the Adelaide *Crotons:* yet of course there might be *Citrus* trees in the vicinity.

Genus CHIONASPIS.

Chionaspis prunicola, sp. nov. Plate II., figs. 3–5.

Female puparium whitish, very broadly pyriform, the margin widening so directly from the first pellicle that the whole seems almost elliptical or even subcircular. Length about $\frac{1}{20}$in. The white secretion seems to be easily rubbed off, and the yellow or yellowish-brown pellicles are exposed. The first pellicle is rather small, terminal; the second appears to occupy about half the puparium. The insects are frequently so massed together on the plant that it is very difficult to make out the exact form.

Male puparium white, the pellicle yellow; form elongated, with parallel sides; length, about $\frac{1}{30}$in. The secreted portion is carinated, but the single median carina is by no means conspicuous, and may be easily overlooked.

Adult female yellow or yellowish-brown, very little elongated; the cephalic and thoracic regions large in comparison with the abdominal, which tapers rapidly. Abdomen terminating in two median lobes, which are triangular with broad bases and crenated sides: on each side of these is a small cylindrical lobe with rounded end, followed by a short spine; then an interval followed by two small triangular lobes: the margin of the abdomen is serrated. Five groups of spinnerets: upper group, 14–20 orifices; upper laterals, 28–34; lower laterals, 20–26. There are three or four rows of large oval pores on each side, marking the abdominal segments.

Adult, male unknown.

Hab. In the Sandwich Islands, on "Japanese plum": specimens sent by Mr. Koebele, who informs me that the plants have been destroyed by the insects. I presume therefore that the insect comes originally from Japan.

It is difficult to make out the real form of the female puparium in this species, which very frequently approaches that of a *Diaspis*, in its elliptical or subcircular outline. But the form of the adult female agrees much better with *Chionaspis;* and I think there is no known species of *Diaspis* exhibiting rows of large oval pores. On the whole, I shall leave it as a *Chionaspis*. In some of its characters it seems to approach closely to *Ch. lintneri*, Comstock (2nd Cornell Univ. Report, 1883, p. 103).

Chionaspis biclavis, Comstock, var. **detecta,** var. nov.

Female puparium greyish-white, somewhat solid, broadly pyriform or subelliptical; pellicles inconspicuous; length about $\frac{1}{10}$in.

Male puparium unknown.

Adult female dark-brown, of normal elongated form; length, about $\frac{1}{13}$in. Abdomen terminating, as in the type, with two largish median lobes, above which are two club-shaped organs; no groups of spinnerets; several strong marginal spines, which are also on the anterior abdominal segments.

Male unknown.

Hab. In Sandwich Islands, on "bark of shade-trees," not named, at Kona. My specimens are from Mr. Koebele.

The difference between this and Comstock's American species (in conservatories at Washington) seems to consist only in the fact that the Sandwich Island form does not burrow, but lies exposed on the bark. The anatomical characters seem identical.

Chionaspis dysoxyli, Maskell. N.Z. Trans., vol. xvii., 1884, p. 22.

This insect occurs on *Hoheria angustifolia* on the hills above the Town of Lyttelton, in this country. I found many specimens there in the autumn of this year, when searching for *Eriococcus hoheriæ,* which I failed to find. The puparia of the *Chionaspis* are narrower than those of the original type, as indeed is only natural, being on narrow twigs and leaves instead of on the broad ones of *Dysoxylon;* but I can detect no difference in the insect itself. These are the first specimens of the species reported from the Middle Island.

Chionaspis xerotidis, sp. nov. Plate II., figs. 6, 7.

Female puparium whitish, flattish, pyriform; length about $\frac{1}{8}$in. Pellicles yellow, comparatively small. The form of the puparium is frequently obscured by masses of dirt and mud.

Male puparium whitish, elongated, narrow, carinated. Length about $\frac{1}{20}$in.

Adult female yellow, elongated; length about $\frac{1}{14}$in. The abdomen ends with a small median depression, the sides of which form small lobes, and at each side there are four equally small rounded lobes with three spines, and one spine a short distance along the margin. All the abdominal and thoracic segments bear marginal groups of rather strong spines. Five groups of spinnerets: upper group with 8–10 orifices; upper laterals about 20; lower laterals about 33: but it is not easy to separate the lateral groups, and the whole arrangement is very nearly an arch. There are a great many large oval pores marking the abdominal segments.

Adult male unknown.

Hab. In Australia, on an aquatic plant of the sedge family —*Xerotes longifolia.* My specimens were sent by Mr. Frog-

gatt, from Sydney. I think that the only Coccids hitherto reported upon water-plants are *Chionaspis spartinæ*, Comstock (2nd Cornell Univ. Rep., 1883, p. 106), which differs considerably from ours, *Coccus* (?) *zosteræ*, Fabr. (Signoret, Essai, p. 467), and *Dactylopius nipæ*, Mask. (1892). There are also a few which live on plants exposed to spray on the sea-beach, such as *Ctenochiton rhizophoræ* of the present paper, or *Lecanium maritimum*, Green (MS.), in Ceylon.

Genus FIORINIA.

Fiorinia stricta, Maskell. N.Z. Trans., vol. xvi., 1883, p. 124.

This insect occurs plentifully, in company with *Chionaspis dysoxyli*, on the hills above Lyttelton, on *Hoheria angustifolia*.

Fiorinia expansa, sp. nov. Plate II., figs. 8–13.

Female puparium snowy-white, very broadly pyriform; length, about $\frac{1}{25}$in. Viewed dorsally, only one pellicle (that of the larva) can be seen at the end; but on turning over the puparium the second pellicle is seen to occupy nearly all the length and about half the width, and to be much larger than the adult female. Both pellicles are yellow, the second being lighter-coloured than the first. The white secretion spreads laterally from the second pellicle more conspicuously than is usual in the genus. From the larval pellicle there usually spring a number of very delicate, longish, curling white threads, which are scarcely to be made out except with a strong lens.

Male puparium snowy-white, with a single yellow terminal pellicle; form cylindrical, not carinated; length, about $\frac{1}{35}$in.

Adult female orange-yellow; elongated, smaller than the second pellicle, segmented; length about $\frac{1}{40}$in. The cephalic extremity is somewhat cylindrical and truncate, a feature which is not uncommon in *Fiorinia*. The abdominal extremity is also somewhat truncate, or even, in some specimens, slightly concave. There is an exceedingly minute median depression, but no lobes; on each side are two or three very short spines. There are no groups of spinnerets.

The second female stage (the pellicle) is elongate, distinctly segmented; length about $\frac{1}{30}$in. The abdominal extremity is much like that of the adult, truncate and without lobes.

Male unknown.

Hab. In Australia, on *Melaleuca linariifolia*. Mr. Froggatt sent me specimens from Bankstown, near Sydney.

At first sight the puparium of this insect suggests a *Chionaspis*, and the non-carinated male puparium suggests a a *Mytilaspis*. It is easy also to mistake the large second pellicle for an adult, and this seems to indicate still more a

Mytilaspis. But on careful examination, and especially when the puparium is overturned, and the insect and pellicles are viewed by transmitted light, the true generic position becomes clear. I think there is no doubt that the species is distinct, from its smallness, from the broad pyriform puparium, from the delicate threads on the larval pellicle, and from the characters of the abdominal extremity.

Genus ISCHNASPIS, Douglas.

Ischnaspis filiformis, Douglas. Douglas, Ent. Mo. Mag., 1887, p. 21.

Specimens of this insect have been sent to me by Mr. Quinn, from Adelaide, South Australia. They were plentiful on palms in hothouses at that place.

The species is clearly tropical, reported originally from Demerara and found all over the West Indies. Probably it also exists in many other localities.

Genus POLIASPIS, Maskell.

Poliaspis exocarpi, Maskell. N.Z. Trans., vol. xxiv., 1891, p. 17.

I have received specimens of this species from Mr. Froggatt, on *Oxylobium trilobatum*, from Bankstown, near Sydney. These exhibit a very slight variation from the type, the lower median group of spinnerets having three, or sometimes four, orifices. But this is not sufficient to separate them from the species. The puparia have a glistening, burnished appearance.

Later specimens on *Dillwynia* sp., from Oatley, near Sydney, have similar characters.

Sub-family LECANINÆ.

Section LECANIO-DIASPIDÆ.

Genus CTENOCHITON.

Ctenochiton eucalypti, sp. nov. Plate III., figs. 1–12.

Test of adult female waxy, whitish or yellowish-white. The central region is formed of a thick pyramidal mass of wax, the sides of which are indented, the angles rounded, and the whole sometimes cruciform, sometimes irregularly triangular: from this central mass to the margin the test is thinner, formed of an elliptical ring of irregularly-hexagonal plates and an outer ring of pentagonal plates with the bases outwards, and along the bases of these is a row of small, more or less rectangular plates, forming a fringe. The whole test is very convex in the latest stage, but flatter in the early adult, and in this earlier state the central mass is much thinner. The test just covers the insect.

Test of male pupa white, more glassy than that of the female: the form is elongated-elliptical, the sides nearly parallel, the dorsum convex: the central region is formed of three plates, of which the two anterior are quadrangular with indented edges, and the posterior one triangular; surrounding these is a ring of rather large quadrangular plates, on the outer edges of which is a small fringe as in the female. Length of male test about $\frac{1}{10}$in.

Adult female dark-brown. In the earlier state it is flattish, but at gestation becomes convex with a flattened margin. The form is broadly elliptical; length when fully developed about $\frac{1}{7}$in. Antennæ of six joints: the first short, the second much the longest, with a "false joint" at about two-thirds its length, the third and fourth the shortest and equal, the fifth and sixth rather slender and equal: the second and third joints bear three or four hairs, the sixth has several. Feet rather long: the tarsus is about half as long as the tibia, and is somewhat thicker, having a rather swollen appearance: claw moderate; the digitules are slender: on the trochanter is a long hair, and on the inner edge of the tibia a few fine short spines. Abdominal cleft and lobes moderate. Rostrum small; mentum monomerous. On the margin, near the four thoracic spiracles, are four semicircular indentations formed by chitinous bands, each bearing three cylindrical spines. All round the margin is a row of numerous fine longish hairs. There do not seem to be any dorsal spinnerets.

Female of the second stage covered by a thin white waxy test of irregular segments, which are very brittle and frequently almost all broken off, so that the insect in this stage seems almost naked: the fringe is very small. Form elongate, regularly elliptical, the margin not wavy; length about $\frac{1}{10}$in. Antennæ of six joints. Feet slender, the tarsus somewhat swollen as in the adult. Margin bearing numerous hairs; but in the spiracular indentations there is only one spine. Abdominal cleft and lobes normal.

Larva yellowish-brown, flattish, active, broadly elliptical. Length about $\frac{1}{55}$in. Antennæ of six subequal joints, of which the last is the longest: this last joint is irregular and tapering to a slender tip, and bears several longish hairs. Feet with a slightly swollen tarsus: all the digitules are fine hairs. On the margin of the body are numerous hairs, of which the last six on each side of the abdominal cleft are much the longest. The abdominal lobes bear long setæ.

Adult male red in colour or sometimes brown. Length, including spike, about $\frac{1}{16}$in. The wings are iridescent, and the nervure deep-red. Antennæ rather long, with ten long slender joints, each bearing numerous hairs. Feet slender. The ab-

dominal spike is short, thick, and slightly curved. The insect emerges from the pupal test by lifting up the posterior triangular plate.

Hab. In Australia, on *Eucalyptus siderophloia* (large-leaved ironbark). Mr. Froggatt sent me specimens from Wallsend, Newcastle, N.S.W.

This is the first species of the genus *Ctenochiton* which has been reported outside New Zealand. It is evidently so near, in the characters of its tests, to the New Zealand species *C. flavus* and *C. fuscus* that I have not any doubt as to the genus. The marginal hairs, the form of the feet in the adult, the spiracular spines, the form of the second stage, and the marginal hairs of the larva are distinguishing characters. The median thick mass of wax on the adult female test approaches that of *C. flavus;* but the insect is clearly distinct. Some specimens also outwardly resemble the New Zealand *C. dacrydii.*

Ctenochiton rhizophoræ, sp. nov. Plate III., figs. 13–17.

Test of adult female (where observed) consisting, on the margin, of a flat greyish-white plate of wax, which on the median dorsal region rises up in a lofty pyramidal mass of irregularly-triangular form: this mass is slightly rough on the top, and at the sides exhibits many striations as if it were built up of successive layers; but no air-cells are apparent. At the margin the wax extends in a very fragmentary fringe.

Female of the second stage covered by yellowish-brown wax, which at the earliest period seems to be very thin and fragmentary, and becomes thicker as the insect grows, until at last it forms broad quadrangular plates round the margin, with a median longitudinal mass which is less elevated than in the adult. This test also extends in a small fringe, but the whole of it appears to be very brittle, so that amongst many specimens only one or two may exhibit it entire.

Adult female (where observed) of clearly Lecanid form, greyish-brown in colour; length about $\frac{1}{8}$in. The specimen seen is acuminate anteriorly. Antennæ and feet not observed. Round the margin runs a row of rather long spines. Abdominal cleft and lobes normal. Probably the dorsal region would be considerably convex.

Female of the second stage yellowish-brown, flattish, elliptical; length from about $\frac{1}{40}$in. in the early part of this stage to about $\frac{1}{12}$in. later on. Antennæ of six joints, of which the third and sixth are the longest and bear a few hairs. Feet presenting no special character; the tibia is as usual shorter than the tarsus; the digitules seem to be fine hairs. Round the margin of the body is a row of long slender spines as in

the adult, and these are usually rather longer at the abdominal than at the cephalic end.

Larva distinctly Lecanid; form regularly elliptical; length about $\frac{1}{65}$in. Antennæ of six subequal irregular joints, the last bearing some long hairs. Feet normal; digitules fine hairs. Margin of the body minutely serrulate and bearing a few scattered very short fine hairs. Spiracular spines rather strong. Mentum monomerous.

Hab. In Australia, on *Rhizophora mangle* (mangrove). My specimens were sent by Mr. Koebele, from Brisbane, Queensland.

I am in a manner breaking, in this instance, a rule which I have laid down for Coccid study, by erecting a new species on the observation of a single specimen in the adult stage. Yet probably no inconvenience will result, as I have between thirty and forty specimens of the second stage, and have examined about a dozen larvæ. The characters of these are so clearly those of a *Ctenochiton* that there is no doubt of the genus; and, as they do not resemble any of the New Zealand forms, nor the only other species from Australia (*C. eucalypti*), I venture to think that the rule may be disregarded for once, more especially as I have only given very general features for the adult and its test. The species will take rank near to the New Zealand *C. flavus*, from which it differs in size, colour, arrangement of test, and in the anatomical features of the second stage. From *C. eucalypti* (Australia) it differs in colour, in the characters of the second stage, and in the larva, which is smaller and has not the long marginal hairs on the abdomen. I suppose, from the food-plant, that the insect must live either close to the water, or sometimes even submerged.

I do not know the adult male nor the male test.

Genus CERONEMA, Gen. Nov.

Female insects in the adult stage covered wholly or partially by tests of threads more or less closely woven, neither glassy nor cottony nor felted, never forming homogeneous plates. No fringe. Form of insect Lecanid, with normal cleft and lobes.

Larva Lecanid, showing cleft and lobes.

Male pupa covered by a glassy test of normal Lecanid form, composed of plates more or less homogeneous.

The formation of this genus has been necessary to include a species from Australia, in which the test appears to be intermediate between those of *Ctenochiton* or *Inglisia* and those of *Signoretia* or *Eriopeltis*, being too loosely woven for the former and too waxy for the latter. In using here the term "waxy," I do not assert that the secretion of *Signoretia*

essentially differs from that of *Ctenochiton;* yet one is conveniently denoted by the word "cotton," the other by "wax."

Ceronema banksiæ, sp. nov. Plate IV., figs. 1–13.

Adult female secreting dorsally a thick mass of white waxy threads, which, when closely examined, are short cylinders. These are produced from pores at or near the margins of the body, and not on the median region, so that the insect is only partially covered, the mass of wax curling thickly inwards from the edges, but leaving the median dorsum visible. At the edges the test spreads out all round in a much looser arrangement of threads, but there is no fringe properly so called. Beneath the insect the threads are pressed into a closer mass between it and the leaf, but the median ventral region is also clear. Thus the insect lies, as it were, in a ring of white threads flattened beneath and curling over above. Diameter of test averaging about $\frac{1}{8}$in.

The second stage of the female and the larva have no tests.

The male pupa is covered by a white, glassy test of the usual elliptical Lecanid form, composed of plates, the posterior plate hinged for egress. Length of test about $\frac{1}{12}$in.

Adult female dark red-brown, of normal Lecanid form, flattish, very slightly convex, without dorsal carinæ. Length about $\frac{1}{8}$in. Antennæ of six joints, of which the third is much the longest, next the first, the rest shorter and subequal. In the third there is a "false joint," and on the sixth are some hairs. Feet small and rather slender: I have not been able to make out the digitules, but they appear to be all fine hairs. Abdominal cleft and lobes, and anal ring, normal. The four spiracular marginal depressions are semicircular, with a chitinous band bearing a few club-shaped spines. On the margin of the body is a row of short fine hairs. The dorsum, except on the median region, which is almost unmarked, bears great numbers of oval pores, the orifices of tubular canals, and close to the margin is a row of larger canals ending in larger pores, which are multilocular. The canals are smaller and more closely set as they approach the median region.

Female of the second stage yellowish-brown, flattish, elongated-elliptical, with a faintly-indicated longitudinal dorsal carina. Length about $\frac{1}{25}$in. Antennæ and feet and abdominal cleft as in the adult. The dorsal pores are absent, but the marginal row of canals with multilocular orifices can be seen.

Larva brownish-yellow, flattish, elongated, narrowly elliptical, naked, active. Length about $\frac{1}{40}$in. Abdominal lobes normal of *Lecanidæ*, the setæ rather long. Antennæ very long and slender, with six long joints, the sixth especially long.

Feet long and slender; digitules fine hairs. Margin of body very minutely serrated.

Adult male unknown.

Hab. In Australia, on *Banksia serrata*. Mr. Froggatt sent me eight adults and a few others from Manly, near Sydney. He informed me that the insect seems to be very rare; but hopes to be able at a future time to procure more.

I have no hesitation in separating this species and genus from other *Lecanio-diaspidæ*, the characters of the secreting pores and therefore of the secreted test being so different. If it could possibly be placed in a known genus, I suppose that would be *Ceroplastes;* yet I know of no *Ceroplastes* where the test is so loosely constructed as in *C. banksiæ*. Of course the fact of the insect being only partially covered by the waxy threads is not a sufficient generic character: it will amply suffice for specific distinction, because it depends upon the absence of pores in the median dorsal region. The antenna of the larva is somewhat unusual in its length and slenderness.

Section LECANIDÆ.

Genus LECANIUM.

Lecanium patersoniæ, sp. nov. Plate V., figs. 1–3.

Adult female reddish-brown, sometimes yellowish-brown; flat, elliptical with nearly parallel sides; length, about $\frac{1}{8}$in. There is a distinct longitudinal median carina, and frequently two transverse carinæ less distinct. The dorsum is sometimes naked, but usually covered with very thin white waxy meal, scattered in minute patches. Antennæ of seven joints, of which the third is the longest, the second next, the rest shorter and subequal: the last bears several hairs. Feet rather slender, of normal form; digitules slender. The margin of the body bears numerous short hairs. On the dorsal epidermis there is seen a row, all round the body, a short distance within the margin, of oval or circular pustules, not always at regular distances, but sometimes as in pairs: there seem to be on an average from thirty-six to forty of these on each side. There are also, scattered over the dorsum, great numbers of smaller oval spots. The pustules are by no means distinctly visible, and both they and the small spots are scarcely to be made out until the insect is rendered more or less transparent.

Second stage of female, and larva, not observed.

The male pupa is covered by a test of the usual elongated-elliptical form, composed of segments of thin white wax, the posterior segment hinged for egress. Length of the test about $\frac{1}{10}$in. These male pupæ seem to be more numerous than the females.

Adult male unknown.

Hab. In Australia, on *Patersonia glabrata.* Mr. Froggatt sent me specimens from Sydney.

I think that this is a clearly distinct species, from the row of large pustules near the margin, and the numerous small oval dorsal spots. There is a species—*L. pruinosum,* Coquillett ("Insect Life," June, 1891)—reported on apricot in California, which presents a thin covering of white powder as in *L. patersoniæ;* and Mr. Coquillett places his insect very close to *L. caryæ,* Fitch (although Signoret, in his description of the latter, makes no mention of the powder). But both of these are very convex, and do not seem to exhibit either spots or pustules.

L. patersoniæ appears to be frequently subject to attacks by parasitic fungi, and I possess specimens in which the fungus can be seen permeating the whole body of the insect, and especially infesting the pustules. The fungus consists of matted and jointed filaments, and does not seem to belong to the groups of *Cordyceps* or *Empusa,* but rather to be Hyphomycetous, like the fungi infesting Lecanids in New Zealand (see N.Z. Trans., 1883, vol. xvi., p. 1883, and Scale-Insects of N.Z., 1887, p. 22, and plate xxiii.).

Lecanium scrobiculatum, Maskell. N.Z. Trans., vol. xxv., 1892, p. 221.

I find, when examining an insect, which I am naming in this paper *Lec. pingue* (below), that I have omitted in my description of *L. scrobiculatum* to mention the longitudinal row of dorsal tubercles which are visible in that species, as well as in *L. pingue.* These tubercles, which are from four to six in number, are not at all noticeable in all specimens, but they are sufficiently constant to form a specific character.

Lecanium pingue, sp. nov. Plate V., figs. 4–7.

Adult female elliptical, convex; colour dark-brown, but with meandering raised yellowish or greyish ridges which divide the dorsum into many small pits: these ridges have a soft, moist, greasy appearance, and the whole dorsum frequently looks as if covered with some oily matter. The median dorsal region bears a longitudinal row of circular raised tubercles, generally six in number. Length of the insect about $\frac{1}{10}$in. Antennæ very small and short: there seem to be six joints, of which the third is the longest, but they are not clearly defined; the sixth joint bears a few hairs. Feet entirely absent. Anal cleft and lobes normal. Rostrum small; mentum round, monomerous; setæ short. Epidermis covered with numbers of circular spinnerets which are the orifices of short cylindrical tubes.

Larva yellowish-red, elliptical, active; length about $\frac{1}{45}$in. The median dorsal region usually exhibits a raised longitudinal ridge, not divided into distinct tubercles. The abdominal cleft, lobes, and setæ are normal. Antennæ rather thick, and very long, almost half as long as the whole body; they have six irregular joints. Feet also long, with thick tibia and tarsus.

Adult male and male pupa unknown.

Hab. In Australia, on *Dillwynia juniperina*. Mr. Froggatt sent me specimens from Bankstown, near Sydney.

This insect approaches very closely to *L. scrobiculatum*, Mask. (1892); the differences are the absence of the feet in the adult, the colour, and the greasy appearance. The two last are of small importance, and if it were not for the first I should consider the insect as merely a variety. I have already mentioned that *L. scrobiculatum* has dorsal tubercles. Full certainty as to the position of *L. pingue* may perhaps be attained when the larva of *L. scrobiculatum* shall have been found.

Lecanium armeniacum, Craw.

I do not know where any description of this form is to be found. But Mr. Ehrhorn has sent me specimens from California, and tells me that it is there a pest on the apricots, plums, and peaches. From these specimens I believe it to be merely a rather smaller form of *L. persicæ*, Sign., if indeed it can lay any claim to be considered even a variety. The habit of erecting new species without proper description and comparison is a pernicious one; still more so if mere colour or food-plant be taken as the basis.

Lecanium tessellatum, Signoret.

This occurs at Adelaide, on *Palms* in hothouses. My specimens are from Mr. Quinn, who tells me that it attacks scarcely any other plants in that locality.

Lecanium hemisphæricum, Targioni-Tozzetti.

This insect occurs plentifully in hothouses in Adelaide on *Eranthemum variegatum*. I have had specimens from Mr. Quinn.

Genus PULVINARIA.

Pulvinaria mammeæ, sp. nov. Plate V., figs. 8–11.

Adult female reddish-brown, covered with thin greyish-white meal: the colour fades to yellowish in extreme age. The form before gestation is flattish, regularly elliptical, with sometimes a faintly-raised longitudinal dorsal ridge. The length at this period is about $\frac{1}{3}$in. At gestation it shrivels

considerably, as usual in the genus, becoming much wrinkled. The ovisac is large, snow-white, irregular, forming a mass of loose cotton behind the insect. The antennæ have eight joints, of which the third is the longest, then the second and fourth, then the first and fifth, the last three much the shortest: all the joints bear a few hairs, and there is one on the last much longer than the rest. The feet have a rather arched tarsus: on the inner margin of both tibia and tarsus are a few slender spines; the trochanter has one very long hair; the tarsal digitules appear to be wanting, those of the claw being long and rather dilated. Abdominal cleft and lobes normal. The mentum is round and monomerous.

Female of the second stage, larva, and male not observed.

Hab. In Sandwich Islands, on *Mammea americana*. My specimens are from Mr. Koebele.

The food-plant of this species, according to Johnson's "Gardener's Dictionary," is the "mammee apple" of the West Indies and South America. I do not know whether it is indigenous or not in the Sandwich Islands. Mr. Cockerell, in a list of the Coccidæ of the neotropical region (Jour. of Trinidad Field Nat. Club, 1894), mentions five species of *Pulvinaria*, none of which, certainly, is *P. mammeæ*. This insect is quite the largest of the genus known to me at present.

Sub-family COCCINÆ.

Section ACANTHOCOCCINÆ.

Genus PROSOPOPHORA.

Prosopophora prosopidis, sp. nov. Plate VI., figs. 1–4.

Adult female covered by a waxy test which is subcircular, rather convex, buff-coloured; diameter averaging about $\frac{1}{7}$in. Surface of the test not quite smooth, but showing very indistinct traces of small irregular segmentations forming polygonal cells on each side of a median indistinctly-raised carina: there is no marginal fringe. No depression is visible on the twig when the insect is removed. There is a small posterior orifice in the test.

Male pupa covered by a buff-coloured, waxy, elliptical test, of which almost the whole is corrugated like that of the female, but much more distinctly; at the posterior end is a shelving hinged plate for egress of the insect. Length of the male test about $\frac{1}{18}$in.; width about $\frac{1}{30}$in.

Adult female really red in colour, but under a lens or to the naked eye bluish-purple, being covered with thin white meal; it fills the test, but shrivels at gestation into a shapeless mass: the proper form is subcircular, convex dorsally, and slightly concave ventrally. Antennæ of eight joints of irregular length; the last always the shortest, and bearing a

few hairs. In all the specimens examined (ten), one of the antennæ was shorter and rather thicker than the other. Feet absent. Mentum monomerous. Anal tubercles very minute, each bearing a seta and a few spines; anal ring bearing several hairs, probably ten. Epidermis covered with large circular simple spinnerets, which are very numerous on the abdominal segments and less so on the thoracic: those on the cephalic segments bear tubular processes. On the abdominal segments there are two ventral rows of circular marks, larger than the spinnerets, each containing many minute orifices; but there seem to be none of these on the cephalic region.

Early stages and adult male not observed.

Hab. On *Prosopis julifera*, Arizona, North America. Mr. Koebele has furnished me with specimens.

This insect is clearly allied to *P. dendrobii*, Douglas (Ent. Mo. Mag., Aug., 1892, p. 207); but differs in a few particulars. The test is lighter-coloured, more circular, and, from the circular form, appearing a good deal larger than in that species; and the corrugations are much less distinct. The large round marks mentioned above (or, as Mr. Douglas calls them, the "perforated discs") are absent from the anterior region; and I cannot see any trace of figure-of-eight spinnerets. I shall not object if it is proposed merely to consider this a large variety of *P. dendrobii;* but for the present leave it as distinct. I understand that *Prosopis julifera* is a South American tree.

Genus PLANCHONIA, Sign. ASTEROLECANIUM, Targioni.

It seems now scarcely worth while to prolong a controversy which has continued for the past few years amongst students of Coccids regarding the exact status of the genus *Planchonia*. In my paper of 1893 I discussed this question, and expressed the opinion—first, that *Asterolecanium* was really only a synonym of *Planchonia;* and, second, that a large number of described species were really only *Planchonia fimbriata* or varieties of it. Some of my friends demur to these views, having apparently very much reverence for external colour or size. With regard to the first point, I am unable to depart an inch from the position taken up last year—namely, that no considerations whatsoever of a fancied "priority" ought to weigh with us as against clearness and common-sense. I agree entirely with a phrase of Mr. Douglas (in a letter to me of this year): "Far too many names have been admitted only on what is termed 'prescriptive right,' but we should not go on sinning with our eyes open." *Asterolecanium* conveys an erroneous idea, and no fetish-worship of priority ought to make us adhere to it. Consequently, I persist in discarding it altogether in favour of *Planchonia*.

With regard to the second point, I am willing, in deference to the opinions of some of my friends, to withdraw somewhat from my position of last year, although not entirely; and the following series will represent what I believe to be the true relationships of the genus:—

A. Tests round or oval,—

Planchonia fimbriata, Boyer de Fonscolombe. Synonyms: *Asterolecanium quercicola*, Bouché; *Asterolecanium aureum*, Boisduval; *Planchonia oncidii*, Cockerell; *Planchonia pustulans*, Cockerell; *Asterolecanium massalongianum*, Targioni (perhaps).
Planchonia fimbriata, var. *bambusæ*, Boisduval.
Planchonia epacridis, Maskell.
Planchonia stypheliæ, Maskell.
Planchonia ventruosa, Maskell.
Planchonia delicata, Green (MS.).
Planchonia arabidis, Lichtenstein, doubtful.
Planchonia hederæ, Lichtenstein, doubtful.

B. Test elongated,—

Planchonia miliaria,* Boisduval. Synonyms: *Asterolecanium palmæ*, Cockerell; *Asterolecanium urichi*, Cockerell.
Planchonia miliaria, var. *longa*, Green (MS.).
Planchonia solenophoroides, Green (MS.).

C. Test irregular,—

Planchonia bryoides, Maskell.

Strictly speaking, I am still by no means satisfied that *P. epacridis* and *P. stypheliæ* ought to be considered as really more than varieties of *P. fimbriata*. But, on the whole, I will leave the genus as above. The separation or otherwise of the different species is, after all, a small matter: the most important point is that the absurd name *Asterolecanium* should be relegated to the limbo of oblivion.

Planchonia stypheliæ, Maskell. Maskell, N.Z. Trans., vol. xxiv., p. 24; vol. xxvi., p. 85.

The Rev. Mr. Thompson, of the Agricultural Department of Tasmania, has sent me specimens collected on a dwarf *Melaleuca* in North Tasmania which I cannot separate from *P. stypheliæ*, though perhaps the tests are rather greener in colour, and the fringes are less silvery-white, than in the type.

* This word has always been printed *miliaris;* but there is no such word (I think) in Latin. *Miliaria* means "like a grain of millet."

Planchonia ventruosa, sp. nov. Plate VI., figs. 5–11.

Test of adult female green, waxy, flat or sometimes slightly concave. The green colour is in the test itself, and not due to the insect showing through it. Form of test broadly elliptical, or with a very slight posterior tapering. Fringe pink or white.

Test of male glassy, greenish-white, elongated-elliptical, convex.

Adult female dull dark-red; form subcircular, or slightly tapering posteriorly; length, about $\frac{1}{20}$in., but rather variable. The dorsum is flat or slightly concave, the ventral surface somewhat prominently convex and wrinkled, the rostrum being situated at the apex, subcentral. Antennæ and feet absent, but the position of the antennæ is indicated frequently by two very small tubercles. Anal tubercles very minute, and only noticeable from the two short setæ. The margin of the body bears the usual rows of figure-of-eight spinnerets, from which springs a fringe, which is sometimes pink, sometimes white, apparently according as the bark of the tree is dark or light-coloured. The mentum is short and monomerous; setæ short.

Female of the second stage red; elliptical. The thin green test is more convex than in the adult.

Larva red, covered with thin fragmentary green wax; elliptical, tapering posteriorly; flattish; length, about $\frac{1}{60}$in. Anal tubercles prominent; setæ moderate. Antennæ short and thick, with six subequal joints. Feet moderately long and slender; digitules fine hairs. On the margin of the body is a row of strong spines, which bear a fringe of feather-shaped segments.

Male unknown.

Hab. In Australia, on *Acacia* sp. I have specimens from Adelaide, sent by Mr. Koebele, on twigs with dark-red bark, and in these the fringes of the adult are pink; others, from Sydney, sent by Mr. Froggatt, are on twigs with lighter and greyish bark, and the fringes are white; but otherwise the specimens are identical. This insect forms for itself depressions or pits in the bark, adapted to the convexity of its ventral surface; and, when it is lifted out, there remain slender, white, cottony trails, denoting the spiracular regions.

The flat or concave dorsum and the protruding ventral region distinguish this species. The test is very apt to fall off, contrary to the usual rule in this genus, where it is generally not easy to extract the insect; and a large proportion of the adults are naked. The variation in colour of the fringe, apparently according to the food-plant, is a point strongly in favour of my theory as to the relationships of *Planchonia*.

Genus Eriococcus.

Eriococcus araucariæ, Mask., var. **minor**, var. nov.

Sac of female elongate-elliptical, snowy-white, of very loose cottony texture; length about $\frac{1}{18}$in.

Sac of male of similar colour and form, but smaller and more closely woven; length about $\frac{1}{30}$in.

Adult female brown or yellowish-brown. Normal form elliptical, but shrivelling at gestation. Length about $\frac{1}{30}$in. Antennæ of six subequal joints as in type. Feet, anal ring, and anal tubercles as in type. Marginal spines rather shorter and stronger than in the type.

Adult male unkown.

Hab. In Australia, on *Kunzea* sp. Mr. Froggatt sent me specimens from Manly, New South Wales.

I can detect no character, except size, valid for separation of this form from the type which I reported, in 1878, from Norfolk Island.

Eriococcus multispinus, var. **lævigatus**, Maskell. N.Z. Trans., 1890, p. 20.

Mr. Froggatt has sent me specimens of this insect from Oatley, near Sydney, on *Epacris longifolia*. The species is readily distinguishable on account of the various numerous short, blunt, conical spines scattered on the dorsum.

Eriococcus pallidus, Maskell. 1884.

I have received from Mr. T. Kirk, F.L.S., some specimens on *Metrosideros robusta* (locality not stated) in New Zealand, which on examination prove to have the slender spines and the elongated third joint of the antennæ which characterize this species. The marginal spines are normal, but those on the dorsum are scanty and small; and the cottony sac is rather dark-coloured. This form seems therefore to approach the variety on *Fagus menziesii* (the last of the four mentioned in my paper of 1890, p. 21).

I find that I have not, in any of my papers, described the larva of this species, and therefore do so now. This stage does not appear to differ appreciably in the different varieties. The larva is pale-red in colour, the form normal of the genus; length about $\frac{1}{80}$in. The antennæ have six subequal joints, of which the fourth and fifth are rather the shortest. Feet rather thick; digitules fine hairs. Anal tubercles short, setiferous. The margin of the body bears a row of rather strong spines.

The colours of the adult females vary somewhat in the different varieties. The type form is greenish-grey, turning to brown at gestation: others are brown or red.

Eriococcus buxi, Boyer de Fonscolombe, var. **australis,** var. nov.

Adult females enveloped in a sac of white cotton, which averages $\frac{1}{10}$in. in length. The antennæ have six joints, of which the third is the longest. The digitules are all fine hairs.

Larva yellowish-brown, elliptical. The marginal spines are very small and inconspicuous.

Hab. In Australia, in the Botanic Gardens, Brisbane, on an unnamed plant. My specimens are from Mr. Froggatt.

I could perhaps mention a number of very minute characters in which this insect differs from the type which is reported from Europe on *Buxus sempervirens :* but the most important seem to be those here mentioned—the digitules of the adult (which in *E. buxi* are widely dilated), and the marginal spines of the larva (which in *E. buxi* are conspicuous). For the present I shall not consider these as sufficient to raise the Brisbane insect to specific rank; more especially as its food-plant may not be Australian, and in any case "Botanic Gardens" are localities for many exotic things.

Section DACTYLOPINÆ.

Genus DACTYLOPIUS.

Dactylopius eucalypti, Maskell. N.Z. Trans., vol. xxiv., 1891, p. 35.

I have received specimens of this species (my first from New South Wales) from Mr. Froggatt, on *Eucalyptus siderophloia,* Newcastle. The adults were only few in number, but correspond with the type; the larvæ were numerous, and presented the characteristic feathery fringe of the species. Mr. Froggatt tells me that this insect is not uncommon on the same tree near Sydney, but that he has never seen more than one or two on a tree: it makes a red blisterlike mark on the leaf.

Dactylopius vastator, sp. nov. Plate VI., figs. 12–16.

Female insects covered by globular sacs of whitish or yellow cotton, which are frequently aggregated in large masses on the twigs. Diameter of sac about $\frac{1}{8}$in.

Sac of male pupa not observed.

Adult female dark-red or purple; slightly elliptical or subglobular; length about $\frac{1}{12}$in.; segments inconspicuous. Antennæ of seven joints, of which the seventh is the longest and largest, the fifth the smallest, the rest subequal: all the joints bear a few hairs, which are most numerous at the extreme tip. Feet moderately strong; tibia about one-third longer than the tarsus: there is not any long hair on the

trochanter, nor any terminal spike on the tibia; the tarsal and claw digitules are all fine hairs. Anal ring compound, with six hairs; anal tubercles inconspicuous, setiferous. Mentum dimerous, with some hairs at the end. Margin of body bearing a few small conical spines wide apart (sometimes absent), which are in pairs or threes on the abdominal segments; and similar spines are very sparsely scattered on the dorsum, where there are also some scattered fine hairs. Epidermis bearing many circular spinnerets of two sizes; those on the dorsal surface being twice as large as those on the ventral.

Larva dark-red, flattish, elliptical, active. Length about $\frac{1}{90}$in. Antennæ thick, with six joints, of which the last is the largest. Feet also rather thick; tarsus longer than the tibia; the digitules are all fine hairs. Anal tubercles normal, with moderate setæ. Margin of body with only a few very small spines.

Male unknown.

Hab. In the Sandwich Islands, at Honolulu; but said to have been introduced from Japan: on *Citrus* and a great many other trees and plants. My specimens have been sent to me by Mr. Koebele.

This insect belongs to the same series of the genus as *Dactylopius globosus*, Mask., or *D. graminis*, Mask., in which the female is enclosed in a cottony sac. The species to which it seems most nearly allied is *Dact.* (*Bergrothia*) *townshendi*, Cockerell, described in Annals and Mag. of Nat. Hist., November, 1893, from New Mexico. I cannot by any means accept "*Bergrothia*"; but the species in question appears to be quite near to that from Honolulu. I have been particular in describing the antennæ and feet, in which the principal differences exist. In the New Mexico insect the comparative lengths of the antennal joints are somewhat different, the digitules of the claw have "large knobs," and there is a long hair on the trochanter: there are also slight differences in the spinnerets and in the marginal spines. Mr. Cockerell does not describe the larva of *D. townshendi*, and merely says, regarding the cotton, "A small, oval species, covered by a white sac." For the present I shall leave my insect as separate.

The name which I have attached to this insect seems to be appropriate, whether it should turn out hereafter to be distinct or only a variety. For Mr. Koebele in his first letter to me says, "It has been introduced from Japan within the last three years, and hundreds of trees have been destroyed by it in Honolulu." And in a subsequent letter he says, "It is not confined to *Citrus* trees, but attacks almost any kind of shrubs and trees. For this reason no plants were allowed to leave Honolulu for the other islands for nearly two years. I

have seen no Coccid that is so destructive to trees as this species. During the summer the trees were actually loaded down with *Dactylopius*." It is quite satisfactory that he continues, "Fortunately the danger is over now, as we are sending out colonies of the best enemy for the same that can be found in Australia" (where his letter was written).

I am told that some one in America has informed the Sandwich Island people that this insect is a *Rhizococcus*, which is undoubtedly an error.

Section IDIOCOCCINÆ.

Genus SPHÆROCOCCUS.

Sphærococcus stypheliæ, sp. nov. Plate VII., figs. 1–4.

Adult female covered by a semi-globular test of wax, which is yellow or with a faint pink tinge, though the general appearance on a twig is blackish, on account of the usual fungus growths. Diameter of test averaging about $\frac{1}{20}$in. The surface is rather rough.

Male pupa covered also by a waxy test, probably (but not certainly) similar to that of the female, but smaller.

Adult female dark-purple or dark-brown, filling the test; the dorsal region convex, the ventral flat or slightly concave. Diameter averaging $\frac{1}{25}$in. Antennæ atrophied, represented by two very minute tubercles. Feet also atrophied; but their places are occupied by six swollen tubercular short processes, which have much the appearance of the "lac-tubes" of *Tachardia*, having an orifice at the end, and being covered with numbers of circular glands. The rostrum is subcentral; the mentum is short and dimerous; setæ short. The anal ring is small, circular, and hairless; anal tubercles absent. Epidermis covered with numbers of circular spinneret-orifices, which are most numerous near the margins.

Female of the second stage not observed.

Larva yellow, flattish, active; length about $\frac{1}{50}$in. Form elliptical, tapering posteriorly. Antennæ of six short joints, subequal in length, but somewhat tapering. Feet moderate; digitules fine hairs. Mentum dimerous. Anal tubercles prominent, with moderate setæ. The margin of the body has a row of spines, which, in life, bear a fringe of short curling white wax.

Adult male brownish-red; length about $\frac{1}{45}$in. Antennæ of ten joints. Feet normal. Anal spike short.

Hab. In Australia, on *Styphelia* (*Monotoca*) *elliptica*. Mr. Froggatt has sent me specimens from Vaucluse, near Sydney.

The very peculiar processes which take the place of the feet in this insect clearly distinguish it. I had much doubt, when first examining it, whether it might not be a quite

abnormal species of *Tachardia*, for the glands on these processes make them strongly resemble "lac-tubes": but the absence of any "tail" and of the characteristic "spine" of that genus, the globular form, and the hairless anal ring seem to place it clearly in *Sphærococcus*.

Sphærococcus leptospermi, Maskell. N.Z. Trans., vol. xxvi., 1893, p. 92.

I find that in my description of this species no locality for it is given. I rectify the omission now. My specimens were sent by Mr. Froggatt on *Leptospermum lævigatum*, from Sydney.

Sphærococcus elevans, sp. nov. Plate VII., figs. 5–8.

Female insects burrowing under the bark of the plant, and raising the bark in a circular convex blister, the diameter of which averages about $\frac{1}{8}$in., and the upper surface seems to consist simply of the bark without secretion. The inner surface and the base of this "blister" are smooth, and seem almost as if plastered with very thin secretion. Some specimens of blisters reach $\frac{1}{4}$in. in diameter.

Female insect circular, yellowish in colour, lying on the centre of the base of the blister: the dorsum is flattish, being sometimes very slightly convex, sometimes very slightly concave, with a small brownish central boss. Diameter of the insect (which looks, indeed, much like a small, flat, yellow cake) about $\frac{1}{24}$in. The rostrum, beneath, is subcentral. Antennæ almost obsolete, being reduced to very minute tubercles at the cephalic extremity, each bearing a few short fine hairs. Feet entirely absent. Mentum round, monomerous. Anal tubercles absent; anal ring simple, hairless. Epidermis apparently without spinneret-orifices. When the insect has been treated with potash and mounted, the dorsal boss is seen to contain a number of brown leaf-like segments or divisions, radiating from the apex and forming a rather elegant arrangement: these rays do not seem to actually meet at the centre, but I have not been able to detect any orifice on the boss of an untouched insect.

Female of the second stage not certainly observed; but in three of the very smallest blisters I have found minute globular insects, with a diameter not exceeding $\frac{1}{100}$in., in which the only organs I could detect were very short thick feet, of which the tibia and tarsus were equal in length, and the claw very small. The colour at this stage was reddish-yellow.

Larva and male unknown. All the blisters which I received contained numbers of white eggs, and these seemed

to be quite healthy, but I could not succeed in hatching any larvæ from them.

Hab. In Australia, on *Eucalyptus dumosa*. Mr. French sent me specimens from Mildura (Victoria).

The blisters produced by this species are, I suppose, technically galls; but really they are but nests in which the insect shelters itself. The form of the female, the absence of anal tubercles, and the simple anal ring sufficiently define its generic position; and it is clearly distinct from the other known species.

Sub-family MONOPHLEBINÆ.

Genus ICERYA.

Icerya koebelei, Maskell. N.Z. Trans., vol. xxv., 1892, p. 245.

I have received specimens of this insect from Mr. Froggatt, which agree entirely with my former ones, except that the dorsal pencil of cotton is yellow instead of white, and from the margin of the body there spring a great number of long, very slender, glassy, straight threads, while a few similar threads spring from various regions of the dorsum.

Genus CŒLOSTOMA.

Cœlostoma immane, Maskell. N.Z. Trans., vol. xxiv., 1891, p. 49.

I have received from Mr. Koebele two specimens, found attached to *Eucalyptus* near Sydney, which seem to belong to this species, and to be a rather more advanced stage than that depicted in plate ix., fig. 12, of my paper of 1891. They resemble that figure in nearly every particular, but are larger, and the abdomen is considerably more inflated ventrally. The antennæ have ten joints; there is no rostrum; and the tarsi are much shorter than the tibiæ: I am therefore confirmed in my opinion that these are early adult females of *C. immane*, but more developed than the one shown in fig. 12 above mentioned.

Mr. Newstead informs me that in the South Kensington Museum there are some specimens apparently of this species, labelled simply "from Australia," without any name.

Cœlostoma australe, Maskell. Proc. Linn. Soc. N.S.W., 1890, p. 280.

This species appears to be not uncommon in New South Wales and Queensland. Some specimens which I have received have rather abundant white meal on the dorsum. The *early* adult stage seems to have antennæ of ten joints, but possibly the first two are conjoined. The principal feature by which the species can be distinguished (besides the

absence of a rostrum) is the presence of the dermal oval cells, with the central small cone: these cannot be well observed until after treatment with potash.

In a mounted specimen of the cephalic region of an adult female I observe that the buccal orifice, which (as in all this genus) may be detected between the first pair of feet, is the termination of a rather long and wide tubular organ, the other end of which appears to end in two muscular fibres situated in the interior of the body, and to be there connected with the intestinal canal, which, however, has not resisted the action of the potash used in the preparation, and has therefore disappeared. This buccal orifice is not to be detected, even with very careful scrutiny, until the insect is rendered transparent, a thing which is not easily done, as it requires prolonged boiling in potash before the internal organs can be washed out.

Sub-family BRACHYSCELINÆ.

Genus TACHARDIA, Signoret. CARTERIA, Signoret.

Dr. Signoret, in 1876, altered his original generic name of *Carteria* to *Tachardia*, on account of the former name having been appropriated earlier to some genus of Mollusca or of Crustacea. I think, myself, that the change was a needless refining, and that less confusion would have resulted if the original name had been retained, for nobody could mistake a Mollusc for a Coccid; and if it had been made by anybody but the first author I should probably have disregarded it. However, we must accept the alteration, under the circumstances.

Tachardia decorella, Maskell. N.Z. Trans., vol. xxv., 1892, p. 247.

Specimens of this insect have been sent to me during the year by Mr. Koebele and Mr. Froggatt from various places in New South Wales, and by Mr. French from Mildura, in Victoria. They occur on various native plants, and the species is evidently not uncommon. Mr French tells me that the people at Mildura call it the "native cochineal." The name is scarcely appropriate. "Native shellac" would be better, as the insect (and also *T. melaleucæ*, Mask., 1891, and *T. acaciæ*, Mask., 1891) is closely allied to the shellac insect of Africa and Asia.

Genus FRENCHIA, Maskell.

Frenchia semiocculta, sp. nov. Plate VII., fig. 9–19.

Adult female not forming a prominent gall, but occupying a cavity under the bark of a twig over which usually a slight

swelling of the bark may be detected. In the middle of this swelling may be seen a very minute pustule with an orifice in it. Usually this pustule seems to have nothing in the orifice, or perhaps some particles of dust, or sometimes the exuviæ of a larva; but sometimes the "tail" of the insect (described below) protrudes through it, and emerges to perhaps $\frac{1}{100}$in., looking like a very minute soft yellowish finger with a red tip pushed through the bark. In the early adult state the insect is thus only just beneath the bark, but later it burrows much deeper, and the cavity in which the female at gestation lies is frequently hollowed out of the wood itself. In this latest state it requires close examination to detect the position of the insect, as the pustule has almost disappeared, and the swelling of the bark is scarcely noticeable.

Male pupa occupying a much more prominent gall than that of the female. This is a conspicuous excrescence on a twig, often congregated in bunches of half a dozen, more or less cylindrical, generally dark-coloured, hollow, with a terminal orifice, of which the lips are circular and thick. The height of this tubular gall frequently reaches $\frac{1}{12}$in.

If the bark round one of the small pustules above mentioned is carefully lifted and turned over, the adult female in its early state may be found lying on the wood (or sometimes will be lifted off with the bark). The body is subcircular; diameter, about $\frac{1}{28}$in.; colour yellowish, or with a tinge of red. The ventral surface is slightly concave; the rostrum, which is very small, is central, and placed on a small boss; the rostral setæ are very short. The antennæ and feet are entirely absent. The dorsal surface is very slightly convex, and from about the centre springs a subcylindrical process or "tail," which fits into the short tube through the bark, and, as mentioned above, sometimes protrudes through the orifice. This tail is bluntly rounded at the end, and the extremity is usually of a red colour. After preparation, a small, simple, hairless, circular anal ring is seen near the end of the "tail," and at the extreme tip there are two very minute short spines.

The foregoing is the *early* adult stage, and the "tail" is doubtless protruded through the orifice in the bark to facilitate the access of the male. After impregnation the female, as stated above, burrows much deeper in the twig. At gestation the insect becomes dull-red in colour, and has increased a good deal in size, reaching $\frac{1}{10}$in. in diameter. It then becomes nothing more than a bag full of eggs and larvæ, and scores of the latter may be found crawling all about in the cavity. The "tail," in several of the specimens observed, seems to have rotted or broken off, leaving a hole in the body through which the larvæ emerge; but in others it existed, although much reduced. The only organ visible is the rostrum, which is the

same as in the early state. The mentum is small, globular, and monomerous.

Between the female and the bark, both in the early and in the late adult state, there is a thin white waxy indusium, which is sometimes fragmentary, but at others fairly complete, with a prolongation to cover the tail.

Second female stage not observed.

Larva greenish, or yellowish, or sometimes slightly red. Length, about $\frac{1}{80}$in. Form broadly elliptical, distinctly segmented; margin minutely crenulated. Antennæ short, with six joints, of which the fourth and fifth are the shortest, the rest subequal: on the last joint are several hairs, of which two are rather long. Feet moderate; the digitules are long, fine hairs. There are two very minute anal tubercles, with long setæ. The dorsum bears two longitudinal rows of large figure-of-eight spinnerets.

The male pupa occupies the tube in the prominent gall above mentioned, but between it and the tube is a white, thin, elliptical, waxy test, which splits in half to permit the egress of the adult. Often galls can be found containing only the two empty halves of this test. The pupa appears to be elliptical, brown, and flattish; but the specimens observed were not in good order. Attached to one of them were the exuviæ of a larva, in which the antennæ had only four joints. Perhaps this may be a distinction between male and female larvæ.

Adult male brown, with iridescent wings. Length about $\frac{1}{80}$in. The antennæ are short, with only eight joints, of which the first is short and round, the second longest, the rest diminishing gradually: on the last joint there are four knobbed hairs. Feet normal; anal spike short.

Hab. In Australia, on *Casuarina* sp. Mr. Froggatt has sent me many specimens from Thornleigh, near Sydney.

Although the very inconspicuous gall formed by this insect (which indeed is almost entirely subcortical) differs considerably from that of *F. casuarinæ* (1891), yet its generic position is very clearly defined by the "tail," by the waxy indusium of the adult female, and by the figure-of-eight spinnerets of the larva. The male pupa forms a decided gall. The discovery of this species is very satisfactory, as indicating the correctness of my view in 1891, when I decided that *F. casuarinæ* might fairly form the type of a new genus.

Many of the male galls of *F. semiocculta* contained numbers of fat, white, soft grubs, which I presume belong to some dipterous insect.

At the risk of wearisome repetition, I cannot help again asking the question: Can anybody suggest an explanation of the burrowing powers of insects such as this? Here is an

insect absolutely, in its adult state, devoid of any visible organs, except its rostrum and setæ, and yet it is precisely in that adult state that it works its way deep into hard wood and digs out a cavern for itself. Before impregnation by the male it lies scarcely buried by the outer bark of a twig; at gestation it is found deep down in the wood. It is, of course, easy enough to say that the thing must be done "by some chemical action"; but what action? what chemical product? what secreting organ exists for the purpose?

EXPLANATION OF PLATES I.–VII.

PLATE I.

Fig. 1. *Aspidiotus ceratus*, pygidium of female.
Fig. 2. *Aspidiotus vitiensis*, pygidium of female.
Fig. 3. *Aspidiotus unilobis*, pygidium of female.
Fig. 4. *Aspidiotus extensus*, adult female, dorsal view.
Fig. 5. " pygidium of female.
Fig. 6. *Aonidia fusca*, insects on twig.
Fig. 7. " puparia, female and male.
Fig. 8. " diagram showing adult female smaller than second pellicle.
Fig. 9. " pygidium of female.
Fig. 10. *Mytilaspis nivea*, pygidium of female.
Fig. 11. *Mytilaspis striata*, puparia, female and male.
Fig. 12. " pygidium of female.

PLATE II.

Fig. 1. *Mytilaspis lactea*, puparia, female and male.
Fig. 2. " pygidium of female.
Fig. 3. *Chionaspis prunicola*, puparia, female and male.
Fig. 4. " adult female, dorsal view.
Fig. 5. " pygidium of female.
Fig. 6. *Chionaspis xerotidis*, insects on plant.
Fig. 7. " puparia, female and male.
Fig. 8. *Fiorinia expansa*, insects on twig.
Fig. 9. " insects on leaf, enlarged.
Fig. 10. " diagram of arrangement: *a*, larval pellicle and threads; *b*, second pellicle; *c*, adult female; *d*, fibrous secretion.
Fig. 11. " puparium of male.
Fig. 12. " pygidium of female.
Fig. 13. " second pellicle.

PLATE III.

Fig. 1. *Ctenochiton eucalypti*, insects on leaf.
Fig. 2. " tests of female, dorsal view.
Fig. 3. " test of female, side view.
Fig. 4. " test of male, dorsal view.
Fig. 5. " antenna of female.
Fig. 6. " foot of female.
Fig. 7. " spiracular spines of female.
Fig. 8. " female, second stage, dorsal view.
Fig. 9. " larva.
Fig. 10. " antenna of larva.
Fig. 11. " foot of larva.
Fig. 12. " abdominal spike of male.

Fig. 13. *Ctenochiton rhizophoræ*, test of female, dorsal view.
Fig. 14. " test of female, side view.
Fig. 15. " female, second stage, dorsal view.
Fig. 16. " larva.
Fig. 17. " foot of larva.

PLATE IV.

Fig. 1. *Ceronema banksiæ*, insects on leaf.
Fig. 2. " adult female, dorsal view.
Fig. 3. " test of male, dorsal view.
Fig. 4. " adult female, removed from test.
Fig. 5. " antenna of female.
Fig. 6. " foot of female.
Fig. 7. " spiracular spines of female.
Fig. 8. " arrangement of dorsal canals.
Fig. 9. " dorsal canals near median region.
Fig. 10. " dorsal canals near margin.
Fig. 11. " diagram of female, second stage.
Fig. 12. " larva.
Fig. 13. " antenna of larva.

PLATE V.

Fig. 1. *Lecanium patersoniæ*, adult female, dorsal view.
Fig. 2. " antenna of female.
Fig. 3. " pustules, spots, and marginal spines.
Fig. 4. *Lecanium pingue*, insects on twig.
Fig. 5. " adult female, dorsal view.
Fig. 6. " antenna of female.
Fig. 7. " diagram of larva, to show length of antenna and the anal lobes.
Fig. 8. *Pulvinaria mammeæ*, insect and ovisac on leaf.
Fig. 9. " *early* adult female, dorsal view.
Fig. 10. " antenna of female.
Fig. 11. " foot of female.

PLATE VI.

Fig. 1. *Prosopophora prosopidis*, test of female, dorsal view.
Fig. 2. " test of male, dorsal view.
Fig. 3. " diagram of female, to show the circular discs and spinnerets.
Fig. 4. " antenna of female.
Fig. 5. *Planchonia ventruosa*, insects in pits on bark.
Fig. 6. " adult female, dorsal view.
Fig. 7. " adult female, ventral view.
Fig. 8. " adult female, side view.
Fig. 9. " spinnerets.
Fig. 10. " larva.
Fig. 11. " fringe of larva.
Fig. 12. *Dactylopius vastator*, insects on twig.
Fig. 13. " adult female, dorsal view.
Fig. 14. " antenna of female.
Fig. 15. " foot of female.
Fig. 16. " larva.

PLATE VII.

Fig. 1. *Sphærococcus styphelicæ*, insects on twig.
Fig. 2. " diagram of female, showing feet.
Fig. 3. " foot of female.
Fig. 4. " spinnerets.

Fig. 5. *Sphærococcus elevans*, blisters on bark.
Fig. 6. " female in cavity.
Fig. 7. " adult female, side view.
Fig. 8. " dorsal boss of female, after treatment.
Fig. 9. *Frenchia semiocculta*, male and female galls on twig.
Fig. 10. " female galls, one with protruding tail.
Fig. 11. " male galls.
Fig. 12. " *early* adult female, side view.
Fig. 13. " adult female, dorsal view.
Fig. 14. " extremity of tail, showing anal ring and setæ.
Fig. 15. " diagram of larva, showing spinnerets.
Fig. 16. " antenna of larva.
Fig, 17. " spinnerets of larva.
Fig. 18. " pupal indusium of male.
Fig. 19. " antenna of male.

ART. III.—*Illustrations of Darwinism; or, The Avifauna of New Zealand considered in relation to the Fundamental Law of Descent with Modification.*

By Sir WALTER L. BULLER, K.C.M.G., D.Sc., F.R.S., &c.

[*Read before the Wellington Philosophical Society, 27th June, 1894.*]

ON my retirement from the chair last year I had to apologize for my inability, owing to my hurried departure for England, to prepare the usual presidential address, but I then promised to deliver it later on; and by the courtesy of Major-General Schaw I am enabled to do so this evening in the form of a paper.

The Turks have a proverb which says that "the devil tempts the busy man, but the idle man tempts the devil." Bearing this in mind, I employed myself during a portion of my last six weeks' voyage from England in gathering together from my New Zealand notes and recollections, and carefully elaborating, certain facts and inferences that appear to me to bear directly on the great doctrine of the evolution of species by a natural process of descent with modification—that is to say, the ever-operating law of natural selection by variation and the survival of the fittest. And, as I must to-night take up some special subject for my address, it seems to me that I cannot perhaps do better than place before you, whilst the matter is fresh in my memory, the facts and considerations that presented themselves to my mind and the conclusions arrived at in the course of this interesting study. I do so the more readily because I find that the distinguished and gallant officer who succeeded me, and who still occupies the presi-